4th INTERNATIONAL CONFERENCE

on

Agriculture and Life Sciences (ICOALS 4)

Tirana 2023

PROCEEDINGS

**PROCEEDINGS OF
INTERNATIONAL CONFERENCE ON AGRICULTURE AND LIFE SCIENCES
(ICOALS 4)**

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Rector of Agricultural University of Tirana, Albania

Conference Co-Chair

Prof. Asoc. Erinda Lika

Vice Rector of Science and Projects, Agricultural University of Tirana, Albania

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International Conference on Agriculture and Life Science (ICOALS IV)
within the framework of the EU negotiation process and
72nd Anniversary of AUT
Program
1 – 3 November 2023

Day 1	1 November 2023
09:00 - 09:30	**FEA building – Conference Room "Behar Male"** Registration of participants (optional - virtual meeting room open)
09:30 - 10:00	Welcoming and official address **Prof. Fatbardh Sallaku – Rector of AUT** **Mr. Iven Schad**, Head of Development Cooperation, Federal Republic of Germany **Mr. Philipp Arnold**, Deputy Head of mission at the Swiss Embassy **Mrs. Anila Denaj**, Minister of Agriculture and Rural Development
Day 1 - Block 1 **10:00 - 13:00**	**Plennary Session: The European future of Albanian agriculture – challenges and prospectives** *(Moderator: Prof. Endrit Kullaj)*
10:00 – 10:30	Agricultural situation in Albania: prespectives and challanges – **Mrs. Anila Denaj, Minister of Agriculture and Rural Development of Albania**
10:30 – 11:00	Croatian experiences in EU accession in agriculture and rural development – **Mr. Zdravko Tusek**, Secretary of state, Ministry of Agriculture Croatia
11:00 – 11:20	Science and Innovation for more resilient agrifood systems in Albania: Role of Agricultural University of Tirana - **Prof. Erinda Lika, Vice Rector for Research and Projects, AUT**
11:20 - 11:45	**Coffee Break**
11:45 – 12:45 Experts' Panel discussion with participation of expert panelists facilitated by a moderator	5 experts in the podium 1. **Mr. Zdravko Tusek**, Secretary of state Ministry of Agriculture Croatia 2. **Mr. Irfan Tarreli**, MARD 3. **Mr. Fatbardh Sallaku**, Rector of AUT 4. **Ms. Elisa Teneqexhiu**, Program Manager EU Delegation 5. **Mrs. Evelina Hazizaj**, ARDN, Albania
12:45 - 13:00	Questions / answers/comments from the participants – facilitated by the Moderator
13:00 - 14:00	**Lunch break**

Day 1 - Block 2 14:00 - 17:00	Plennary Session 2 Strengthening a strategic research cooperation *(Moderator: Prof. Thomas Ertl, Prof. Giuseppe Maiorano)*
14:00 - 14:20	Interaction of forests and agriculture and what the means for future development in Albania – *Prof.* Hubert Hasenauer, *Institute of Silviculture (WALDBAU), BOKU, Austria*
14:20 - 14:40	How to boost rural development in Albania in times of great uncertainty?" Stay people centric and market focused to impact and achieve your goals - *Mr.* Hans Jöhr, *RISI Albania*
14:40 - 15:00	Our food of tomorrow in the context of the sustainable food systems and nutrition: drawing parallels between Albania and Austria – *Prof.* Qëndrim Zebeli, *University of Veterinary Medicine Vienna, Austria*
15:00 - 15:20	Urban Stormwater Management in te context of climate change - *Prof.* Thomas Ertl, *Institute of Sanitary Engineering and Water Pollution Control (SIG), BOKU, Austria.*
15:20 - 15:40	Coffee Break

Day 1 - Block 2 14:00 - 17:00	Plennary Session 2 *(Moderator: Prof. Thomas Ertl, Prof. Giuseppe Maiorano)*
15:40 - 16:00	The value of the integrated administration and control system (IACS) for research and management, *Dr.* Daniel Müller, *Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Humboldt University, Germany*
16:00 - 16:20	Improving soil fertility by soil and crop management, *Prof.* Hans-Peter Kaul, *Institute of Agronomy, BOKU, Austria*
16:20 - 16:40	New challenges to tackle the antimicrobial resistance in poultry production, *Prof.* Giuseppe Maiorano, *Department of Agricultural, Environmental and Food Sciences, University of Molise, Italy*
16:40 - 17:00	Bioenergy conversion technologies – *Assoc. Prof.* Rafat Al Afif, *Department of Material Sciences and Process Engineering, BOKU, Austria*

Day 2 – Timing	2 November 2023
08:30 – 09:00	Registration
Day 2 – Timing	**5 Parallel Scientific Sessions**
09:00 – 13:00	**Session 1: Agricultural Sciences and Production Technologies (Room Silvano Pedrolio)** *(Chair: Prof. Ilir Kristo, Dr. Silvio Iacovino)*
09:00 – 09:15	– Perspectives of Albanian producers in export-oriented value chains - *Mr.* Stephan Joss, Director RisiAlbania, Country Coordinator HELVETAS Albania
09:15 – 09:30	– Priming for induced resistance as a possible strategy in plant protection – *Dr.* Adam Schikora, *Julius Kühn Institute (JKI), Braunschweig, Germany*
09:30 – 09:45	– On the potentiality of chia mucilage (*Salvia hispanica*) solutions and emulsions for coatings applications. – *Dr.* **Silvio Iacovino**, *Department of Agricultural, Environmental and Food Sciences (DiAAA), University of Molise, Italy*
09:45 – 10:00	– The performance of grafted tomato plants under saline irrigation water conditions is dependent on rootstock-scion compatibility – *Prof.* **Astrit Balliu**, *Department of Horticulture and Landscape Architecture, AUT*
10:00 – 10:15	– The growth of plants containing pyrrolizidine alkaloids (PAs) in plots cultivated with medicinal aromatic plants (MAPs) and in their natural wild habitats in Kosovo – *Prof.* **Fadil Millaku**, *Faculty of Natural Sciences and Mathematics, University of Prishtina, Kosovo*
10:15 – 10:30	– Application of geospatial technique and analytic hierarchy process for crop-land suitability evaluation – *MSc.* **Olsid Mema**, *Department of Agronomic Sciences, AUT*
10:30 – 11:00	**Coffee Break**
11:00 – 11:15	– Quality assessment of plant genetic resources conserved in Albanian Inventory – *Prof.* **Belul Gixhari**, *Institute of Plant Genetic Resources, AUT*
11:15 – 11:30	– Landscape connectivity assessment at metropolitan scale via – effective mesh size metric and Model Designer In QGIS– *Ark.* **Enkela Hasa**, *Department of Horticulture and Landscape Architecture, AUT*
11:30 – 11:45	– Looking for Landscape Layers in Tirane - Vore itinerary, how can we bring to light new interpretations of existing landscapes? – *Akr.* **Dea Buza**, *Department of Horticulture and Landscape Architecture, AUT*
11:45 – 12:00	– Ornamental bulbous plant performance on Mediterranean green roof environment – *Urb.* **Silvi Jano**, *Department of Horticulture and Landscape Architecture, AUT*
12:15 – 12:30	– Evaluation of buckwheat (*Fagopyrim esculentum*) genetic diversity and its potential for cultivation in Albania. – *MSc.* **Rea Tako**, *Department of Agronomic Sciences, AUT*
12:30 – 12:45	– Impact of nitrogen fertilizer application rates on nitrogen and chlorophyll content and grain production in wheat (*Triticum aestivum* L.) – MSc. **Moltine Prebibaj**, *Department of Agronomy Sciences, AUT*
12:45 – 13:00	– Unveiling the cultivation potential of black seed in Albania using some agro-morphological characteristics – *MSc.* **Jonida Biturku**, *Department of Agronomical Sciences, AUT*

09:00 – 13:00	**Session 2: Rural Development Policies and Agribusiness Management Strategies (Room Behar Male)** *(Chair: Prof. Ilir Kapaj, Prof. Remzi Keco)*
09:00 – 09:15	– Agrobusiness: Financial Prospective for Albanian rural communities – *Dr.* **Alessandro Alex Doria**, *CEO, Intesa Sanpaolo Albania*
09:15 – 09:30	– Sustainable Agriculture: Future Challenges – *Prof.* **Giulio Mario Cappelletti**, *Department of Economics, Management and Territory, University of Foggia, Italy*
09:30 – 09:45	– Digitization in Albanian agriculture_the case of integration of farms in the value chain – *Prof.* **Remzi Keco**, *Department of Agribusiness Management, AUT*
09:45 – 10:00	– E-Agriculture in the Western Balkans: Exploring the ICT-Agriculture Nexus in Economic Contributions – *Prof.* **Anila Boshnjaku**, *Department of Economics and Rural Development Policies, AUT*
10:00 – 10:15	– Climate change now or in the future – Who is postponing it – *Prof.* **Elena Kokthi**, *Faculty of Biotechnology and Food, AUT*
10:15 – 10:30	– Investigating consumer perceptions of food safety risks in Albania (Tirana) – *MSc.* **Pranvera Troka**, *Department of Agribusiness Management, AUT*
10:30 – 11:00	**Coffee Break**
11:00 – 11:15	– Innovation frameworks for addressing systemic issues in Albania's olive oil supply chain – *Dr.* **Timothy Silberg**, *Michigan State University*
11:15 – 11:30	– Analysis of the value chain of medicinal and aromatic plants in Albania with a focus on quality, environmental, social and sustainable requirements – *Prof.* **Xhevaire Dulja**, *Head of Tourism Management Department, AUT*
11:30 – 11:45	– Innovating education for rural and sustainable tourism – *Prof.* **Klodiana Gorica**, *Faculty of Economy, University of Tirana*
11:45 – 12:00	– Descriptive analysis of open calls under IPARD II Programme (Instrument of Pre-Accession for Rural Development)-Albanian Case – *Dr.* **Merita Gecaj**, *AUT*
12:00 – 12:15	– Literature review on academic staff performance evaluation models_A comparative. - *MSc.* **Adela Culani**, *Department of Human Resources, Business Academy*
12:15 – 12:30	– Circular Economy and Industry 4.0 integration in manufacturing sector: An open innovation perspective for stakeholder's collaboration – *MSc.* **Kriselda Sulcaj Gura**, *Beder University*
12:30 – 12:45	– Smart Tourism Technologies after COVID – 19: Evidences from Albania – *MSc.* **Ambra Kraja**, - *Department of Mathematics and Informatics, Faculty of Economy and Agribusiness, AUT*
12:45 – 13:00	– Consumer awareness about the degree of food processing in Albania – – *MSc.* **Erjola Shehu**, *Department of Agribusiness Management, AUT*

09:00 – 13:00	**Session 3: Environmental Sciences, Natural and Forest Resources Management (Room Skender Xhiku)** *(Chair. Prof. Seit Shallari, Prof. Florian Kretschmer)*
09:00 – 09:15	– Solution approaches for implementing the recast of EU wastewater treatment directive in Albania, Prof. Florian Kretschmer, *Department of Water, Atmosphere and Environment (WAU), BOKU, Austria*
09:15 – 09:30	– Plants to reduce heavy metals from industrial wastewater – *Prof.* **Premton Thaqi,** *- Department of Environmental Engineering, Faculty of Civil Engineering, University of Prishtina*
09:30 – 09:45	– Analysis of heavy metals in the soil, in the Rehova mine area – *Dr.* **Arta Dollani,** *Director of National Environment Agency, Albania*
09:45 – 10:00	– Background heavy metal levels in soils derived from metal-rich parent materials in Albanian regions – *Prof.* **Fran Gjoka,** *Department of Environment and Natural Resources, AUT*
10:00 – 10:15	– Magnetic-biochar-clay composite as an efficient adsorbent for pollutants in waters – *MSc.* **Aleksandër Peqini,** *Department of Environment and Natural Resources,AUT*
10:15 – 10:30	– Integrated sewage sludge management in Albania – *MSc* **Vjola Bakillari,** *Department of Environment and Natural Resources, AUT*
10:30 – 11:00	**Coffee Break**
11:00 – 11:15	– Long-term observations and yields in a tillage experiment in eastern Austria, *Prof.* Reinhard Neugschwandtner, *BOKU, Austria.*
11:15 – 11:30	– Exploring the notion of "Landscape" in Albania: Learning From – different approaches in Landscape Design Education – *Prof.* **Zydi Teqja,** *Department of Horticulture and Landscape Architecture, AUT*
11:30 – 11:45	– Pumpkinseed (*Lepomis gibbosus*) preliminary biological characterisation in an Albanian lake (Dega lake, Belsh, Dumre, Elbasan) – *Prof.* **Rigers Bakiu,** *Department of Aquaculture and Fisheries, AUT*
11:45 – 12:00	– Analysis of variations and trends of climate change in the area of Tirana in order to adapt and increase the resilience of agricultural systems to climate change – *MSc.* **Adri Erebara,** *Department of Environment and Natural Resources, AUT*
12:00 – 12:15	– Accumulation of nitrates in groundwater – *MSc.* **Xhuljo Sema,** *Department of Environment and Natural Resources, AUT*
12:15 – 12:30	– Phosphorus fixation capacity in some selected greenhouses soils in Albania – *MSc.* **Fatos Huqi,** *Department of Environment and Natural Resources, AUT*
12:30 – 12:45	– The importance and effectiveness of introducing fish passes in newly developed Hydro Power Plants: the Ashta HPP case – *MSc.* **Denik Ulqini,** *Department of Biology-Chemistry, Faculty of Natural Sciences Luigj Gurakuqi University*
12:45 – 13:00	– Brief overview of the Adriatic Sea landing trends in relation to climate change – *MSc.* **Elvis Kamberi,** *Department of Aquaculture and Fisheries, AUT*

09:00 – 13:00	**Session 4: Animal and Public Health, Food Safety and Nutrition Science (Room Luc Agraja)** (*Chair: Prof. Rezart Postoli, Prof. Martin Wendland*)
09:00 – 09:15	– Detection of Antibiotic Resistance Genes in Waste Waters in the "One Health" approach – *Prof.* **Erinda Lika**, *Veterinary Medicine Faculty, AUT*
09:15 – 09:30	– Patient specific implants (psi) for bone and cartilage reconstructions in veterinary applications – *Prof.* **Alberto Crovace**, *Università degli Studi di Sassari, Italy*
09:30 – 09:45	– Agri-food products tracked with digital blockchain technology: consumers' willingness-to-pay for quality and safety information – *Dr.* **Michel Frem**, *SINAGRI Spin off, University of Bari (Italy)*
09:45 – 10:00	– The role of sheep and goats in epidemiology of Shiga Toxin-Producing *Escherichia coli* – *Prof.* **Xhelil Koleci**, *Veterinary Medicine Faculty, AUT*
10:00 – 10:15	– Biosecurity enhanced through training evaluation and raising awareness – A COST Action to improve biosecurity in livestock – *Dr.* **Alberto Allepuz**, *Universitat Autònoma de Barcelona, Spain*
10:15 – 10:30	– Snakebite in ruminant animals in the area of Shkodra, based on the monitoring of cases in the years 2021-2022 – *Prof.* **Jani Mavromati**, *Veterinary Medicine Faculty, AUT*
10:30 – 11:00	**Coffee Break**
11:00 – 11:15	– Is there a linkage of subsidies for food production in Albania, dietary style and environmental state? – *Prof.* **Spasse Shumka**, *Faculty of Biotech Food, AUT*
11:15 – 11:30	– Precision oenology: Laboratory on Chip (LoC) for Polyphenols Detection in wine – *PhD.* **Margherita Modesti**, *Department for Innovation in Biological, Agro-food and Forest System UNITUS, Viterbo Italy*
11:30 – 11:45	– The influence of food environment in sustainable food choices: exploring fast-food behaviour among adolescents in Albania - *Prof.* **Elena Kokthi**, *Faculty of Biotechnology and Food, AUT*
11:45 – 12:00	– Botanical, microbiological and chemical composition of fresh and fermented pollen – *MSc.* **Gianluca Albanese**, *University of Molise, Italy*
12:00 – 12:15	– On-Farm welfare assessment of Albanian dairy goats using animal-based parameters – *Prof.* **Sokol Duro**, *AUT*
12:15 – 12:30	– Mycotoxigenic fungi on cereals: can they represent a risk for consumer health in Albania? – *Prof.* **Mario Masiello**, *Institute of Sciences of Food Production, National Research Council of Italy*
12:30 – 12:45	– Effects of *Lycium barbarum* supplementation on semen quality, oxidative status, and histological features of the reproductive tract of male rabbit – *Prof.* **Gabriele Brechia**, *Faculty of Veterinary Medicine, Milano, Itali*
12:45 – 13:00	– Determination of Resorcylic Acid Lactones in caprine urine samples by LC-MS/MS – *Phd.* **Suela Teqja**, *Institute of Food Safety and Veterinary, Albania*
13:00 – 14:00	**Lunch break**

14:00 – 15:00	**3rd Scientific Session**
14:00 – 15:00	**Introduction and Discussion of Posters**
Day 2 –Timing	**5 parallel Scientific Session(continue)**
15:00 – 17:00	**Session 1: Agricultural Sciences and Production Technologies (Room S.Pedrolio)** *(Chair: Prof. Sokrat Sinaj; Prof. Lirika Kupe)*
15:00 – 15:15	– The case of *Xylella fastidiosa*: alternative woody plants for the renewal of Salento (Italy) agriculture and landscape – *Dr.* **Hysen Kokiçi**, *National Research Council of Italy*
15:15 – 15:30	– Collecting landraces and wild relatives in three agricultural regions of Albania – *Prof.* **Sokrat Jani**, *Institute of Plant Genetic Resources, AUT*
15:30 – 15:45	– *Fusarium* sp. morphological identification and their spread as the main cause of wilt disease on tomatoes grown in Albania – *MSc.* **Elion Ismailaj**, *Department of Plant Protection, AUT*
15:45 – 16:00	– Chemical components of Achillea millefolium and their medicinal properties – *MSc.* **Edlira Kaloshi**, *Department of Pharmacy, Albanian University*
16:15 – 16:30	– Ultrasound assisted alkaline and acidic pretreatments of cellulose from tobacco stalk – *Prof.* **Marija Srbninoska** - *Scientific Tobacco Institute, University St. Kliment Ohridski in Bitola, Republic of North Macedonia*
16:30 – 16:45	– Molecular identification of pomegranate pathogens and aphid control – *Prof.* **Magdalena Cara**, *Department of Plant Protection, AUT*
16:45 – 17:00	– First findings of the genus *Xiphinema* spp. (Nematoda: Longidoridae) in Kosovo vineyards – *MSc.* **Gazmend Gjinovci**, *Agrarian Institute of Kosova*
17:00 – 17:15	– Initial findings on the local European eel (*Anguilla anguilla*) stock and silvering process in the Karavasta lagoon – *MSc.* **Marco Kule**, *Department of Aquaculture, AUT*
15:00 – 17:00	**Session 2: Rural Development Policies and Agribusiness Management Strategies (Room Behar Male)** *(Prof. Edvin Zhllima, Prof. Fatmir Guri)*
15:00 – 15:15	– From Pandemic to Warfare: Understanding the Complex Trajectory of External Shocks on Albania's Agricultural Sector – *Prof*. **Orjon Xhoxhi**, *Department of Agribusiness Management, AUT*
15:15 – 15:30	– The role of crisis situations of fostering innovation in agritourism – *Prof*. **Shpresim Domi**, *Department of Tourism Management, AUT*
15:30 – 15:45	– Factors associated with smallholder farmers' financial illiteracy – An analysis of farmers' ability to calculate credit yearly payments – *Prof.* **Edvin Zhllima**, *Dep. Economy and Rural Development Policies, AUT*
15:45 – 16:00	– Is it possible to have a non-oil palm diet - analysis from consumers and food producers' side – *Prof.* **Fatmir Guri**, *Department of Economy and Rural Development Policies, AUT*
16:00 – 16:15	– What do tourists prioritize? The importance of language proficiency and communication skills among hotel staff in Vlora Region. – *MSc.* **Era Hoxha**, *Department of Foreign Languages, Faculty of Economy and Agribusiness*

16:15 – 16:30	–	Financial sustainability of rural microfinance institutions an important factor of financing farming economics – *MSc.* ***Klodia Kola***, *Albanian University*
16:30 – 16:45	–	A survey of sharing cooperation results in a supply chain. Case study: apple fruit in the Korça district – *MSc.* **Anjeza Bekolli**, *Department of Mathematics and Informatics, AUT*
16:45 – 17:00	–	Review of rhetorical devices in the advertising discourse and preliminary usage in Albania – *MSc.* **Erion Shehu**, *Department of Foreign Languages, AUT*

15:00 – 17:00	**Session 3: Environmental Sciences and Natural Resources Sustainable Management of Forest Resources (Room Skender Xhiku)** *(Chair: Prof. Leonidha Peri, Prof. Angela Lo Monaco)*	
15:00 – 15:15	–	Camera trapping monitoring for managing ungulate populations in Central Italy's beech forest – *Dr.* **Pedro Girotti**, *Department of Agriculture and Forest Sciences - Tuscia University*
15:15 – 15:30	–	Virgin forests as a knowledge source for developing a close-to-nature silviculture. Conclusions from Albanian beech (*F. sylvatica* L.) virgin forests – *Prof.* **Vath Tabaku**, *Department of Forestry Sciences, AUT*
15:30 – 15:45	–	Extreme environments as sources of potentially useful microorganisms in agriculture and food industry – *Dr.* **Francesco Canganella**, *- DIBAF, University of Tuscia, Italy*
15:45 – 16:00	–	Behaviour after one year of outdoor exposure of heat-treated Ayous wood. – *Prof.* **Angela Lo Monaco**, *- Department of Agriculture and Forest Sciences, DAFNE, University of Tuscia, Italy*
16:00 – 16:15	–	The allometric equations for evaluation of stem volume and aboveground biomass of Black Pine (*Pinus nigra.* Arn) in Albania – *Prof.* **Elvin Toromani**, *Department of Forestry Sciences, AUT*
16:15 – 16:30	–	Application of strategic management in Albanian wood industry – *Dr.* **Alketa Grepca**, *Department of Wood Processing, AUT*
16:30 – 16:45	–	Effects of feed speed and wood species on surface roughness – *Prof.Asoc.* **Holta Çota**, *Department of Wood Industry, AUT*
16:45 – 17:00	–	Development of agrotourism in Albanian riviera through adaptive reuse and flexible design strategy; case study, Dhërmi – *MSc.* **Franceska Delia** *- Department of Department of Wood Production, AUT*

15:00 – 17:00	**Session 4: Animal Medical Science and Welfare, Food Safety and Public Health (Room Luc Agraja)** *(Chair: Prof. Kapllan Sulaj, Dr. Sonila Cocoli)*	
15:00 – 15:15	–	Use of essential oils as natural preservatives in food industry - A review – *MSc.* **Elton Basha**, *Department of Agri-Food Technology, AUT*
15:15 – 15:30	–	Prevalence of *Escherichia coli* producing extended spectrum β-lactamasesin the Shkumbini River Ecosystem. *Msc.* **Florian Plaku**, *AUT*
15:30 – 15:45	–	Evaluation the impact of Metschnikowia pulcherrima as3c1 in co-fermentation with Saccharomyces cerevisiae yeast on the quality parameters of Albanian Kallmet wine– *MSc.* **Mamica Ruci**, *- Faculty of Biotechnology and Food, Food Research Center, AUT*
15:45 – 16:00	–	Utilizing Tomography as a tool of evaluation the bone regeneration after the use of scaffolds in osteochondral structures: A Sheep Model Study - *MSc.* **Taulant Goga**, *Veterinary Medicine Faculty. AUT*

Time		Session
16:00 – 16:15	–	Preliminary data on the presence of Caprine Arthritis Encephalitis in the region of Fushë-Kruja, Albania – *MSc.* **Brixhilda Qyra**, *Institute of Food Safety and Veterinary, Albania*
16:15 – 16:30	–	Preliminary serological results of West Nile Virus in horse in Korça region. *MSc.* **Kristi Morava**, *Fan S Noli University Korçë*
16:30 – 16:45	–	Overview of biosecurity in aquaculture farms in Albania – *MSc.* **Letera Zhilli**, *Department of Food Microbiology, Water and Quality Monitoring, Institute of Food Safety and Veterinary, Tirana, Albania*
16:45 – 17:00	–	Improving the treatment of small animal ACL rupture with the addition of porous titanium scaffold to tibial tuberosity advancement surgery - *MSc*. **Bledar Goxhaj**, *Veterinary Medicine Faculty, AUT*
14:00 – 17:00		**WORKSHOP 1: Cultivation of MAP in Albania: Developments and Challenges for the future (Room 101, Building B, Faculty of Economy)**
		Chair: **Prof.Dr. Ilir Kristo**, Dean of Faculty of Agriculture and Environment, AUT
14:00 – 14:10	–	AUT and its contribution for MAPs sector in Albania (**I. Kristo**)
14:10 – 14:25	–	Cultivation of MAP in Albania: Developments and challenges for the future (**A. Ibraliu**)
14:25 – 14:40	–	Good agricultural practices in the cultivation of MAP in Albania (**E. Kullaj**)
14:40 – 14:55	–	Standards and quality control in the production of MAP (**Xh Dule; K.Balla**)
14:55 – 15:10	–	Research activity in support of MAP sector of Albania (**A. Ibraliu; K Hajkola**)
15:10 – 15:20	–	Introduction in drying methods and parameters in innovative systems at MAPs in Albania (**Presentation from students**)
15:20 – 15:50	–	Production challenges and MAPs markets (**MAPs Associations**)
15:50 – 16:00		Coffee Break
16:00 – 17:00		Open discussion: CHALLENGES of the MAP sector
14:00 – 17:00		**WORKSHOP 2: Building Trust of Consumers through food safety systems and standards (Goethe Room, Building A, Faculty of Economy)**
		Chair: **Prof.Dr. Erinda Lika, Vice/Rector for Research and Projects**, AUT
14:00 – 14:10	-	Welcoming remarks, Opening Remarks and welcome address (**Erinda Lika, MARD, RisiAlbania, Andi Stefanllari**)
14:10 – 14:25	-	Sector Strategy and Legal Framework of Food Safety (**Valdete Buca, MARD**)
14:25 – 14:40	-	GlobalG.A.P, localg.a.p and links with food safety in Albania (**Klajdi Ceka**)
14:40 – 14:55	-	Potential of Biological Solutions for assured food safety and consumer-wellbeing - opportunities and challenges (**Prof. Ariola Bacu, Prof. Vjollca Ibro,** Commission of BAV/ Academy of Science)
14:55 – 15:10	-	Challenges in adopting and applying Quality Standards (GLobalG.A.P and others) (**CBS, Lulzim Kadiasi, FOTON, Edita Dibra**)
15:10 – 15:20	-	Current approaches and challenges to the control of foodborne diseases in Albania. (**Roland Mecaj, Drejtor, AKVMB**)

15:20 – 15:50	- Potential of Albanian Exporters to better supply local markets. Securing the position of farmers and exporters in the value chain (**Laurat Mulliqi**)
15:50 – 16:00	Coffee Break
16:00 – 17:00	- Open discussion: CHALLENGES of the Food Safety sector in Albania: what can we do to improve the Albanian consumers' confidence in fresh produce?
14:00 – 17:00	**WORKSHOP 3: Strengthening collaboration for a science-supported water resources management in Albania (Room 103, Building Faculty of Agriculture)**
	Chair: **Assoc. Prof. Romina Koto, Vice Rector for Institutional and Public Relation,** AUT
14:00 – 14:10	- Welcoming remarks, Opening Remarks and welcome address (**Romina Koto, Roza Allabashi, Dr. Florian Kretschmer**)
14:10 – 14:55	- Short presentations from key stakeholders - Main challenges concerning the implementation of Action Plans, legal basis for the water management in Albania.Water Resources Management Agency (**AMBU**). - National Environment Agency (**NEA**) - National Agency of Water Supply, Sewerage and Waste Infrastructure (**AKUM**)
14:55 – 15:10	- The recast of EU wastewater treatment directive - solution approaches for implementation in Albania (**Dr. Florian Kretschmer, BOKU**)
15:10 – 15:50	- Open space joint working (audience is the only working group) & discussion on **3 objectives/topics**: - Identification of main challenges concerning the implementation of integrated water resources management approaches. - Possible roles of science and higher education institutions on solving problems in regard to water management. - Elaboration of solutions approaches for a science-supported implementation of integrated water (resource) management concept.
15:50 – 16:00	Coffee Break
16:00 – 17:00	- Wrap-up and conclusions

Day 3 - Timing	3 November 2023
8:00 – 18:00	Visit to touristic city of Berat.

On the third day of the Conference activities, a field visit to Berat is scheduled for participants to explore this historic city. During this visit, there will be a stop in the village of Sopez, where participants will gain insight into the best practices for the collection and processing of Medicinal and Aromatic Plants (MAPs) by BIOBES, one of the top 10-15 companies in Albania specializing in MAP exports. Additionally, a visit to the PUPA AGROTOURISM is planned, offering participants a glimpse into wine production at this establishment and the industry's best practices. Following this, we will proceed to the PUPA AGROTOURISM for lunch. This complex, also supported by IPARD funding, is engaged in both wine production and agrotourism.

CONTENTS

Session "Agricultural Sciences and Production Technologies"

Session "Rural Development Policies and Agribusiness Management Strategies"

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SESSION

"Agricultural Sciences and Production Technologies"

PRIMING FOR INDUCED RESISTANCE AS A POSSIBLE STRATEGY IN PLANT PROTECTION

ADAM SCHIKORA

Julius Kühn Institute (JKI) - Federal Research Centre for Cultivated Plants Institute for Epidemiology and Pathogen Diagnostics, Braunschweig, Germany

During the cultivation of crop plants, priming for enhanced resistance using biocontrol agents is an efficient disease management strategy. It results in robust resistance and higher yield. The beneficial effects of the bacterial QS molecules, e.g. *N*-acyl homoserine lactones (AHL), on resistance and plant growth have been shown in different plants. Presence of AHL influences the transcriptional of various defense and growth-related genes and modifies the physiology of primed plants. Here, we present the effects of the AHL oxo-C14-HSL and AHL-producing bacteria on the priming capacity of barley plants. Barley is one of the most important crops worldwide and an enhanced resistance against pathogens, such as the powdery mildew causing fungus *Blumeria graminis*, is of high importance to agriculture. We demonstrate here that barley, primed with the beneficial bacterium *Ensifer meliloti*, expresses enhanced resistance against *B. graminis*. We show also that the capacity to induce priming varies among different barley cultivars. This suggests that appropriate genetic equipment is required in order to induce AHL-priming, at the same time it bears the potential to use this genetic feature for new breeding approaches. Very important aspect of plant interactions with microorganism is the diversity of the later. Recently we showed that the diversity of AHL molecules produced by plant-associated bacteria may positively influence plant resistance. The use of biologicals or beneficial bacteria represents therefore a good strategy for sustainable plant protection measures and opens new opportunities for breeding approaches.

Keywords: Induced Resistance, Priming, Barley, Quorum Sensing

ON THE POTENTIALITY OF CHIA MUCILAGE (*SALVIA HISPANICA*) SOLUTIONS AND EMULSIONS FOR COATINGS APPLICATIONS

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Hydrocolloids are widely used in food technology as thickening, gelling, emulsifying, stabilizing and coating agents, and increasing attention is being paid to the research of natural colloids. For this reason, considering its composition and nutritional value, chia (*Salvia hispanica*) mucilage which consists of a tetrasaccharide extracted from chia seeds soaked in water to form a hydrogel network, is attracting the interest of the food industry. However, in order to be used for various applications, a detailed knowledge of the structure of mucilage hydrogels and the physicochemical behavior during food processing is required. Therefore, in this study we investigated hydrogels prepared by dispersing freeze-dried chia mucilage in water. The properties of the hydrogels were studied through scanning electron microscopy, intrinsic viscosity measurements, rheology and small-angle X-ray scattering. The results showed that temperature and ionic strength significantly affected the architecture of hydrogels and that the strength of the matrix decreased with time, suggesting that ageing acts as a destabilizing factor. Indeed, a less entangled and packed meshwork whose mesh increased with ageing was observed. Taking into account that auto-oxidative phenomena could affect chia mucilage stability, hydrophilic and hydrophobic antioxidants were added to the suspensions. The hydrophilic antioxidant had positive effects at low concentration, but the hydrophobic antioxidant was more effective for stabilizing mucilage. Against this background, an emulsion-based system containing lemongrass essential oil with natural antioxidant properties was prepared. In particular, it was found that the emulsion could limit the extent of mucilage depolymerization, and thus improve its potential application. Overall, the findings obtained in this study could be useful to develop effective coating formulations based on the utilization of chia mucilage.

THE PERFORMANCE OF GRAFTED TOMATO PLANTS UNDER SALINE IRRIGATION WATER CONDITIONS IS DEPENDENT ON ROOTSTOCK-SCION COMPATIBILITY

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Non-grafted and grafted tomato plants were included in an experiment aimed at testing the potential use of several rootstocks as a tool to alleviate the negative effects of high sodium (Na) content in the irrigation water. The plants were individually transplanted in 5 L plastic pots filled with a mixture of peat and vermiculate (2:1, vol:vol) and were daily/twice a day irrigated with equal amounts of a nutrient solution containing N (100 mg L^{-1}), P_2O_5 (25 mg L^{-1}), K_2O (120 – 140 mg L^{-1}) plus sufficient amounts of other macro and microelements. Each non-grafted/grafted combination was split in half and treated respectively with the normal nutrient solution (as described above), or a saline solution which was obtained by adding sodium chloride (NaCl) 50 mM. Forty-two days after transplanting, several plants were randomly removed, root morphology data were analysed and nutrient contents of roots and leaves were analyzed after acid hydrolysis in nitrohydrochloric acid by ICP-OES. At the remaining plants, fruits were harvested at full maturity and individually weighted and recorded for each experimental unit. The performance of grafted plants depended on the compatibility level between the rootstock and the scion, although increased salinity in irrigation water has drastically reduced the yield. The rise of salinity in the irrigation water multiplied Na concentration in plant shots by several times. However, grafted variants did show a higher Ca:Na ratio under non-saline conditions (but not under saline conditions), and a higher K:Na ratio than the non-grafted plants under both non-saline and saline conditions.

Keywords; reduced growth volume, root morphology, nutrient concentration, Ca:Na ratio, K:Na ratio.

THE GROWTH OF PLANTS CONTAINING PYRROLIZIDINE ALKALOIDS (PAS) IN PLOTS CULTIVATED WITH MEDICINAL AROMATIC PLANTS (MAPS) AND IN THEIR NATURAL WILD HABITATS IN KOSOVO

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Abstract

Thousands plant species worldwide produce about 600 different pyrrolizidine alkaloids (PAs), which are known to cause disease in humans and animals.

The plants containing PAs were investigated in 70 plots cultivated with 19 MAPs species and the natural habitats of 20 wild MAPs species.

Most of the poisonous plants found in cultivated and the natural habitats of wild MAPs belong to the families of Asteraceae and Boraginaceae. In the cultivated MAPs plots, 22 plant species known for their PAs content were identified, including 7 from the Asteraceae family, 13 from the Boraginaceae family, and 2 species from the Convolvulaceae and Solanaceae families, one of each. 34 species with PAs were identified in natural habitats, 17 of which belonged to the Boraginaceae family, and 15 to the Asteraceae family. In contrast, the other two families, Convolvulaceae and Solanaceae were represented by only one species each. Most species from the Asteraceae family containing PAs identified in cultivated fields and natural habitats were from the genera Senecio and Jacobaea, while identified species from the Boraginaceae family were from the genera Myosotis, Pulmonaria. and Symphytum. In the plots cultivated with MAPs, Convolvulus arvensis containing PAs and tropane alkaloids (TAs) was the most prevalent.

Key words: *Species, Pyrrolizidine alkaloids, medicinal plants, cultivated, wild*.

APPLICATION OF GEOSPATIAL TECHNIQUE AND ANALYTIC HIERARCHY PROCESS FOR CROP-LAND SUITABILITY EVALUATION

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Abstract

Crop-land suitability analysis is a prerequisite to achieve optimum utilization of the available land resources for sustainable agricultural production. The Food and Agricultural Organizationrecommended a land suitability assessment approach for crops in terms of suitability ratings ranging from very highly suitable to unsuitable based on climatic and terrain data, soil properties and social-economic data. The aim of this study was to develop a GIS-based multi criteria evaluation technique to assess suitability areas for wheat cultivation in Mollaj Administrative Unit, Korça Municipality. Four suitability criteria including soil (pH-H2O, texture, soil depth, organic matter, Cationic exchange capacity),topography (slope) climate (rainfall) and social-economic (land use and land cover) wereselected based onFAO frameworkand agronomist experts opinions.Weights indicating the relative importance of each criterion was determined using Analytical Hierarchical Process (AHP) in IdrisiSelva Software. The resulting weights were used to construct the suitability maps using ArcGISsoftware. The final output land suitability map for wheat cultivation was generated by overlaying these mapsusing Weighted overlay analysis in ArcGIS.The results of this research showed that in the study area, 58.6% (1487 ha) of the land is highly suitable, 31.95% (811 ha) is moderately suitable and 9.45% (240 ha) is not suitable for wheat cultivation. The results can be used by the Ministry of Agriculture and Rural Development of Albaniato advice the local farmers on the suitable areas for wheat cultivation.The model of present research work can be applied to determine land evaluation for other agricultural crops.

Keywords: Multi Criteria evaluation, Geographic Information System (GIS), Analytical Hierarchical Process (AHP), Land suitability map, Spatial analysis

Introduction

Development of sustainable agriculture is one of the main objectives of all countries in the world.In today's conditions, when the agricultural land is quite limited, it is impossible to search for a larger area for cultivation, therefore farmers must familiarize themselves with the fact that they must increase food production on the land they have available. In this context, in order to use the available agricultural land in an optimal way, to have sustainable agricultural production, the analysis of the suitability of agricultural land is a necessary prerequisite[1]. Among all types of crops that grow in Albania, wheatis the major food crop which forms the basis of the food diet and is essential to our economy.However, the production level of wheat remains at a problematic level in relation to consumption. To increase the production of wheat is required to arrive at most suitable sites for their cultivation.A careful evaluation of the land would directly help in mitigating the production challenge.

Land suitability evaluation (LSE) involves the process of appraisal and grouping of specific areas of land in terms of their suitability according to the specific types of use[2].Food and Agriculture Organization (FAO)[3]developedan approach widely used for suitability analysis, by considering different criteria.To facilitate FAO's principles, concepts and theories on land suitability evaluation for crops, much progress has been made over the last years in developing methods of multi-criteria-LSE, especially by integrating Geographic Information system (GIS), Remote Sensing (RS) with Multi criteria decision making (MCDM) [4][5].

Currently, there are no studies and researches in Albania on the suitability of agricultural land for the cultivation of wheat. Moreover, the quantity, location and degree of suitability of agricultural land for wheat cultivation is not documented. This paper present a combined technique of AHP and GIS to evaluate land suitability for wheat cultivation in Mollaj Administrative Unit, Korça Municipality.The aim of the study is to provide an effective mechanism through combination of GIS, AHP and MCDM in order to have better decision and direct impact on farmers for cultivation of specific crops.

Material and Methods

Study area

The study was carried out for Mollaj Administrative Unit of Korça Municipality, eastern part of Albania. It is geographically located in 40° 34' 25'' N latitude and 20° 43' 57'' E longitude. The area where the research was held covers approximately 2550 ha. The Administrative Unit consist of flat area that lies on northwest, north and northeast side and hills which rise on the southwestern, southern, southeastern and eastern sides.

Data types and sources

Various types of datasets wereused for land suitability evaluation for wheat crop. Based on literature review, analytic studies and expert opinions the main criteria and sub-criteria for suitability analysis were selected. A hierarchy of four main criteria (topographical, climatological, physical-chemical and social-economical) and eight sub-criteria (pH-H2O, texture, soil depth, organic matter, Cationic exchange capacity,slope, rainfall, land use and land cover) were incorporated in this study. The physical-chemical soil data (pH-H2O, texture, soil depth, organic matter, Cationic exchange capacity (CEC)) were obtained from Agriculture Technology Transfer Center, Fushë Kruje, part of Ministry of Agriculture and Rural Development of Albania. The data for precipitation were extracted from Climate Research Unit (University of East Anglia) and UK's National Centre for Atmospheric Science (NCAS)[6].The slope raster was derivedfrom Digital Elevation Model (DEM) with 30 m resolution, Shuttle Radar Topographic Mission (SRTM). The Land use and land cover (LULC 2022) map was extracted from Esri New 2020 Global Land Cover Map at 10-meter resolution, was built using European Space Agency (ESA) Sentinel-2 satellite imagery[7].

Methodology framework

The methodology was based on matching soil/land characteristics against agronomical requirements of wheat and then the suitability classification was assessed. In this research GIS was combined with Multi-criteria decision-making (MCDM) method [8].This method was very useful because combine all spatial factors (criteria) and results in a map with the best locations for a certain type of land-use. To summarize, (i) criteria that determine wheat production and growth were selected and organized in an hierarchy; (ii) every criterion were mapped using GIS environment and each criterion-map were converted and geo-referenced into Universal Transverse Mercator (UTM) projection zone number 34 N of WGS 1984; (iii) criteria were compared to determine the degree of importance using AHP[9];(iv) standardization (in GIS environment) of sub-criteria layers in suitability classes(N "not suitable" , S3 "marginally suitable" , S2 " moderately suitable", S1 " highly suitable") according to wheat requirements ;(v) suitability index was calculated using weighted overlay analysis in GIS environment.

Results and Discussion

Table 1 shows the weightings obtained for each sub-criterion. The pair-wise comparison matrix (AHP) was carried out for rating and weighting of eight sub-criteria. The fundamental scales given by Satty's [9]for comparing the two sub- criteria were used. The most important sub-criteria for wheat growth and production were texture (27%), slope (22 %) and pH-H2O (17%). The consistency ratio (CR) was 7 %, less than 10 % (allowed value) and it was acceptable for further process. Table 2 showed that 58.6 % (1487 ha) of the study areas were "highly suitable", 31.95 % (811) were "moderately suitable" and 9.45 % (240 ha) were "not suitable" for wheat cultivation. Figure 1 depict the output map withthree different suitability classes for wheat cultivation generated in GIS environment by using weighted overlay analysis as an intersection of standardized and differently weighted layers during suitability analysis [10].

Conclusions

Integration GIS, MCDM and AHP is a useful combination that can create a superior database and suitability map which will serve as a guide for local farmers and decision makersfor agricultural land management of different crops.

Table 1. The pair-wise comparison matrix (PWCM) for eight criteria

	Texture	Slope	pH-H2O	Soil depth	Organic matter	CEC	Rainfall	LULC 2022	**Weights (%)**	Rank
Texture	1	2	2	3	3	4	5	7	**27**	1
Slope	1/2	1	2	3	3	4	5	6	**22**	2
pH-H2O	1/2	1/2	1	2	3	4	5	6	**17**	3
Soil depth	1/3	1/3	1/2	1	2	3	5	6	**13**	4
Organic matter	1/3	1/3	1/3	1/2	1	2	4	5	**9**	5
CEC	1/4	1/4	1/4	1/3	1/2	1	3	4	**6**	6
Rainfall	1/5	1/5	1/5	1/5	1/4	1/3	1	4	**4**	7
LULC 2022	1/7	1/6	1/6	1/6	1/5	1/4	1/4	1	**2**	8
			CR= 7 %					**∑=100**		

Table 2. Land suitability areas for wheat under different classes

Classification	Index	Area (ha)	Area (%)
Highly Suitable	S1	1487	58.6
Moderately Suitable	S2	811	31.95
Not Suitable	N	240	9.45

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Figure 1: Land suitability map for wheat cultivation

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LANDSCAPE CONNECTIVITY ASSESSMENT AT METROPOLITAN SCALE VIA EFFECTIVE MESH SIZE METRIC AND MODEL DESIGNER IN QGIS

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Abstract

Urban sprawl is exceedingly affecting biodiversity loss and landscape fragmentation (LF). The most significant elements of land-use that indicate landscape fragmentation are the transportation network and urban area. This study aims to evaluate the LF caused by transportation networks in metropolitan areas, with a simulating approach to identify the elements that can enhance the landscape connectivity on a local scale. It also provides a process modeling through QGIS software and Model Designer tool, as a user-friendly model to end-users. The landscape metric used for the landscape fragmentation and connectivity assessment is effective mesh size, which expresses the connection possibility of any two random points/animals without being separated by barriers. The study area selection was based on a previous research study of metropolitan cities in Europe. Mapping and other statistical data are obtained from Urban Atlas as a free source and high-resolution mapping database. The final results are compared among cities and within one city, by providing materials to be discussed. The method makes it possible to analyze the impact of "buffer" values added to natural surfaces, and understanding the potential for landscape connectivity within the city landscape.

Keywords: landscape connectivity, transportation network, European cities, effective mesh size, process modeling, QGIS

1. Introduction

Urbanization is identified as one of the most prominent phenomena that has major impacts on every living creature on Earth; among other effects, it causes fragmentation and altering of the landscape and habitat patches [2,3]. Almost three quarters of the EU's population live in cities making it more vulnerable to climate-related impacts. The most significant elements of land-use that indicate landscape fragmentation (LF) are the *transportation network* [1], and the *urban area*. The concern about ecological effects of roads has been studied since the 70s [1]. Considering the impact of LF – such as, loss or alteration of different ecosystem services, loss of biodiversity, acceleration of global warming, and the deterioration of human life quality [2] – it urges to direct the focus on urbanized areas where human activity is most prominent, and to develop more sustainable land-use management applications.

The urban landscape is a strong physical element, where the most of its agglomeration is made up from barrier elements that prevent movement of species, but there can also be potential connecting elements that facilitate the movement of specific species [3]. This study aims to evaluate the LF caused by transportation networks in metropolitan areas, as a starting point to identify the potential landscape spots that can help enhance the landscape connectivity of green infrastructure on a local scale. It also provides process modeling by utilizing QGIS software and its Model Designer extension, and Urban Atlas dataset, as a user-friendly approach to end-users and policy makers in the landscape planning field.

The landscape metric used to evaluate the LF degree is the effective mesh size (*meff*) implemented firstly by J.A.G. Jaeger [4,5]; it expresses the possibility of any two random points to be connected and not separated by barriers within the observed region. This metric measures only the connectivity of natural areas, and has been approved to be valid for urban ecological studies as well [3]. The assessment is designed to be consecutive by addition of a 'buffer' value for the 'Natural Area' layer in a reclassified Urban Atlas (UA) mapping database. The 'buffer' value is considered to be a derivative of the minimum width of a road (4m). The aim is to simulate the addition of buffers to the fragmented natural surface, and analyze the categories of roads that can be re-considered in the landscape and urban planning process in order to reduce as much as possible the LF effect.

The study area selection was based on a previous study's pre-selection of 15 cities in Europe [6]. The selection criteria among 15 cities were such as excluding coastal cities due to their different city structure, UA population, and the selection of only one city for a country; the selected cities are Dresden, Bratislava, Brussels, Munich, Lyon, Milano, Prague, and Vienna. The comparative study aims to bring out the degree of LF caused by roads and urbanization in respective metropolitan areas. The objective is not only the extraction of some statistical data, but also to provide a user-friendly method that can be easily implemented in landscape planning and management actions.

2. Materials and Methods

The metric used to assess LF and connectivity in this study is effective mesh size, which has been evaluated to be valid in ecological studies [3]. It measures the degree of fragmentation of landscape from physical boundaries, and its value can be interpreted also as landscape connectivity degree [4,5]. The scope of this study is to assess the degree of landscape fragmentation caused by transportation networks in an urban context - metropolitan cities - and simulate the existing condition through "buffering" the 'natural area' to measure the impact of transportation networks on existing landscape (Table 1). It

relates with transportation network fragmentation since the buffer values are considering the minimum road width as 4m wide, thus applying increasing derivatives of the minimum width (0, 8, 16, 24 meters) to analyze the spatial impact of different road structures in landscape fragmentation.

Table 1. Fragmentation Geometries (FG) with different buffer values

Fragmentation Geometries	FG 0	FG 1	FG 2	FG 3
Buffer Value (m)	0	8	16	24

Urban Atlas is a land cover and land use database having a relatively high resolution of visual representation with a minimum mapping unit 0.25 ha (50x50 m). It provides detailed data only for urban areas of Europe and it served as a source of spatial and statistical data in this study. Before applying the method of LF assessment through *meff* and addition of buffer width, it is conducted a reclassification of layers of the base map; the classes are grouped into 3 categories: natural areas, semi natural areas (connectors, and potential natural areas), and artificial areas (fragmenting agents). QGIS software is the tool that mediates the workflow. It is a free source, very user-friendly, updated and improved constantly. Model Designer is an extension in QGIS, that creates models with step-by-step configuration which are applied in different evaluations and statistical studies. In this study, the graphic model is the core of the process-modeling workflow methodology (Table 2).

Table 2. Workflow of *meff* calculation through Process Modeling with Model Designer in QGIS

	Step	Input/Algorithm	Input Layer	Output Layer
Study Area	1	Fix Geometries	Urban Atlas (vector layer)	Fix geometries_UA
	2	Extract by Expression	UA_NAT (expression) & Fix geometries_UA	Extract by expression_UA_NAT
	3	Fix Geometries	Study Area (vector layer)	Fix Geometries_Study Area
FG0 Natural Areas	4	Clip Geometries	Fixed Geometries_Study Area & Extract by expression_UA_NAT	Clip_UA
	5	Dissolve	Clip_UA	Dissolve_NAT
	6	Multipart to singleparts	Dissolve_NAT	Multipart to singleparts_NAT
	7	Field Calculator	Multipart to singleparts_NAT	Field Calculator_AREA
	8	Extract by Expression (*"Area_ha" > 0.25*)	Field Calculator_AREA	Extract by Expression_AREA>0.25
	9	Field Calculator	Extract by Expression_AREA>0.25	Field Calculator_Area_tot
	10	Field Calculator	Field Calculator_Area_tot & Meff (expression)	Field Calculator_Meff (calculated: **NAT_Meff**)
FG1	11	Buffer (*8m*)	Clip_UA	Buffer_fg1
	12	Dissolve	Buffer_fg1	Dissolve_fg1
	13	Multipart to singleparts	Dissolve_fg1	Multipart to singleparts_fg1
	14	Buffer (*-8m*)	Multipart to singleparts_fg1	Buffer_fg1-
	15	Field Calculator	Buffer_fg1-	Field calculator_fg1_AREA
	16	Extract by expression (*"Area_ha" > 0.25*)	Field calculator_fg1_AREA	Extract by expression_fg1>0.25
	17	Field Calculator	Extract by expression_fg1>0.25	Field Calculator_Area_tot_fg1
	18	Field Calculator	Field Calculator_Area_tot_fg1 & Meff (expression)	Field Calculator_meff_fg1 (calculated: **Meff_fg1**)

3. Results and Discussion

The results of *meff* of fragmented landscape by road networks with simulated buffers show a slightly surprising and optimistic value for landscape connectivity level. Comparing FG0, FG1, FG2 and FG3 for each city it is evident a doubled value of *meff* and considerably decreasing number of patches, especially after the minimum buffer 8m (see Table 3). Wien, Lyon and Brussels have the morphological capacity to create more connectivity after elimination of tertiary or secondary road-network fragments, eliminated instantly after 8m buffer value in mapping layers. Among all cities, Wien has an increasingly extended integration of fragmented patches of landscape after each added buffer value. Milan seems to be very concentrated, so after each buffer value there are slight differences in landscape connection values in *meff* or number of patches – especially in the total area of green connected infrastructure; it is clear that Milan has very limited capacity to consider the road network as a possible medium

for landscape connectivity. Bratislava on the other hand is the city with the highest existing *meff* value among the study area, but when comparing Wien and Bratislava, Wien seems the most advantageous of its landscape configuration.

Table 3. Descriptive data and Meff results derived from QGIS

	FG 0 (0m)			FG 1 (8m)			FG2 (16m)			FG3 (24m)		
	Meff Tot.	No. of Patches	Area Tot. Ha	Meff Tot.	No. of Patches	Area Tot. Ha	Meff Tot.	No. of Patches	Area Tot. Ha	Meff Tot.	No. of Patches	Area Tot. Ha
Munich	65	1116	5500	111	698	5561	153	603	5583	187	534	5617
Wien	446	1486	14300	1111	965	14402	2394	801	14468	4481	693	14563
Milan	24	2523	12449	43	2107	12497	67	1930	12542	90	177.9	12620
Lyon	32	1394	10019	326	564	10194	623	446	10264	663	37.6	10365
Prague	75	516	7352	316	246	7420	465	222	7451	478	204	7479
Brussels	27	811	4699	267	341	4809	1323	282	4844	1385	246	4871
Bratislava	1942	533	13491	2939	364	13548	3076	301	13573	3312	253	13665

This statistical and mapping data processing predicts possible scenarios to enhance landscape connectivity. The road network as presented in this study can be easily tested through the proposed method to detect possible re-configurations that benefit landscape connectivity. QGIS and Graphic model make the workflow more practical to follow, or to intervene in case of changing priorities during evaluation process.

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QUALITY ASSESSMENT OF PLANT GENETIC RESOURCES CONSERVED IN ALBANIAN INVENTORY

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Abstract

Biological characteristics of crops, the quantitative composition of collections, the geographic distribution of plant species, and environmental information of the collecting sites (characterization and adaptation components) were used to assess the genetic quality of plant germplasm conserved in the Albanian Inventory. The genetic quality comprises the amount of diversity of plant germplasm contained in landrace populations, crop wild relatives, modern varieties, and other economically important plant species. Comparison analysis showed an increase in the quality and quantity of ex-situ collections of the National Inventory. Representativeness analysis found a high presence of quality genes (64% of genes represented by primitive or landrace populations, crop wild relatives, and low domesticated genes per species), which are very important for breeders and field users. Geographic information systems gathered information about the environmental conditions under which crop wild relatives and landraces have acquired their adaptive traits improving the efficiency of the collecting, conservation, and use of plant genetic resources. The spatial-modeling analysis found the temperature seasonality and annual precipitation of the driest month were the most limiting factors for the distribution of plant species in the northern part of Albania; the annual mean temperature and maximum temperature of the warmest month for central Albania; and the maximum temperature of the warmest month, precipitation seasonality and precipitation of driest month for southern Albania.

Keywords: environmental components, quality genes, genetic resources.

Introduction

Plant Genetic Resources (PGR), of actual or potential value, comprises diversity contained in landrace populations and crop wild relatives, providing vital genetic diversity for crop improvement and food security. Genetic diversity of PGR, providing raw materials for crop improvement [1] and abiotic-biotic stress resistance, adaptation to climate change [6; 13; 12], allows crops to evolve and adapt, and is a major source for plant breeders to meet the challenges of food security and environmental stability. Production factors such as the reduction of land availability and suitable for agriculture, environmental degradation, and global climate change are making breeders and farmers identify adapted genotypes suitable to be grown on delimitated factors such as poor soils, salt soils, drought, water logging, extreme temperatures, etc. [4; 3; 18]. To identify the adapted genotypes breeders; need a high genetic quality present in the gene bank and any information that may help to select parents with the desired traits.

The preservation of genetic resources is regarded as an important need for human society and the objective and collecting strategies of genebank aim to fill gaps shifting the goal to maximize the genetic representativeness of collection while minimizing the economic cost of collecting missions [17]. Doing this ex-situ collections of genebank are expected to be more representative of the existing genetic variation and the range of environmental adaptation, present in nature or in the field across the distribution of the target taxa or species.

Geographic information systems (GIS) tools gathered ording to Kresovich et al., (2006) [14], C&E data without environmental components of collecting sites are not very useful information about the environmental conditions under which crop wild relatives and landraces have acquired their adaptive traits improving the efficiency of the collecting, conservation, and use of plant genetic resources. The phenotypic characterization and evaluation (C&E) of PGR, have great importance in discovering the genes of interest for successful breeding crops. Accfor breeders. The most useful information on adapted genotypes and bioclimatic factors that delimitate the distribution of one species is related to the environmental components under which landrace populations and crop wild relatives have acquired their adaptive traits. Plant adaptation can be defined as the degree to which an individual or population can live and reproduce in a given environment with a unique combination of biotic and abiotic stresses [2]. The environment directly influences the phenotype and shapes genotypes through adaptation. Collected germplasm covering all adaptation range of a species, help breeders to detect the presence of adapted genotypes able to grow in extreme environments.

The paper aims: i) to assess the genetic diversity of plant genetic resources conserved in the Albanian Genebank as part of the National Inventory (NI), and ii) to analyse the quality and quantity of genes stored in ex-situ collections of the Albanian Genebank database.

Material and Methods

Materials include literature published on the management of PGR, gene bank data on crops' biological characteristics, their collecting source, germplasm storage type, C&E data of gene bank collections, and ecogeography applied to PGR. The statistical data of PGR from the gene bank database and The European Search Catalogue for Plant Genetic Resources (EURISCO) database, comparison analysis, synthesis, and interpretation of results used in research papers of respective fields were some of the methods used in this review for the assessment of qualitative and quantitative traits of the Plant Genetic Resources found in the Albanian NI.

Results and Discussion

Genetic diversity represented in the National Genebank: The Albanian Genebank was set up in 1998, and plant germplasm stored as seeds under long-term storage conditions, until 2000 consisted of 2686 accessions (acc.) of 46 different plant species. Plant germplasm was represented by the most important group of cultivated crops as follows: cereals 28%; maize 26%; legumes 10%; forages 9%; vegetables 7%; industrials 14% and others 6%. Comparison analysis by source and biological status showed that 46% of total germplasm, provided by ex-research Agricultural Institutes to the gene bank, was presented by narrow genetic base materials (breed materials, breeder lines, advanced cultivars). Collected genetic materials, with a potentially large genetic base, were only 14%.

Actually, the Albanian NI conserved nearly 5000 accessions of 205 different plant species. Plant germplasm is represented by the most important group of cultivated crops as follows: cereals and maize 36%; legumes 8%; forages 5%; vegetables 14%; medicinal and aromatic plants 11%, industrials 8% and fruit trees 23%. Comparison analysis showed an increase in the quality and quantity of ex-situ collections of the National Inventory and the composition of the National Inventory is changed in favour of plant species none represented in the gene bank. There was an increase in vegetables, landraces, crop wild relatives, and especially fruit tree species not presented before in the genebank database.

Qualitative analysis of NI by biological status: Comparison analysis by biological status, highly related to the quality of genotypes (useful genes) represented in the genebank, found that: 18% of all germplasm was composed of crop wild relatives and wild food plant species (or wild genes with a very large genetic base); 46% was represented by primitive cultivars and landraces (or genes with large genetic base); 18% was represented by breed or experimental materials (or genes with narrow genetic base) and only 2% was represented by advanced cultivars (or genes with very narrow genetic base). The analysis demonstrates the high presence of qualitative genes (of wild and landraces) with a very large genetic base and highly adapted to the disfavouring environmental conditions, which are useful to fulfil plant breeders' and farmers' quality and quantity needs. Representativeness analysis found a high presence of quality genes (64% of genes represented by primitive or landrace populations, crop wild relatives, and low domesticated genes per species), which are very important for breeders and field users.

The aim of the genebank is to conserve and use PGR providing basic materials to the crop experts to use genetic variability for the development of high-yielding cultivars with a broad genetic base. However, the utilization of these genetic resources depends upon their efficient and adequate information related to ecogeographic data, C&E data, molecular data [10] etc., which requires efficient standards and appropriate strategies.

For effective utilization of PGR in practice geographic data are very important for the plant breeders. Kresovich et al., (2006) [14] said that collecting germplasm without geographical data would not be very useful to the breeders. Geographical data help the breeders to verify how genetic diversity in nature or in the field is represented by genebank, and to identify the adapted genotypes for the specific areas. Witcombe et al., (2008) [18], Mackay (2011) [15], Khazaei et al., (2013) [13], and Gixhari et al., (2016) [12], found that geographic data is highly related to the identification of adapted genotypes that can be grown on delimitated growing factors such as poor soils, salt soils, drought, waterlogging, extreme temperatures, etc. as stated in [9, 5]. The genetic materials of Albanian NI with geographic environmental information represent 56% of the total germplasm stored in the genebank.

Geographic tools: Genebank uses GIS tools to gather information about the environmental conditions under which crop wild relatives and landraces have acquired their adaptive traits improving the efficiency of the collecting, conservation, and use of plant genetic resources. Similar to Mólnar et al., (2004) [16] and Farroq (2002) [8] the Albanian genebank using GIS tools has identified and collected *Aegilops* species with wide genetic variation for disease resistance, drought, and salt tolerance. The spatial-modeling analysis found the temperature seasonality and annual precipitation of the driest month were the most limiting factors for the distribution of plant species in the northern part of Albania; the annual mean temperature and maximum temperature of the warmest month for central Albania; and the maximum temperature of the warmest month, precipitation seasonality and precipitation of driest month for southern Albania [11].

Prospects

Improvement of the genetic quality of plant germplasm requires prioritizing of collection of landrace populations, crop wild

relatives, and low domesticated plant genes, which are very important for breeders, field users and production factors. IS tools gathered information about the environmental conditions under which crop wild relatives and landraces have acquired their adaptive traits improving the efficiency of the collecting, conservation, and use of plant genetic resources, are helpful for the collecting, conservation, efficient uses of PGR, regeneration, plant breeding, precision agriculture, environmental conservation, rural development, and on-farm. An increase in GIS tools is expected in the present decades, particularly as regards the challenges implied by global climate change for agriculture, in select germplasm sets containing specified traits, and identifying the most suitable sites for conservation and regeneration, as a key factor in reducing genetic erosion.

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LOOKING FOR LANDSCAPE LAYERS IN TIRANE - VORE ITINERARY, HOW CAN WE BRING TO LIGHT NEW INTERPRETATIONS OF EXISTING LANDSCAPES?

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Abstract

Albania has changed and transformed a lot the urban and rural landscape in the last three decades. Ecological systems are understood as a transformation of fields. These transformations we can read and define through different layers, from maps, narratives and photographic readings.

What data we can bring to light? One of the axes with the most remarkable change over the last 30 years is the Tirane-Vore-Durres highway. This axis has the largest economic potential and one of the axes with the highest fluxes of exchange. Being in the crossroad between North and South and East and West, connecting Tirana with the Port of Durres, it is one of the areas which has been heavily transformed. In this axis one can find a high diversity of landscapes which are merged along the transport corridor. One may find rural, agricultural, natural, industrial, urban landscapes which all intersect with each other in a very strong way. In this highly diverse axis, besides the classical layers of landscapes, there are also landscapes which evolve at the intersection between these layers. It is these ones that represent a high interest of research. The aim of this paper is to understand, analyze and identify the different layers of landscape in the area, bringing to light the tensions that arise at the intersections between the different layers. The analysis will be conducted through a multicriteria analysis of the different types of landscape layers found in the area.

Basic types of landscapes will be defined, and following the criteria for each, the territory between Tirane and Vore will be analysed. Multi-criteria analysis will include aspects like land-use, infrastructure, building use and functions, natural or agricultural uses as well as any other manmade or natural features. These results will bring new light in categorizing landscapes and providing new ideas of landscape planning for the region. Could this landscape be a new guide for the development axis of Tirana-Vore?

Keywords: layers, urban/rural landscapes, transformation, intersection

1- Introduction

The Tirana – Durres region has been one of the main growth areas in Albania after the 1990s. The dynamic development of the region has been manifested in population, economic and urban growth over the past three decades. The axis that connects the two main cities, Tirane and Durres, following the construction of the highway in the 1990s, has become one of the most important business hubs in Albania and in the region (Aliaj, 2008). Practically, the continuity of the business along the two sides of the highway has unified the cities of Tirane and Durres. Meanwhile, the town of Vore, situated in the middle of the two main cities, has too grown in importance.

What once was a slow, rural connection between Tirana and Durres, now it is a fast, business hub, which represent the core of the Albanian economy. The area has very quickly changed from an agrarian oriented development towards an industrial and service oriented one. The urbanisation of the area has happened quickly, often without appropriate planning or coordination from local and national authorities. The informal development approach, combined with the lack of planning and infrastructure has created different types of landscapes in the area.

Within the Tirane-Durres highway, the segment between Tirana and Vora is the one which has had the highest intensity of development. This is visible by the extensive industrial development along both sides of the highway as well as the extension of the sub-urban areas of Tirana towards this axis. Additionally, the town of Vora too has expanded, often at the expense of the loss of agricultural land.

In this highly diverse axis, besides the classical layers of landscapes, there are also landscapes which evolve at the intersection between these layers. It is these ones that represent a high interest of research. The aim of this paper is to understand, analyze and identify the different layers of landscape in the area, bringing to light the tensions that arise at the intersections between the different layers. The analysis will be conducted through a multicriteria analysis of the different types of landscape layers found in the area.

The objective of this paper is to also identify persistent types or characteristics of landscape which have resisted the pressures of change. It is this type of elements, as well as finding of landscape characteristics at the intersection of the different typologies that are the objective of this paper. The results of the paper will be used in further studies for the simulation and

development of new landscape strategies for the future development of the area.

The paper is organized in 4 different chapters. The next chapter discusses the main theoretical concepts, the third chapter discusses the wider regulative framework in the region in terms of regional and local planning documents. The fourth chapter focuses on an analysis of landscapes in the area, while the last chapter is focused on the main conclusions and recommendation for further studies. From a methodological perspective, the paper is based on literature review, content analysis of planning documents as well as analysis of historic maps of the area.

2- Theoretical Framework

The origins of the word landscape come from the Germanic languages based on the concept of "lantscep", basically connecting a bordered territory (the land) with reclamation and recreation (the "scep") (Antrop, 2005). In a certain sense, landscape represents the visual manifestation of the territorial identity (Antrop, 2013). Meanwhile, Greider and Garkovich (1994) define landscape as … the symbolic environments created by human acts of conferring meaning to nature and the environment, of giving the environment definition and form from a particular angle of vision and through a special filter of values and beliefs (p1).

Categorizing landscapes has been difficult over the years. Very often, this has been driven by concepts related to land-use planning, where a clear-cut and rational division between different land-uses is made for purposes of development or management. However, this clear cut definition, this strict division does not work any longer with the dynamic development that is occurring in the current world. It is very difficult to make a clearcut division between urban landscape (traditionally defined as landscape dominated by human alterations to the natural environment), rural landscape (defined as landscape predominated by agrarian activities) or natural landscape (landscape dominated by natural environment). Additionally, even these landscapes within themselves have many further definitions or categorizations. Few authors, however, will explicitly mention the rural–urban transition zone as a specific landscape. For example, Allen 2003, defines the peri-urban landscape or otherwise known as the transition zone as a mosaic of agricultural and urban ecosystems, subject to rapid change with a large social mix and with clearly measurable distinctive features.

Therefore, considering this aspect, rather than focusing on the traditional divisions of landscape, becomes more important to analyse some features, persistent to the initial notion of defined by Antrop as the visual manifestation of territorial identity. Hence, for the purpose of this study it becomes important to analyse some of the main characteristics of landscape that have resisted time, some of the strong features of change, and some other aspects such as landmarks that will serve as the basis for the definition of "new" layers or types of landscape in a given region.

3- Regulatory Framework in Tirane-Durres Region

The Tirane – Durres Metropolitan area is mainly defined by the axis of the highway that connects the two cities. In Albania there are no regional authorities, hence, development and planning is either conducted at the national level, for issues of national importance, and at the municipal (local) level through the general local territorial plans. It is worth to mention that in Albania there is no legal framework that regulates landscape Allkja, L. (2020). This is something which is done either by spatial/ territorial planning or by environmental plans. Along the Tirane-Durres motorway there are four municipalities such as Tirane, Vore, Shijak and Durres. For the purpose of this study, only the segment between Tirane and Vore is taken in consideration. While taking a closer look at the plans that may affect the Tirane-Vore segment, there are three main plans:

- The Cross Sectorial Integrated Plan for the Tirane-Durres Economic Area
- The General Local Territorial Plan of the Municipality of Tirana
- The General Local Territorial Plan of the Municipality of Vora

The Integrated Cross Sectorial Plan of the Tirane-Durres Economic Area offers a comprehensive vision for the development of the area in the next 15 years. It is an "extension" of the National General Territorial Plan. The plan was approved in 2016 and served as a guide to local authorities to prepared their plans afterwards.
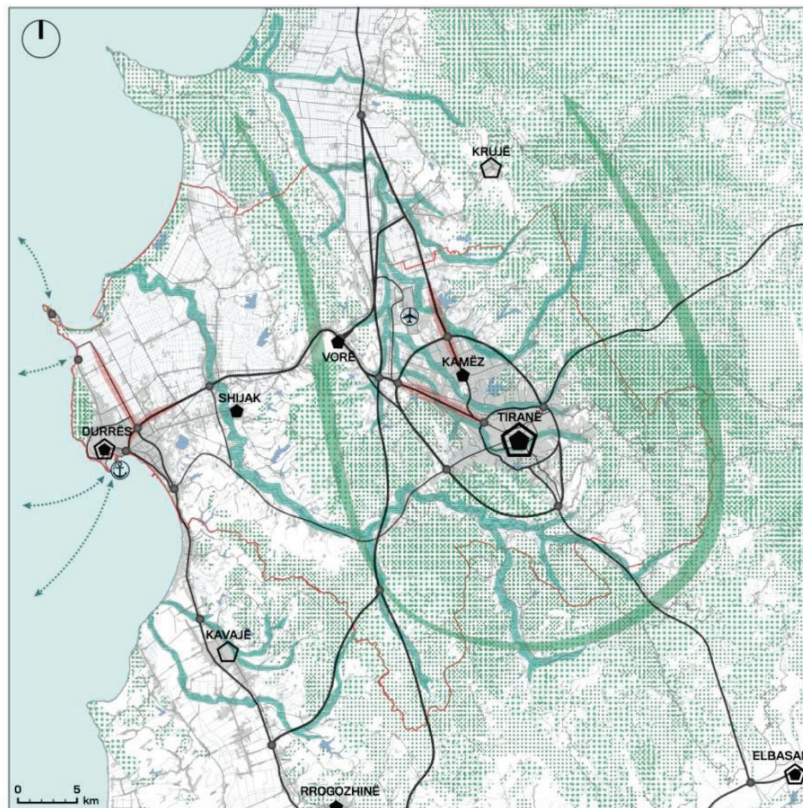
(AKPT, 2017)

The plan has a strong economic vision, complemented by policies focusing on different sectorial policies such as infrastructure, environment, rural development etc. However, when it comes to landscape planning, landscape design or even less so landscape architecture, there is a major shortcoming. There are few, if no recommendation, and the only related to landscape focus on protection of natural landscape.

The same thing can be said also about the General Local Territorial Plans of the Municipalities of Tirane and Vore. Also, these plans fail to regulate or offer recommendations in terms of landscape. While the municipality of Tirana has a more ambitious vision, typical of a capital city, the municipality of Vora focuses mostly on regulating land-uses. Nevertheless, while the planning framework in Albania has evolved towards a spatial and integrated approach, it still fails to integrate issues of landscape. It is predominantly driven by urban issues and focus mostly on urban regulation and development. Therefore, neither of these plans are capable of supporting landscape with the way they are conceived, having a greater urban focus as wellas a typical land-use approach.
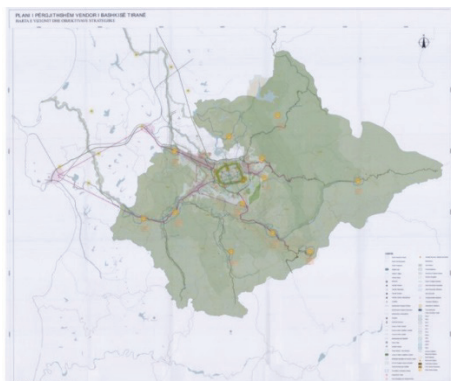
(Bashkia Tirane, 2016)   Bashkia Vore (2018)
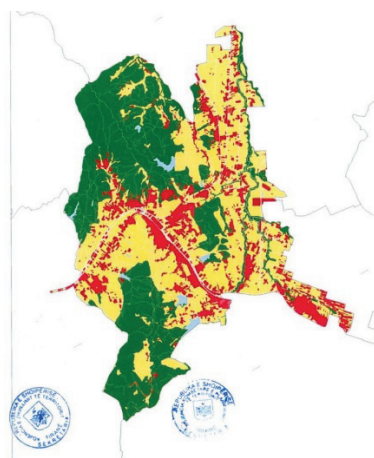
4- Analysis of Tirane - Vore Segment

The Tirana and Vore Segment until the 1990s has been a predominantly rural area. The major change has occurred in the 1970s with the expansion of the settlement of Vore to a small town of 10,000 inhabitants.

(Asig- https://geoportal.asig.gov.al/map/?auto=true)
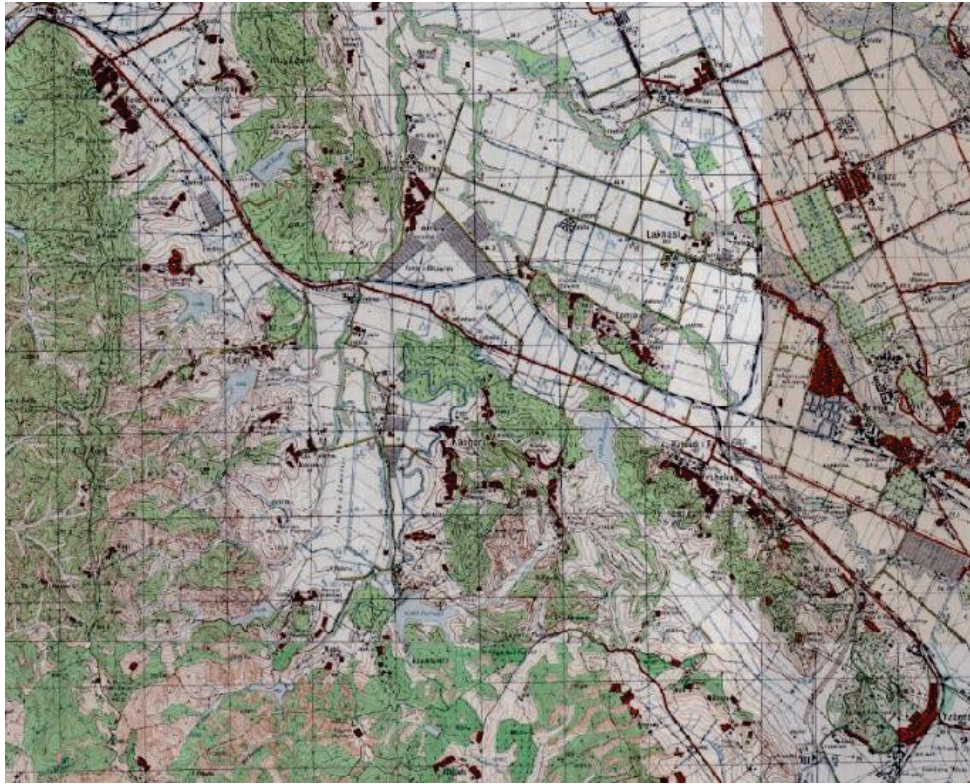
From the above image, it can be seen that the Vore-Tirane Segment is quite rural. The field part is mainly organized in agricultural parcels, while the hillsides, were converted in agricultural terraces for production.
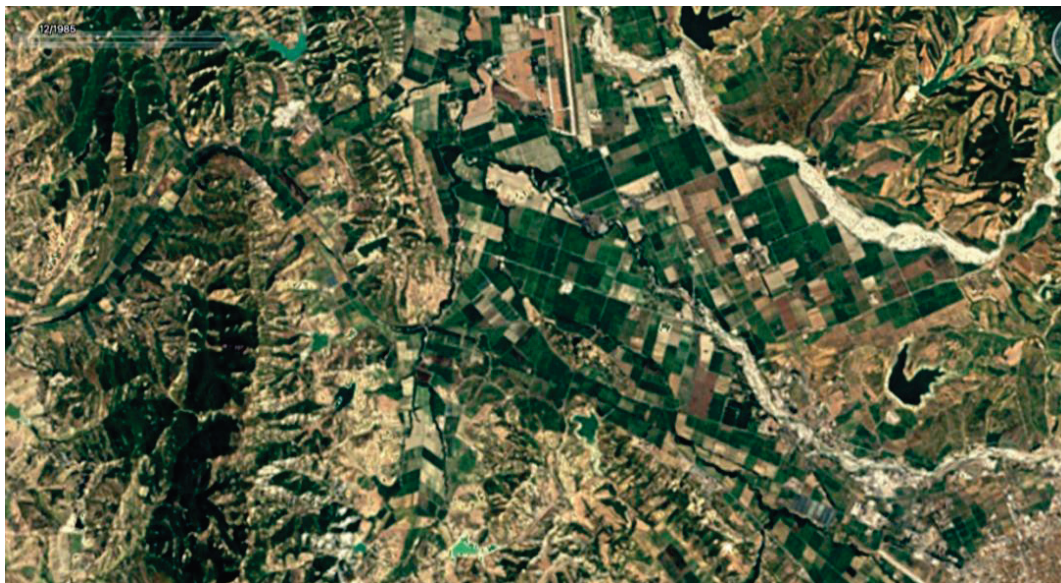
(Google Earth, image of 1985)

Meanwhile, after the 1990s, the area has rapidly changed. The development of the motorway, lead to a concentration of the businesses along both sides of the highway. This combined with informal housing development led to a vast change in the landscape.

(Google Earth, image of 2003)

In the early 2000s the development already had started to emerge, while nowdays, it is consolidated and continues to intensify.
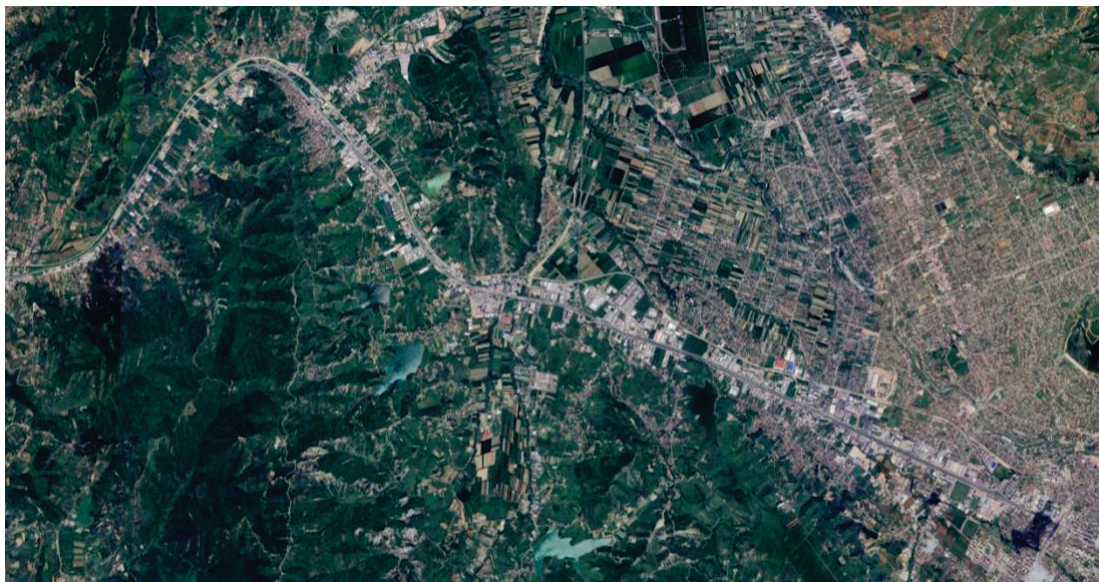
(Google Earth, 2023 Image)

So, considering these changes, one may ask, what are the main features that have persisted over the time area? what are some of the strong features of the current days that will not change? How can we use these features in landscape design?

Based on this historic map analysis we can highlight the following elements from this segments:

1- *Area of Old Vore* 45

Origin of the town of Vore, what once was a rural settlement now is the periphery or a small city. This rural area continue to retain its character, although interventions have been made in infrastructure. The "Old Vore" is a strong feature, composed of 2-3 story villas. One of the most typical characteristics of this area is the home garden, usually used to grow veggies and fruits for daily family use.

2- *Tirana – Vore Hills*
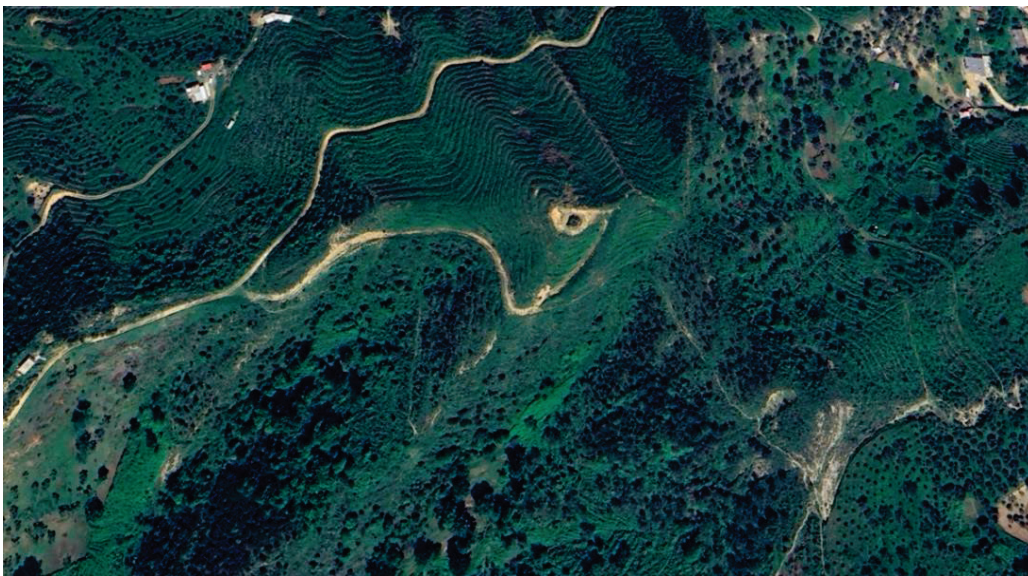
The hills of the Tirana – Vore region have been used for agriculture for a while. This was intensified in the period 1945-1990 through the terracing of hills for agricultural purposes. After the 1990s, agricultural produce slowed down due to the failure of state cooperatives. Most of these hills, especially in the Kashar side were under development pressure. Nevertheless, now with the strengthening of legal procedures of planning, with low chances of (urban) development, the inhabitants have returned to use these hills for agricultural purposes. Mostly, they are being used for olive trees or growing vineyards.

3- The Industrial Corridor

The industrial development along both sides of the high-way is there to stay. It is a strong feature of the area and it will not change. The development is continuing and even the few remaining empty plots will be soon developed.

4- The Lakes
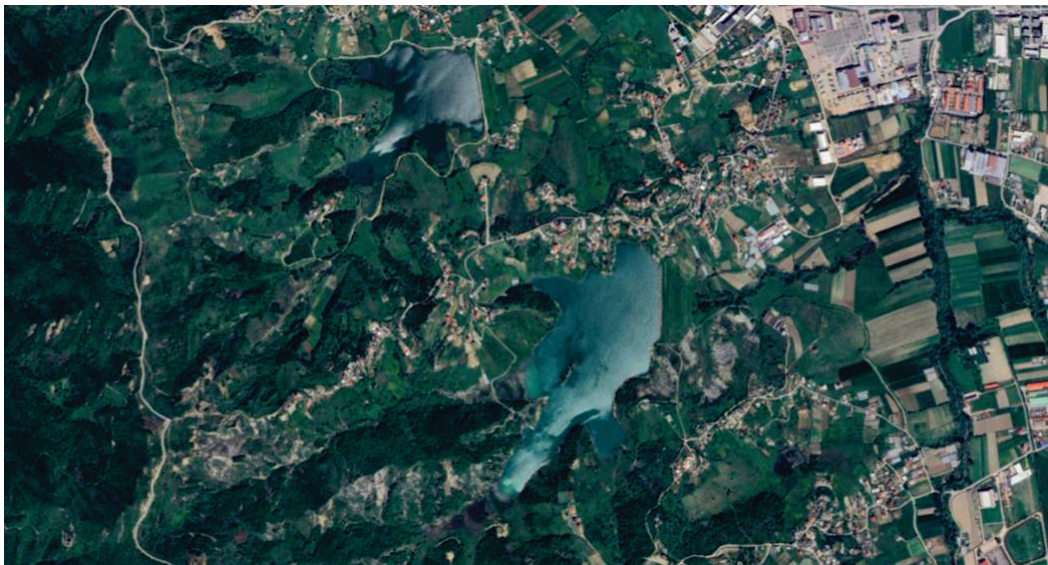
These are man-made lakes, used primarily for agricultural purposes. There are several of these lakes (reservoirs) along the axis, with the Kashari Lake being one of the bigger ones. These lakes are under pressure of development as they have currently lost their purpose for agriculture. Hence, they represent one of the features that is currently under threat and care should be taken on how to develop their surrounding area.

5- Conclusions and Recommendation

This paper makes a first analysis of some of the main changes in the Tirane-Durres highway, with a specific focus on the Tirane-Vore segment. Following an analysis of the main changes and densification of the area, and based on the theoretical concepts, it tries to identify some of the areas which are at the fringe. It tries to identify some of the main persistent aspects of a rapid changing region as well as some of the features that will continue to stay there. The paper makes also a summary of some of the main documents of planning for the area.

As a conclusion it can be said:

1- The area has been rapidly urbanized over the past 3 decades leading to a somewhat chaotic development

2- Landscape planning and landscape design have been neglected and continue not to be part of the planning policies. It would be recommended that spatial plans to be associated with an additional document in the framework of a landscape plan or landscape regulation

3- In the Tirane-Vore axis there have been identifies some main features such as the highway, the Old Vore, the Hills and the Lakes. These four features of the territory need to be better understood from a landscape perspective with further studies as they can be the key to future development of the area

4- It is important to further analyses features such as the ones identified in this article.

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UNVELING THE CULTIVATION POTENTIAL OF BLACK SEED IN ALBANIA USING SOME AGRO- MORPHOLOGICAL CHARACTERISTICS

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ABSTRACT

Nigella sativa L. (botanical family, Ranunculaceae) is one of the most admired medical oil seeds in history. Nigella sativa seeds contains active phyto-chemicals (i.e., phenolics, thymoquinone, fatty acids, tocols, sterols, polar lipids, amino acids etc.) with diverse biological effects. Use of seed and black seed oil in the world is increasing due to diverse medicinal and food properties. With regards to this, the goal of this study was to evaluate and characterized of black seed based on some agro-morphological traits: plant height, capsule number, capsule weight, number of seeds per capsule, 1000- seed weight, and yield. For the experimental purposes, domesticated population of black cumin was used. Investigation was carried out during May-August 2023, in a completely randomized design with three replications at the Didactic Experimental Field of Agricultural University of Tirana under field conditions using good agricultural practices, for the first time described for agro-ecological conditions of Albania. With defined appropriate growing technology, Albania farmers will be able to continuously provide these raw materials with consistent quantity and quality, intended for application in food, pharmaceutical and cosmetic industries.

Key words: *Nigella Sativa, black seed, evaluation, domesticated population, characters*

1.INTRODUCTION

Nigella sativa L., commonly referred to as black cumin or black seed [2], is an annual flowering dicotyledon angiosperm herb that self-pollinates [1]. It belongs to the Ranunculaceae family and is cultivated in various Mediterranean countries [3]. This versatile plant is utilized for both edible [6] and medicinal purposes [5] due to its rich array of essential constituents, which include vital oils, essential fatty acids, vitamins, carbohydrates, minerals, proteins, and indispensable amino acids [11]. These bioactive compounds exhibit a diverse range of pharmacological attributes, encompassing antihypertensive, diuretic, gastroprotective, antibacterial, anti-inflammatory, anticancer, and wound healing properties, [7], [8], [9], [10]. Furthermore, they contribute to the enhancement of respiratory and nervous system functions [4]. The cultivation of Nigella sativa in Albania holds the potential to yield substantial benefits, spanning health, economic, agricultural, and cultural domains.

2.MATERIALS AND METHODS

2.1 Collection of population

Eight different populations originating from Syria, Egypt, Turkey, South Arabia, were gathered from different sources.

2.2 Field experiment

The present research was carried out at the Didactic Experimental Field of the Agricultural University of Tirana 41.3998180, 19.7285460 during May- August 2023 where the average temperature reported for this period is 28.25^0C (average high: 35.75, average low: 20.27) and average accumulated precipitation is 42.5mm [12], using a randomized complete block design with three replications. Each population in each replication consisted of three rows with 30cm apart and 2.5m in length with inter row plant distance of 5cm. Good agricultural practices were applied to the experiment throughout the growing season. Different agronomic traits including plant height (PH), capsule number (CN), capsule weight (CW), number of seeds per capsule (SC), 1000- seed weight (SW), and seed yield\plant (SY) were evaluated. Statistical analyzes (ANOVA and correlation) were performed using Excel Office 2019.

3.RESULTS AND DISCUSSION

The ANOVA results indicated significant differences in agro-morphological traits among *N. sativa* L. populations.

Plant Height: Population 8 exhibited the highest PH (42cm), while population 2 had the shortest (17.11cm). *P-value* 4.62789E-35

Capsule Number: Population 8 had the highest CN (39), and population 2 had the lowest (11). *P-value* 5.4073E-20

Capsule Weight: Population 8 had the highest CW (0.31g), and population 2 had the lowest (0.18g*). P-value* 1.51306E-08

Number of Seeds per Capsule: Significant differences among populations. P-value 5.55063E-15

Population 8 had the highest SC (78.5), and population 2 had the lowest SC (37.9)

1000-Seed Weight: Population 6 had the highest 1000-seed weight (3.35g), while population 4 had the lowest (2.7g). *P-value* 0.002533008

Seed Yield: Population 8 had the highest seed yield (12.8g), and population 2 had the lowest (2.28g). *P-value* 2.05218E-17

Positive correlations were observed among the studied traits, indicating their interdependence.

Tabel 1. Analysis of the correlation between all morphological traits studied

	PH	CN	CW	SC	SW	SY
PH	1					
CN	0.824972	1				
CW	0.941789	0.921149	1			
SC	0.935057	0.907464	0.993707	1		
SW	0.941789	0.921149	1	0.993707	1	
SY	0.842755	0.99853	0.938792	0.927665	0.938792	1

This analysis is positive for all the traits studied; PH (r= 1), CN (r= 0.82), CW (r= 0.94), SC (r= 0.93), SW (r= 0.94), SY (r= 0.84).

4.CONCLUSIONS

The study conducted on eight distinct populations of *Nigella sativa L.* in the ecological conditions of DEF of AUT provides valuable insights into the agro-morphological characteristics of this versatile plant. The research revealed significant variations among these populations, particularly in traits like PH, CN, CW, SC, 1000-SW, and SY.

Among the eight populations of *Nigella sativa L.* population 8 exhibited several noteworthy for all the characteristics studied

These findings underscore the potential for tailored cultivation practices in Albania that can lead to consistent and high-quality raw materials. Such raw materials have wide-ranging applications, from the food industry to pharmaceuticals and cosmetics. As Nigella sativa proves its adaptability to Albanian conditions, it offers a promising avenue for economic, agricultural, and cultural development, strengthening its position as a valuable resource in this region. This study not only enhances our understanding of this medical plant but also highlights its significance in the context of sustainable agriculture and economic growth in Albania.

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ORNAMENTAL BULBOUS PLANT PERFORMANCE ON MEDITERRANEAN GREEN ROOF ENVIRONMENT

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Abstract

Green roofs have gained increasing popularity in urban environments for their numerous ecological and aesthetic benefits. This two-year study (Sept. 2021 – Sept. 2023), investigated the growth, adaptability, and performance of 11 bulbous plant species, on three experimental green roof plots situated on the terrace of a five-story building in the city center of Tirana, Albania. In a departure from traditional bulb planting practices, none of the bulbs were removed after foliage decomposition during the study period. All bulbs were planted in plots measuring 1 meter by 75 centimeters with a soil depth of 14 cm, despite being planted at a depth of 10 cm. Watering was provided exclusively through a drip irrigation system during the months of June, July, and August, with a frequency of every other day, lasting for 30 minutes at 9 am. Each experimental plot (P1, P2, P3) contained a total of 55 bulbs (5 from each of the 11 selected species), interplanted with three different ground cover plants for succession planting (P1-Ajuga, P2-Verbena tenuisecta, P3-Rosa spp.). Observations included flower count, vegetative growth, and plant rot for all bulbs and cover plants. Plant composition and bulb positioning were identified as significant factors influencing plant rot, with certain summer bulbs displaying aggressive growth that occasionally suffocated ground covers. A reduction in flower count was observed in some tulip species during their second year of growth. This research provides valuable insights into the viability of bulbous plants on green roofs in an urban setting, shedding light on planting practices, bulb retention, and the influence of plant composition on overall performance. The findings contribute to the understanding of sustainable urban landscaping and can guide future green roof designs and plant selection in similar climates.

Keywords: green roof vegetation; bulbous plant performance; companion planting; succession planting; urban ecology

Introduction

After the 2015 Administrative and Territorial Reform (TAR) that Albania went through which resulted in the amalgamation of 373 local units to 61 municipalities, the social dynamics, natural and built environment of most Albanian cities had changed drastically. This includes a series of positively reflected changes such as lower rate of informality, improvement of infrastructure and above all a special highlight on designing of public places such as parks and plazas.

Tirana, the capital city, is at the forefront of these transformative initiatives. It has introduced newly designed public spaces with inclusive features for easy accessibility, opted for improved vegetation options that support pollinators and wildlife, and witnessed the development of various new buildings, both private and public, like schools, institutions, houses, bus stops, and urban installations, many of which now feature green roofs or similar greenery installations.

The chosen vegetation of this green roofs varies, including grasses, shrubs, annual and perennial plants. Little research is conducted though on bulbous plant growth on these green roofs, and further more in combination with other vegetation such as cover crops.

Hence, the discoveries made on the experimental green roof plots can enrich our comprehension of sustainable urban landscaping. They can also serve as valuable insights to steer the future design of green roofs and plant choices, not only in Tirana but also in cities sharing similar climates.

Materials and Methods

Three experimental green roof plots, each measuring 1 meter by 75 centimetres and featuring a soil depth of 14 cm, were constructed on the rooftop terrace of a five-story building located in the heart of Tirana, Albania. To create these plots, 2x15cm pine wood planks were cut to the appropriate dimensions and securely fastened together. Subsequently, the wooden framework was coated with two layers of varnish and allowed to dry for a day.

A dimpled geomembrane sheet with a thickness of 4mm was installed first to keep moister and ensure air ventilation between the bottom of each plot and the roof, than a geotextile made out of non-woven polyester needle-punched fabric was layered on top for drainage and as a plant root barrier, were stappled together to the wooden frame.

The growing medium used was a commercially available universal soil substrate. Watering was provided exclusively through drip irrigation system during the months of June, July, and August, with a frequency of every other day, lasting for 30 minutes and starting at 9 am. 11 bulbous plants within the genera of *Tulipa*, *Lilium*, *Allium*, *Iris*, *Freesia*, *Narcissus*, *Hyacinthus*, *Gladiolus*, *Anemone*, *Crocus*, and *Muscari*, were tested. Each experimental plot (P1, P2, P3) contained a total of 55 bulbs (5 from each of the 11 selected species), interplanted with three different ground cover plants for succession planting (P1-Ajuga, 10 plants, P2-Verbena tenuisecta, 10 plants, P3-Rosa spp., 5 plants). The position of the bulbs and cover crops was identical for each plot (P1, P2, P3), including sun exposer and wind conditions.

Results and Discussion

55 Bulbes // Plot

LEGENDE

1. Tulipa
2. Lilium
3. Allium
4. Iris
5. Freesia
6. Narcissus
7. Hyacinthus
8. Gladiolus
9. Anemone
10. Crocus
11. Muscari

Plot 1 – Ajuga
(10 Plants)

Plot 2 - Verbena tenuisecta
(10 Plants)

Plot 3 - Rosa spp.
(5 Plants)
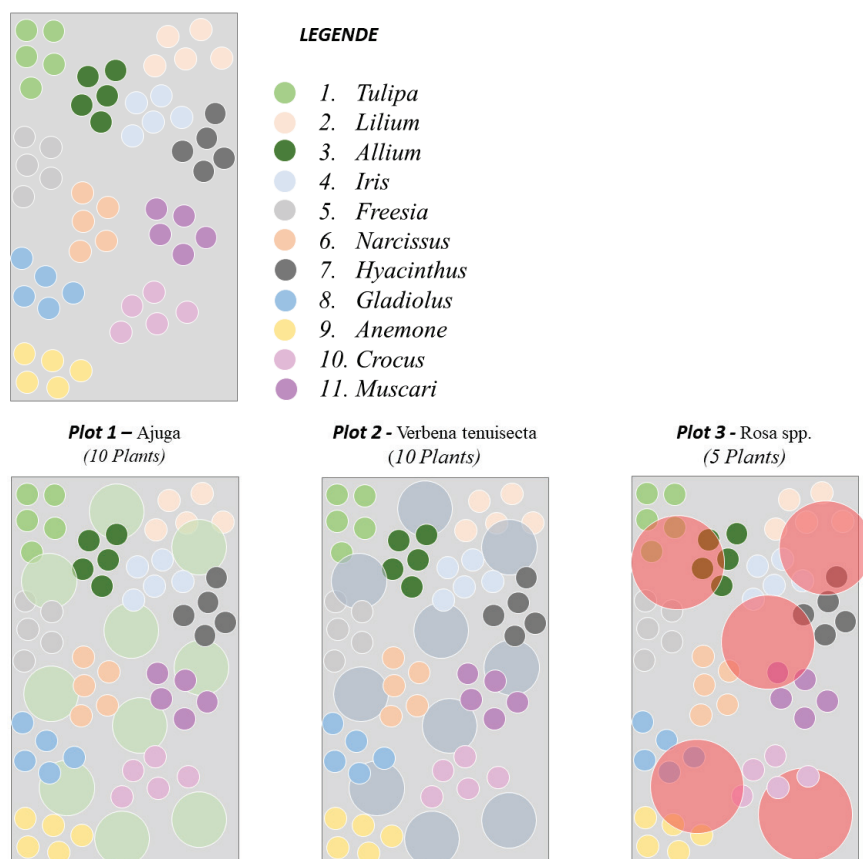
The two-year study focused on the growth, adaptability, and performance of 11 bulbous plant species on green roofs, in combination with cover crops. The research identified several key findings that shed light on the viability of such plant combinations in an urban setting:

1. **Bulb Performance with Cover Crops:** The experiment demonstrated that bulbous plants can coexist and grow successfully alongside cover crops on green roofs. This observation supports the concept of companion planting in green roof design, where different plant species can complement each other's growth.

2. **Importance of Bulb Positioning:** One crucial factor influencing plant performance was the positioning of the bulbs. Some bulbous species exhibited vigorous growth and, in certain cases, overshadowed the cover crops, leading to a reduction in their growth.

3. **Short-Term Study Limitations:** It's important to note that this study spanned two years, which is relatively short to fully understand the long-term dynamics of bulbous plants and cover crops on green roofs. To gain a more comprehensive understanding of the sustainability of this combination, future research should consider extending the study period. In this regard, future research in this field could explore variations in irrigation practices, including plots with no irrigation, to assess the impact on plant survival and performance. Furthermore, investigating the use of organic nutrients could provide insights into enhancing the long-term sustainability of green roofs in urban environments.

In conclusion, the study offers valuable insights into the potential for bulbous plants and cover crops on green roofs. These findings can inform future green roof designs and plant selections, not only in Tirana but also in cities with similar climates, contributing to the development of sustainable urban landscaping practices.

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EVALUATION OF BUCKWHEAT (*FAGOPYRIM ESCULENTUM*) GENETIC DIVERSITY AND ITS POTENTIAL FOR CULTIVATION IN ALBANIA.

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Albania is characterized by high biological and natural diversity due to its diverse topography and climate, with pronounced changes in a relatively small territory. Albania possesses diverse vegetation with special plant resources, with a potential for cultivation of many new cultures. Buckwheat (*Fagopyrim esculentum*) is an agricultural crop which in recent years has increased in popularity as a grain, and is exclusively cultivated and consumed in Russia, Japan and China. Buckwheat seed is gluten free and has a high level of quality protein, with a lysine content over 5%. Buckwheat also is used extensively in sustainable agriculture, as a cover crop, natural plant protection and it is excellent for human nutrition. Buckwheat is not known in Albania, where its cultivation is non-existent. The aim of this study is the introduction of buckwheat to Albanian agricultural production and the evaluation of the potential of this crop as a second crop after the early harvest of cereals or legumes within a year increasing crop profitability. 12 genotypes with two sowing dates September 2023 (planted) and May (2024), and three potential areas with different climate conditions have been selected for testing yield-related parameters and seed nutritional qualities.The best genotypes performing under Albanian climate condition will be selected for breeding.

Key words: *Fagopyrim esculentum*, buckwheat, Albania, cultivation, genotypes.

PHYTOCHEMICAL COMPONENTS OF *ACHILLEA MILLEFOLIUM* AND THEIR MEDICINAL PROPERTIES

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In recent years, extensive research has been carried out in the field of medicine through medicinal products of herbal origin. *Achillea millefolium* is a well-known plant of the Asteaceae family that has been studied for its therapeutic properties.The health benefits of these plant extracts result from a variety of secondary metabolites that include flavonoids, phenolic acids, terpenes, guaianolides, phytosterols, fatty acids, and organic acids. Some extracts and isolated compounds of the plant show significant inhibitory, antioxidant and antimicrobial properties of tyrosinase and thus are interesting candidates for active ingredients of products for different health problems. In this study we reviewed the latest in vitro, in vivo, and clinical studies on the phytochemical constituents and new formulations of *A. millefolium* for the treatment of different health problems. Data were collected from published articles on in vitro, in vivo, and clinical studies on phytochemical constituents and novel formulations of *A. millefolium*. Studies show that the use of different types of *A. millefolium* extracts improves different health problems.

Keywords: *Achillea millefolium, phytochemical constituents, health*

Introduction

Achillea millefolium is a medicinal plant of Asteraceae family widely spread throughout the world and has been used since ancient times. The name Achillea was adopted by Linnaeus, taking up the Greek term Achilles's, which means herb of Achilles, with reference to the plant used by the hero of the Trojan War to heal the wounds of his fellow soldiers[14]. It is an herbaceous plant growing up to 80 cm with straight, unbranched stem, white flowers like umbrella and green to gray leaves. Itis lightly aromatic with bitter taste, blooming from June-November. It is very widespread in mountain massifs in meadows and in some cases in forests. It is found starting in the low areas (500-600m above sea level) and reaches up to the mountain heights 2400 m above sea level. *Achillea millefolium* is found throughout Albania, from the northernmost to southernmost regions (Tropoje,Shkoder,Kukes,Tirane,Librazhd,Kruje,Pogradec, Permet,Delvine). The aim of this study is to review and identify the relevant data of the latest in vitro, in vivo and clinical studies on the phytochemical constituents and new formulations of *A. millefolium* for the treatment of different health problems.

Materials and methods

An extensive review of literature was made on *A. millefoilum* L.using published articles journals, and scientific databases in order to summarize the current state of the knowledge regarding the properties of *Achillea millefollium.* Also attempting to bridge the reports on the traditional uses with modern pharmacological data. Relevant data were obtained through electronic searches from various scientific databases including Google Scholar, Scopus, PubMed with the focus in ethno pharmacological properties of the *Achillea millefolium,* medicinal applications, and phytochemicals of the essential oils extracts and secondary metabolites. The findings of this review represent therapeutic characteristics of *Achillea millefolium* and account for its significant impact on the current and future medicine, especially green chemistry with nanoparticles that include this plant.

Results and Discussion

The current study reviews the most recent in vitro, in vivo, and clinical research on *Achillea millefolium's* phytochemical constituents and new formulations for treating various health issues. Our data are entirely from published articles discussing *A. millefolium's* in vitro, in vivo, and clinical investigations into novel formulations and phytochemical constituents. The findings indicate that the use of various A. millefolium extracts can enhance different health concerns. Achillea millefolium has been traditionally used for various health issues across different countries worldwide. In Italy, *A. millefolium* is utilized for menstrual problems, diuresis, urinary issues, toothaches, sedation, and gastrointestinal disorders [10]. In England, it is utilized for wound healing, nosebleeds, uterine hemorrhages, high blood pressure, respiratory infections, fevers, and rheumatic ailments [5]. In India, it is used for treating gastric problems, high blood pressure, and fever [9]. In China, it is used for snakebites, wounds, hemorrhoids, varicose veins, dysmenorrhea, and tuberculosis [2]. In South Africa, *A. millefolium* is utilized to treat arthritis, diabetes, general detoxification, nausea, and dizziness [4]. In Brazil, it is used for wounds, skin problems, diarrhea, and gastrointestinal issues [16]. Literature shows that *A. millefolium* has a variety of medicinal uses in different countries. Numerous phytochemical studies have been conducted to support traditional uses of *A. millefolium*. These studies have determined that many components within the plant's extracts are highly bioactive [7; 11]. The health benefits of *A. millefolium* extracts result from a variety of secondary metabolites, including flavonoids, phenolic acids, terpenes, guaianolides, phytosterols, fatty acids, and organic acids.
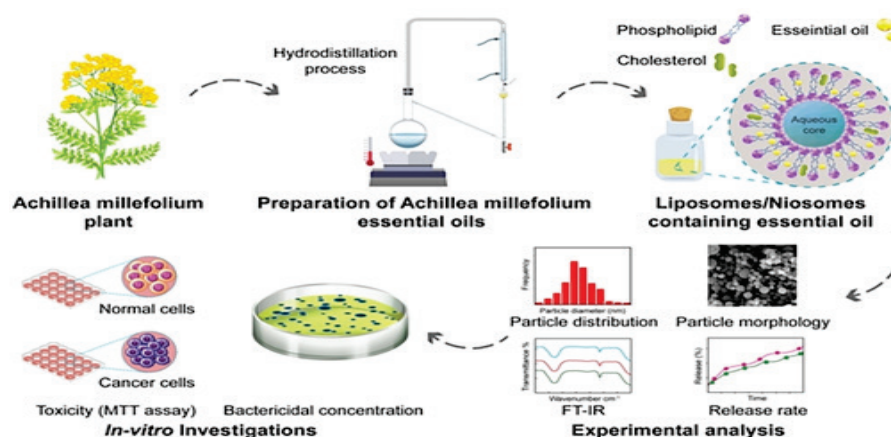
Figure 1: Nanoparticles of *Achilleamillefolium* in vitro investigations

Chemical constituents of *A. millefollium* are identified using various techniques, including hydro-distillation with gas chromatography, supercritical CO_2 extraction, and solid-phase micro-extraction (SPME).Distinctive pharmacological studies conducted on numerous in vitro and in vivo models have demonstrated *A. millefolium's* potential in exhibiting anti-inflammatory, antiulcer [1], anticancer activities [6], which validates its traditional uses. Due to its essential oil pharmacological activities, *A. millefolium* could prove to be a superior option for novel drug discovery.Green chemistry aims to develop efficient methods for synthesizing nanoparticles. It is a relatively new and emerging field in nanotechnology that provides economic and environmentally friendly benefits compared to chemical and physical processes. Nanomaterials used in Achillea millefolium are expected to have notable applications and can be potentially useful in pharmaceutical and biomedical industries. The developed nano-based systems were identified as lipid-based nano-carriers with promising potential for delivering essential oils, offering innovative and highly effective therapy for breast cancer and favorable antimicrobial outcomes, as reported in [8].

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FIRST FINDINGS OF THE GENUS *XIPHINEMA* SPP. (NEMATODA: *LONGIDORIDAE*) IN KOSOVO VINEYARDS

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Abstract

In Kosovo, grapevine production has been extended in recent years. Its main production region is located in Rahovec and neighboring municipalities. However, due to the favorable weather conditions of the country, important grapevine pests and diseases have developed. Therefore, the aim of this study was to investigate the genus *Xiphinema* spp. in symptomatic and damaged vineyards. In September 2022, as an appropriate time for sampling, sixty soil samples were taken and transferred to the laboratory for nematode extraction and further analysis. The extraction of nematodes was carried out using Flegg modified Cobb technique. Each sample was subjected to morphological and microscopic identification. Of sixty soil samples, twenty-four were morphologically identified as *Xiphinema* spp. Furthermore, single nematodes from the positive samples were subjected to DNA extraction with commercial kits. For molecular analysis, the D2-D3 expansion region of the 28S rDNA gene was amplified using forward D2A and reverse D3B primers. The PCR remaining product was then purified and will be used further for sequencing. This study confirmed the genus of *Xiphinema* spp. in Kosovo vineyards. Therefore, our further aim will be an initial evaluation of the impact of these ectoparasitic nematodes and their damage to the grapevine yield production.

Keywords: *Xiphinema* spp., grapevine, nematodes, Kosovo

Introduction

Grape is one of the largest cultivated crops worldwide [9]. However, Europe incorporates around 40% of the vineyard area in the world [6]. In Kosovo, the grapevine production area has been extended in recent years. Its main production area is in the Municipality of Rahovec and its neighboring municipalities. In 2021, the total vineyard area in Kosovo was 3471 ha [10]. Although the vineyard area has been increased, the problems due to pests and diseases also are rising. It is well known thatKosovo has favorable weather conditions for the development of many important pests and diseases affecting grapevine production. Despite common fungal diseases, interesting studies were conducted in previous years. The presence of important virus diseases, phytoplasma and insects affecting grapevine production was recorded in Kosovo [5, 2, and 7]. However, there is no data available about the presence of nematodes in affected vineyards. It is well known that the genus *Xiphinema* commonly called dagger nematodeis characterized by the presence of a stylet used for root tissue penetration. Recent studies revealed that annual crop losses caused by this genus are estimated to range between 8 to 15% of total crop production worldwide [1]. Particular species of this genus are vectors of several important plant viruses that cause significant damage to grapevine production [4]. Among dagger nematodes, *Xiphinema* index and *Xiphinema americanum* are pathogenic in vineyards and cause economic damage by feeding on the roots [13, 14].In order to know the current situation of grapevine nematodes in Kosovo, a survey has been conducted in symptomatic and damaged vineyards to focus our study on investigating the genus Xiphinema in affected vineyards.

Material and Methods

In Kosovo, vineyards have greatly expanded in the last ten years. However, no information is apparently available on the occurrence and distribution of the genus Xiphinema nematode in Kosovo. The present survey and the aim of our study suggested the importance of *X. index* as a vector of Grapevine fan-leaf virus (GFLV). This study was carried out in the Municipality of Rahovec which is considered the most important vineyard region in Kosovo. Sixty soil samples were collected in the late summer of the year 2022. Each sample consisted of 2 kg of soil collected from the rhizosphere 30-60 cm depth and transferred to the laboratory with a portable cooler for nematode extraction and further analysis. Each soil sample was extracted according to the EPPO protocol PM7/119 (1) using Flegg modified Cobb technique. Extracted samples were then subjected to morphological and microscopic identification using Olympus CX 43 Microscope (Tokyo, Japan) with 40-fold magnification.Of the sixty extracted samples, twenty-four were morphologically identified as *Xiphinema* spp. Furthermore, a single nematode from each morphologically positive sample was subjected to DNA extraction using Nucleo Spin® Tissue XS Kit (Macherey-Nagel, Duren, Germany).Universal primers D2A (5′-ACAAGTACCGTGAGGGAAAGTTG-3′) and D3B (5′-TCGGAAGGAACCAGCTACTA-3′) were used to amplify the D2–D3 fragments of the 28S rDNA gene [11].PCR amplification reactions were performed in a final volume (25 μl) containing 14.7μl of MGW, 2.5 μl of PCR buffer 10X (Qiagen), 2.5 μl of $MgCl_2$ 25mM (Qiagen), 1 μl of each primer (D2–D3), 2 μl of dNTPs 10mM (Qiagen)1 μl of extracted DNA and 0.3 μl of TapTaq 5U (Qiagen). The thermal cycling program employed an initial denaturation at 95°C for 5 min, followed by 35 cycles with a denaturation at 95°C for 30 s, annealing at 55°C for 40 s, and extension at 72°C for 2 min. A final extension was performed at 72°C for 10 min[8]. Amplification success was evaluated electrophoretically on 1% agarose gel.The remaining PCR product will be used for sequencing.

Results and Discussions

In this study, the determination of *Xiphinema* spp. was performed using an integrated approach based on morphological analysis combined with molecular-based techniques. Among the total number of sixty soil samples included in the present study, we distinguished twenty-four putative *Xiphinema* species using morphological characteristics. Morphological identification of the genus *Xiphinema* was carried out using the key described by [3]. *Xiphinema* (Cobb, 1913) is among the largest genera in the family Longidoridae and has a body length of 1.2–7.3 mm, habitus straight to spiral with a stylet composed of needle-like (Fig. 1).
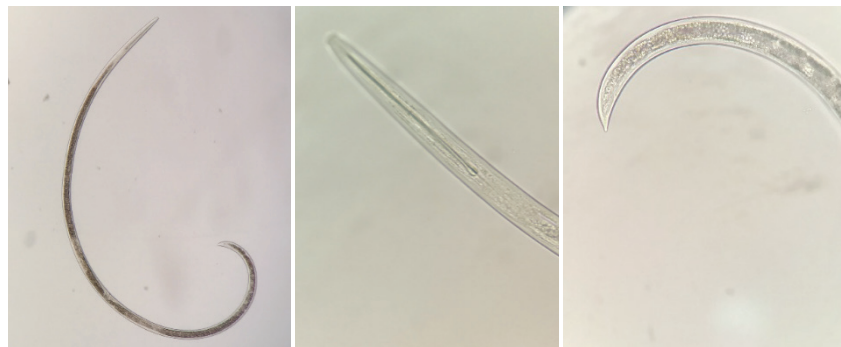
Fig. 1: Habitus of *Xiphinema* spp. (left), anterior part with stylet (middle), and posterior part (right)

In order to confirm morphological findings, single nematodes from each positive sample were subjected to molecular analysis. Universal primers D2A and D3B were used to amplify the D2–D3 fragments of the 28S rDNA gene as described by [12]. In each analyzed sample, the amplified product of the D2-D3 expansion domains of the 28S rDNA gene region produced single fragments of 730 bp and 980bp, respectively (Fig. 2).
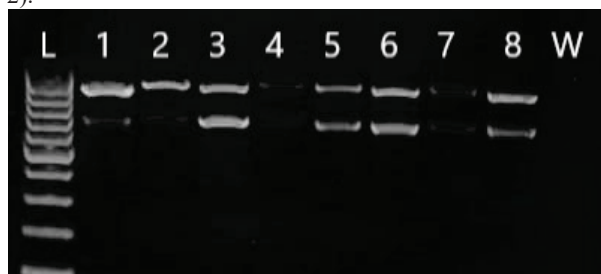
Fig. 2: Electrophoresis of the amplified DNA products in a molecular test using Universal primers designed by Nunn, 1992.

The PCR remaining product is currently prepared for sequencing. This study confirmed the presence of the genus *Xiphinema* spp. in Kosovo vineyards. Therefore, our further aim will be the determination of specific species of *Xiphinema* genus and the evaluation of the impact of these ectoparasitic nematodes and their damage to the grapevine yield production in Kosovo.

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IMPACT OF NITROGEN FERTILIZER APPLICATION RATES ON NITROGEN AND CHLOROPHYLL CONTENT IN WHEAT (*TRITICUM AESTIVUM* L.)

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This study aims to assess the correlation between nitrogen and chlorophyll levels in winter wheat leaves during its flowering phase and establish empirical relations between nitrogen and chlorophyll concentrations. A field experiment was conducted using a widely cultivated Austrian winter wheat variety (Arnold) in Eastern Austria, specifically at the Experimental Farm Groß-Enzersdorf of the University of Natural Resources and Life Sciences, spanning the vegetation period 2022/23. Leaves were sampled from wheat plants grown in the field and subjected to two distinct nitrogen fertilization levels (N50 and N100). We confirmed a close correlation between nitrogen and chlorophyll quantities in field-grown wheat. Elevated nitrogen levels in wheat correlated positively with increased chlorophyll content. Consequently, a favorable association was observed between, nitrogen concentration, and chlorophyll content in wheat plants at the culmination of the flowering phase. Increasing levels of K fertilization up to 100% of the plant demand increased the N content in the wheat grain.

Keywords: Winter wheat, nitrogen-chlorophyll relationship, nitrogen fertilization.

Introduction

Nitrogen is a primary nutrient for wheat growth and development. Its availability and uptake are pivotal in determining the plant's metabolic processes, biomass accumulation, and ultimately, its successful production. N represents one of the highest input costs in agricultural systems: therefore, environmental and economic considerations require the effective use of N fertilizer in plant production (Montemurro et al., 2007). Pressures created by intensive production methods could cause serious damage to the environment due to high levels of residual nitrate remaining in the soil at harvest (Shepherd et al., 2002). Excessive amounts and Inappropriate nutrient balance lead to low uptake efficiency and high fertilizer losses through runoff, leaching, denitrification, and volatilization, increasing pollution risks, and reducing microbial diversity in the soil. Alternatively, lower N rates can decrease economic returns (Scharf and Lory, 2003). Thus, efficient N utilization should be realized in agriculture for environmental and economic reasons (Stevens et al., 2005).

On the other hand, chlorophyll levels indicate a plant's photosynthetic capacity, and they directly impact its ability to capture and convert sunlight into the sugars and carbohydrates necessary for growth and reproduction (Adams et al., 2004). Investigating the relationship between chlorophyll concentrations in winter wheat leaves and grain production is pivotal for unraveling the physiological mechanisms underlying crop productivity.

This study explores the intricate relationship between nitrogen and chlorophyll levels within winter wheat leaves, specifically during its crucial flowering phase. By examining these elements, we aim to uncover the underlying correlations between nitrogen content, chlorophyll concentrations, and the subsequent grain production.

Material and Methods

Experimental Location and Crop Selection

The field experiment was conducted at the Experimental Farm Groß-Enzersdorf, of BOKU University. The silty loam soil is classified as a chernozem of alluvial origin and rich in calcareous sediments. It has a pHCaCl2 of 7.6 and an organic matter content of 2.2–2.3%.

Experimental Design and Sampling

The experimental design was a randomized complete block design with four replications. Four K chemical fertilization rates were randomly assigned, based on the relative level of the recommended rates 0, 50, 100, and 150%, as potassium sulphate and two N chemical fertilization at the level of 50 and 100%. Nitrogen fertilizer was 50% urea and 50% ammonium nitrate fertilizer; potassium fertilizer was potassium sulphate; phosphorous fertilizer was superphosphate. Chlorophyll content was measured in the flag leaves using the SPAD 502 Plus chlorophyll meter

In this study, nitrogen content for both the wheat grains and straw portions of the wheat plants is analyzed using the combustion method in conjunction with an elemental analyzer. The process begins by subjecting the samples to combustion in a controlled environment, where the organic material undergoes complete oxidation. During combustion, nitrogen in the sample forms

nitrogen oxides, which are then separated and quantified using an elemental analyzer. This sophisticated device detects and measures the nitrogen compounds present in the sample, providing precise information about its nitrogen content. …

The collected data, including nitrogen and chlorophyll concentrations, were subjected to statistical analysis such as statistical software SPSS Statistics 27. ANOVA was performed on the collected data to determine the average chlorophyll content and assess any significant differences among the samples. Correlation analysis was conducted to investigate the relationship between nitrogen and chlorophyll levels.

Results and Discussion

The One-way ANOVA test shows a significant difference between the mean scores of groups ($p < 0.05$). The value of F is 2.504, which reaches significance with a p-value of .044 (which is less than the .05 alpha level). This means there is a statistically significant difference between the means of the different variants' variable.

ANOVA

Chlorophyll

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	303705.469	7	43386.496	2.504	.044
Within Groups	415907.750	24	17329.490		
Total	719613.219	31			

According to the Tukey post hoc test, the K100N100 variant demonstrated a statistically significant increase in chlorophyll levels compared to the K150N50 variant ($p = .039$). However, there were no statistically significant differences observed among the other variants ($p > 0.05$).

The variant K100N100 exhibited the highest chlorophyll content in the study. This finding implies that, when utilized within the specified conditions, it significantly enhanced plant chlorophyll production. Thus, it stands out as the most effective variant among the options tested.

In the study, the K100N100 variant emerged as a standout performer, exhibiting the highest nitrogen content in both grain and straw. This significant observation highlights a considerable boost in plant nitrogen production attributed to this specific variant. Such compelling results underscore the efficacy of the K100N100 approach, firmly establishing it as the most efficient variant among the options scrutinized in the study.

Correlation Between Nitrogen and Chlorophyll Levels:

Close positive correlations were observed between nitrogen and chlorophyll quantities in the leaves of field-grown wheat. The increased nitrogen levels in the wheat plants were consistently associated with elevated chlorophyll content. This correlation underscores the role of nitrogen as a primary driver of chlorophyll synthesis, a process essential for photosynthesis. Indicates a positive correlation, i.e., as chlorophyll values increase, nitrogen content values also tend to increase.

Correlations

		Chlorophyll	N Straw	N Grain
Chlorophyll	Pearson Correlation	1	.220	.205
	Sig. (2-tailed)		.227	.260
	N	32	32	32
N Straw	Pearson Correlation	.220	1	.076
	Sig. (2-tailed)	.227		.680
	N	32	32	32
N Grain	Pearson Correlation	.205	.076	1
	Sig. (2-tailed)	.260	.680	
	N	32	32	32

In the case of the correlation between Chlorophyll and Nitrogen in grains, represented by the statistic r, is 0.205. This value indicates a low positive correlation between the two variables, suggesting that as Chlorophyll levels increase, there is a mild tendency for Nitrogen content in grains to also increase.

In the case of the correlation between chlorophyll and nitrogen (straw), denoted by the statistic r, is recorded as 0.220. This value signifies a low positive correlation between the two variables, indicating that as Chlorophyll levels rise, there is a modest tendency for Nitrogen content in straw to increase as well.

The positive association between elevated nitrogen levels and increased chlorophyll content suggests that appropriate nitrogen management practices could enhance the photosynthetic efficiency of winter wheat, thereby augmenting its capacity to capture and convert sunlight into vital carbohydrates.

Conclusion

In conclusion, this comprehensive study delved deeply into the intricate relationship between nitrogen levels and chlorophyll content in wheat plants. The application of the One-way ANOVA test unveiled a significant disparity in mean scores among different variants, with the K100N100 variant emerging as the most promising option. This variant not only exhibited a substantial increase in chlorophyll levels but also demonstrated the highest nitrogen content in both grain and straw, underlining its efficacy in enhancing plant chlorophyll production and nitrogen assimilation.

The observed positive correlations between nitrogen and chlorophyll content in leaves, emphasize the pivotal role of nitrogen in chlorophyll synthesis and its subsequent impact on photosynthetic efficiency.

This study corroborates previous research and adds valuable insights into the nuanced interplay between nitrogen and chlorophyll, shedding light on the fundamental mechanisms underpinning plant energy production and overall health. The implications of these findings are substantial, offering a pathway for optimizing agricultural practices and improving crop yield through targeted nitrogen management.

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THE CASE OF *XYLELLA FASTIDIOSA*: ALTERNATIVE WOODY PLANTS FOR THE RENEWAL OF SALENTO (ITALY) AGRICULTURE AND LANDSCAPE

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In less than 10 years an epidemic of *Xylella fastidiosa* interested 3 provinces in Salento (Puglia, Italy) devastating the landscape, the local olive oil industry, causing huge economic/environmental damages and raising the need to renew and partially substitute the olive woody tree coverage. In a larger project funded to DAJS, in order to increase the biodiversity/resilience of the future agro-ecosystem, the present research is aimed to study the traits of woody crops/species able to flank olive in agricultural regeneration/reconversion in term of pedoclimatic/agronomic requirements, market potential, plant protection needs and investments. A list of about 80 plants, classifiable in present at small scale, totally new or cultivated in the past in Salento, were selected by specific criteria studying the main conditions and limiting factors (climate, pedology, farm's structure, economic/organizational, phytosanitary factors) and particularly the capacity to co-exist with the bacterium in the whole infected area. In a circular economy perspective, particular attention was paid to the contrast to climate changes considering new agricultural products, new uses and by-products with high value as well as sustainable low inputs crops. The information will be available as a "reasoned catalogue" that draws data/info from bibliography, specialist consulting and small farming experiences. For the species not present in Salento, pathogenicity tests for 12 species, by controlled artificial/vector inoculation and qPCR analyses, are in progress to verify their immunity/resistance. The results are addressed to producers/technicians to guide investments or pilot field trials as well to policy makers to plan strategies and funding measures.

Key words: *Xylella fastidiosa*; crops; landscape; reasoned catalogue; regeneration.

COLLECTING LANDRACES AND WILD RELATIVES IN THREE AGRICULTURAL REGIONS OF ALBANIA

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Abstract: In 2022, in continuation of previous collecting missions in other regions of the country, a further expedition was carried out in the Dibër - Kukës region, Kavaja region and the Ionian coast of Vlora by a team of the Institute of Plant Genetic Resources (Albania). From an economic point of view, the country has seen a profound change in the main business activities in the last 30 years. Urban constructions, road infrastructure and tourism have been the sectors with the most pronounced development. For this reason, the focus of the expeditions have been precisely those regions with an intensity of economic constructions and serious genetic erosion was recorded, especially in landraces and wild relatives. The samples were identified in the field, with the participation of local specialists, based on morphological characters, according to a specific group of plants, flower and fruit characters. From each plot, according to collection protocols, plants were selected, trying to capture the maximum variability of the population. Further, during the ripening period, seed samples were collected from most populations of local landraces and endangered crop wild relatives. Dry seeds were collected and kept in cotton bags. A total of 142 accessions were collected, mainly vegetables and wild relatives. Among other things, the report gives some specific suggestions to prevent the extinction of local agriculture.

Keywords: Germplasm collecting, landraces; crop wild relatives;

FUSARIUM SP. MORPHOLOGICAL IDENTIFICATION AND THEIR SPREAD AS THE MAIN CAUSE OF WILT DISEASE ON TOMATOES GROWN IN ALBANIA

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Fusarium wilt is one of the major diseases caused by pathogenic Fo strains. Wilts are a major threat for agriculture and Fo ranks among the 10 most devastating fungal plant pathogens worldwide. In certain areas this disease has often led to the reduction and even the destruction of a considerable number of plants, affecting a significant reduction in production. The identification and characterization of Fusarium species with the potential to cause wilting of tomato plants using morphological approaches is the start that will provide us the information needed for a more acurate molecular analysis and effective disease control measures. For this purpose we collected tomato plant samples that showed wilting symptoms in different areas of Albania. Using the standard protocol for the isolation of Fusarium fungi from plant tissue we isolated the pathogen on PDA media and after several transfers we obtained a pure culture which we used for morphological identification of the fungus. The results showed that Fusarium sp. was the main cause of all the tomato wilting symptoms, confirming in this way his presence in tomatoes grown in protected environments in Albania.

Key words: *Fusarium sp., tomato, morphological identification, pure culture.*

ULTRASOUND ASSISTED ALKALINE AND ACIDIC PRETREATMENTS OF CELLULOSE FROM TOBACCO STALK

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ABSTRACT

Tobacco is one of the most important non-edible economic crops that has been planted world-widely. Annually, the global tobacco production could generate about 260 million stalks as post-harvest waste, and the valorization of this waste represents one of the most challenging issues. Tobacco stalks are potential post-harvest biomass for second generation bioethanol production, but direct conversion without pretreatment results in a low yield because presence of lignin in significant amount and the high crystallinity of cellulose hinder the enzymatic conversion of cellulose to glucose.

A study was conducted to evaluate the alkaline and acidic pretreatments on the concentration of cellulose, insoluble lignin, and reductive sugars. The pretreatment procedure involved immersing the stalks in in 4% NaOH or 4% H_2SO_4 at 80°C and ultrasound sonication for 30, 45, and 60 minutes. The tobacco stalks after pretreatment were characterized by the determination of the contents of cellulose, hemicellulose and lignin by Chesson method. The contents of cellulose, hemicelluloses and lignin in the untreated tobacco stalk were of 36.5% 5.9% and 20.5%, respectively.The results showed that the alkaline pretreatment was more efficient compared to the acidic pretreatment and gave higher yields of cellulose, hemicellulose and lignin. Increasing the pretreatment time resulted in higher concentrations of cellulose, from 29.2% at 30 minutes to 34.4% at 60 minutes. The optimum conditions in this study were a 4% NaOH, temperature of 80°C, and time of 60 minutes with the yield of cellulose 31.4%, lignin 18.7 %, hemicellulose 4.51% and reducing sugars 12.8 %.

Key words: tobacco, post-harvest waste, pretreatment, bioethanol

INTRODUCTION

Today the production of sustainable bio-based products such as fuels, chemicals, and other commercial products from lignocellulosic biomass gets extensive attention. After harvesting tobacco leaves for cigarette manufacturing, tobacco stalks as post-harvest waste is conventionally burned which causes serious environmental pollution [1]. Tobacco stalk was mainly composed of cellulose, hemicellulose, and lignin and their quantities are comparable to constituents in non-woody species such as wheat straw, rice straw, and corn stover. As a kind of lignocellulosic biomass, tobacco stalk could be used to produce many valuable bio-based products, such as ethanol by biorefinery. Pretreatment of lignocellulosic materials is the first step in the bioconversion process utilized to break down the structure of lignin and change the crystalline structure of cellulose, so that acids or enzymes can easily hydrolyze cellulose. Many pretreatment procedures have been developed, such as physical treatment, chemical treatment, and biological treatment, or a combination of treatments [2]. Among the pretreatment procedures of lignocellulosic biomass, chemical pretreatment under alkaline or acidic conditions is considered to be the most promising procedure for commercialization.

During alkaline and acidic pretreatments, substantial amounts of sugars are solubilized, mainly derived from hemicellulose and partially from cellulose, the lignin in the cell wall is relocated and this could produce a highly digestible cellulosic substrate. The ultrasound generates shear forces that cleaves the complex network structure of lignocellulosic biomass and promotes the extraction of desired compounds such as, cellulose, hemicellulose, and lignin [3].

Our work is based on two approaches aimed to the usage of stalks as post-harvest tobacco waste: 1) Characterization of air-dried tobacco stalks regarding to content of cellulose, lignin, hemicellulose and reductive sugars. 2) Investigation the suitability of chemical pretreatment with 4% NaOH or 4% H_2SO_4 and ultrasound for solubilization of cellulose and lignin removal.

MATERIALS AND METHODS

Sample preparation. Stalks from Burley tobacco varieties B 98/N was obtained from Experimental field of Scientific Tobacco Institute –Prilep, Republic of North Macedonia. After air drying, stalks were cut into pieces about 5 cm and then dried by oven (60 ± 5°C).

Pretreatment procedure. 10 g of tobacco powder (0.250 mm, 7.2 % moisture) was treated with 100 mL of 4% NaOH (A) or 4% H_2SO_4 (B) in ultrasonic bath DU-22, 30 to 40 kHz (Clifton, UK) for 30, 45 and 60 minutes and temperature of 80 °C, and after the appointed time, the content of the beaker was vacuum filtered through the crucible. The insoluble residue is dried in oven at 105°C during 4 hours.

Characterization of biomass.

Before and after pretreatment, dry sample has been analyzed for its lignin, cellulose and hemicelluloses content by using Chesson method. The weight loss during each fractionation step gives the weight fraction of each of the major components: hemicelluloses, cellulose, and lignin in the lignocellulose raw material. The filtrate from pretreatment was analyzed for content of reductive sugars using the dinitrosalicylic acid (DNS) method.

RESULTS AND DISCUSION

The levels of hemicellulose, cellulose, lignin, that were obtained from the results were then analyzed using ANOVA to determine the effect of the type of pretreatment (alkaline A and acidic B) and time (30, 45 and 60 minutes) on pretreated tobacco stalk.

Before pretreatments, the cellulose content in tobacco stalks was 36.5 %. Compared to untreated samples, the cellulose content decreased to 34.4% after alkaline pretreatment and 30.4% after acid pretreatment, followed by a subsequent decrease in the amount of hemicellulose and lignin. The results showed that the alkaline pretreatment was more efficient compared to the acidic pretreatment and gave higher yields of cellulose, hemicellulose and lignin (Figure 1). Increasing the alkaline pretreatment time resulted in higher concentrations of cellulose, from 29.2% at 30 minutes to 34.4% at 60 minutes. The optimum conditions in this study were a 4% NaOH, temperature of 80°C, and time of 60 minutes with the yield of cellulose 31.4%, lignin 18.7 %, hemicellulose 4.51 %, and reducing sugars 12.8 % (Figure 2).
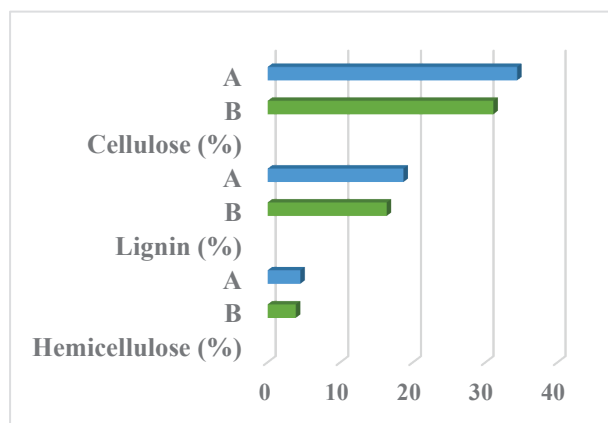
Figure 1. The chemical composition of tobacco stalks after the alkaline (A) and (B) acidic pretreatment
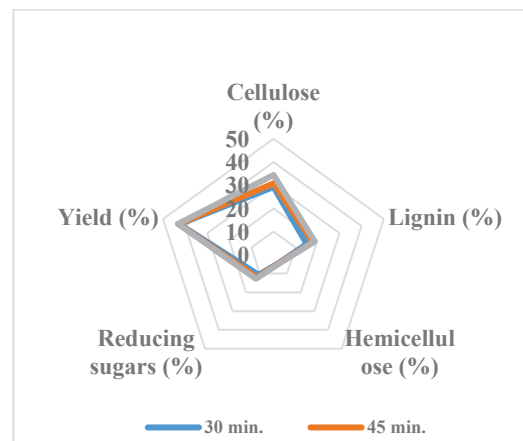
Fig.2 Efficacy of alkaline pretreatment on cellulose content

CONCLUSIONS

In this study, two pretreatment procedure (alkaline and acidic) were investigated and compared on the content of cellulose, lignin, hemicellulose, and reductive sugars from tobacco stalk. The optimum conditions in this study were a 4% NaOH, temperature of 80°C, and time of 60 minutes with the yield of cellulose 31.4%, lignin 18.7 %, hemicellulose 4.51% and reducing sugars 12.8 %. From the studied conditions, the alkaline pretreatment with ultrasound is more effective to extract cellulose and improve the enzymatic digestibility of tobacco stalk.

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MOLECULAR IDENTIFICATION OF POMEGRANATE PATHOGENS AND APHID CONTROL

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The cultivation of pomegranate (*Punica granatum L.*) trees dates back many centuries. This species can grown in an extensive area since, it is very adaptable. The pathogenic fungi may damage pomegranates, mostly in the field but also in the postharvest stages. Gray and blue molds, black heart and black spot, anthracnose, dry rot, as well as other soft rots are the most serious fungal diseases. During the period 2022 – 2023 we have sampled over 100 symptomatic pomegranate fruits belonging to cvs. *Acco* and *Wonderful One*, as well as we did weekly monitoring for pests, mainly aphids.

Pathogens were annotated to: *Alternaria alternata, Alt tenuissima, Alt citri Stemphylium versicarium, Aspergillus niger, Penicillium glabrum, Coniella granati,* and *Aspergillus niger.* Macro- and micro-morphological characteristics of each monospore culture were analyzed at genus/species level. The extracted DNA of the selected *Alternaria spp* strains was assayed for the presence of *pksI*, a key gene for the biosynthetesis of the mycotoxin alternariol, *act1* and *act2* genes of ACT phytotoxin biosynthesis, and *acr1* and *acr2* genes of ACR phytotoxin biosynthesis.

In the spring, it was found that the pomegranates were infected with *Aphis punicae* above the critical threshold of 10%. The presence of the parasitoid entomophagous: *Aphidius colemani* in over 80 percent of the fruits was interesting. This presence requires a very smart use of insecticides.

Key word: pomegranate, *Alternaria spp, Aphis punicae, Aspergillus niger, Aphidius colemani*

FIRST RESULTS OF THE EUROPEAN EEL (*ANGUILLA ANGUILLA*) LOCAL STOCK AND THE SILVERING PROCESS, IN THE KARAVASTA LAGOON, ALBANIA.

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Abstract

The European eel (*Anguilla anguilla*) is considered a critically endangered species and the fisheries have not been operating responsibly in recent years. Furthermore, safe natural recruitment and thus long-term economic exploitation are no longer guaranteed. Much research has been conducted in the Mediterranean basin to determine the significance of this species' existence. Until date, data on biology and population dynamics in the Adriatic Sea's south-eastern region have been lacking. The current study is the first of its kind on Albanian territory, focused on the local stock of European eels in the Karavasta lagoon. This study focuses on biological parameters including the length frequencies distribution Length-Weight relations, and sex composition. The ocular diameter, pectoral fin length and index of Hartmann were also observed to determine the stage of development. Simultaneously, the health status of migrating silver eel samples was assessed, with a particular focus on nematode Anguillicola crassus infestation. The 140 eel samples were collected by the end of December 2022 using a fyke-net fence positioned before and after the fish barrier. The results show that the samples presented a negative allometric growth. The health status of the migrating silver eels is optimal because none of the 140 individuals have infected with *Anguillicola crassus* nematode. Further studies should be made in the future to have a clear understanding of the Karavasta lagoon's native stock.

Keywords: *European eel; length-weight relationshim; stock; growth*.

Introduction

The European eel (*Anguilla anguilla*, Linnaeus 1758) is a catadromous species that is born in the North Atlantic. In a long process of migration and metamorphosis from leptocephalus to glass eels they arrive in the areas of Europe, North Africa, and the Mediterranean Sea [1] when they live in freshwater, brackish, and coastal habitats transforming into yellow eels. After reaching the maturing stage as silver eels they migrate back to the Sargasso Sea once in their lifetime to spawn and die [1, 2].

Since the 1970s the population of European eels has decreased by 99%. The causes of this decrease are related to unsustainable fishing and other man-made causes. Long-term records of eel species (Anguilla spp.) over the last four decades indicate an extensive worldwide reduction in numbers. *Anguilla anguilla* has already been placed on the IUCN Red List of critically endangered species [3]. After the 1970s, the commercially most important species, the European eel, has shown population reductions of 99% [1]. The reasons for this population include overexploitation of fisheries, climate change, declined glass eel recruitment, barriers to migration in rivers, habitat loss, parasitism, pollution, re-oligotrophization of fresh-water habitats and reduction in available prey, and predation by cormorants (*Phalacrocorax* spp.) [4,5]. The critical levels of the eel populations in Europe led to the application of measures for stock recovery based on European Council Regulation 1100/2007 [6] and management plans for eel fisheries (http://ec. europa. eu/fisheries/marine species/wild species/eel/ management plans/) [7].

Albania is one of the countries when eel has been used for alimentary purposes for centuries, but the studies in general for this species in Albanian territory are absent. The present study aimed to study the morphometric relationships between length and weight (LWR) as the first study for this species in one of the eight Albanian lagoons (Karavasta lagoon). The LWR can be used to assess the well-being of silver eel individuals that are prepared for the migration stage to the Sargasso Sea for spawning. This LWR also can be used to determine possible differences between different unit stocks of the same species or can be used to find differences between sexes [8].

Materials and Methods

Site and Sample Collection: The study was conducted in the Karavasta lagoon, Albania. A total of 140 individuals were collected using a fyke net by the end of December 2022.

Biological Parameters: Each individual was examined for Total Length (ranging from a minimum of 35.6 cm to a maximum of 63.4 cm with a mean of 44.91 cm) and Weight (with a minimum of 93 g, a maximum of 439 g, and a mean of 185.8 g). In the sample, there were 2 yellow eels and 138 silver eels. The sex composition included 70 males and 70 females.

Data Analysis: Length-frequency histograms were prepared by grouping individuals into 1 cm length classes, revealing a bimodal distribution within the sample. The sex ratio was calculated, and an accentuated sexual dimorphism was observed, with a breakpoint related to total length (all individuals larger than 44 cm were females). Length-weight relationships were calculated, demonstrating negative allometric growth. This negative allometry was more pronounced when the Length-Weight relationship was calculated separately for each sex.

Results and Discussion

The findings of this study revealed several significant results:

- A bimodal length distribution in the sample.
- Pronounced sexual dimorphism, with a clear breakpoint at 44 cm total length, beyond which all individuals were female.
- Negative allometric growth, especially apparent when the Length-Weight relationship was calculated separately by sex.
- The health assessment of the migrating silver eels indicated optimal health, as none of the 140 individuals were infected with the *Anguillico lacrassus* nematode.

The bimodal length distribution and the pronounced sexual dimorphism observed, with females dominating the larger size class, is a common characteristic of *Anguilla anguilla*. Such sexual dimorphism may be related to the eel's complex life history, where females migrate to the Sargasso Sea for reproduction, necessitating a larger body size.
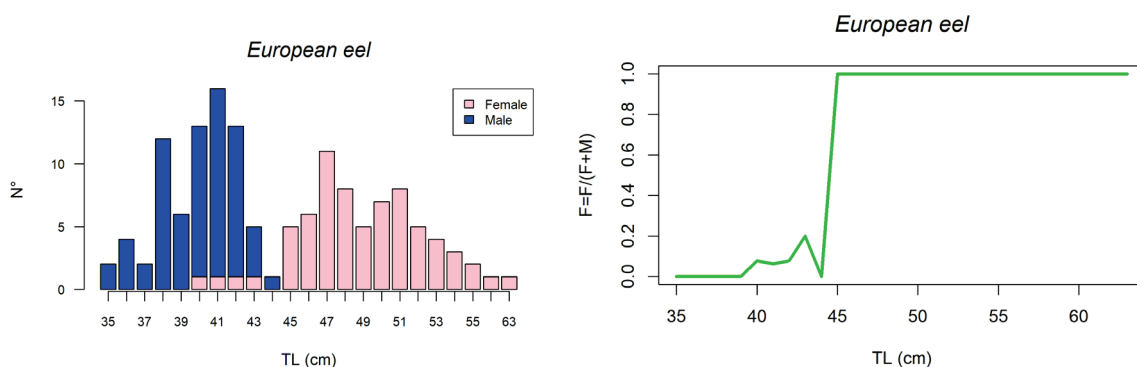
Table 1&2: Length frequency distribution (LFD) by sex and Sex ratio

The negative allometric growth observed in the Length-Weight relationship indicates that eels' weight does not increase in proportion to their length. This can be attributed to the allometric differences in body shape between smaller and larger eels.
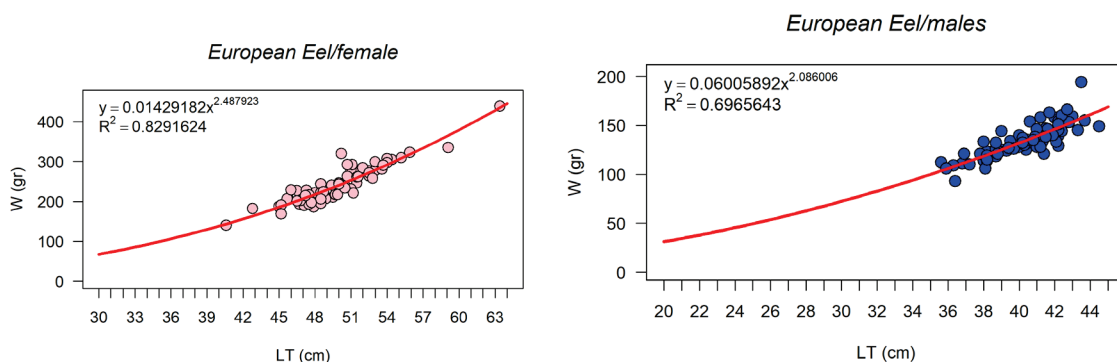
Table 3&4: Length-Weight relationship divided by sex

The absence of *A. crassus* nematode infection among the migrating silver eels suggests that the health status of this population is favorable. This is a promising sign for the conservation of European eels in the Karavasta lagoon.

Conclusion

This study represents a significant step in understanding the local stock of European eels in the Karavasta lagoon, Albania. The findings of bimodal length distribution pronounced sexual dimorphism, and negative allometric growth provide valuable insights into the population dynamics of this critically endangered species. Additionally, the optimal health status observed among migrating silver eels is a positive sign for their conservation. Further research should be conducted to gain a more comprehensive understanding of the native stock in the Karavasta lagoon and contribute to the responsible management of European eel populations.

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VASCULAR FLORA PROTECTION AND CONSERVATION IN DIVJAKA COASTAL AREA IN ALBANIA

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ABSTRACT

The Divjake Karavasta National Park in Albania is a park faces numerous challenges in terms of biodiversity. This paper presents the natural habitates classified according NATURA 2000, and threaten taxonas with regarding statues based on IUCN.This activity was carried out in the period April-November 2022. The methods followed the guidelines concerning the monitoring of the Directive 92/43/EEC (Habitats) species and habitats. The activity combined field vegetation surveys and threat factors negatively affect the conservation of habitats and provide management indications. With reference to the flora, a number of 179 taxa was recorded, 50 families and 136 geniuses. There are 15 taxons with appropriate statues (EN A1b) 10 or 81% and vulnerable (VU A1b) 4, critical endangerous 1 specie (CR B1).

Key words: NATURA 2000, Directive 92/43/EEC, IUCN

INTRODUCTION

The Article 17 of the Habitats Directive arange the need to conduct monitoring activities on coastal habitats and species of interest. The monitoring results report information regarding the conservation status of habitats and species, their trend, as well as the pressures and threats that affect the conservation of these ecological entities [5]. The conservation status of a habitat of Community interest is a concept defined by the Article 1 of the Habitats Directive, which also establishes the criteria for considering that status as satisfactory, based on structural (such as measurable areal properties) and functional properties. Similar criteria are also given for taxonsanalysed in the present research. In the Divjake Karavasta National Park, these scientific monitoring are needed for all habitats and species of the EU directives. The objectives of the study were to represent the distribution of the habitats of the Directive, identify the main environmental factors that affect the conservation status of these habitats and acquire new information on the flora aimed conservation interest.

MATERIAL AND METHODES

The study area has north coordinate N 41 0 00' 57,3"; E 019 0 29' 27,4" and south N 40 0 55' 41,1''; E 019 0 27' 36,0''. All these study area is "well known" from a floristic point of view. Except the oldest studies, the progress on the floristic knowledge of the study area, as well as monitoring on vegetation and habitats, is divided into a series of stages which are the years 1989 [6]. Based on the Habitats Directive 92/43/EEC of the Council of Europe "On the conservation of habitats and wild fauna and flora" we have identified 14 types of interest habitats of the community, three of which have priority status such as: 1) * Lagoon of Karavasta 2) *Coastal forests of sand dunes with Pinus *halepensis, P.pinea, P. pinaster* 3) *Coastal dune with *Juniperus oxycedrus* ssp. *macrocarpa.*The vegetation of the Divjake Karavasta National Park area analyzed based on relevés follow the phytosociological method of Zurich-Montpellier school [1]. This analysis conducted with the support of Flora of Albania [7] and Flora Europaea [10]. The nomenclature followed is Paparisto et al., 1984-2000. Number, size, distribution pattern of the stations and transects depend on the size and heterogeneity or diversity of habitats situated in the area of Divjake Karavasta National Park, as well as on the bio-ecological characteristics of the species or group of species. The GPS used to tell the exact location of stations or transects. Protected species [8, 11], endangered species [2, 3, and 9] and rare species have been treated as a particular category called species of greater conservation interest. Data on the origin and invasiveness of exotic species are taken from [4] for the Divjake Karavasta National Park flora. During the surveys, evidence was also recorded on the presence of pressures and threats. While pressures are natural or anthropogenic factors that affect the conservation of habitats, threats are natural or anthropogenic potential factors. For this data, the European pressures / threats classification system used for the monitoring of species and habitats of EU directives has been adopted [5].

RESULTS

About 90 vegetation surveys were carried out. Floristic records are shown in graf below:
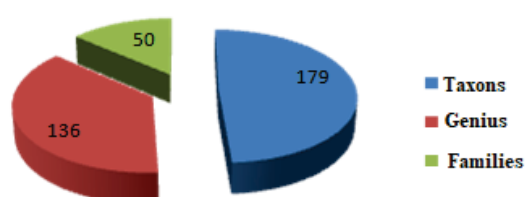
Graf 1. In general, 179 taxa were recorded, 50 families and 136 geniuses.

Sintaxonomical review of vegetation of Divjake Karavasta National Park is presented in the following Table 1.

Table 1 Main Habitates, Associations and Taxons in Divjake Karavasta National Park

Nr.	Habitat	Code according NATURA 2000	Associations	Main species
1	Estuaries of Shkumbin and Seman Rivers	1130		*Zostera noltii; Ruppia maritima Spartina maritime; Sarcocornia perennis*
2	*Lagoon Karavasta	1150	***RuppieteaZosteretea***	*Ruppia maritima, Zoostera noltii*
3	Annual vegetation of drift lines	1210	***Cakiletea maritimae***	*Cakile maritima, Salsola kali, Atriplex spp. Polygonum spp., Euphorbia peplis, Potentilla reptans, Glaucium flavum, Matthiolatri cuspidata, Euphorbia paralias, Eryngium maritimum.*
4	Salicornia and other annuals colonising mud and sand	1310	***Thero-Salicornietea***	*Salicornia sp, Suaeda maritima, Salsola soda, Parapholi sincurva, Hordeum marinum,*
5	Mediterranean salt meadows (Juncetaliamaritimi)	1410	***Juncetalia maritimi***	*Juncus maritimus, Juncus acutus, Trifolium so, Plantago coronopus, Pucinella festuciformis.*
6	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocorneteafruticosi)	1420	***Salicornia, Limonium vulgare, Suaeda and Atriplex***	*Halimio neportulacoides, Inulacritmoides, Suaedavera, Arthrocnemum glaucum, Limonium vulgare, Artemisia gallica.*
7	Embryonic shifting Dunes	2110	***Agropyron junceum***	*Elymus farctus, Sporobolus pungens, Euphorbia peplis, Otanthus maritimus, Medicago marina, Eryngium maritimum, Pancratium maritimum.*
8	Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	2120	***Amophiletum***	*Ammophila arenaria, Eryngium maritimum, Euphorbia paralias, Calystegia soldanella, Otanthus maritimus, Echinophora spinosa, Eryngium maritimum, Medicago marina, Anthemis maritima; Cyperus capitatus, Ononis natrix, Polygonum maritimum,*
9	*Coastal Dunes with Juniperus oxycedrus subsp. macrocarpa	2250	***Juniperetum***	*Juniperus macrocarpa, J communis, J. oxycedrus*
10	*Coastal forests with *Pinushalepensis, P. pinea, P. pinaster*	2270	***Pinetum***	*Pinuspinea, P. pinaster, P. halepensis, Juniperus. Oxycedrus ssp. macrocarpa*
11	Helophytic associations with *Phragmitesaustralis*	3150	***Pragmitetum-Typhetum***	*Phragmites australis, Typha angustifolia, Typha latifolia, Scirpus sp.*
12	Constantly flowing Mediterranean rivers with Salix and Populus alba	3280		*Cyperus fuscus, Salix spp., Populus alba*
13	Southern riparian galleries and thickets (NerioTamaricetea and Securine giontinctoriae)	92D0	***NerioTamaricetea and Securine giontinctoriae***	*Nerium oleander, Vitexagnus-castus, Tamarix spp., Securine gatinctoria, Prunussp, Viburnum tinus.*
14	Agricultural Land			

The focus of monitoring is protected and conservation of ex-situ plants, in Coastal areas these germoplasm is more threaten by activities, tourism, alien invasive plants and other factors.

Im the table below are the list of 15 plants and their statues based on the IUCN protocole and their habitat spread.

Table 2. The species extinction risk assessment is based on the IUCN

Nr.	Taxon	IUCN Statues	Habitat
1.	*Pancratium maritimum*	EN A1b	Sandy dunes
2.	*Juniperus oxycedrus subsp. macrocarpa*	VU A1b	Sandy dunes
3.	*Juniperus phoenicea*	EN A1b	Med. forest
4.	*Galatella albanica*	EN A1b	Med. forest
5.	*Sambucus nigra*	EN A1b	Med. forest
6.	*Ammophila arenaria*	EN A1b	Sandy dunes
7.	*Elymus farctus*	EN A1b	Sandy dunes
8.	*Hypericum perforatum*	EN A1b	Med. forest
9.	*Stachys marittima*	VU A1b	Sandy dunes
10.	*Origanum vulgare*	EN A1b	Med. forest
11.	*Colchicum autumnale*	EN A1b	Med. forest
12.	*Hydrocotile vulgaris*	VU A1b	Acidic damps
13.	*Orchis albanica*	EN A1b	Sandy dunes

| 14. | *Salvina natanis* | CR B1 | Fresh water canals |
| 15. | *Quercus robur* | VU A1b | Riparian forests |

DISCUSSION

According to the Article 1 of the Habitats Directive, cover change is one of the criteria for assessing the conservation status of a habitat. Divjake Karavasta National Park is a complex mosaic of biodiversity with high ecological value with 3 prioritary habitates and some association that begin with sandy dunes vegetation which determine the morphology of a sandy coast: the vegetation present in the area have to be considered as determining factor, with typical psammophytes such as *Eryngium maritimum, Cakile maritima, Echinophora spinosa, Euphorbia paralia,* and *Ammophila arenaria*. They form the beaches and the shifting dunes. The increase of dune height is accompanied as well with the gradual change of the physiognomy of this vegetation. The highest dunes are colonized by the big tufts of Ammophilaarenaria which grow especially on the crest of the dunes. This species is the real builder of the dunes. The presence of this species is an important factor in impeding the movement of sand quantities pushed away by the sea winds.As a conclusion there are noticed three evaluative lines:

1. Sandy dunes and theformation of depressions, where the vegetation grows from that of dunes dominated by *Erianthus ravennae, Scirpus holoschoenus, Schoenus nigricans* and *Plantago coronopus.*

2. Mediterranean pine forest: they represent relatively youngforests, cultivated recently in order to protect the agricultural lands. Th e physiognomyof this formation is imparted by the species *Pinus halepensis and Pinus pinea*. Th e shrubby layer is represented bytypical Mediterranean species. The most spread shrubs inthis formation are *Myrtus communis, Juniperus oxycedrus subsp. macrocarpa, Erica manipuliflora and Pistacia lentiscus.*

3. Salt marsh vegetation with the main specie *Salicornia europaea* followed by *Limonium vulgare, Juncus acutus, Juncus maritimus* and the next stage the development of the plant communities dominated by *Phragmites australis.*

CONCLUSION

The results achieved by the study increase the ecological knowledge of the pretected areas of Divjake Karavasta National Park, allow evaluating the conservation status of the habitats, highlighting the environmental detrimental factors and directing towards the adoption of particular conservation measures. The need to develop and adopt a standardized monitoring method over the long term is evident.

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SPATIAL VARIABILITY AND SOIL FERTILITY STATUS IN TOBACCO PLANTING AREA OF MUNCIPALITY OF PRILEP

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Abstract

A study was conducted to asses soil fertility status in the Municipality of Prilep (Republic of North Macedonia), that has a long history of land management and is one of the largest oriental tobacco production areas in the country. The objective was to explore spatial variability of soil parameters that provide basis on nutrient management, balanced fertilization and pollution in this tobacco growing area. Samples were collected at fixed depth (0-30 cm) and analyzed for the following parameters: pH, organic matter, total nitrogen, available phosphorus and potassium, carbonate content, soil texture, Zn, Cu, Pb and Cd. Interpolations of all measuring points were made using the tools of the Source Geographic Information System. According to the results, most of the samples have low total nitrogen and organic matter content and showed no spatial trend. Most of the soil samples have poorly acidic soil reaction and light mechanical composition. Soil available potassium and phosphorus have significant spatial trends with spatial dependence ranging from weak to strong. Despite intensive tobacco production, content of Zn, Cu, Pb pointed out level typical for agricultural and low anthropogenic pressure area, where Cd content of all tested samples was under the limits of detection (1 ug/L). This study provides a basis for specific site field management, which targets soil quality improvement in the Prilep tobacco growing region.

Key words: soil parameters, sustainability, pollution

Introduction

Improving soil health and fertility level with appropriate understanding of the soil properties is imperative. Heterogeneity of soil parameters is affected by continuous land use and monitoring of their distribution properties is necessary [2, 3, 6, 12]. Almost all agricultural data has some form of spatial component and when dealing with voluminous data, precision agriculture tools provide accurate and efficient predictions of spatial variations of fertility parameters [1, 2, 7]. This proved to be successful for sustainable management practices and predictions of the distribution patterns of soil properties over an area of interest [3, 5, 6 7].

Tobacco production in North Macedonia has a long history. Soil properties vary spatially and their monitoring is essential to understand the land use and to provide tools for effective nutrient management, as primary goal is sustainable tobacco production. This study is focused on the arable land in Prilep, one of the largest oriental tobacco production municipalities. The main aim was to establish relationship between soil properties and to explore their spatial variability in order to provide recommendations for balanced fertilization.

Soil fertility properties that showed evidence or spatial dependence were mapped using geostatistics and geographic information system tools. This study supports research aiming at sustainable tobacco production which will also, limit the negative impact of pollution.

Material and Methods

The study area covers 213 ha arable land in the municipality of Prilep located in the Pelagonian massif. All area is covered with delluvial and alluvial soils, with mildly continental climate, and annual precipitation of 640 mm. Soil composite samples from pedological profiles at fixed depth (0-30 cm) were taken from 352 locations (Figure 1) in the period of 2016-2021. Samples were taken from cultivated soil after tobacco harvesting and Longitude, latitude and altitude were noted for every sampling location. The geographical coordinates of the sampling points are plotted on a map using the tools of the Source Geographic Information System - QGIS, software version 3.18.2.

Samples pretreatment was done in accordance with ISO 11464:2006. Soil properties as soil texture, pH, total nitrogen, organic matter, carbonates, available phosphorus and potassium were determined [9]. Zn, Cu, Pb and Cd content of soil samples were measured by ICP-AES (Varian, 715-ES).

Descriptive statistics of the studied soil properties were done using IBM SPSS 25 statistics software, Armonk, New York, U.S.A. Bivariate statistics (linear correlation coefficients, *r*) was used to determine the degree of correlation between the soil properties. Interpolations and analysis of all sampling points were made according to Inverse distance weighting (IDW) parameters over ordinary kriging because geo reference points are not representative for agricultural land [4, 11].
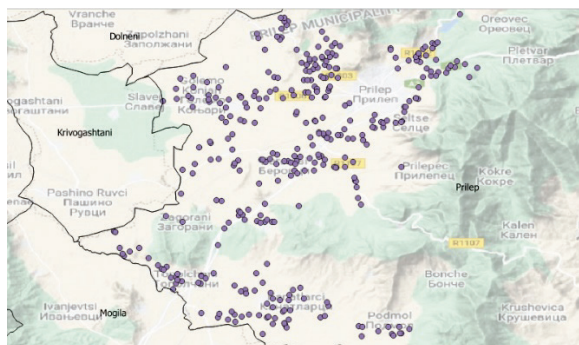
Figure 1. Sampling locations (municipality of Prilep, n=352)

Results and Discussion

Distributions of all the studied variables were lightly skewed (skewness < 1.1), and their means were close to their medians, except soil available potassium and phosphorus (Table 1). High coefficient of variation reveals the heterogeneity of agricultural soil in the selected area. Most of the testes fall within the suitable limits for producing high-quality tobacco raw materials [8, 10].

Table 1. Statistical parameters that characterize the frequency distribution of soil properties (n=352)

Soil parameter	Minimum	Maximum	Mean	Median	SD	Skewness	Kurtosis	CV (%)
Humus, %	0.48	3.73	1.41	1.26	0.56	1.10	1.21	40
Total nitrogen, %	0.02	0.18	0.07	0.06	0.03	1.10	1.22	40
pH (H$_2$O)	4.92	8.30	6.44	6.41	0.65	0.52	0.29	10
pH (KCl)	0.00	7.62	5.48	5.46	0.79	-0.49	6.12	14
CaCO$_3$	0.00	19.17	0.16	0.00	1.45	12.16	153.02	919
P$_2$O$_5$ mg/100 g	1.77	183.30	20.30	11.59	27.08	3.42	12.99	133
K$_2$O mg/100 g	5.75	67.74	19.02	17.67	8.56	2.07	6.85	45
Clay, %	10.10	77.70	30.72	29.05	9.53	1.10	2.31	31

A strong and positive correlation is observed between humus content and total soil nitrogen (r=0.998), (Table 2). For the rest of the analyzed variables, moderate correlations were obtained.

Table 2. Pearson's correlation coefficients between selected soil properties

	Humus	Total nitrogen	pH (H$_2$0)	pH (KCl)	CaCO$_3$	P$_2$O$_5$	K$_2$O
Humus	1						
Total nitrogen	0.998**	1					
pH (H$_2$0)	0.198**	0.193**	1				
pH (KCl)	0.241**	0.238**	0.944**	1			
CaCO$_3$	0.134**	0.134**	0.410**	0.406**	1		
P$_2$O$_5$	0.321**	0.320**	0.364**	0.411**	0.164**	1	
K$_2$O	0.467**	0.468**	0.333**	0.377**	0.186**	0.554**	1
Clay	0.497**	0.494**	0.241**	0.230**	0.147**	0.100**	0.267**

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed)

Table 3. Descriptive statistics for total concentrations of Cu, Pb and Zn in soil samples given in mg/kg

Trace element	Minimum	Maximum	Mean	Median	SD	Skewness	Kurtosis	CV (%)
Cu	2.3	34.3	8.5	6.4	7.4	2.7	7.3	87
Pb	3.5	78.1	10.7	7.8	13.1	5.0	26.0	123
Zn	5.1	63.3	16.8	12.8	12.7	2.6	7.2	75

Cd content of all tested samples was under the limits of detection (1 ug/L) therefore is not presented. Highest content of studied trace elements (Table 3) was detected in the same soil samples where content of the available phosphorus was high, above 35 mg/100g.
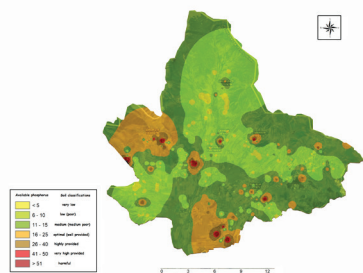
Figure 2. Spatial distribution of available phosphorus content (P_2O_5)
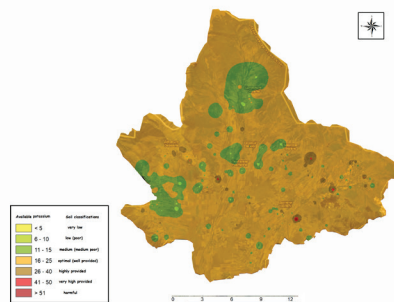
Figure 3. Spatial distribution of available potassium content (K_2O)

Spatial distributions (IDW) of available phosphorus and potassium are presented in figures 2 and 3. As it can be seen most of the tested soils have low to medium phosphorus content (Figure 3), but are well provided with potassium. According to the soil classifications, fertilization rates were calculated and for 60 % the tested samples mainly complex NPK 10:30:20 is recommended.

This study demonstrates the effectiveness of geostatistical technique through visualization of voluminous data that is difficult to interpret with classical descriptive statistics. According to the results there is presence of moderate to weak spatial dependencies of the selected soil parameters. Given the fact that soil fertility is a dynamic value, further and extended monitoring is crucial in order to test and validate appropriate interpolation methods and to identify nutrient deficiency zones. The results are useful for recommendations for best management practices in the agricultural area of municipality of Prilep.

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SUSTAINABLE MANAGEMENT OF THE DAMPING OFF DISEASE WITH THE USE OF BIOPRODUCTS IN TOBACCO SEEDLINGS PROTECTION

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Abstract

According to the agroecological concept of sustainable agricultural production, effective protection of tobacco as well as the environment can be achieved by applying the natural resources.
There are number of bioproducts who expressed the fungicidal effect through multiple action, in which the strengthening of the defense system plays a major role.
Tobacco seedlings protecting from the damping off disease (caused by *Pythium debarianum* and *Rhizoctonia solani,* often double infection) by using them will reduce the risk of inappropriate and excessive use of chemical fungicides. Also, this is the only way to have long lasting positive effects.
The aim of this study was to examine the effectiveness of several bioproducts on the intensity of the damping off disease in tobacco seedlings.
They are: SoftGuard (Chitosan - oligosaccharide from sea crabs), Vacciplant (Laminarin -polysaccharide from brown algae), Timorex gold (extract of Melaluca alternifolia), Myelfos (hydroxy methyl merkaptan phosphoric acid) and Cuore Crystal (organic complex of Cu-Zn-Vanila). Biopreparations were applied in appropriate doses for each of them (1-2 kg or *l* / ha). All of them (except Timorex gold) showed satisfactory fungicidal effect. The highest effectiveness (83.92 and 80.40%) had SoftGuard and Vacciplant.
The results of this study confirm the effectiveness of biofungicides in control of the damping off disease in tobacco seedlings. At the same time, they emphasize the ecological principle, security in protection of tobacco and the positive impact on the environment. Thus, they are an acceptable option in the management of sustainable production of tobacco seedlings.

Key words: agroecological concept, bioproducts, effective protection, sustainability

Introduction

The production of tobacco seedlings can be seriously threatened, mainly by fungal diseases, like the damping off disease. Protection is difficult (presence of the two causing agents of this disease, soil parasites) and inadequate choice of fungicides. Hence, the use of biological control, and especially the strengthening of the plant's defense responses, can be the only acceptable measure.
The World Health Organization (WHO) advocates reducing the use of chemical pesticides, and increasingly applying environmentally safe preparations. Following EU legislation and strict criteria for environmental safety, such bioproducts are increasingly being introduced in Macedonia.
Bioproducts, beside microorganisms, can include numerous natural substances as active substances: plant extracts, hormones and various other products of plant or animal metabolism. They show a stimulating effect on the plants, but also affect the defense mechanisms. Hence, these bioproducts can (with a correct application model) be used in the protection against plant diseases.
The aim of these researches was to determine the fungicidal effect of some such bioproducts in the protection of tobacco seedlings from the damping off disease and further inclusion in the IPM programme for tobacco.

Materials and methods

The study of the fungicidal action of some bioproducts against the causing agents of the damping off disease in tobacco seedlings were carried out under seedling production conditions (Table 1).

The beds were sown with 6.75 g/10 m2 ie. 0.67 g/m2 The herbicide Gamit (a.i. clomazone) was used in a dose of 0,1 ml/ m^2, over the mulch. All variants were placed in 3 replications (3,33 m^2 each) in a randomized block system.

Table 1. Investigated bioproducts

Bioproducts	Active ingredient	Dose
SoftGuard	Chitosan oligosaccharide from marine crustaceans	1-2 *l* / ha
Vacciplant	Laminarin - a polysaccharide from brown algae	1,5-2 *l* / ha
Timorex gold	Tea tree extract (Melaluca alternifolia)	2 *l* / ha
Myelfos	Hydroxy methyl marcaptan phosphoric acid	0,1-0,2 *l l* / ha
Cuore Crystal	Organic complex Cu-Zn-Vanila	1,5-2 kg *l* / ha

Application of bioproducts

According to the dose (1 to 2 *l* or kg / ha), were applied by applying 0,7 ml (g) /3.33 m². Each replication was treated separately.

The rating - determining the intensity of the disease

After 15-20 days of each treatment, the infected area in each replication of the variant was measured. The results are expressed in percentages, as well as the mean value of the replication, per variant.

The efficiency of the treatments (variants) was calculated according to Abbott's method, from the mean values in both evaluations.

Results and discussion

At the first assessment, the damping off disease in the check has an attack intensity of 1.83%. In the Timorex Gold variant, a great value has also been determined. Such a value is particularly affected by the strong attack intensity in the second iteration (Table 2). The lowest intensity of attack was determined when treating the seedlings with Soft Guard and Vacciplant.

Table 2. Intensity of the damping off disease (1st estimation)

Variant	Replication			Average value
	I	II	III	
Check Ø	**1,09**	**1,84**	**2,57**	**1,83**
SoftGuard	0,01	-	0,34	0,12
Vacciplant	0,02	0,21	0,25	0,16
Timorex Gold	0,003	3,03	0,56	1,20
Myelfos	0,38	1,80	0,91	1,03
Cuore Crystal	-	0,64	0,68	0,50

Table 3. Intensity of the damping off disease (2nd estimation)

Variant	Replication			Average value
	I	II	III	
Check Ø	**1,57**	**1,98**	**2,91**	**2,15**
SoftGuard	0,48	0,64	0, 43	0,52
Vacciplant	1,11	0,33	0,45	0,63
Timorex gold	0,47	3,44	0,55	1,48
Myelfos	0,68	0,74	0,51	0,55
Cuore Crystal	0,36	0,91	0,61	0,64

At the second evaluation, the percentage of infected area ranged from 0.52% for SoftGuard to 1.48% for Timorex Gold (Table 3). The improvement of the condition is evident, that is, the second treatment had a positive effect. Such is the situation with Myelfos. Such an improvement in the situation during the second evaluation has an impact on the overall evaluation of the fungicidal effect of the tested biopreparation.

According to Fig. 1, the lowest efficacy was achieved when the seedlings was treated with the biopreparation Timorex gold. These results are in accordance with the findings of Mihajlović et al. (2013) [5].

SoftGuard and Vacciplant bioproducts showed the greatest efficiency in protection against the damping off disease. Similar results are highlighted in the research of Гвероска (2023) [4]. The obtained results are in accordance with the facts highlighted by Arysta LifeScience (2019) [2] and Агрохемија (2019) [3]. Values around 80% efficiency are quite satisfactory for a bioproducts, and hence, these biopreproduct showed a satisfactory fungicidal effect in these tests.

Also, for Cuore Crystal it can be said that the results are justified and within the limits of expectations as a biopreparation. Myelfos showed better results in the second evaluation, which changed the picture of its effectiveness, but even so, its results in these trials are somewhat weaker. However, it (as well as the other tested preparations) has generated interest for further trials. (Agricom, 2023) [1].

These biopreparations with the different nature and content of active substance showed a satisfactory fungicidal effect. In addition to the stimulating role, they strengthen the plant's immune system and natural protection against phytopathogens. Hence, in addition to being biostimulators, they can be used as biofungicides in the protection of seedlings and planted tobacco, certainly supported by other studies and the application model (Гвероска, 2023) [4].
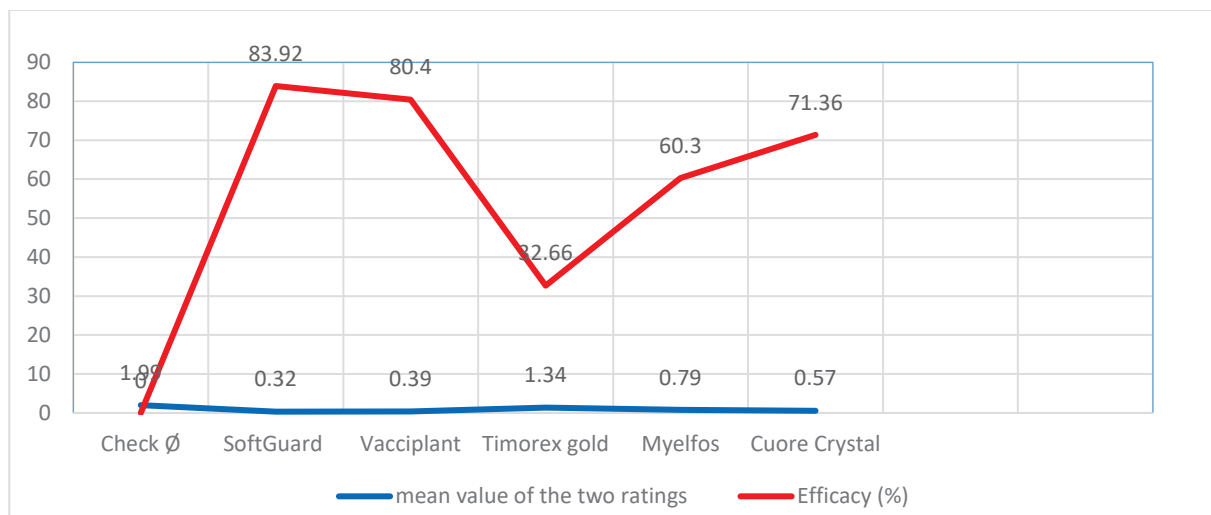
Figure 1. Efficacy of variants

Conclusions

* The investigated bioproducts showed a satisfactory fungicidal effect against the causing agents of the damping off disease in tobacco seedlings.
* The results are in line with the efficacy expected from a biofungicide.
* Bioproducts SoftGuard and Vacciplant showed the highest efficiency in the tobacco seedlings protection protection from the damping off disease.

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VARIATION IN SUSCEPTIBILITY OF RAPESEED CULTIVARS TO THE PEACH POTATO APHID

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Considering the need for reduction in insecticide use, we studied the potential for antibiosis and the potential for antixenosis in seven highly yielding winter *Brassica napus* L. cultivars against *Myzus persicae* (Sulz.). We found evidence for antixenosis, i.e., disruption in probing in non-phloem tissues and a failure in reaching sieve elements in cultivar 'Alister'. We found evidence for antibiosis, i.e., reduced ability of the plant to serve as a host, in cultivar 'Florida'. On 'Alister' and 'Florida', net reproduction and reproductive period duration of *M. persicae* were the lowest of all studied cultivars. 'Adriana', 'Andromeda', 'Gladius', and 'Kolumb' are intermediately susceptible to *M. persicae* infestation with medium values of net reproduction and reproduction period duration, and slight disturbances in aphid probing and feeding. 'Artoga' is highly susceptible. On 'Artoga', reproduction period was the longest, daily fecundity and net reproduction of *M. persicae* were highest, and probing and feeding behaviors were unaltered. Glucoallysin, glucobrassicanapin, gluconapin, gluconapoliferin, progoitrin, glucobrassicin, and 4-OH-glucobrassicin occurred in the leaves of all rapeseed cultivars in similar quantities and proportions and did not affect aphid performance and phloem sap ingestion by *M. persicae*.

Keywords: Plant resistance; Glucosinolates; Probing behawior; Electrical penetration graph

BIOLOGICAL CONTROL IN PEPPER CULTURE

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Abstract

Pepper (Cappsicum annum L .) is an annual vegetable plant with very high biological value and specific taste. In terms of economic importance, nutritional value, human consumption, and cultivated areas, pepper is among the most significant perennial plants in Kosovo.

Pepper cultivation accounts for 16.2% of the total vegetable cultivation area. In the year 2021, pepper cultivation reached 52,381 tons, fulfilling 84.9% of the consumption needs. The cultivation of this crop takes place in protected environments, but open field cultivation is also common.

Various agricultural crops, including peppers, are susceptible to different diseases and pests that can cause damage to both yield and quality. Considering that pepper cultivation is particularly affected by various pests, with special emphasis on *Frankliniella occidentalis*, combating and managing it can be quite challenging. *Frankliniella occidentalis* is characterized as a polyphagous pest with a short life cycle and rapid development. This pest has shown resistance to chemical insecticides, but success has been achieved through biological control using *Orius laevigatus*.

Since there hasn't been prior research of this nature in Kosovo, it is essential to determine: The presence, dynamics, and population levels of *Frankliniella occidentalis* in various pepper cultivars. The sensitivity of pepper cultivars to infestation by *Frankliniella occidentalis*. The use of biological control with *Orius laevigatus* against this pest.

TESTING BASF BIODEGRADABLE MULCHING FILMS AT THE EXPERIMENTAL AND DIDACTICAL FARM OF AGRICULTURAL UNIVERSITY OF TIRANA

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Abstract

The amount of plastic used in agriculture is enormous and due to frequent contamination with soil, recycling companies often do not accept them for processing alongside other plastics. As plastic usage increases, it increasingly enters the environment, impeding efforts to mitigate plastic pollution. In light of this critical challenge, the adoption of biodegradable mulching films emerges as a promising solution, offering a balanced approach that marries agricultural productivity with environmental stewardship. BASF SE has been researching biodegradable films for more than 20 years and is testing some new grades of soil biodegradable mulch films against a commercial grade. The trial consisted in two repetitions each containing four rows for each of the four vegetable crops (tomato sweet pepper, eggplant and watermelon), totalling 32 small plots. In each repetition, three rows of plants were mulched with one of the soil biodegradable films and one row not mulched (bare soil). To test the effects of mulching in terms of soil temperature and soil moisture, two sets of sensors were used. Tiny Tag temperature sensors measured soil temperature at ground level (10 cm deep) on mulched and non-mulched rows for each of the crops in the trial. Two sensors are connected to each of the four data loggers. Watermark sensors measured soil moisture at two depths, 25 cm and 50 cm for each variant. All sensors are connected to a control unit equipped with a data logger. In order to show the advantages of mulching with soil biodegradable films; we have also assessed the performance of the plants compared to bare soil. We started by measuring the vegetative growth of the plants and then the production harvested. The commercial grade M2351 seems to provide a better performance in terms of yield compared to the experimental grades but still this is not significant and not the case of watermelon. To compare the quality of fruits under different mulching films we measured Brix and Acidity of tomato fruits taken from the rows covered with biodegradable mulching film and those left bare. To compare the degradation of the grades during the entire season as well under the climatic conditions of the lowlands of Albania (typically Mediterranean climate), we have designed a table with some indicators as weed penetration, elasticity and degradation of the film exposed and buried. Different films did not show clear differences in behaviour during laying out (elasticity, breakage or tearing, etc.). All films performed very well during the season for 4-5 months. S15 and S25 started to get brittle and to degrade in the buried part earlier than M2351 but this did not cause any problem for the weed control in the different crops.

Keywords: *biodegradable, mulching film, vegetables, soil temperature, soil moisture*

Introduction

The amount of plastic used in agriculture is enormous. According to some estimates from the Food and Agriculture Organization of the United Nations (FAO), in 2019, the agricultural subsectors used around 12.5 million tons of plastic for crop and livestock production [1]. To this, an additional 37.3 million tons of plastic used in food packaging is added. Among the most common uses are soil mulching, silage, tunnel and greenhouse coverings, irrigation and micro-irrigation pipes, crates, bottles – even as wrapping for chemical fertilizers, pesticides, and seeds. They also find use as non-woven protective textiles, shields, and nets for fruit trees or other crops, ropes, stakes, and hoops, etc. Plastic allows the cultivation of vegetables and fruits in any season, and often the quality of these products is higher than that in open fields. Polymers come to the aid of farmers by improving production, reducing losses in yields, and conserving water.

A wide variety of plastic polymer materials, easily and readily produced with highly versatile physical properties, find extensive application in agriculture. The quantity and range of plastics in agriculture have increased significantly, particularly polyolefins such as polyethylenes (PE), polypropylenes (PP), ethylene-vinyl acetate copolymers (EVA), but also, somewhat less commonly, polyvinyl chloride (PVC), polycarbonates (PC), and polymethyl methacrylate (PMMA). Ironically, the same properties that make plastics useful also present challenges for their post-use elimination, posing an environmental threat. Sorting and recycling become difficult as a wide array of polymers and additives are blended within agricultural plastics. Few microorganisms are capable of degrading conventional plastics in short timeframes, causing them to persist in the environment for decades or longer. Furthermore, due to frequent contamination with soil, recycling companies often do not accept them for

processing alongside other plastics. As plastic usage increases, it increasingly enters the environment, impeding efforts to mitigate plastic pollution. In light of this critical challenge, the adoption of biodegradable mulching films emerges as a promising solution, offering a balanced approach that marries agricultural productivity with environmental stewardship. Biodegradable mulching films are engineered to break down naturally, reducing the burden of plastic waste and mitigating the adverse ecological impacts associated with traditional plastics.

BASF SE has been researching biodegradable films for more than 20 years. The continuous development of these high-performance plastics takes place in close cooperation with customers, research institutes and local authorities to explore their possibilities and prove their performance. The focus always lies on the biopolymer's best environmental performance in regard to advancing organic recycling, no matter if the material contains fossil or renewable resources. For each individual application, environmental safety, cost efficiency and the social consequences have to be examined for its entire life cycle in order to find the most suitable material with the greatest benefit. With the development of every new application, it should always be considered if and how the option for organic recycling of biopolymers offers an added value. The aim of the trial is to test two experimental grades (S15 and S25) against a commercial grade (M2351).The experimental grades have a higher renewable content.

Material and Methods

The trial consisted in two repetitions each containing four rows for each of the four vegetable crops (tomato sweet pepper, eggplant and watermelon), totalling 32 small plots. In each repetition, three rows of plants were mulched with one of the soil biodegradable films and one row not mulched (bare soil). In terms of surface, each grade covers 135 m² of the surface cultivated with tomato, sweet pepper and eggplant respectively, while for watermelon is the double due to a bigger row distance (1.5 resp. 3 m). In order to test the effects of mulching in terms of soil temperature and soil moisture, two sets of sensors were used. Tiny Tag temperature sensors measured soil temperature at ground level (10 cm deep) on mulched and non-mulched rows for each of the crops in the trial. Two sensors are connected to each of the four data loggers. Watermark sensors measured soil moisture at two depths, 25 cm and 50 cm for each variant. All sensors are connected to a control unit equipped with a data logger.

In order to show the advantages of mulching with soil biodegradable films, we have also assessed the performance of the plants compared to bare soil. We started by measuring the vegetative growth of the plants and then the production harvested. The commercial grade M2351 seems to provide a better performance in terms of yield compared to the experimental grades but still this is not significant and not the case of watermelon. To compare the quality of fruits under different mulching films we measured Brix and Acidity of tomato fruits taken from the rows covered with biodegradable mulching film and those left bare.

To compare the degradation of the grades during the entire season as well under the climatic conditions of the lowlands of Albania (typically Mediterranean climate), we have designed a table with some indicators as weed penetration, elasticity and degradation of the film exposed and buried [2].

Fig.1 The layout of the trial, including the positioning of sensors

Results and Discussions

The temperature sensors showed the differences between mulched and non-mulched rows (Fig.2) which becomes more visible during the late season (Fig. 3).
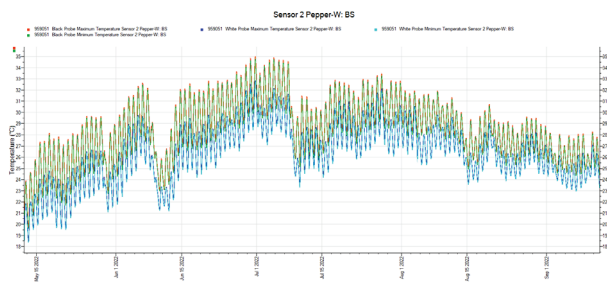
Fig.2 The dynamic of temperature in mulched and bare soil of sweet pepper
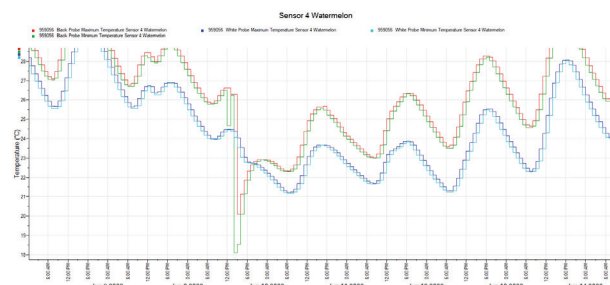
Fig.3The effect of moisture retention and its effect on soil temperature can be noticed in heavy raining events.

Different films did not show clear differences in behaviour during laying out (elasticity, breakage or tearing, etc.). All films performed very well during the season for 4-5 months. S15 and S25 started to get brittle and to degrade in the buried part earlier than M2351 but this did not cause any problem for the weed control in the different crops.

The following chart (Fig. 4) shows the median values of all measurements and the various levels of water availability. It should
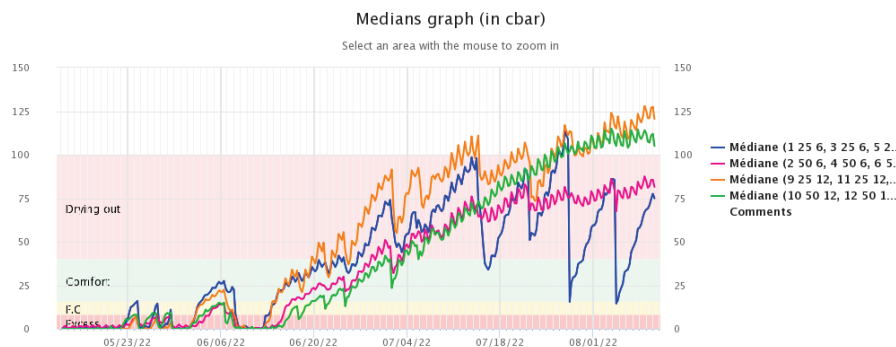
Fig.4 Median levels of water availability in the soil for all measurements

be underlined that due to the malfunctioning of the water pump, it was not possible to guide the irrigation using the monitoring of soil moisture. Ideally, the water content should have been kept within the comfort zone. For a good part of the season, plants dried out and suffer severe water stress. When we compare the measurements from sensor 5 (without mulching) with 7

(with mulching), until the 23rd of July, water stress is higher in the bare soil, as it should be. This is a demonstration of the clear effects of mulching in reducing evaporation.

Measurements of plant performance, in terms of vegetative growth, production, and etc. quality of production cannot be all shown here. We are showing only the total production by crop and grade. The commercial grade M2351 seems to provide a better performance in terms of yield compared to the experimental grades but still this is not significant and not the case of watermelon.

Table 1.Total production (in kg) harvested by each treatment (crop, mulching film grade and bare soil)

CROPS/GRADES	TOTAL PRODUCTION (KG)				
	M2351	S15	S25	BS	TOTAL
Tomato	503	477	488	521	1989
Sweet Pepper	180	199	189	173	741
Eggplant	365	373	412	371	1521
Watermelon	995	1053	950	622	3580

The experiment did result in some specific findings related to the resistance of the new experimental grades (S15, S25) compared to the commercial grade (M2351) under the climatic conditions of the lowlands of Albania (typically Mediterranean climate). Table 2 shows the scores assigned for each indicator throughout the season. The two experimental grades which contain a higher content of renewable material performed well. The photos of films in different stages of degradation show better their gradual degradation but could not be shown under the format of this paper.

Table 2. Coring system used during field evaluations showing the values of indicators that describe the behaviour of different films in the field

Plot no. Date	Film	1/8	Weed penetration				Elasticity				Degradation exposed				Degradation buried			
			1/9	13/9	6/10	21/10	1/9	13/9	6/10	21/10	1/9	13/9	6/10	21/10	1/9	13/9	6/10	21/10
1	M2351	9	9	7	5	5	3	3	3	3	7	7	7	7	5	5	5	5
6		9	9	5	5	5	3	3	3	3	5	5	5	5	5	3	3	3
10		7	9	7	7	7	5	5	5	5	7	7	5	5	5	5	5	5
15		9	9	7	7	7	5	5	5	5	5	5	5	5	3	3	3	3
18		9	9	7	7	7	5	5	5	5	5	5	5	5	3	3	3	3
24		7	9	7	7	7	3	3	3	3	7	7	7	5	5	5	3	3
27		7	9	7	7	7	5	5	5	5	7	7	7	5	7	5	5	5
31		7	9	7	7	7	5	5	5	5	7	5	5	5	3	3	3	3
Mode			**9**	**7**	**7**	**7**	**5**	**5**	**5**	**5**	**7**	**5**	**5**	**5**	**5**	**3**	**3**	**3**
2	S15	7	9	5	5	5	5	3	3	3	7	5	5	5	5	3	3	3
7		7	9	5	3	3	1	1	1	1	7	5	5	5	5	5	3	3
9		7	9	5	5	5	3	3	3	3	7	5	3	3	5	5	3	3
14		5	9	3	3	3	3	3	3	3	5	5	5	5	3	3	3	3
19		7	9	5	5	5	3	3	3	3	5	5	5	5	3	3	3	3
21		7	9	5	3	3	3	3	3	3	5	5	5	5	3	3	1	1
28		7	9	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30		7	9	7	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mode		**7**	**9**	**5**	**5**	**5**	**3**	**3**	**3**	**3**	**5**	**5**	**5**	**5**	**5**	**3**	**3**	**3**
3	S25	9	9	5	5	5	1	1	1	1	7	7	5	5	3	3	3	3
8		7	9	7	5	5	3	3	3	3	7	7	5	5	3	3	3	3
12		7	9	7	7	7	7	7	5	5	7	7	7	7	5	5	3	3
13		7	9	7	5	5	7	7	7	5	7	5	5	5	5	5	3	3
17		9	9	7	5	5	5	5	5	5	7	7	7	5	5	5	5	5
23		9	9	7	7	7	3	3	3	3	5	5	5	5	3	3	3	3
26		7	9	7	7	7	5	5	5	5	7	5	5	5	5	5	3	3
32		7	9	7	7	5	5	5	5	5	5	5	5	5	5	5	3	3
Mode		**7**	**9**	**7**	**5**	**5**	**5**	**5**	**5**	**5**	**7**	**7**	**5**	**5**	**5**	**5**	**3**	**3**

Conclusions

The results of this experiment show that different films did not show clear differences in behaviour during laying out (elasticity, breakage or tearing, etc.). However, all films performed very well during the season for 4-5 months. S15 and S25 started to get brittle and to degrade in the buried part earlier than M2351 but this did not cause any problem for the weed control in the different crops. Soil biodegradable films were incorporated in the soil on October 21st. Biodegradation in the soil will be followed for each film in the coming months.

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SOME EVALUATIONS ON THE DEVELOPMENT OF AQUACULTURE AND SHELLFISH IN ALBANIA IN THE LAST 9 YEARS

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Abstract

Albania, according to the data, the production of aquaculture in 2014 was 1663 tons; in 2022 it was 7986 tons. Shellfish was 808 tons in 2014, while in 2022 it is 922 tons. The purpose is to reflect the panorama of fish production activity during the last 9 years in: aquaculture and shellfish. The methodology used is that of GFCM (General Fisheries Commission for the Mediterranean) for data collection based on segments of fishing fleet etc. The statistics are from the Ministry of Agriculture and Rural Development as well as the Institute of Statistics in Albania(2014-2022), where the method of comparing data for several years is used, reflecting in changes in the fluctuation of fish production in aquaculture and shellfish. We give our evaluation in the way of their development as well as show the right ways of increasing their potential in the future.

Keywords: Aquatic category, cyprinids, salmonids.

Introduction

Albania is now included in the EUSAIR initiative, that includes the Adriatic and Ionian Seas, which focuses on the Blue Economy. Albania has a potential for marine and coastal areas as well as inland waters. The development of which includes water categories such as: marine, coastal, lagoon and inland waters with the aquaculture and shellfish sector. Aquaculture in Albania started about 53 years ago with the introduction and cultivation of carp imported from the countries of origin. In the countries of the Adriatic Sea, aquaculture is presented with a variety of cultivated species and advanced technologies used by these countries. This is also the case in Albania has its own development. According to INSTAT data (2014 -2022), aquaculture production in 2014 was about 1663 tons, while in 2021 it was 3544 tons. The main species cultivated in inland waters include: Trout (*Onchorinchus mykiss* and *Salmo letnica*), gilt- head bream (*Sparus auratus*), sea bass (*Dicentarchus labrax*) and mussel (*Mytilus galloprovincialis*). Aquaculture for 10 years has been cultivating bluefin tuna (*Thunnus thynnus*) in the Adriatic area together with Croatia. Albania imports the species of cod and sea bass. Aquaculture in our country is dominated by the production of cyprinids and salmonids. The purpose of this paper is to reflect the panorama of the activity of fish production of inland waters, this include: aquaculture and mollusks. The statistics are from the Ministry of Agriculture and Rural Development as well as the Institute of Statistics in Albania, where the method of comparing data for several years is used, reflecting the progress of the fishing industry in the aforementioned water categories for the last few years. The fleet fishing in Albania is included in GFCM Geographical Subarea 18, South   Adriatic (GFCM, 2001). At the same time, we also give our opinion on the further growth and development of these sectors.

Material and Methods

The fishing data used in this work were obtained from the Ministry of Agriculture and Rural Development**,** the methodology used is GFCM (General Fisheries Commission for the Mediterranean) which deals with data collection based on interviews with aquaculture operators. Data on fish catch are collected according to water categories at the country level [4, 5, 6, 7]. Data collection is based on the Law 17 /2018, [7] for Official Statistics and the Decision Albanian Parliament No.40/2019 for approval of the 2019, Plan for PSZ (2017-2022) as well as on the Regulation European Commission No.762 dated 2008, on Aquaculture Statistics where the main variables for our work are grouped in these categories: Catching fish by water categories: **1. Inland fisheries, 2. Aquaculture, 3. Mytiliculture.**

1. Inland fisheries: In this category, the general production in the years 2014-2022 has undergone a gradual linear increase from year to year. Thus, the values go to 2014-1663 tons in 2015-1659 tons there is a decrease of 4 tons difference with the year 2014 which is very easy, then in 2016 - to 1568 tons [4]. Year 2017 is 1668 tons, which is followed by a significant increase in 2018 with a total of 2007 tons, which is followed again by another increase in 2019 [5] where we caught about 2427 tons. The year 2019 again has an increase with a total of 2772 tons. The year 2020 [6] appears again with an increase in production of 2844 tons, where the peak is reached in 2021 with a production of 3544 tons, which production, if compared to that of 2014, is 1891 tons different. While the year 2022 [7] brings a slight decrease compared to 2021, this production is estimated at 3388 tons. This overview of the results for internal waters shows that in a period of 9 years we have an increase in the production of internal waters that is more than double the production for 2014. This growth is attributed to high market demand.

Table1. Production from fishing in internal waters, aquaculture and mytiliculture in tons in Albania

Denomination	2014	2015	2016	2017	2018	2019	2020	2021	2022
Water category									
Inland Fisheries	1.663	1.659	1.688	2.007	2.427	2.772	2.844	3.544	3.388
Aquaculture	1.500	3.000	3.200	4.000	5.136	5.229	8.799	8.068	7.986
Mytiliculture	800	295	1.450	430	1.108	1.075	285	593	922
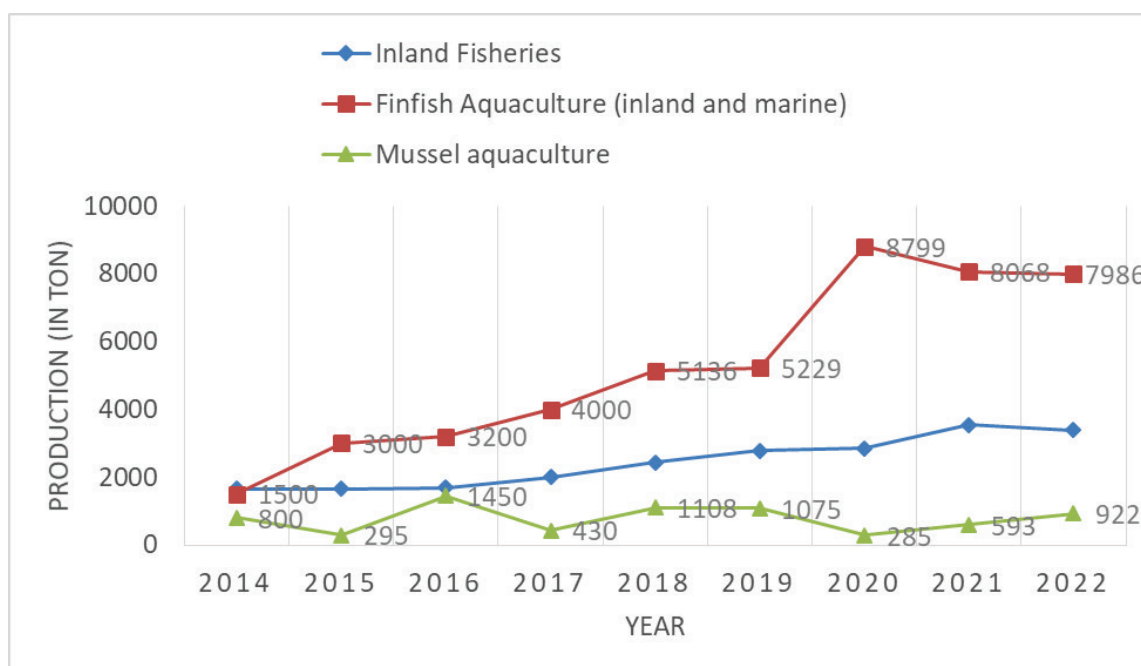
Figure 1. The production in Inland fisheries, aquaculture and mussel culture (2014-2022) years in Albania

2. Aquaculture: In 2014 - aquaculture is in the figures of 1500 tons. The year 2015 begins with a doubling of production compared to 2014, so the amount caught reaches 3000 tons. Likewise, the year 2016 comes again with an increase in production in the aquaculture sector of 3,200 tons, which is followed by the year 2017, when there is again a significant increase in production, the figure reaches 4,000 tons. The year 2018 with 5136 tons, or, we have an increase of about 28.5% compared to the previous year, which is followed by 2019 with 5229 tons or the "Aquaculture" category with 1.77% compared to a year ago. While the highest point in this 9-year study period is reached by aquaculture in 2020 with a total of 8799 tons. In 2020, the category "Aquaculture" increases by 68.3% of the total production, compared to a year ago. This can be attributed to several factors, such as favorable environmental conditions, efficient disease management and high market demand for aquaculture products, both marine and inland waters. Year 2021 (8068 tons): so in 2021, there was a significant decrease of 8.28% with little in aquaculture production compared to the previous year. Year 2022 (7968 tons): In 2022, there was a further decrease of 1.24% in aquaculture production compared to 2022

3. Mytiliculture; The year 2014 represents a total of 800 tons of mollusks, the year 2015 has a drastic decrease of about 295 tons where there were problems in cultivation and disease. The year 2016 has a figure of 1430 tons. This increase has been attributed to the care taken by farmers and improvements in environmental conditions. The year 2017 again has a decrease where the total comes down to 430 tons. In 2018, (1108 tons of mussels) the category "Mollusks" experienced the biggest annual increase by about 157.7%, compared to the previous year (2017). In 2019 (1075 tons of mussels) in 2019 the "Mollusk" category has decreased by 2.98% compared to a year ago. In 2020 (285 tons of mussels) the category of mollusks has decreased by 73.4% compared to 2019. In 2021 (593 tons of mussels) had an increase of 107.72% compared to 2020. In 2022 (922 tons of mussels) there was an increase of 55.49% compared to 2022.

Results and discussion

Based on the data presented above, we say that the production of inland water has undergone a gradual increase from year to year. In the category of inland waters, we have a positive linear growth, where the year 2014 is presented with a catch of 1661 tons, and from year to year we have an increase in production. In 2022, we have a production slightly more than 2 times the production compared to 2014. This increase is attributed to the high demands for the market that are coming and growing.

In Aquaculture; in the aquaculture category, we have continued growth until 2020. In 2020, the "Aquaculture" category increases with 68.3% of total occupations, compared to the previous year. This can be attributed to several factors, such as favorable environmental conditions, efficient disease management and high demand in market for aquaculture products, both marine and inland. Year 2021 (8068 tons): so in 2021 [7] there was a significant decrease of 8.28% with little in aquaculture production compared to the previous year. Year 2022 (7968 tons): In 2022, there was a further decrease of 1.24% in aquaculture production compared to 2021.The cause of this decline is thought to be climatic changes, especially those related to water quality. At the same time, it is worth emphasizing the economic factor, where the increased cost of food and other operational expenses may have influenced the decline in production. At this point, the market demand may have had an impact on the reduction of the number of production. It must be said that in Albania there are no producers of fish food and there is no factory that produces juveniles (for marine aquaculture), so both of these are imported products [1] given the fact that prices have risen significantly in recent years, the producers have been forced to reduce both the amount of food and the imported crop and all this helps directly in the amount of annual production .In marine aquaculture[1] we have the rapid development in gilt- head bream (*Sparus auratus*), and sea bass (*Dicentarchus labrax*) . The salmonids have experienced growth in recent years because the increase in demand has stimulated the expansion of this activity. In mytiliculture, these fluctuations show a significant variability in mussel (*Mytilus galloprovincialis*) production over the years, which may have been influenced by factors such as environmental conditions, diseases, impact from predators and alien species, market demand and the practices or "policies" followed by mussel producers in Albania.

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PHENOTIPIC DIVERSITY OF ALBANIAN CHERRY GERMPLASM

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Abstract

Sweet cherry is one of the important stone fruits in Albania. Exploring the main zones of cherry cultivation are collected and conserved several old native local cherry accessions in the National Collection of Fruit Trees Genetic Resources in Valias. The description of the main morphological features was done using UPOV Code and cherry descriptors and followed standardized protocols for sampling and measurements . The following characteristics were evaluated: tree habitat brunches, tree vigor, season of flowering and maturity, fruit size, fruit shape, fruit flesh color, flesh juiciness, sugar/acid ratio, fruit stem length, stone size, stone shape during the vegetation period. All characters are coded and rated numerically. As a result, significant diversity exists between the analyzed accessions. They differ in the quantitative and qualitative characteristics of fruit. Fruit descriptors were the most efficient to distinguished between the analyzed sweet cherry characters. Fruit characteristics variation represents an important resource for future genetic improvement and sustainable use. The results of this study help to better know the old traditional and local sweet cherry present in our country and to expand their cultivation. Their description is an important step towards identification and conservation of Albanian cherry germplasm. The database of characterization and evaluation of cherry accessions was updated in ordered to be used by interested organizations, farmers and other gene banks. Work on DNA identification and further evaluation of cherry genetic resources is recommended.

Key words: accession, cherry, genetic resources

CURRENT SITUATION AND FIRST MORPHOLOGICAL AND MICROSCOPIC DESCRIPTION OF THE CACTUS SCALE INSECT *DIASPIS ECHINOCACTI* BOUCHÉ (HEMIPTERA: DIASPIDIDAE) IN *OPUNTIA FICUS-INDICA* IN MOROCCO

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Abstract

A study was carried out on a total of 460 sites in 28 provinces located in the northern part of Morocco from autumn 2020 to winter 2022. In 2020 and the first half of 2021, the cochineal *Dactylopius opuntiae* Cockerell (Hemiptera: Dactylopiidae) was the only scale insect recorded on the pads of the prickly pear *Opuntia ficus-indica* in many regions in Morocco. However, a heavy infestation of the pads and fruits of *O. ficus-indica* by *Diaspis echinocacti* Bouché (Hemiptera: Diaspididae) was subsequently recorded in three sites in Morocco which represents a serious potential threat to the country's cacti. *Diaspis echinocacti* is described based on the morphology of adult males and females and microscopic examination of 60 slide-mounted adult females. According to the followed two predators, *Rhyzobius lophanthae* Blaisdell (Coleoptera: Coccinellidae) and *Cybocephalus sp.* (Coleoptera: Nitidulidae), and two hymenopteran parasitoids, the *ectoparasitoid Aphytissp.* (Hymenoptera: Encyrtidae) and an endoparasite Encyrtidae, have been recorded as being associated with cactus scales.

Keywords: Morocco, current status, *Diaspis echinocacti*, *Opuntia ficus-indica*

Introduction

The prickly pear cactus *Opuntia ficus-indica* (L.) Mill (Caryophyllales: Cactaceae) plays an important economic role in Morocco; the pads and fruits of this crop are used as human food, animal feed, for human medical applications, and for cosmetic industries. *Opuntia* spp. are subject to attack by many pests, mainly scale insects, which are the most important pests in terms of the impact on yield and productivity [15, 16]. The invasive prickly pear cactus pest *Dactylopius opuntiae* (Cockerell, 1896) (Hemiptera: Coccomorpha: Dactylopiidae) is the most important pest on cactus worldwide. It is found mainly in the Mediterranean basin, including Morocco [10]. In Morocco cactus is an important crop that is present in all regions in the country. Since it was first recorded in 2015, *D. opuntiae* has been considered a major cactus pest in the country and it has rapidly became widespread in all regions. The high abundance of *D. opuntiae* on the pads and fruits of the cactus crop causes important economic losses in the country. The Moroccan Ministry of Agriculture has carried out many procedures and activities to control the cochineal scale: chemical control, mechanical and physical methods, including mechanical harvesting or cleaning of the infested pads of cactus crops, as well as providing equipment, tools and pesticides to producers to control this new scale pest. According to Zimmermann & Granata [16], very few insect pests have been recorded on cultivated cacti in countries other than Mexico, including the Mediterranean countries. The same authors reported that the family Cactaceae hosts only one species from the family Diaspididae (scale insects), *Diaspis echinocacti* Bouché (Hemiptera: Diaspididae), which is host specific to the family. The cactus scale *D. echinocacti* is recorded from 74 countries and is found in Asia, Europe, North America and Africa [4]. According to the same authors, this pest was recorded on 58 plant species belonging to the family Cactaceae. *Diaspis echinocacti* is one of the armoured scales which commonly occur in European greenhouses although they may not be considered as established [12]. It is a sap-sucking insect that can have a great impact on the pads and fruits of prickly pear cactus. Feeding on the surface of pads of *O. ficus-indicata*, *D. echinocacti* produce serious damage resulting indesiccation. *D. echinocacti* has multiple overlapping generations each year [13]. According to the author, development from egg to adult requires 22.8– 25.9 days under constant temperatures of 27°C or greenhouse conditions, respectively. In the EPPO region, *D. echinocacti* has already been already reported in many regions with no further details in Mediterranean Basin [1, 3, 8]. Little is known about the cactus scale in Morocco and *D.echinocacti* was first recorded in Opuntia in the country [5], but without any additional information. Subsequently, the occurrence of the scale was recorded once more in Cactaceae host but with no further details [9]. After that date, no additional information was given. This paper aims to present the current status of the cactus scale *D. echinocacti* in cactus in Morocco. Adult morphological and microscopic descriptions are provided.

Material and Methods

A total of 460 sites in 28 provinces located in the northern part of Morocco, where the prickly pear cactus *O. ficus-indica* is a natural crop, were surveyed from autumn 2020 to winter 2022. In 2020 and the first half of 2021, the cochineal scale *D. opuntiae* was the only scale recorded on pads of *O. ficus-indicata*. However, subsequently, low to high infestation levels (percentage of infected pads of cactus) were seen on pads of *O. ficus-indica*, with *D. echinocacti* recorded in three sites (Table 1). The level of pad infestation by scale was estimated by dividing the number of infested pads by the total number of pads observed. Each shoot was considered to be infested when it hosted at least one individual of *D. echinocacti* or *D. opuntiae*. Infestation level was categorized in four classes: high (25–100%), moderate (12–25%), low (1–12%) and pest absent when no scale was found on pads. Pads of *O. ficus-indica* with high infestation of *D. echinocacti* were collected, placed into white plastic bags and

transferred to the laboratory for identification. In addition, *Opuntia* sp. pads were collected on site, planted in polypropylene black bags and kept for caging for planting in a glass greenhouse. Subsequently, the *D. echinocacti* colony was reared to allow for the development of this scale and to reproduce the damage on cactus pads. Morphological description of *D. echinocacti*, was performed based on the morphological characters of adult female's cover and male using a stereomicroscope in the laboratory. For authoritative identification of *D. echinocacti*, a total of 60 slide-mounted adult female specimens were mounted on microscope slides and microscopic examination of slide-mounted females was made according the instructions on how to prepare scales in an EPPO Standard on another scale pest [6] (EPPO, 2005). Species identification was performed using available identification keys and illustrations [11, 14].

Provinces	**Benslimane**	**Kénitra**	
Geographic coordinates	Site 1 : 33.687862, -7.152901	Site 2 : 34.153809, -6.714232	Site 3 : 34.150822, -6.716855
Area of *O. ficus-indica* (meter linear)	11	7	6
First record of *D. echinocacti*	15/10/2021	01/04/2021	27/01/2022
Infestation level of *D. echinocacti*	low	low (01/04/2021) high (07/07/2021)	moderate
Infestation level of *D. opuntiae*	high	pest absent-	pest absent

Results and discussion

Diaspis echinocacti (Bouché) *Aspidiotus Echinocacti* Bouché 1833: 53. *Diaspis cacti* Comstock 1883: 91–94. *Diaspis cacti opuntiae* Cockerell 1893j: 256. *Diaspis opuntiae* Newstead 1893d: 188.

Field characteristics

Female scale cover circular, convex and with white waxy material, with central or sub central exuviate. Diameter of scale cover of adult female is about 2.5–3.0mm. Male cover linear and parallel sided. Adult male is linear, oblong and elongate, while exuviate located in the anterior is yellow. The sides of the male cover are almost parallel and covered with white wax. Anterior of the male scale bears a brown exuviate while posterior the distance between the sides is enlarged. From exuviate an apparent median located runs the whole length of the scale dorsal posterior. The scale adult has three pairs of long thin legs.

Microscopic diagnosis

Slide-mounted adult female subcircular, with prosoma membranous at maturity. Pygidium with five pair of lobes. Median lobes (L1) large, divergent, not forming a deep notch at the apex of the pygidium, with a pair of setae between the lobes. Second lobes (L2) bilobed, outer lobule (L2b) slightly smaller than inner lobule (L2a). Third lobes (L3) and fourth lobes (L4) each bilobed. Fifth lobes (L5) present as pronounced sclerotized spur. Gland spines present on abdominal segments numbering: 1 between segments VII and VIII, VI and VII, and V and VI, 2 between IV and V, 2 on segment IV, 4 on segment III, and 1 on segment II. Marginal macroducts short, with 6 on each side; also 2 submarginal ducts present on each of segments VI and VII. One marginal macroduct present between median lobes. Dorsal ducts smaller, numerous present on segments V and VI, forming conspicuous compact submedian groups. Perivulvar pores present in five groups.

Economic importance

During our surveys, *D. echinocacti* was recorded to attack all ecotypes of Opuntia spp. in the field. Pads and fruits are highly infested and located in the lower part of the Opuntia plants. The first infestation was low in April (site 22021), however, by 1 July it had increased to high levels. During this period, the D*. echinocact*i population caused severe damage oninfested pads and fruits. Under greenhouse conditions we observed how *D. echinocacti* first infested the lower part of pads where it subsequently reached high numbers, sometimes entirely covering the surface of the pads of *O. ficus-indica* and inducing rapid pad desiccation and death.

Natural enemies

Two predators were found to be associated with the *D. echinocacti* population: *Rhyzobius lophanthae* Blaisdell (1892) (Coleoptera: Coccinellidae) and Cybocephalus sp. (Coleoptera: Nitidulidae) on site and in the caged plantation. Adults and larvae were recorded to feed on *D. echinocacti* on eggs both locations. The ectoparasite *Aphyti*s sp. (Hymenoptera: Encyrtidae) also parasitized young female *D. echinocacti*. In addition, an endoparasite, Encyrtidae, was found to parasitize preovipositing females of the cactus scale. D. echinocacti regulation factors are multiple and include many parasitoids, for example Aphytisdebachi Azim (Hymenoptera: Aphelinidae) and *Plagiomerusdiaspidis* Crawford (7). According to these authors, several predators, mainly *Cybocephalus fodori* Endrödy-Youga (Coleoptera: Cybocephalidae) and Bdellidae mite predators, were found to be associated with the cactus scale. In Brazil, *Coccidophilus citricola* (Brèthes, 1905) (Coleoptera: Coccinellidae) was also found to be a predator of *D. echinocacti*. (2)

Conclusion

To date, the occurrence of D*. echinocacti* with low to high infestation levels is limited to three sites. However, this pest represents a serious threat to the prickly pear cactus in Morocco. Taking into account the natural dispersion of the closely related cochineal scale *D. opuntiae* on cactus since it was first record in 2014; this additional pest may represent a serious threat to cactus production in the country. It is very important to control populations of *D. echinocacti* in these sites to prevent it spreading to other regions. Controls strategies need to take into account both *D. opuntiae* and *D. echinocacti*.

Acknowledgements

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EFFECT OF AUXIN DIFFERENT CONCENTRATIONS ON ROOTING OF THE SEMI-HARDWOOD CUTTING IN *NERIUM OLEANDER*

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Abstract

Nerium oleander L. is a shrub that is indigenous to northern Africa and the Mediterranean region. Its flowers and evergreen foliage are highly valued, and its long flowering period, which extends from early spring to late fall, makes it a popular choice for landscaping and xeriscaping projects in semi-arid environments.

An experiment was conducted in an ornamental nursery located in Tirana, Albania, inside a plastic greenhouse in Laknas (41° 22' 36" N, 19° 44' 14" E). In February 2020, two hundred semi-hardwood cuttings of Oleander, each measuring 10-12 cm in length and 0.2-0.5cm in diameter were taken from the mother plants' upper part. These pieces were treated with phytohormone IBA (Indole Butyric Acid) before being placed into a rooting bank consisting of 100% perlite, to study the effect of four different concentrations: Variant 1-1000mg/l IBA, Variant 2-2000 mg/l IBA, Variant 3-3000 mg/l IBA and 4-4000 mg/l IBA. The experiment aimed to evaluate the influence of auxin on the percentage of rooting and the development of plants produced by this method. Therefore, three measurements of biomorphological parameters were taken, including length, fresh and dry weight of the stems, and root system, at equal time intervals after rooting. From the results of the rooting data, we can conclude that the highest percentage of rooting (70%) is achieved by the application of the concentration of 3000 mg/l IBA. Additionally, the concentration of 2000 mg/l IBA produces a competitive effect, encouraging 67% of the rooting of the pieces placed under artificial fog. The morphological parameters, such as the dry weight of the roots and stem, prove that the variety treated with 3000 ppm IBA has superior plant development compared to the others.

Keywords: vegetative propagation, phyto-hormone, Indole Butyric Acid, dry weight, roots., Indole Butyric Acid, dry weight, roots.

Introduction

Nerium oleander L. (oleander) is a commonly found shrub in Albania, often planted along roads or in xeriscaping near the coast. While it is believed to have originated from northern Africa and the Mediterranean region, it can also be found growing wild in our country near the Vlora River. Oleander belongs to the Apocynaceae family, which includes other plants such as star jasmine and periwinkle. It has long, dark green leaves and bright flowers that come in various colors such as white, pink, red, coral, or yellow depending on the variety. This fast-growing evergreen shrub or small tree can be used to create a living screen or wall in gardens. With proper pruning, oleander can be maintained as a shrub or trained to grow into a small tree up to 3 to 5.5 meters in height. When left to grow naturally, it will form a mounded shape up to 3 meters wide. Its ornamental value lies in its evergreen foliage and long flowering period that lasts from early spring through late fall.

Studies of Oleander carried out by Dirr [1] recommend taking root cuttings collected from mature wood in late July or August after a 3000 ppm IBA application. Meanwhile, Hartmann [2] suggests another successful method for propagating oleander cultivars is by using leafy cuttings, which root easily if taken from mature wood during the summer and treated with an IBA quick dip. Experiments conducted by the Department of Horticulture in Albania for the vegetative propagation of the species *Nandina domestica* [6] and Photinia x Fraser [5] have verified the significant influence of auxin (IBA) on both the percentage of rooting and the development of the root system and stems. Other studies have also recommended the method of obtaining cuttings. Sabatino et al [3] suggest that the use of three- and four-node cuttings together with an IBA basal dip may be beneficial for propagating oleander. This practical method of propagation can bring potential economic benefits for producing oleander plants for planting in semi-arid environments in a short period.

Material and methods

The study was conducted in a plastic greenhouse located in Laknas, Tirana, Albania with controlled conditions of temperature (22°C) and humidity (90%). The mother plants were grown in the greenhouse. Propagation took place in February 2020, where semi-hardwood cuttings of Oleander, measuring 10-12 cm in length and 0.2-0.5 cm in diameter, were taken from the top of the mother plants. The cuttings were treated with phytohormone IBA (Indole Butyric Acid) and planted in a rooting bank consisting

of 100% perlite to study the effect of four different concentrations of IBA: Variant 1-1000mg/l IBA, Variant 2-2000 mg/l IBA, Variant 3-3000 mg/l IBA, and Variant 4-4000 mg/l IBA. At least two hundred cuttings were planted in three replicates for each variant, and all were placed under artificial fog to ensure the same temperature, humidity, and lighting conditions. For every 15 days, ten plants grown under the same conditions were randomly selected for each measurement in the Department of Horticulture and Landscape Architecture laboratory. The percentage of rooting was evaluated for each variety to determine the impact of IBA on rooting. Bio-morphological parameters such as length and fresh and dry weight of the stems and root system were evaluated at equal time intervals after rooting [4]. The dry weight of the roots and the entire aboveground part of plants were measured after being put on a thermostat at a temperature of 105°C. To determine the influence of different concentrations of IBA on the rooting and development of the seedling root system of Oleander, an analysis of variance of the dry weight of plants and the root system was carried out.

Results and discussion

Our work begins by evaluating the effect of different concentrations of auxin (IBA) on the rooting of *Nerium oleander* L. Specifically, we examined four different IBA levels: Variant 1 - 1000 mg/l IBA, Variant 2 - 2000 mg/l IBA, Variant 3 - 3000 mg/l IBA, and Variant 4 - 4000 mg/l IBA.

Based on the results of our experiments, we can confidently say that the concentration of 3000 mg/l IBA promotes the highest percentage of rooting, at 70%. Additionally, the concentration of 2000 mg/l IBA is also highly effective, promoting 67% of rooting in cuttings placed under artificial fog. The variant treated with 4000 mg/l, which promotes about 62% rooting of the treated cuttings, has a lower impact, while the treatment with 1000 mg/l IBA has the lowest rooting percentage, at only 38%.

In conclusion, our findings suggest that the treatment of *Nerium Oleander* semi-hardwood cuttings with 2000 and 3000 mg/l IBA is recommended for industrial propagation purposes.
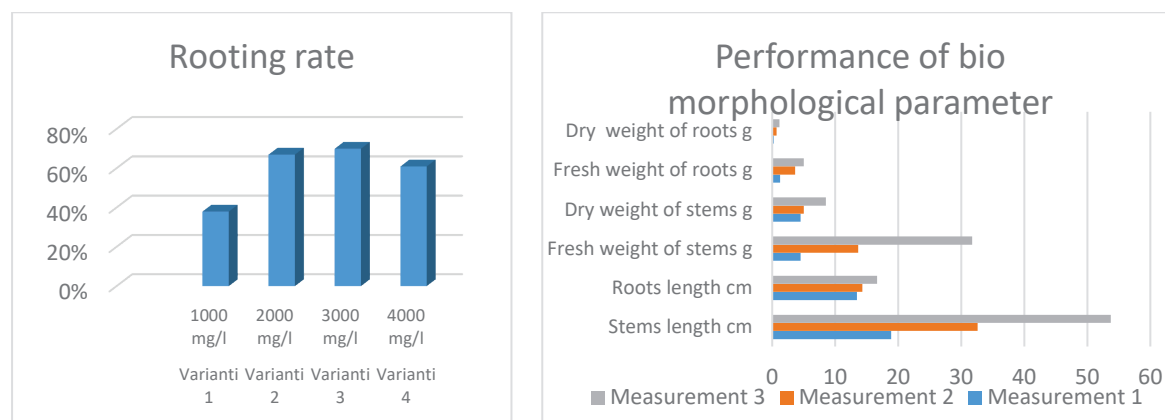
Graph No.1. A. Impact of IBA concentration on rooting rate **No.1. B.** Performance of bio-morphological parameters of V3.

During the experiment, three bio-morphological parameters were measured at regular intervals after rooting: the length, fresh weight, and dry weight of both the stems and roots. The results showed that there was a steady increase in both the root system and above-ground part over time, with the Auxin playing a significant role in promoting this growth (as evidenced by Graph No.1.B).

However, there was significant diversity in the plants that were propagated using semi-woody cuttings. This could be attributed to the fact that the cuttings were not of the same size and thickness, which led to varying numbers, lengths, and development of the roots during the rooting process. This, in turn, affected the overall growth and development of the new plants. The evaluation of the growth rate of the dry weight of the roots is a very important moment to evaluate the progress of the plant's development after rooting.

Based on the graph, it is evident that Variant 3 treated with 3000mg/l IBA has a stronger root system development of 1.15 g compared to other concentrations of auxin. On the other hand, Variant 1 treated with 1000mg/l IBA has a slightly developed root system with a dry weight of 0.11 g, which is not adequate to produce developed plants based on the bio-morphological parameters measurement.
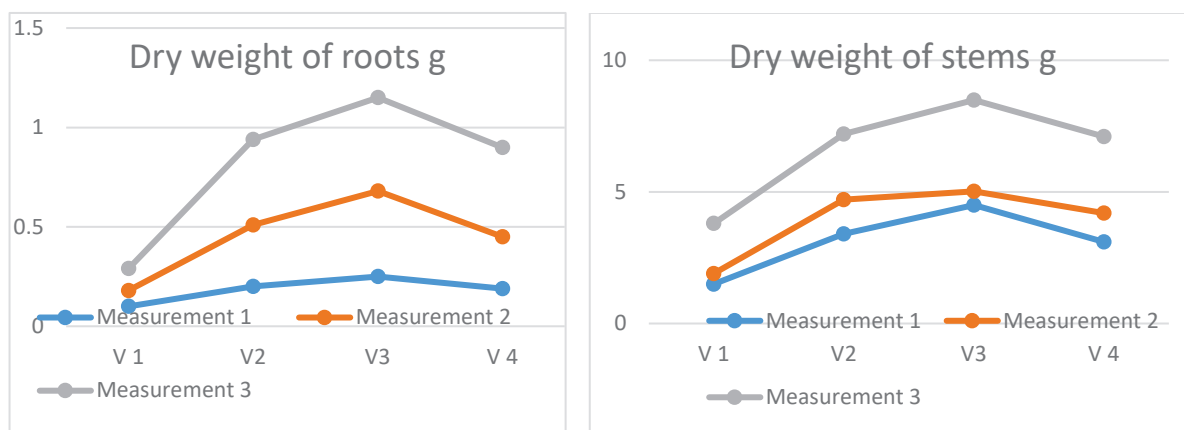
Graph No.2. Performance of dry weight of roots and stems during 45 days.

The dry weight of the shoots was measured every 15 days, and it was observed that Variant 3 treated with 3000 mg/l IBA had a greater increase in dry weight compared to Variant 2 treated with 2000 mg/l IBA. Variant 1 treated with 1000 mg/l IBA had the lowest increase in dry weight compared to all other variants.

The reason for this difference is that IBA promoted the development of a more powerful root system in Variant 3, which provided more nutrients to the new plant. This led to a more powerful development of the entire plant.

The analysis of variance showed that there were statistical differences in the dry weight of plants between Variant 1 (1000mg/l IBA) and Variant 3 (3000mg/l IBA). However, there was no statistically significant difference in the dry weight of plants between Variant 2, Variant 3, and Variant 4. The calculated F value was greater than the critical F value (Fisher test), which proved the statistical significance of the differences in dry weight of plants for Variant 1 and Variant 3 at a significance level of 0. 05.

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	22.08002	1	22.08002	8.179955	0.045927	7.708647

After 45 days, plants propagated using this method have a commercial appearance and are ready for permanent planting in pots or in the garden.

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TEMPERATURE AND PRIMING EFFECTS ON GERMINATION AND GROWTH PARAMETERS ON GARDEN PEA PLANTS

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Five equal samples of graded seeds of a commercial garden pea were used in the experiment. The first was used as control (ctr), and the rest were subject to priming to different osmotic solutions (KNO_3 2%, KH_2PO_4 2%, KNO_3 1%+KH_2PO_4 1%, and KNO_3 2%+KH_2PO_4 2%). All primed variants were incubated for 24 hours in a germination room (24°C, 80% RH), then removed from the respective solutions, dried, and kept for the next 72 hours at the same conditions (24°C, 80% RH). The control variant was also kept at the same conditions for the last 72 hr. Following that procedure, all seeds were sown in polyester trays, filled with vermiculite (60 cm3 per module), and transferred in two different growth chambers with different temperature regimes, respectively 12 and 20°C. Equal RH (80%) and lightening conductions (12 h, PPFD 180 µmol m-2 s-1) were applied. Germination, growth, and root morphology were measured ten and fifteen days after sowing, and relative growth rates of plant dry matter and root length (RL) were calculated for the period between ten and fifteen days after sowing. Temperature significantly affects all germination and growth parameters. On the contrary, there was no advantage of KNO_3 2% and KH_2PO_4 primed seeds versus control regarding germination and growth parameters. Even, these parameters were significantly deteriorated under the combined application of a concentrated solution of potassium salts (KNO_3 2%+KH_2PO_4 2%). Slight improvements were only recorded regarding root length, surface area, and volume of the root system in primed seeds under low-concentration osmotic solutions (KNO_3 1%+KH_2PO_4 1%).

Key words; garden pea, priming, germination, growth, root morphology, relative growth rate.

INFLUENCE OF VARIETAL STRUCTURE IN MACEDONIAN PRIMARY TOBACCO PRODUCTION

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ABSTRACT

Tobacco production traditionally occupies a significant place in the agricultural complex and plays an important role in the economic development of the Republic of North Macedonia. Our oriental tobacco is mainly an export-oriented crop and any lack of attention regarding the maintenance of varieties and the preservation of varietal structure in primary production can have, a negative impact with unforeseeable consequences for the tobacco economy. In certain years, the primary production of tobacco shows greater variations in relation to the planted areas and the obtained quality and yield of tobacco. For this purpose, in this paper we decided to analyze the period from 2010-2020, where there is a certain increase in the average annual production of tobacco of 26,367 tons, which in relative amount is 16-22% higher than the period 1987-2009 and there is a visible increase in the average yield per unit area, which is 1492 kg/ha.

Key Words: tobacco, structure, oriental, variety

INTRODUCTION

Tobacco production, traditionally, occupies a very significant place in the agro-industrial complex and plays an important role in the economic development and overall economy of the Republic of North Macedonia. The economic importance of this culture can be seen from the fact that in the past ten-year period (2009-2018), in our country, an average annual production of tobacco was organized on an area of 17,940 ha, which area is about 3.54% of the total arable land. area or about 80% of the area under industrial crops. In this analyzed period, an average annual production of unprocessed tobacco was achieved in the amount of about 26,182 tons, and in the same period, the average export of processed tobacco amounted to 22,903 tons. However, in some years the total primary production of tobacco shows greater variations both in relation to the planted areas and in relation to the obtained yield and quality of tobacco. A large number of factors influence the aforementioned situation in tobacco production. The reasons are: unresolved ownership relations of the production plots, unadaptability of the tobacco variety to certain soil and climatic conditions, untimely and inappropriate application of agrotechnical and protective measures of tobacco in nursery and field production, unfavorable climatic conditions - occurrence of drought, high temperatures and others .(Gornik R.1973).

In order to maintain the continuity and stability of the primary production of tobacco in accordance with the current needs of the market, cigarette companies and the tobacco trade, it is necessary to continuously maintain the good commercial characteristics of the quality of smoking tobacco of the appropriate commodity type.(Uzunoski M. 1985). The introduction of new, more productive varieties of tobacco in primary production provides a broad perspective for the realization of higher, but also planned production, in line with the demands of the foreign market.

MATERIJAL AND METHODS

In the preparation of this paper, data from the Statistical Yearbook , from the Ministry of Agriculture, Forestry and Water Management of the Republic of North Macedonia and data on the amount of seed material sold from the Scientific Tobacco institute - Prilep were used. The data were statistically processed, from which the average values for the analyzed years were presented.

RESULTS AND DISCUSSION

In the analyzed period, 1987 - 2009, there is a certain decline in the total annual production of tobacco (Table 1), it is characterized by much lower average annual production in the amount of 22,112 tons of tobacco. Also, in this period, the average planted areas under tobacco are reduced to 19,285 ha, However, at the same time the yield per hectare has increased as a result of change in the varietal structure, with the introduction of newly created varieties, which replaced the existing standard varieties within the individual commodity types of tobacco. During this period, the average yield per unit area has increased significantly, which is 1223 kg/ha.

Average production of tobacco and percentage representation of types and varieties

Table 1.

Year	Average production, in tons	Average yield, kg/ha	Average planted area under tobacco, in ha
Subperiod **1987/99** **2000/2009**	21.590 22.791	1.212 1.238	19.844 18.558
Share by type, in % (1987-1999)	Prilep – 49,5 Yaka – 31,0	Dzebel– 5,7 Otlja – 5,6	Virginija – 6,1 Berlej – 2,1
2000/2009	Prilep – 58% Yaka -33%	Dzebel – 1% Otlja 0,3%	Virginija , Berlej - 0,4%

Source: Statistical yearbook of the Republic of Macedonia, 2010, p. 374.

This period (1987-2009) is characterized by the fact that for the first time new more productive varieties of tobacco are introduced in the primary production of tobacco. Namely, already during the first years of the period, the replacement of the previous standard varieties of tobacco within the separate long-standing (more than 50 years) renowned product types of tobacco recognized on the foreign market began to be carried out. With the newly introduced varieties (JV125/3 and Jaka 48), the production of the "jaka" type remains stable during this period, and these varieties are still grown in primary tobacco production today.(Dimitrieski M. 1990)

However, with the introduction of most varieties within the "prilep" type, the varietal structure is disturbed and production destabilizes for a longer period of time.(Miceska G. Dimitrieski M.2018)

In the ten-year sub-period (2000-2009) in the production of tobacco in our country, the most represented are oriental tobaccos of the aromatic types "prilep", "jaka", "basmak" and "jebel" (Table 1). From the average data presented in the table , it can be seen that in this sub-period the "prilep" type is most represented with 58%, then the "collar" type with 33%, the "basmak" type with 7.3 (newly introduced type since 2006), as well as with 1% the type "Jebel", and with an insignificant share the types "Otlja" with 0.3% and the large-leaved types "Virginia" and "Berlay" with 0.4%.

Stojanoska (2007), states that the structure of tobacco production in the Republic of Macedonia for the period 2000-2005 was with the following percentage representation by types of tobacco: "prilep" 61.42%, "jaka" 34.81%, "jebel" 1.06%, "Otlia" 0.47%, "Virginia" 1.32%, "Berlay" 0.04% and "Basmac" 0.88%, these data are correlated with the presented data on the percentage representation of the types tobacco for the period 2000-2009 shown in Table 1.

From 2009, the situation began to change significantly with introduction the newly created variety Prilep 66 9, into tobacco production .The new type prilep 66 9 is a creation of the authors prof. Dr. Miroslav Dimitrieski and Prof. Dr. Gordana Miceska. This highly productive oriental aromatic variety tobacco was very well accepted by the three key subjects for the tobacco economy: from the foreign market, all registered buyers of tobacco in our country and tobacco producers together with tobacco associations, and today it is the most represented variety in primary production of tobacco at the republic level.

Given that in our country, oriental tobacco is mainly an export-oriented crop and any insufficient attention, in terms of the maintenance of the varieties and the preservation of the varietal structure in the primary production, it can have a very negative impact on the development of the tobacco economy.In the analyzed period, when the Department of Genetics, Selection and Seed Control in the Institute was staffed with a sufficient number of scientific research and secondary professional staff with many years of experience, it took more than 20 years to stabilize the varietal structure within the "prilep" type. Today, if by chance the varietal structure is allowed to destabilize, regardless of the type of tobacco, one can only guess how long it will take to stabilize it, when the scientific research staff at the Institute working in the narrower field (genetics and selection of tobacco) is below the necessary minimum, and the secondary professional staff is reduced to a minimum.(Miceska G. , Dimitrieski M.2018)

In the last analyzed period (2010 – 2020), a higher average annual production of tobacco is observed (Table 2). The period is characterized by a much higher average annual production in the amount of 26,367 tons of tobacco. In this period, the average planted areas under tobacco are reduced to 17,676 ha. At the same time, in this period (20010/20) there is a visible increase in the average yield per unit area which is 1,492 kg/ha. In addition to the increase in production during this period, the stabilization

of the varietal structure within the product type "prilep" has a special impact, and thus an increase in the competitiveness of this aromatic type of tobacco on the foreign market, which is enabling greater export and achieving a higher purchase price for this tobacco. Of course, the increase in tobacco production during this period has a special share in direct payments, that is, subsidization of producers in den/kg of delivered tobacco.

Average production of tobacco and percentage representation of types and varieties

Table 2.

Year	Average production, in tons	Average yield, kg/ha	Average planted area under tobacco, in ha
2010/2020	26.367	1.492	17.676
Share by type, in % **2010/2020**	Prilep – 84(Prilep 66 9 – 79%) Yaka – 14	Dzebel, Otlja- 0,2 Basmak – 1,8	

Source: - Statistical yearbook of the Republic of Macedonia, 2015, p. 437 and 441.

- Statistical yearbook of the Republic of North Macedonia, 2021, p. 455 and 459.

From the data presented in Table 2, it can be seen that in the ten-year period (2010-2020), in our country, the average annual production of raw tobacco is 26,367 tons. This average annual tobacco production was achieved on an average planted area of 17,676 ha.

In the last period (2010-2020), in the production of tobacco from our country, mainly oriental tobaccos of the aromatic types "prilep", "jaka", "basmak" and "jebel" are represented (Table 2), and large-leaf tobaccos of the types "Virginia" and "Berlay" are not grown at all. From the average data presented in the table, it can be seen that in the ten-year period the "prilep" type participates with the largest share in production with 84%, then the "jaka" type with 14%, and with the smallest share of 1.8% the "basmak" type and with an insignificant part the types "Jebel" and "Otlja" with 0.2%.

If we compare the average percentage representation of tobacco types from this period (2010/20), with the average percentage representation of types from the sub-period 2000/09 (Table 1), it can be concluded that:

►In the period 2010/20 (Table 2), 6 varieties of tobacco are represented in the variety structure of the Prilep type, among which the Prilep 66 9 variety dominates the total production with 79%.

►In the two analyzed periods, in the primary production of our country, oriental types of tobacco are mostly grown, which in the sub-period 2000/09 are represented by 99.3% in the total average annual production (Table 1), and in the period 2010/20 the primary production is with 100% representation of oriental tobaccos (Table 2).

It is necessary to point out the fact that in the last four years only the Prilep 66 9 variety participates with 94% in the total production and with 98% within the "prilep" type, its production has increased the competitiveness and demand of this renowned product type on the market . This finding can be confirmed by the continuous stable production of tobacco (over 25,000.00 tons) during this period and by the export of seed material of this variety to Serbia, Turkey, as well as the interest in introducing the Prilep 66 9 variety into production and from side of other Balkan countries. (Dimitrieski M., Miceska G.2012).

Photo 1. Prilep 66 9

CONCLUSIONS

- The Scientific Institute for Tobacco continuously takes care of the maintenance of all commercialized varieties of the renowned types of tobacco. Also, although it has a stable varietal structure, it is highly competitive in the market especially of the "sticky" type.
- If there is a demand for the "collar" type on the market and buyers show interest in increasing the production of this type, the Scientific Institute for Tobacco - Prilep is available to solve this problem.
- The introduction of newly created varieties of tobacco, regardless of what type of tobacco they will be (oriental type - "prilep", "jaka", "jebel", "basmak", semi-oriental type - "otlya"; large-leaf type - "virginia" and "berlay"), should be phased in through production trials at manufacturers in the relevant region of the type, and after their acceptance by the market, they will be introduced into mass production. For the implementation of these complex and significant activities, it is necessary to provide adequate funds with the Tobacco Production Strategy in the coming period.

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CHEMICAL AND MORPHOLOGICAL PROPERTIES OF THE PLANTS FROM SOLANACEAE FAMILY

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Abstract

Tobacco is a plant from the Solanaceae family, characterized by specific chemical and morphological properties that vary based on the species and type of tobacco. Nicotine, one of the significant alkaloids present in the *Nicotiana tabacum* species, notably sets this plant apart as an industrial crop from others within the same family.

Eight wild tobacco species were examined: *N. rustica, N. alata, N. longiflora, N. petunia hibrida, N. repanda, N. glutinosa, N. miersii,* and *N. undulate.* Their values were compared with the cultivated species *N. tabacum* (P 23 variety).

The goal of the study was to analyze the chemical and morphological characteristics of wild tobacco species compared with the cultivated species *N. tabacum* (P 23 variety). The obtained data will contribute to the further selection. The acquired findings concerning the levels of nicotine, proteins, and soluble sugars are as follows: ranging from 1.53% nicotine, 8.77% proteins, and 25.72% soluble sugars in the cultivated *N. tabacum* species (P 23 variety) to 0.01% nicotine in the *N. petunia* hibrida species, along with 11.44% proteins and 1.59% soluble sugars in the *N. repanda* species.

The data from morphological measurements were statistically methods with the following parameters: standard error of the mean ($\sigma \bar{x}$), standard deviation (σ) and coefficient of variation (CV%).

Chemical property analyses of tobacco were conducted in the accredited laboratory in the Department of Technology and Chemistry of Tobacco and Tobacco Products, following internationally recognized methods.

Keywords: family, genus, species, tobacco, wild species.

Introduction

The species *Nicotiana tabacum* belongs to the Solanaceae family. This species encompasses a large number of tobacco types and varieties, with each type of tobacco distinguished by its characteristic chemical and morphological properties. Among the chemical properties, nicotine stands out as one of the important alkaloids present in tobacco of the *Nicotiana tabacum* species. This alkaloid sets tobacco apart as an industrial plant from other plants belonging to this family.

Unlike the cultivated tobacco species *N. tabacum*, which is characterized by a haploid number of chromosomes [2], wild tobacco species have different numbers of chromosomes and exhibit various morphological and chemical traits in the plants Rudolph G [3]. Some wild tobacco species have the same chromosome number as the cultivated tobacco species and can be easily used for cross breeding. This should be emphasized because one of the most important reasons for cross breeding in selection is the property of disease resistance in plants, inheritance of certain chemical and morphological traits such as a greater number of leaves, obtaining plants with a shorter vegetative period,etc.

Materials and Methods

The trial was set up in the experimental field of the STIP, in metodrandomized block design with 3 replications. Seven wild species were used as working material (*N. rustica, N. alata, N. longiflora, N. petunija hibrida, N. repanda, N. glutinosa, N. miersii, N. undulata*) and the cultivated tobacco variety (P-23 Ø).

The harvesting of the leaves was carried out at their technological maturity in 5-6 harvests and drying was done in the shade. Morphological measurements were made in the stage of full flowering. Selected tobacco was stringed, yellowed and then sun-dried.

Following chemical properties were analyzed: nicotine content in %, protein content in % and soluble sugars content in%. Nicotine in the raw material was determined spectrophotometrically using the CORESTA method. Total nitrogen content was determined according to the Foster method, proteins by the J. Moor method and soluble sugars by the Bertrand method.Morphological measurements were conducted during the full flowering phase of the plants on five stalks of each wild species and the control. Data from the morphological measurements were statistically analyzed using basic statistical parameters: standard error of the mean ($\sigma \bar{x}$), standard deviation (σ) and coefficient of variation (cV%), calculated according to Filiposki K. [6]

Results and Discussion

Chemical and morphological properties are among the most important characteristics of plants for identifying different types and varieties of tobacco; this also applies to other types of plants.

Table 1. Chemical properties of the raw material of *Nicotiana tobaccum* type

VARIETY	Chemical analysis		
	Nicotine%	Proteins%	Soluble , Sugars%
N.tabacum P-23	1.53	8.77	25.72
N. rustica	0.40	9.11	4.25
N. alata	0.37	9.97	3.86
N.longiflora	0.50	10.69	2.15
N. petunia hibrida	0.01	9.15	3.10
N.repanda	0.09	11.44	1.59
N. glutinosa	0.55	8.89	3.73
N. miersii	/	/	/
N. undulata	0.69	8.50	4.20

Table 1 displays data for the chemical composition of dry tobacco from the tested wild species. It shows: %of nicotine, %of proteins and %of soluble sugars.

- **Nicotine Content**

Uzunovski M. (5), climate conditions have a significant influence on nicotine content. In Table 1 nicotine content varies from 1.53% in the *N. tabacum* variety (P-23) to 0.01% in the *N. petunia* hibrida variety, where the presence of nicotine is almost in traces. Lazaroski T. (1984) has observed that irrigation, as an agricultural practice, significantly influences the reduction of nicotine content in tobacco. Depending on the irrigation variant, nicotine ranged from 0.80% to 1.14%.According to Mitreski M. [4], the average nicotine content in 2009 ranged from 1.18% in P 12-2/1 variety to 1.96% in P 23 variety.

- **Soluble Sugar Content**

Soluble sugars are considered primary for the formation of other organic compounds in photosynthesis. The soluble sugars in the tested species range from 25.72% in the cultivated variety *N. tabacum* (P-23) to 1.59% in the wild species *N. repanda*, whose percentage is significantly lower compared to the P -23 varieties.Other wild tobacco species also exhibit low content of soluble sugars. The highest content was observed in the wild species *N. rustica* (4.25%). Mitreski M. [5], the average nicotine content ranges from 1.18% in P 12-2/1 variety to 1.96% in P 23 variety.

- **Protein Content**

The optimal range for proteins is 5-10%. In the examinations, the protein content in the cultivated variety *N. tabacum* (P-23) is 8.77%, whereas in the wild species, it ranges from 11.44% in *N. repanda* to 8.50% in *N. undulata.* From the data presented in Table 1, we conclude that most wild species have an optimal protein content.

Arsov Z. et al. [1] emphasize that protein content below 5.5% of the dry matter is an indication of a monotonoustaste, while a content higher than 7% is a sign of a deteriorated taste of the smoke and the quality of the tobacco.

- **Length and width of the leaves from the middle belt (cm)**

In Table 2 the control variety P-23 stands out with the greatest average length of the middle leaf (26.6 ± 0.64) and it also has the smallest standard deviation (0.64). Its coefficient of variation is insignificant - 5.71%, indicating the stability of this variety. The wild species *N. miersii* is characterized by the smallest length of the leaves from the middle belt (2.3 ± 0.12), witha coefficient of variation of 11.90%, thus we conclude that the variability in length of the middle leaf is medium.The wild species *N. repanda* stands out for the property length of the leaves from the middle belt with the largest standard deviation of 2.17 and a coefficient of variation of 17.77%.

Table 2. Average values of length and width of leavesfrom the middle belt (cm)

VARIETY	Length of leaves (cm)			Width of leaves (cm)		
	$\bar{x} \pm c\,\bar{x}$	σ	cV%	$\bar{x} \pm c\,\bar{x}$	σ	cV%
N.tabacumΠ-23	26.6 ± 0.64	0.64	5.71	10.5 ± 0.57	0.65	12.27
N. rustica	14.4 ± 0.21	0.47	3.29	11.3 ± 0.46	1.04	9.18
N. alata	19.2 ± 0.58	1.30	6.79	8.5 ± 0.63	1.41	16.64
N.longiflora	19.2 ± 0.58	1.30	6.79	8.5 ± 0.63	1.41	16.63
N. petunia hibrida	13.5 ± 0.35	0.79	5.85	8.6 ± 0.19	0.42	4.86
N.repanda	12.2 ± 0.97	2.17	17.77	10.0 ± 0.67	1.50	15.00
N. glutinosa	8.9 ± 0.37	0.82	9.23	7.6 ± 0.19	0.42	5.50
N. miersii	2.3 ± 0.12	0.27	11.90	1.1 ± 0.10	0.22	20.33
N. undulata	19.2 ± 0.58	1.30	6.79	8.5 ± 0.63	1.41	16.64

The wild species *N. rustica* (11.3 ± 0.46) is characterized by the largest average width of the leaves, whose standard deviation is 1.04 and the coefficient of variation is 9.18%. The wild species *N. miersii* is characterized by the smallest leaf width (2.3 ± 0.12), the smallest standard deviation (0.22) and the largest variation coefficient of 20.33%. According to the obtained data, the standard deviation is low, from which it can be concluded that the tested wild species are stable.

Conclusions

Nicotine content among the examined wild species varies from 1.53% in the *N. tabacum* variety (P-23) to 0.01% in *N. petunia*.

Protein content in the cultivated *N. tabacum* variety (P-23) is 8.77%, while in wild species, it ranges from 11.44% in N. repanda to 8.50% in *N. undulata*.

Soluble sugars in the examined species range from 25.72% in the cultivated *N. tabacum* variety (P-23) to 1.59% in the wild *N. repanda*.

The length of the middle leaf is highest in the control variety P-23 (26.6 ± 0.64) with a coefficient of variation of 5.71%, while the wild species *N. miersii* has the shortest length of leaves in the middle belt (2.3 ± 0.12) with a coefficient of variation of 11.90%.

N. repanda having the highest standard deviation of 2.17 and a coefficient of variation of 17.77%. *N. miersii* has the lowest standard deviation (0.22), and *N. rustica* has the lowest coefficient of variation, at 3.29%.

Wild species N. rustica stands out with the greatest average width of leaves (11.3 ± 0.46), with a standard deviation of 1.04 and a coefficient of variation of 9.18%. *N. miersii* exhibits the smallest leaf width (2.3 ± 0.12), the lowest standard deviation (0.22) and the highest coefficient of variation, 20.33%.

Based on the data obtained, we conclude that the wild species exhibit variability ranging from insignificant to momoderate.

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ASSESSING GROWTH AND MILK PRODUCTION IN SHEEP BREEDS: A STUDY IN SOUTHEAST ALBANIA

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Abstract

The present study aimed to assess the growth patterns of lambs by monitoringtheir body weight at various developmental stages and the milk production of three sheep breeds, thereby examining potential disparities among them. The research was conducted at the farm of the Center of Agricultural Technology Transfer in the Korca region, situated in Southeast Albania. A total of 96 sheep from three different breeds were included in the study: Lara e Polisit, Shkodrane (both native Albanian breeds), and Awassi (an imported breed).Throughout the study, detailed records of body weight were systematically collected for 135 lambs, spanning from birth to the weaning stage. Post-weaning, milk measurements were conducted twice daily, in both the morning and evening, over a six-month period. The mean body weight at birth for Shkodrane lambs was 3.30 ± 0.30 kg, increasing to 7.84 ± 1.97 kg at 30 days of age and reaching 9.91 ± 3.18 kg at the time of weaning. In comparison, Lara e Polisit lambs had a mean birth weight of 3.25 ± 0.48 kg, 8.99 ± 2.56 kg at 30 days, and 10.18 ± 3.07 kg at weaning. Meanwhile, Awassi lambs exhibited a mean birth weight of 3.83 ± 0.43 kg, growing to 11.47 ± 2.38 kg at 30 days and 19.80 ± 6.75 kg at weaning.The average daily weight gain from birth to the weaning period was 0.07 kg for Shkodrane, 0.08 kg for Lara e Polisit, and 0.23 kg for Awassi. The results revealed robust growth intensity in lambs from birth to weaning, culminating in an average absolute gain of 6.609 kg for Shkodrane, 6.935 kg for Lara e Polisit, and 15.967 kg for Awassi. No statistically significant differences were observed between the two native breeds concerning live weight at different ages and average daily weight gain ($p>0.05$). However, the Awassi breed consistently displayed higher body weights at all postnatal stages compared to the native breeds, and these differences were highly significant ($p<0.0001$).Regarding milk production, the average daily milk yield over the entire lactation period was 1.06 ± 0.80 kg for Lara e Polisit, 1.32 ± 0.81 kg for Shkodrane, and 1.37 ± 0.81 kg for Awassi. Statistical analysis unveiled significant variations between Lara e Polisit and both Shkodrane ($p=0.046$) and Awassi ($p=0.001$) breeds. Furthermore, a robust negative correlation was observed between daily milk yield and the progression of the lactation month, characterized by a Pearson correlation coefficient of $r = -0.899$ ($p<0.01$).

Key words: Sheep,Body weight, Daily gain, Milk yield, Lactation period

ORGANIC SEEDS BREEDING IN DURUM WHEAT FOR MEDITERRANEAN ENVIRONMENT

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According to the European Union Farm to Fork strategy, at least 25% of the EU agricultural land shall be under organic farming by 2030. However, the lack of wheat varieties specifically adapted and selected specifically for organic conditions and lower input of pesticides and fertilizers in organic production systems result in lower grain yields.

The aim of the present study, conducted in the frame of the ECOBREED project (European Union's Horizon 2020 research and innovation program under grant agreement No 771367), was to select suitable durum wheat accessions for organic farming in the Mediterranean region.

The trial started in 2018 at Tuscia University, Central Italy, with a preliminary evaluation of 72 durum wheat genotypes, including old varieties, landraces, and new accessions developed in the Central European and Mediterranean areas. The screening was focused mainly on traits important for organic farming, including crop ground cover/competitiveness with weeds, disease resistance/tolerance, but also grain yield, protein content, etc. From the first-year trial, 27 genotypes were selected and evaluated in the field trial for three years more. The accessions were also characterized genotypically by SSR markers associated with traits of interest.

The study allows us to identify seven accessions suitable for organic agriculture with wide adaptation to different environmental conditions, and one of them was submitted to the Italian Ministry for Variety registration.

Keywords: durum wheat; organic farming; phenotyping; genotyping.

INTEGRATING "*IN SITU*" AND "*EX-SITU*" METHODS OF CONSERVATION OF FARM ANIMAL GENETIC RESOURCES FOR GENE CONSERVATION, BREEDING PROGRAMS, AND SCIENTIFIC RESEARCH.

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Abstract

The animal genetic resources of farm animals are one of the national assets of value for human nutrition. Conservation and sustainable use of this national asset is a task that requires the permanent engagement of society in general, central and local government, agricultural institutions, and related specialists. Albania is also threatened by the substitution of native/ autochthonous breeds with exotic ones as the most efficient way of increasing animal production. Other factors like emigration and migration from rural areas to urban ones are affecting the diminishing of farm animals in general as well as native breeds. At the same time, Albania has limited capacities for implementing programs for in-situ conservation of breeds at risk of extinction and/or to invest to set up its national bank for *ex-situ* conservation. Until now attempts have been undertaken to set up in vivo both *in situ* and *ex situ* and cryopreservation. Somatic cells are used for cryopreservation of some farm animal breeds at risk of extinction. *In situ*, conservation is applied for buffalo species, three native breeds of cattle, four native breeds of goats, two native breeds of sheep, and three native breeds of pigs. Cryopreservation is applied only for one native breed of goat and two native breeds of sheep. Somatic cell samples are deposited in ATTC of Korça but their administration is far from the standard to be considered a genetic bank. There are a lot of challenges related to the selection of donor animals, biological material to put in the cryo-bank, protocols to follow for sample collection and preservation, etc. The selection of biological material for cryopreservation should support in vivo conservation, breeding programs, and future genetic studies at the DNA level. It is necessary to awareness of all stakeholders on the importance of farm animal genetic resources and to get support from public funds for conservation programs, especially for ex-situ conservation

Keywords: *in situ*" and "*ex-situ*" conservation; cryopreservation; native breeds;

Introduction

Farm animal genetic resources represent one of the most important wealthy of a country. They provide food, cash, and occupation for the farmers, but not only. Their raw and processed products are the main food of animal origin with high biological value for human nutrition. The geographical terrain of Albania is more suitable for animal rearing than for agriculture, especially in hilly and mountainous regions. Due to this terrain, different bio-climate ecosystems are found characterized by high biodiversity and an abundant diverse genetic fund of farm animal genetic resources. Albania has a lot of local breeds, especially in small ruminants (sheep and goats) but also in other species. This genetic fund of farm animal resources is recently threatened for different reasons, like as, economic, migration, and emigration of people living in rural areas.

In-situ and ex-situ conservation are two strategies used to preserve biodiversity. In-situ conservation involves conserving all living species, especially wild and endangered species, in their natural habitats and environment. Ex-situ conservation involves conserving all living species in artificial habitats, like farms, research stations, zoos, and cryopreservation DNA --banks. Complementary to animal genetic resources maintained *in situ* or *ex-situ invivo*, they are also conserved *ex-situ invitro* in public and/or private gene banks. Many countries have established national gene bank collections of animal genetic resources as a backup. Cryopreservation is the main form of *ex-situ* conservation of animal genetic resources.

Materials and methods

This study is based on the work done until now fornative farm animal genetic resources conservation. The data used are taken from national reports handed to international organizations, study reports and presentations in different activities.

Results and discussions

According to the second report on the state of genetic resources of farm animals, handed over to FAO (2013), 39 adapted local breeds and s13 imported ones are bred in Albania. Actually, the last evidence of Animal genetic resources in Albania reports for:

Table 1, Number of breeds of Farm Animal Genetic Resources in Albania

No	Species	Native	Exotic
1	Cattle	5	3
2	Dual purpose cattle	-	5
3.	Sheep	6	3
4	Goats	10	2

5	Pigs	3	1
6	Hens	5	3
7	Horses	3	-
8	Donkeys	2	-
9	Bufalos	1	-
10	Rabit	1	-
11	Turkeys	2	-
12	Honey bees	1	-

Native cattle breeds are all in critical condition nevertheless their number has increased recently mainly because of the agrotourism development in mountainous regions. According to K. Kume et al,(2023), four to six native sheep breeds are not threatened. Three to ten goat breeds are at risk of extension, and two are in vulnerable condition. The native pig breeds are in critical condition and the Buffalo species is at risk of extinction. One hen's breed is at risk of extinction because of intensive crossing with exotic breeds.

What is done to preserve native animal genetic funds in Albania?

The national action plan was compiled and the main activities were the capacity building of the national network of animal genetic resources, sponge of farmers who are owners of native breeds, identification and phenotyping characterization, red book compilation, and in vivo conservation of some breeds at risk of extinction or in critical condition. In situ, conservation is used for two native cattle breeds: Ilirian dwarf cattle, Prespa cow, located in southeast Albania near Prespa Lake, and Busha-type cattle in the Tropoja region. In situ conservation programs were developed based on the community of farmers who were breeding these breeds. Some measures were undertaken to secure the implementation of in situ conservation, like farmers' training, improvement of stables, and practical animal feeding. Promotion of traditional methods of processing products, and diversification of products from native breeds in order to increase farmers' income ends their economic interest to continue to breed native breeds. The program implemented is open nucleus breeding system (John W James,1977), with sufficient reproductive animals. This work started 15 years ago and some male lines are produced to avoid inbreeding and to increase the number of animals for each breed.

Some projects are undertaken for in situ conservation of other species like Bufalo, three goat breeds: Capore e Mokres, Capore e Dragobis, Goat of Dukati: two sheep breeds: Shkodrane and Lara e Polisit, and three pig breeds. In some cases, the interruption of funds has put this breed again in critical or at risk of extinction. In situ conservation is considered the best method to preserve breeds in their dynamism. Butin cases where the farmers have no more interest in breeding them or for other reasons, ex-situ methods can be used to preserve breeds at risk. Some attempts are made to conserve endangered breeds in research stations, rescue private farms, etc, applying ex-situ in vivo conservation. The medium and long-term conservation of the genetic resources of farm animals will be used by complementary in vivo and ex-situ conservation. Accomplishments have been obtained for invivo approaches but gaps are substantial and ex-situ–in vivo conservation is costly For cost-effective conservation genebanks should believe raged by in situ program and better integratethesetwoconservationavenuesandaddressfuturesectorialissues strategies (in vivo & cryopreservation) (Samuel R.T. et al 2014).

Nevertheless, gene banks have multiple functions in addition to the long-term conservation goal. Reproductive material from gene banks can be used to support *in vivo* conservation, as a backup in case of genetic or sanitary problems, to develop new lines/breeds, to modify and/or reorient selection, or for research purposes. According to a survey by Leroy et al. (2019), many breeds in European countries have either no or insufficient material in gene banks. *Ex-situ in vitro* programs should be established, implemented, or strengthened to initiate or expand collections for all breeds,[1] especially local breeds at risk. Complementary gene bank collections should be established for all breeds. When it comes to collecting genetic material, critically endangered, local breeds should have priority,

The first attempt to create the gene bank in Albania was the storage of somatic cells in the Agricultural Technology Transfer Centre of Korca. Skin samples of Capore e Mokres goat, Shkodrane, and Lara e Polisit sheep breeds are put in liquid nitrogen, but their administration is too far from the standard to consider these deposits as genetic banks. The lack of commitment of public institutions, the Ministry of Agriculture and Rural Development, and the Agricultural University, for the establishment of the genetic bank for the cryopreservation of genetic funds of farm animals that are at risk of extinction, has generated a situation that is not similar to any other country in the region or elsewhere. We have signed the understanding memorandum being part of the European Network of Gene Banks for cryopreservation of genetic funds of farm animal genetic resources (EUGENA) which can be used to exchange information and preserve our genes until our gene bank is established.

In the future, the national cryopreservation program should determine the practices for choosing donor animals and the type of material that will be preserved to help in vivo conservation and breed creation in cases of loss.

The acquaintance of new biotechnology for freezing of other genetic material such as eggs, embryos, oocytes, and sperm for ex-situ, in vitro, conservation of native breeds at risk of extinction.

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COMPARATIVE EVALUATION OF ROYAL JELLY PRODUCTION IN THREE APIARIES

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Abstract

This study intends to compare the parameters of acceptance rates of the larvae and royal jelly production in three apiaries; respectively in Krrabë (A1), Cërrik (A2) and in Tirana (A3). Apis Mellifera Carnica bees with two-years-old queens were bred in all the three apiaries. The 10 strongest colonies were used in each apiary, among which; 5 were used as starter and the other 5 as finishing colonies. In the second half of June, three successive plantings were carried out in each apiary with a difference of 6 days with five grafting frames. One-day-old larvae were grafted into queen cell cups. They were removed from the cell builders 72 hours after grafting, where both the acceptance rate and the royal jelly production were recorded. At the end of the trial, in all three apiaries it was noted a significant increase ($P < 0.05$) for acceptance rates of the larvae (respectively 20.16, 13.93 and 36.41%) and for royal jelly production/frame (respectively 59.54, 28.13 and 78.93%). In the A1, the acceptance rate of the larvae was 14.38% higher than in the A2 and 45.97% than in the A3. Also, in this apiary, an obvious superiority of A1 for royal jelly production per grafting frame was evident (22.31 ± 6.98 versus 14.25 ± 2.47 and 7.92 ± 4.51). This is also related to the positioning of the apiary, the pasture's flower estate, the strength of the bee colonies, and the supplementary feeding applied. From A1-A3, a decreasing trend of the level of royal jelly production/cell for $p<0.05$ was observed.

Key words: Royal jelly production, acceptance rates of the larvae, grafting frames, apiary.

Introduction

Royal jelly (RJ) is one of the natural products of bee colony and is considered a functional food produced by bees aged 6-12 days - Apis Mellifera L. [4, 7]. It is secreted by two glands (hypopharyngeal and mandibular) in the head of the nurse worker bees [13].

Royal jelly is produced as a result of the process of larvae grafting and their acceptance rate is influenced by the type I feeding and the number of cups placed in the frame [15] as well as the honey bees' races [12].

The Royal jelly production is influenced by a series of factors: genetics, interior conditions within the bee colony, nectar and pollen recourses [5, 13,14], grafting techniques [6] external factors related to climatic conditions, rearing season. Royal jelly has become a major income source of beekeepers around the world [1, 3].

The present study aimed at comparing the acceptance rates of the larvae and royal jelly production in three apiaries, located in the central Albania.

Material and methods

The monitoring was conducted in three apiaries as follows: In Krraba (A1), Cërrik (A2) and in Tirana (A3) with 30 bee colonies each. All the three apiaries bred bees of the Apis Mellifera Carnica breed, with 2-years-old queens. In the second half of June 2021, three plantings for each apiary were monitored.

Ten colonies per apiary (5 were used as starter and the other 5 as finishing colonies) with a standardized adult population size, food store and brood pattern were used. So, for each apiary, 5 grafting frames were used in each planting.

The preparation of bee colonies, undergoing monitoring process, started 7-10 days before the start of the RJ harvesting (intensive feeding procedure), to increase the number of new workers and stimulate their hypo pharyngeal and mandibular glands, which are responsible for producing the Royal Jelly.

First, cups are prepared, which are pre-emptively inserted into molten wax to take the shape of true honeycombs. The cups prepared in this way, were placed in grafting frames, which were placed in the rearing colonies before larvae grafting for polishing.

Then the new 24-hour larvae were grafted into queen cell cups. After 3 days, the frame was taken out from the colony to check the queen cell acceptance and RJ production, according to standard procedures [8].

The wax at the top of the plastic cells and larvae in the cells was removed. The RJ was collected from all cells with a microspatula, placed in a plastic container, and weighed on an electronic scale. This monitoring was repeated three times with six-day intervals in all three apiaries.

The larval acceptance rate was calculated by dividing the number of accepted queen cells, which contained RJ and live larvae, by the total number of grafted larvae for each colony. The RJ weight per queen cell was calculated by dividing the RJ weight per colony by the accepted queen cell numbers in the same colony [2].

The results obtained from this monitoring were subjected to statistical processing with ANOVA method and descriptive analysis, while the tTest was applied for the comparisons. Means were compared at 0.05 probability level.

Results and discussion

The following table shows the aggregated data for all the three apiaries for the acceptance rates of the larvae and quantity of RJ production

Table 1. Summary results for the rate of larvae acceptance and the amount of milk harvested in all three apiaries

Apiary (A)	No. of grafting	No. of grafted larvae	No. of accepted cells	% of accepted larvae	Quantity of the harvested RJ (ml/frame)	Quantity of the harvested RJ (ml/cell)
A 1	1	46	34.33±7.57	75.60±15.34	11.33±1.53	0.33
	2	52	46.20±11.19	89.40±4.86	23.20±3.27	0.50
	3	52	49.40±11.63	95.76±3.62	28.00±1.58	0.57
	Mean	50	44.69±11.55	88.66±10.74	22.31±6.98	0.47
A 2	1	51	34.00±1.41	64.25±1.06	11.50±2.12	0.30
	2	52	35.33±1.15	66.69±3.59	12.50±0.71	0.35
	3	52	41.33±1.15	78.18±2.57	16.00±1.41	0.38
	Mean	51.67	38.33±3.44	72.44±8.12	14.25±2.47	0.34
A 3	1	60	15.33±8.39	25.57±13.99	2.67±1.15	0.17
	2	60	24.33±1.53	40.53±2.54	8.43±0.51	0.25
	3	59	36.67±7.64	61.98±11.63	12.67±2.08	0.35
	Mean	59.67	25.44±10.90	42.69±18.32	7.92±4.51	0.26

In Krraba Apiary (A1), from the first harvest to the third one, a significant increase in the acceptance rate of larvae and the amount of produced RJ (significant changes) was observed. From the first to third harvest the larvae acceptance rate increased by 20.16%, while the amount of harvested RJ per frame and per cell increased by 59.54% and 42.11%, respectively.

In the Cërriku apiary (A2) a significant increase in the rate of larvae acceptance (13.93%) and an increased tendency for the amount of harvested RJ per frame was observed. The amount of the harvested RJ per frame and per cell from the first to third harvest increased by 28.13% and 21.05%, respectively. For both indicators, the differences are significant per $p<0.05$.

In Tirana Apiary (A3), from the first harvest to the third one, with statistically proven differences ($p<0.05$) the rate of larvae acceptance, the amount of RJ harvested per frame and per cell were evidently increased, respectively by 36.41%, 78.93% and 51.43%. In this apiary, low values of these indicators were evidented, since not strong colonies were provided, which is the basic condition to perform RJ harvesting and the food supply was insufficient.

In terms of the percentage of larvae accepted, the superiority of Krraba Apiary (A1) over the other two was observed. The differences between groups are significant. In Krraba apiary the rate of accepted larvae is 14.38% greater than in Cërriku Apiary (A2) and 45.97% than in Tirana Apiary (A3).

Even for the amount of the harvested RJ out of each grafting frame, the superiority of the Krraba Apiary over two others is clear. The same is true for the amount of harvested RJ per cell (cup), but in this case the differences between apiaries are not statistically proven for $p<0.05$. In A1 was received 17.4% more RJ per cell compared to A2 and 37% more than in A3.

The amount and quality of RJ production are affected by a variety of biotic and abiotic variables [10]. In many studies, it has been demonstrated that RJ production could be affected by a broad range of factors, such as honeybee' breeds, age of grafted larvae, floral sources, and harvesting intervals [9, 11].

Conclusions

The final results indicated that queen cell acceptance rate and RJ production was significantly higher in the third planting in all the three apiaries, because of the rapid increase of the fodder resources (nectar & pollen). Results revealed that the highest rate of larvae acceptance and RJ production was recorded in Kërraba's apiary, followed by Cërriku's one, whereas Tirana's apiary showed the lowest value. The superiority of Kërraba's apiary is dedicated to the correct apiary management practices in combination with the proper localization nearby the fodder resources and strong bee colonies.

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BIODIVERSITY OF MEDICINAL AND AROMATIC PLANTS IN HOTOVA - DANGELLI NATIONAL PARK

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Abstract

National Park "Bredhi i Hotovës " is the largest national park in Albania, covering a surface area of 34,361 hectares (343.61 km^2). It is situated in the southeast of Albania, near the city of Përmet, to the northeast of the Vjosa River. This park is considered one of the most important Mediterranean plant relics in Albania, and the International Union for Conservation of Nature (IUCN) has designated it as Category II. It is highly valued for its biodiversity and is renowned for its endemic species. The park is home to a total of 527 phanerogams plants, including 163 medicinal and aromatic plants. These plants make up 30% of the area's flora and belong to 39 different families. Among these species, 20 are listed in the Albanian Red Book. Local communities within the "Bredhi i Hotovës - Dangelli" National Park region have a long-standing tradition of gathering medicinal and aromatic plants from the park's diverse flora. This practice is deeply rooted in their cultural heritage and has been passed down through generations.

Key words: National Park "Bredhi i Hotovës , Albania, medicinal and aromatic plants.

CHEMICAL PROPERTIES OF THE RAW MATERIAL OF PRILEP P 66 9 TOBACCO TYPE, DEPENDING ON THE HARVEST TIME

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Abstract

Chemical composition as the basic material component of tobacco leaves manifests itself both in their external appearance and in the smoking properties. Knowing the chemical composition of tobacco is of particular importance because leaves harvested at different stages of maturity have different chemical compositions.
When assessing the quality of tobacco based on its chemical composition, the balance of the components may play a more crucial role than their individual content.
Taking into consideration the prior knowledge, an experiment with tobacco type Prilep P 66 9 was conducted at the experimental field of the Scientific Tobacco Institute - Prilep, following a standard methodology.
Three variants were included in the trial - oriental tobacco harvested during technological maturity, before technological maturity (green state), as well as tobacco leaves harvested after technological maturity (overripe state). The aim of this study was to perceive the quality of tobacco depending on the time of harvest.
Considering the great importance for the tobacco quality, we decided to analyze the following important chemical properties: nicotine, nitrogen and total nitrogen, proteins, soluble sugars, mineral substances and Schmuck's number.
The ratio between soluble sugars and proteins is used as an objective indicator of tobacco quality.

Keywords: tobacco quality, chemical composition, maturity, nicotine, total nitrogen, soluble sugar.

Introduction

The chemical composition plays a significant role in determining the qualitative value of tobacco raw material. Quality of tobacco does not depend on the chemical components it contains, but on their mutual relationship, as well as on the changes that occur under the influence of growing conditions and the curing method [1].
The optimal tobacco quality depends on harvesting the leaves at technological maturity. Maturity is judged subjectively, based on the leaf color, visual appearance, sound when removed from the plant and the angle at which the leaf is oriented relative to the plant's main stem. Chemical composition of tobacco is also manifested through the external appearance of the leaves, especially through the color and materiality of the leaf [8]. After curing, immature tobacco leaves have a greenish shade, poor texture, higher content of nitrogen substances and low Shmuk's number. Overripe leaves in a dry state crumble during handling, have a lower content of soluble sugars and contain a higher percentage of mineral substances compared to leaves harvested at technological maturity.

Material and methods

During the 2020 harvest, a trial with tobacco type P 66 9 was carried out on the experimental field of Scientific Tobacco lnstitute - Prilep.
Tobacco harvested during technological maturity was used as the standard in the tests. For quality and quantity comparison, two harvests of tobacco leaves were performed, one before technological maturity (green state) and one after technological maturity (overripe state). The aim of this study was to perceive the quality of tobacco depending on the time of harvest.
The seedlings were produced in the usual manner, in cold crafted beds covered with polyethylene cloth on an area of 40 m2, in the nursery of Scientific Tobacco Institute - Prilep. The field experiment was performed using the method of randomized blocks, three variants in three replications. Tobacco planting was done manually at a distance of 40x15 cm. The tobacco was harvested manually at technological maturity (standard), before technological maturity (green state) and after technological maturity (overripe leaves). It was harvested by hand and cured in the sun on racks covered with polyethylene cloth placed in one row. Obtained tobacco raw material from the three variants was examined for technological and chemical properties as indicators of quality. Following chemical properties will be elaborated in this paper: nicotine, total nitrogen, proteins, soluble sugars, ash and Shmuk's number. Chemical tests were performed according to recognized standard methods in an accredited laboratory of Scientific Tobacco Institute - Prilep.

Results and discussion

Table 1. Important chemical properties of tobacco

Harvest Time	Harvest	Nicotine %	Total nitrogen %	Protein nitrogen %	Proteins %	Soluble sugars %	Ash %	Shmuk's number
Technological maturity	Middle belt	0,75	1,78	1,20	5,95	27,14	9,82	4,56
	Upper belt	0,65	1,73	1,15	6,14	26,97	10,15	4,39
Green state	Middle belt	1,00	3,37	1,20	7,38	18,16	13,63	2,46
	Upper belt	1,10	3,40	1,60	8,23	18,63	12,84	2,26
Overripe state	Middle belt	0,65	1,62	0,85	5,80	24,14	12,12	4,16
	Upper belt	0,55	1,58	0,81	5,95	25,19	11,09	4,23

Tobacco raw material has a different chemical composition depending on the type of tobacco, insertion, technological processing, as well as the conditions during the vegetation. According to its chemical composition, tobacco is a complex chemical substance composed of a large number of chemical compounds which, during combustion, pass into the tobacco smoke partially or completely, or are transformed into other compounds and thus act to a certain extent on the smoker's body. Nicotine, as the most typical representative of the alkaloid group, is one of the most important indicators of tobacco quality [2]. Nicotine is present in all parts of tobacco except the ripe seeds and is mostly present in the leaf [5]. The leaves harvested in green state contain the most nicotine: 1.00% middle belt leaves and 1.10% upper belt leaves (Table 1), because the decomposition of nicotine is carried out incorrectly. Overripe leaves have the lowest values, 0.65% in the middle belt and 0.55% in the upper belt. Nicotine content of Pilep type ranges from 0.59% to 0.84% [6]. Nicotine should not be analyzed in isolation as an indicator of quality, but in correlation with the composition of other chemical compounds that neutralize its negative effect on the quality of tobacco.

Nitrogen substances (total nitrogen, protein nitrogen and proteins) expressed in percentages are most prevalent in tobacco harvested in green state, which indicates a lower quality. Total nitrogen content is negatively correlated with tobacco quality and total nitrogen content above 3% has a negative impact on quality [3]. Leaves harvested in the green state contain total nitrogen expressed in percent 3.37 for the middle belt and 3.40 for the upper belt (Table 1).

Soluble sugars are the only chemical component that has a positive effect on taste. During the combustion of tobacco, they neutralize the alkaline reaction produced by the proteins and other compounds in the leaf. High quality oriental tobacco should contain more than 14% soluble sugars, good quality 10-11% and poor quality less than 9% [8]. Compared to leaves harvested in green state, where the content of soluble sugars is 18.16% for middle belt leaves and 18.63 for upper belt leaves (Table 1), tobacco harvested at technological maturity gives a high quality tobacco raw material with a content of soluble sugars of 27.14% for middle belt leaves and 26.97% for upper belt leaves.

In Table 1 it can be seen that tobacco raw material obtained from the leaves harvested at technological maturity has a lower and more favorable content of mineral substances (9.82% for the middle belt leaves and 10.15% for the upper belt leaves) and higher content when harvesting the leaves in the green state (13.63% for the middle belt leaves and 12.84 % for the upper belt leaves).

In addition to the values for presence of certain chemical components from the chemical composition of tobacco, so-called quality coefficients are also used to represent the mutual relations of these components [7]. In our research, we decided to analyze the Shmuk's number (shown in Table 1) due to its frequent use worldwide and in our region. In green tobacco leaves, there is an unfavorable ratio of soluble sugars to proteins, specifically a very low Shmuk's number (2.46 for the middle belt leaves and 2.26 for the upper belt leaves). According to the tested chemical properties, the most favorable ratio of soluble sugars to proteins, with the highest values of Shmuk's number, is found in the middle and upper belt leaves harvested at technological maturity (4.56 and 4.39). Ratio between soluble sugars and proteins is used as an objective indicator of tobacco quality [4].

Conclusions

Based on the results from the analysis of chemical properties of Prilep P 66 9 tobacco raw material, which was obtained by harvesting tobacco leaves at different stages of maturity, the following conclusions can be drawn:

- The nicotine content varies from 0.55% in overripe leaves to 1.10% in leaves harvested in green state;
- Nitrogen compounds (total nitrogen 3.40%, proteins 8.23%) are most abundant when tobacco leaves are harvested in green state;
- Tobacco harvested at technological maturity has a high content of soluble sugars (27.14% for the middle belt leaves and 26.97% for the upper belt leaves), indicating high-quality tobacco in terms of its chemical composition. The ratio between soluble sugars and proteins, represented by Shmuk's number, reaches its highest values of 4.56 and 4.39 for the leaves from the middle and upper belts, which were harvested at technological maturity;
- Tobacco leaves harvested at technological maturity have the most favorable chemical composition, indicating high-quality tobacco raw material.

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THE BENEFITS OF AGRICULTURE AND TECHNOLOGY IN AFRICA

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Agriculture plays a key role in promoting economic growth, reducing poverty and improving food security on the African continent. The sector employs around two-thirds of the continent's labour force and accounts for 30-60% of national GDP on average. African countries would benefit from expanding and diversifying their participation in international trade and global value chains to reduce poverty on a large scale and transform their economies if the region improves its physical integration, such as cross-border energy, transport and connectivity infrastructure, strengthens policy cooperation, harmonises customs rules and procedures, and facilitates business integration, regional e-payments, e-business, e-invoicing, e-governance and e-business platforms. The aim of the Bio-Economy Strategy is to expand and intensify sustainable agricultural production and processing in order to ensure food security, improve nutrition and health and create jobs. The growing shortage of agricultural scientists needs urgent attention. In geopolitical terms, the development and promotion of agro-innovation across Africa should be seen as a longer-term outcome of this strategy. The tertiary education of African nationals remains critical. Regional regulations for registering and introducing new crop varieties, livestock and biocontrol agents need to be consolidated where appropriate for sustainable and competitive agriculture across the continent.

Keywords: Africa, promoting growth of African countries, development, Agro-innovation, Economic

MOLECULAR AND SEROLOGICAL IDENTIFICATION OF PLUM POX VIRUS IN STONE FRUIT IN CERTIFICATION SCHEME, EPPO AND EU PROTOCOLS.

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The pathogen responsible for Sharka disease in Prunus and stone fruit, is *plum pox virus* (PPV), belonging to the genus *Potyvirus* (family *Potyviridae*). Since its first discovery in Bulgaria, PPV has gradually spread to other countries on other continents and is currently present in almost all of continental Europe (with an endemic status in many countries of Central and Southern Europe). With the help of aphids, the virus spreads over large distances through the uncontrolled movement of plant debris.

In our study, we took samples from "Kumbulla Tropojane" plants in their habitats as well as in other areas such as: in Tropoja (4), Pukë (4), Kukës (4), Has (4), Durrës (Origin of Tropoja) (5),

Kamez (Origin of Tropoja) (4), Paskuqan (Origin of Kukës) (6 samples), during the period 2022 and 2023.

The samples taken in Tropoja, Kukës, Pukë and Has of the Tropojane plum have all been negative with the ELISA and PCR test (2022 - 2023). Symptomatic samples taken in Durrës for tropical plum populations were positive in both years, in the second year the rootstock and some of the surrounding plants were also positive. The samples in Paskuqan were negative in 2022 and positive in 2023. In accordance with EPPO and EU protocols, we have applied determination methods such as ELISA, RT PCR, "In situ" analysis with AGRISTRIP (2023). All these methods are recommended to be used for analyzing this virus in the implementation of the certification scheme.

Keyword: Sharka, kumbulla Tropojane, RT PCR, Agristrip.

EXPLORATION, COLLECTION AND CONSERVATION OF CROP GERMPLASM FROM KORÇA REGION, ALBANIA

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Abstract

The genetic erosion of crop landraces has increased over time in Korça Region, particularly past the 1990s, due to the replacement of local varieties by modern varieties, the change in agricultural techniques, the lack of policies to protect landraces from competing commercial varieties, demographic migration, mainly young generation, abandonment of rural areas mainly in mountain areas and other factors. Nevertheless, landraces continue to be cultivated by farmers in Korça region due to their unique values and societal functions and services. This paper reports the results of a survey carried out in Korça and Devoll district (Korça Region, Albania) aiming to explore and collect multi-crop landraces to initiate an ex-situ conservation programme in community seed bank. Several territorial surveys were performed during June 2021 to August 2023. A total of 152 local landraces were collected during exploration missions at 22 sites, mostly cultivated on small farms or home gardens by elderly farmers. These explorations were conducted keeping in view the period of maturity and harvest of collected germplasm. The surveyed landraces belong to 8 botanical families and 27 species, with the highest number for Fabaceae (66), Solanaceae (24), Poaceae (22), Cucurbitaceae (19), Amaryllidaceae (8) and Asteraceae (7). Greater diversity was found in common bean (26) and fresh bean (24), followed by tomato and maize (11 each other), pepper (9) and lettuce (8) etc. This study highlights information on the germplasm explored, collected, and threats leading to genetic erosion in the studied area.

Key words: conservation, exploration, landrace, multi-crops germplasm.

Introduction

The plant genetic resources in agriculture are essential for the sustainable development of agricultural production, food security and adaptation to climate changes [1]. Local crop diversity contributes a wide range of goods and services to food, fibre, fuel, and health and livelihood security [4].

Landraces are traditional crop varieties or populations growing in specific locations. Many traditional local varieties, locally adapted, with historical origin and cultural significance have disappeared from cultivation. Such loss is recognized as one of the major threats of agriculture [2, 5].

For centuries, different traditional local varieties and landrace crops areas have been cultivated with low input farming systems in Korça region, but many of them have disappeared and during the last decades their cultivation has been dramatically reduced. There is a significant decline in the number of landraces in cultivation, indicating a loss of locally adapted genetic diversity [3]. While the loss of local traditional varieties continues, many farmers continue to maintain and cultivate a significant amount of crop diversity, including farmers' varieties and landraces. The conservation of varieties/landraces diversity on-farm and ex situ (in National Gene Bank and Community seed bank of Korça) helps to stop the rapid loss of local varieties and rebuild local crop diversity through rescue and rehabilitation, preserving and protecting, conserving local varieties on-farm at the community level and the seed exchange network.

In remote mountain villages of the Korça region, small-structured family farms are dominating. Most of them are traditional or conventional low-input farms. They are of great importance to society and to agrobiodiversity conservation, as they most often produce agricultural goods mainly for self-subsistence or for the local market. They are also of great importance to the environment and traditional local varieties/landraces conservation because these crop resources have not been replaced yet with modern ones and can be found in family garden. Significant diversity still exists at the mountain areas; therefore, a high priority was given to these areas for the collection of germplasm. It is important to collect landraces, which have been conserved and used by different communities as part of their tradition. With this aim, an exploration for the collection and conservation of available crop genetic diversity in the region was planned and executed to safeguard diversity at risk. The present study reports on collection expeditions of multi-crop germplasm carried out in the years 2021-2023, in different sites of Korça region primarily to capture multi-crop genetic variability and to conserve the representative germplasm in Community seed bank of Korça and National Gene Bank for future use multi-crop germplasm.

Materials and methods

A broad-based systematic survey (multi-crop collecting mission) had been conducted during the 2021-2022 to collect the local multi-crop germplasm from different areas of Korça region, focusing mainly on Devolli and Korça districts. Prior to that, information on crop diversity and results from previous collecting missions was gathered and analysed with the aim of better

planning these explorations. The collection of germplasm was concentrated in the area where the possibilities of maximum diversities are available depending upon the information based on local farmers. The main sources of germplasm samples of cultivated crops were farmers' fields. In a few cases samples were also collected from seed sellers in local markets, who sell both agricultural products and seeds of various crop landraces that they have gathered from their home and neighbouring villages. This made possible to find out and collect several old traditional seeds. Each collection was assigned a unique collector number. The collected material was deposited in the Korça Community seed bank and a part of it in National Gene Bank for long-term conservation.

Results and discussion

Altogether 152 accessions of various crop genotypes were collected, covering 8 botanical families and 27 species together with their variability (Tab. 1). Crop group wise accessions collected are vegetables (90) mostly fresh bean, tomato and pepper, pulses (38) mostly common beans, cereals (19) mostly maize, besides 3 accessions of *Sorghum vulgare* var. technicum and 2 accessions spices (*Trigonella ssp).*

In terms of number of species, the Fabaceae family is the most abundant (66) followed by Solanaceae (24), Poaceae (22), Cucurbitaceae (19), Amaryllidaceae (8), Asteraceae (7), Brassicaceae (4) and Amaranthaceae (2). The highest number of vegetable accessions (landraces) was observed for Fabaceae (66 accessions or 43.42%), followed by Solanaceae (24 or 15.79%), Poaceae (22 or 14.47%), Cucurbitaceae (19 or 12.5%), Amaryllidaceae (8 or 5.26%), Asteraceae (7 or 4.60%), Brassicaceae (4 or 21.32%).

Table 1. List of accessions collected for each crop species

No.	Crop species	Family	Local name	Common name	No. of accessions
1	*Allium cepa* L.	Amaryllidaceae	Qepë	Onion	5
2	*Allium porrum* L.	Amaryllidaceae	Presh	Leek	3
3	*Atriplex hortensis* L.	Amaranthaceae	Labot	Garden orach	2
4	*Avena sativa* L.	Poaceae	Tërshërë	Oats	2
5	*Brassica oleraceae* var. capitata	Brassicaceae	Lakër	Cabbage	4
6	*Capsicum annuum* L.	Solanaceae	Spec	Pepper	9
7	*Cicer arietinum* L.	Fabaceae	Qiqër	Chickpea	3
8	*Cucumis melo* L.	Cucurbitaceae	Pjepër	Melon	5
9	*Cucumis sativus* L.	Cucurbitaceae	Kastravec	Cucumber	5
10	*Cucurbita maxima* Duchesne	Cucurbitaceae	Kungull dimri	Pumpkin	5
11	*Cucurbita moschata* L.	Cucurbitaceae	Kungull	Squash	2
12	*Cucurbita pepo* L.	Cucurbitaceae	Kungull gjelle	Summer squash	2
13	*Lactuca sativa* L.	Asteraceae	Sallatë	Lettuce	7
14	*Lathyrus sativus* L.	Fabaceae	Koçkull	Grass pea	2
15	*Lens culinaris* Medik	Fabaceae	Thjerrëz	Lentil	1
16	*Phaseolus coccineus* L.	Fabaceae	Fasule pllaqi	Runner bean	5
17	*Phaseolus vulgaris* L.	Fabaceae	Fasule	Common bean	26
18	*Phaseolus vulgaris* L.	Fabaceae	Mashurkë	Fresh bean	24
19	*Pisum sativum* L.	Fabaceae	Bizele	Green pea	2
20	*Secale cereale* L.	Poaceae	Thekër	Rye	1
21	*Solanum lycopersicum* L.	Solanaceae	Domate	Tomato	11
22	*Solanum melongena* L.	Solanaceae	Patëllxhan	Eggplant	4
23	*Sorghum vulgare* var. *technicum*	Poaceae	Fshesë	Broom corn	3
24	*Trigonella caerulea* (L) Ser.	Fabacbeae	Trendelinë blu	Blue fenugreek	1
25	*Trigonella foenum-graecum* L.	Fabaceae	Grurë Qabeje	Fenugreek	1
26	*Vicia sativa* L.	Fabaceae	Burxhak	Common vetch	1
27	*Zea mays* L.	Poaceae	Misër	Maize	11
28	*Zea mays* ssp. everta	Poaceae	Misër për pufka	Popcorn	5
	Total				152

Good quantities of different kinds of vegetables and other crops are produced in Korça region. Despite of the introduction of high yielding varieties of vegetables in the region traditional landraces, they are still very popular for their delicious taste. During the present study, 50 accessions of *Phaseolus vulgaris*, 11 accessions each of *Solanum lycopersicum* and *Zea mays*, 9 accessions of *Capsicum annum* have been collected from different areas of the region. Seven (7) accessions *Lactuca sativa,* five (5) each of *Allium cepa, Cucumis melo, Cucumis sativus, Cucurbita maxima, Phaseolus coccineus* and *Zea mays* ssp. everta were also collected. Good variability (4 accessions each) has been collected in *Brassica oleraceae* var. capitata and

Solanum melongena. Three (3) accessions each of *Allium porrum* and *Sorghum vulgare* var. *technicum,* as well as two accessions each of *Atriplex hortensis, Avena sativa*, *Cucurbita pepo, C. moschata, Lathyrus sativus* and *Pisum sativum* have been collected too. Only one each of lentil, common vetch, fenugreek and blue fenugreek landrace were collected during the course of this study.

Farmers of Korça region gradually have neglected to grow their own local cultivars/landraces, preferring to grow higher-yielding varieties. Although, the yield is often considered the most important aspect of crop production, landraces continue to be cultivated for organoleptic qualities that still meet users' needs, drought tolerance and other qualities that are not available in high-yielding varieties.

Although the study did not allow us to determine confidently to what extent erosion of local genetic resources has occurred, the observations of authors indicate a general decline in the on-farm diversity of traditional varieties in the Korça region. This erosion has occurred particularly due to social and demographic pressures such as migration, introduction of modern cultivars, the absence or inappropriate legislation and policy, as well as the promotion of genetically uniform varieties in the replacement of local varieties. The negligence of the Government and competent local authorities is another factor for the decline of their landraces. The conservation of Korça's crop landraces has not been a priority for local authorities and there have not been initiatives for the preservation of local genetic resources.

Declining diversity of local varieties indicates the urgent need for complementary on-farm and ex situ conservation to protect crop landraces before they are lost. Continuation of investigation, collection and storage of crop landraces in community seedbank and support for the regeneration and distribution of landrace seeds to farmers, could revitalize the cultivation and spread of these landraces in the region.

Conclusions

Farmers in Korça region have cultivated different crops to fulfil their basic needs. A wide range of traditional varieties of various crops has been available in the region for centuries, as these crops are preferred by farmers for their cooking quality and affinity. The results of the present work highlight a significant diversity in the species' local germplasm. The multi-crops germplasm collected are very useful assets for the region and country too. The richness of crop diversity in the explored areas cannot be limited only to the results of this study, which has provided a good basis for the exploration of diversity, leaving wide space for further collection, study and evaluation of the germplasm of the region. Other areas of the region should be systematically explored for additional genetic resources as soon as possible, since economic changes, urbanization and lifestyle changes may accelerate the genetic erosion of traditional multi-crops germplasm. Findings of this study support the possibility to correctly preserve local materials on farm conservation through community-level seed-saving initiatives, initiatives to support seed-saver farmers groups and creation of seed-saver networks in the region.

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POTENTIAL INSECT VECTORS OF *XYLELLA FASTIDIOSA* IN MOROCCO: CASE OF SPITTLEBUG

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Following the recent confirmation of *Xylella fastidiosa* in the European Union. This bacterium has become a serious potential risk to the Moroccan flora, particularly for citrus, olive, almond and vineyards industries. A thorough understanding of the distribution and ecology of potential vectors in wine-growing systems in Morocco is critical to the development of successful control. A sweeping net was used to collect insects (2604 specimens), assess their occurrence, and establish an inventory of its potential insect during 2019 and 2021. Five insect potential vectors were recorded and mainly located in the northern part of Morocco, namely; *Philaenus tesselatus*, *P. maghresignus*, *Philaenus* sp., *Neophilaenus campestris,* and *N. lineatus*. *Philaenus tesselatus* was the most important spittlebug recorded with uneven occurrence throughout the country. *Philaenus spumarius* has not been found in the present surveys which could indicate that it has been replaced by *P. tesselatus*. Therefore, the latter should be considered as the main potential insect vector of *X. fastidiosa* in Morocco.

Key words: *Xylella fastidiosa*, survey, *Philaenus tesselatus; Neophilaenus campestris*, Morocco.

COLLECTING SOME LANDRACES AND CWRS IN THREE AGRICULTURAL REGIONS OF ALBANIA

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Abstract

In 2022, in continuation of previous collecting missions in other regions of the country, a further expedition was carried out in the Dibër - Kukës region, Kavaja region and the Ionian coast of Vlora by a team of the Institute of Plant Genetic Resources (Albania). From an economic point of view, the country has seen a profound change in the main business activities in the last 30 years. Urban constructions, road infrastructure and tourism have been the sectors with the most pronounced development. For this reason, the focuses of the expeditions have been precisely those regions with an intensity of economic constructions and serious genetic erosion was recorded, especially in landraces and wild relatives. The samples were identified in the field, with the participation of local specialists, based on morphological characters, according to a specific group of plants, flower and fruit characters. From each plot, according to collection protocols, plants were selected, trying to capture the maximum variability of the population. Further, during the ripening period, seed samples were collected from most populations of local landraces and endangered crop wild relatives. Dry seeds were collected and kept in cotton bags. A total of 142 accessions were collected, mainly crop vegetables and crop wild relatives. Among other things, the report gives some specific suggestions to prevent the extinction of local agriculture.

Keywords: Germplasm collecting, landraces; crop wild relatives;

Introduction

Local varieties/farmer varieties (landraces) and crop wild relatives (CWR) are a valuable genetic resource, which have not yet been sufficiently appreciated and exploited for the benefit of humanity. Many of them have evolved to survive in difficult conditions. They contain useful traits that can help breeders develop new varieties that are more resilient to climate change [7]. Albania is known for its great richness in biological diversity. It is considered as one of the richest countries in plant species and varieties, valuable for the development of agricultural and livestock production. Although it occupies less than 0.3% of the surface of the European continent, it is home to up to 30% of plant species, including many endemic species. According to studies on the flora, it turns out that in the territory of Albania there are about 3651 species of plants; adding 907 subspecies, the number reaches about 4560 taxa [8]. However, during the last three decades, there has been a progressive decline in the number of CWR species and varieties. There has been a marked decline especially for local landraces. This phenomenon is attributed to changes in socio-economic system, demographic, climate change and rapid changes in agricultural technology. The alarming rate of damage to biodiversity is already known for many species, including landraces and CWRs.

Although they are vitally important, many CWRs are not preserved either in their habitat or in the genebank, therefore many of them are threatened in their natural environments by urbanization, deforestation, overgrazing, expansion of agricultural and touristic areas, etc. Collaborating with community residents, specialists in three agricultural regions and protected areas, we sought to identify their presence in those areas and, further, collect seed material of landraces and CWRs of some endangered crops, to ensure their long-term storage and at the same time facilitate the possibility of *in-situ* conservation.

Material and methods

The 12 collecting missions were organized during the year 2022 by Institute of Plant Genetic Resources of Tirana, respectively during flowering, fruiting and seed ripening of local landraces and CWRs. The objective of the missions was to collect and conserve the diversity of agricultural crops and related wild species endangered by extinction.

The route of the missions led through three agricultural regions of the country, Dibër - Kukës region, Kavajë and the Ionian coast of Vlora, to gather information for the situation, assess the vegetation and habitats, and further to collect the seed samples. Using the other experiences, the exploration and collecting process was done with the participation of local specialists and community residents. The plant samples were identified in the field based on morphological characters. CWRs are usually reliably identified based on a specific set of vegetative, floral and fruit characters [1, 2, 3, 4, 5, 6, and 9]. These include plant descriptors such as plant height and diameter; plant branching, leaf shape, leaf color, flower color, fruit shape and size.

During the ripening period, seed samples were collected from most populations of local landraces and endangered CWRs. This was done according to collection protocols [2], trying to capture the maximum variability of the population. Ripe seeds were collected and kept in cotton bags. GPS coordinates were obtained with a GPSMAP 60CSx.

After returning from the field, the collected seed samples, after being processed, are sent to the fund of the Plant Gene Bank of Tirana, for long-term conservation.

Results and Discussion

During exploration and collection missions, 142 accessions were collected in 46 sites of three agricultural regions. Most of these (53.5%) was CWRs of 42 species and were collected in wild and ruderal habitats, while the rest (46.5%) were landraces

collected from people living in villages (in home gardens). Findings from exploration and collection missions are presented in the Table 1 and Table 2, by regions.

- *In the north-eastern region* (Dibër – Kukës), were visited 27 villages and 28 acc were collected, of which 24 acc local landraces and 4 acc CWRs.
- *In the Kavaja region*, were visited 6 villages and 62 acc were collected, of which 4 acc local landraces and 58 acc CWRs.
- *In the Ionian coast of Vlora*, were visited 13 villages and 52 acc were collected, of which 38 local landraces and 14 acc CWRs.

Conclusions

The collected materials are of interest and did not exist in other collections. They are valuable landraces, old cultivars traditionally cultivated for a very long time and CWR endangered by extinction. All materials are protected in the Tirana GeneBank and are available to domestic and foreign users.

Large-scale use of imported seeds and moving from traditional and small-scale production to large-scale modern agriculture will cause extinction of valuable landraces. Great plant diversity should be protected as fast as possible by organizing next collecting missions.

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Table 1. The landraces collected in three agricultural regions of Albania

Crop name	Taxon name	No of accessions collected by regions:		
		Dibër- Kukës	Kavaja hills	Ionian coast of Vlora
Basil	*Ocimum basilicum L.*	-	-	2
Cabbage	*Brassica oleracea var. capitata*	3	-	-
Cucumber	*Cucumis sativus L.*	1	-	-
Chard	*Beta vulgaris L.* var. *cycla* (L.) Ulrich	-	-	2
Dill	*Anethium graveolens* L.	-	-	1
Eggplant	*Solanum melongena L.*	-	-	1
Okra	*Abelmoschus esculentus (L.)* Moench	-	-	2
Onion	*Allium cepa* L	1	-	1
Squash	*Cucurbita moschata Duch*	1	1	
Summer squash	*Cucurbita pepo* L.	-	1	
Parsley	*Petroselinum sativum* Hoffm.	-	-	2
Pumpkin	*Cucurbita maxima* L.	1	-	
Pepper	*Capsicum annum* L.	-	-	5
Chili pepper	*Capsicum annum* L.	-	-	2
Lettuce	*Lactuca sativa* L.	-	1	4
Spinach	*Spinacia oleracea* L.	-	1	1
Common bean	*Phaseolus vulgaris* L.	4	-	1
Green bean	*Phaseolus vulgaris* L.	2	-	7
Runner bean	*Phaseolus coccineus* L.	1	-	-
Snake-bean	*Vigna unguinculata* L.	-	-	1
Tomato	*Solanum lycopersicum* L	1	-	4
Cherry tomato	*S. lycopersicum* var. *cerasiforme*	-	-	1
Alfalfa	*Medicago* sativa L.	1	-	-

Rye	*Secale cereal* L.	1	-	-
Oat	*Avena sativa* L.	1	-	-
Corn	*Zea mays* L	6	-	1
Total	**26**	**24**	**4**	**38**

Table 2. The CWR accessions collected in three agricultural regions of Albania

CWR name	Taxon name	No of accessions collected by regions:		
		Dibër- Kukës	**Kavaja hills**	**Ionian coast of Vlora**
Grass	*Aegilops ovata L*	-	1	-
Grass	*Aegilops biuncialis L*	-	1	-
Barbed goat grass	*Aegilops triuncialis L*	-	1	-
Three-awned goatgrass	*Aegilops neglecta L*	-	1	-
Grass	*Aegilops geniculata L*	-	1	-
Wild leek	*Allium ampeloprasum L*	-	4	-
Wild Ball-head onion	*Allium sphaerocephalon* L	-	2	-
Common amaranth	*Amaranthus retroflexus* L	-	2	-
Purple amaranth	*Amaranthus caudatus* L	-	3	-
Green amaranth	*Amaranthus hibridus* L.	-	1	-
Wild asparagus	*Asparagus acutifolius L*	-	2	-
Garden orache	*Atriplex hortensis L*	-	4	-
Wild Oat	*Avena fatua L*	-	1	-
Wild Sea beet	Beta vulgaris subsp maritime L	-	-	1
Wild Brassica	*Brassica cretica* Lam	-	-	3
Wild Brassica	*Brassica incana*Ten	-	-	2
Wild turnip	*Brassica rapa* L.	-	-	2
Rapeseed	*Brassica napus* L.	-	-	1
Common chicory	*Cichorium intybus L*	-	1	-
Brotero's carrot	*Daucus broteri Ten*	-	1	-
Wild carrot	*Daucus carrota L*	-	1	-
Wild Chili pepper	*Capsicum baccatum* L.	-	-	1
Wild Chili pepper	*Capsicum frutescens* L.	2	-	-
Rocket	*Eruca vesicaria* (L.) Cav.	-	-	1
Fennel	*Foeniculum vulgare Mill*	-	4	-
Topinambur	*Helianthus tuberosus L*	-	1	-
Wild barley	*Hordeum spontaneum L*	-	2	-
Wall barley	*Hordeum murinum L*	-	2	-
Prickly Lettuce	*Lactuca serriola L*	-	3	-
Bottle gourd	*Lagenaria siceraria (Molina) Standl.*	1	1	-
Oregano	*Origanum vulgare*	-	1	1
Wild poppy	*Papaver somniferum L*	-	1	-
Peppermint	*Mentha piperita* L	-	-	1
Wild Husk tomato	*Physalis pubescens L*	-	3	-
Native gooseberry	*Physalis minima L.*	1	1	-
Mastic	*Pistacia lentiscus L*	-	1	-
Meadow-grass	*Poa pratensis L*	-	1	-
Patience dock	*Rumex patentia L*	-	5	-
Cherry tomato	*S. lycopersicum* var. *cerasiforme*	-	-	1
Tomato black nightshade	*Solanum nigrum L*	-	3	-
Hairy nightshade	*Solanum villosum* Mill.	-	1	-
Johnson grass	*Sorghum halepense (L.) Pers.*	-	1	-
Total	**42**	**4**	**58**	**14**

CONSERVATION IN SITU FOR FRUIT SUBTROPICAL TREE IN REGION OF SHKODRA AND MALSIS E MADHE

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Abstract

Subtropical trees are one of the important resources of our country. The geographical and climatic position has favored us, we have these trees, where figs, pomegranates, persimmons, jujube, loquat, white mulberry, etc. Quince is a tree that grows between two subtropical and continental climates and can be treated in both climates. All these species are present in our country, a gift of nature but also of the inheritance of generations. Our country is characterized by autochthonous varieties and also varieties which fromother countries. The purpose of this study has been the identification, study, morphological evaluation, characterization of these subtropical species in situ and ex situ, to avoid genetic erosion for many reasons. Only if genetic resources are identified, studied and preserved can they be passed down to generations. We must know how to use and preserve the wealth that nature has given us. In this region founded varieties, ecotypes, forms. They are found in cultivated, ger and ½ wild forms. Conservation is achieved by collecting this genetic material, adding it ex situ and in situ, family gardens or established farms. Now this preservation is realized in several forms. The species of fig is found more than ever in the region of Shkodra, where from the exit of Shkodra to Postribe, Drisht and up to Pre Kal, the edge of the river Kir and above it, all the way you encounter these species as the cultivated fig and the wild one, cultivated pomegranate and the wild one, with a wonderful landscape, nature is intertwined with these trees that did not end all along the road, a true symbiosis. On the other side of Shkodër, on the road to Gur the zi, there are figs, pomegranates, on the road to Ana e Malit, Oblik to the border throughout the area, figs, pomegranates and olives. From the Bun river to the lake Shirokes, everywhere figs and pomegranates, which had already doubled. And so, from Lezha to Shkoder, in villages like, Dajc, as well. In the great Malsi what dominated was the wild pomegranate, up to Selcia they were found everywhere, starting from the height of 30 m above sea level up to the height of 430 m above sea level in the region of the great Malsi.The investigations confirmed the old origin of the varieties.

Keywords: in situ, diversity, orchard, river, like

Introduction

The lowland of the western border from Sarnda to Koplik and further inside it, which is under the influence of the mild Mediterranean climate and with abundant sunlight, is the region of subtropical fruit tree cultivation. The species that are included in this group are part of two divisions: with evergreen where citrus, olive, medlar, fejo, etc. and deciduous trees such as fig, pomegranate, persimmon, jujube, Actinidia, etc. are included. The limiting factors for their spread is the relatively limited resistance to low temperatures. From this point of view, citrus fruits and olives are less resistant to low temperatures, while deciduous trees are more resistant, because they are grouped in the same group, all species have different biological characteristics and different genetic diversity. The region where the study was carried out is in Malsi and Shkoder. At different heights above sea level. Malsia e Madhe begins at an altitude of 50 m above sea level and ends in Vermosh at an altitude of 730 m above sea level with the wild pomegranate. The region of Shkodër is surrounded on all sides by cultivated and wild trees of this group, led by the wild pomegranate that is present everywhere, the cultivated one, the cultivated and wild fig, the white mulberry, rose, peach, persimmon, idea, olive and a few others.

Materials and Method

The study was conducted in the Region of Greater Malsa and the region of Shkodra. The exploration, identification and morphological evaluation of the genetic resources of the respective areas was done. Samples were taken for morphological characteristics, 10 leaves per variety for each species which were evaluated as autochthonous, 10-20 fruits for each variety. Genetic material was taken for planting in the Valias collection. The morphological analysis was done according to the descriptors of ECPGR and IPGRI.

Results and Discussion

Shkodra and Malsia e Madhe region is rich region with genetic resources of subtropical tree mainly wild pomegranate and wild fig. In every 50 m you can finde wild fig and every 2 m you can fine wild pomegranate. Wild pomegranate is in shrub form and cultivation pomegranate is in tree form., wild fig is for pollination process, and Tivaras fig is topic of zones varieties. When we are in low of sea level 50 m over sea leveal to 250 m you can find e in Kelmend zones Devedishe and Tivaras and different forms.

In Shkodra region are explored a lot of wild pomegranate and cultivate pomegranate, mainly Devedishe and Tivarash, in at all zones of Shkodra, near Kir river, near Shkodra lake, near Adriatic sea, near Buna lake. The weight cultivation pomegranate is from 500 gr to 700 gr, number of seed is 500 gr to 680 gr. Weight of seed is 20-25 gr, colour seed is dark red. % of sugar is 16% to 18 % sugar. The pomegranate fruit is very good for industry,syrup. We have exploredFig varieties such as, Tivaras, Shengjinas, Melacak, Patllixhan. Tivaras and Bajun, with fresh destination consume when Melacak, Bajun are for fresh and dry destination consume. The shape and type of the leafis from 5 lobe untill 7 lobe. the petiole is long, The colour fruitmoves from green to black, from brown to violet, Internal colourwere red colour, dominate red colour. The shape of the fruit is

turbiniform to cucurbiform. The fruit weight moves from 25 gr, to 30 gr, to 40 gr. In general the size of the fruit is small to medium. The percent of sugar is 18 to 22 % shugar, this indicatordependsonthe temperature during ripening.

Mulberry tree is found and Rosa mulberry tree , this sort is rare for our country, is with origin from North America. Persimmon tree is found, the fruit size is medium, with weight 120 gr to 180 gr, the colour fruit is yellow to orange, is with astringent and polenization.Jujube tree is found, the fruit is with big and medium size..

This genetic material is conservatein Gene Bank, with different biological origin for species, autochthon, local varieties. This material is selected from spontan and wild populate

At all samples species will registrate according indexes of passport species, every species has different characteristics, traits, according lists of incentivization of ECPGR list. On database of Gene Bank will be registrate index's from characterization and evaluation of samples.

Histogram show for two group, one group are varieties pomegranate from 0 to 490 and second group are varieties from 490 to 900 gr. Histogram show for two group are varieties figs from 13-17.7 cm and second group are varieties from 17.7 to 22.4 cm.

Graph no 2: Imdexs of fruit pomegranate local resources in Shkodra, Malsi e Madhe
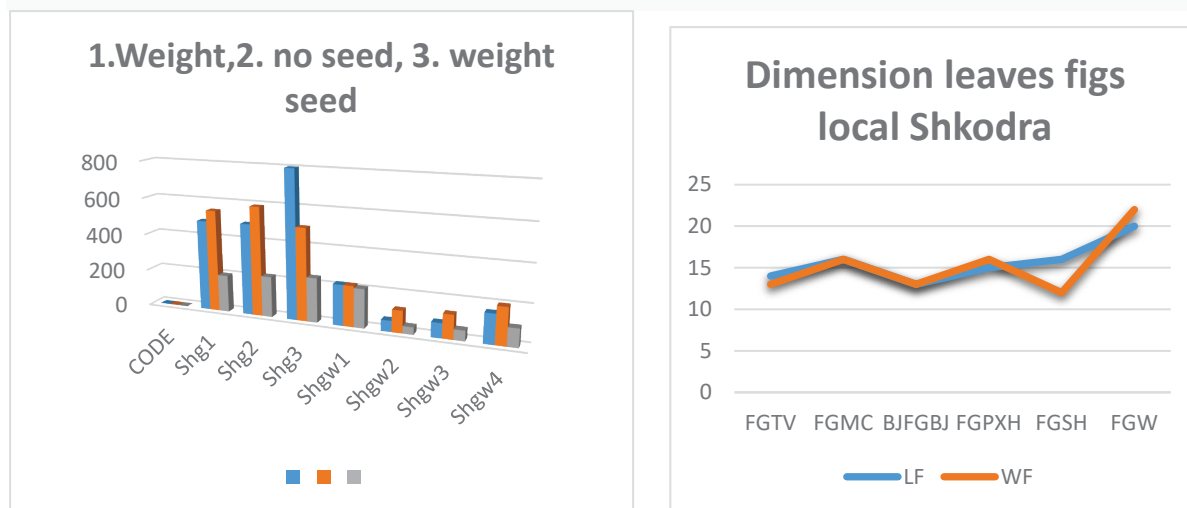
Table no 1: Location and altitude collecting of the genetic resource in Shkodra and Malsi e Madhe.

Altitude	Localities	Culture	Destination
60	Koplik	Pomegranate/shgd	Fresh consume
30	Shirok	Pomegranate/shgt	Fresh consume
260	Tamare	Pomegranate/shgw	Ecosyste, industry

Altitude	Localities	Culture	Destination
60	Postribe	Mulberry rosa	Fresh consume
60	Postribe	Mulberry alba	Fresh consume, industry
50	Postrib	Persimon	Polenization

Altitude	Localities	Culture	Destination
30	Shiroke	FGTV	Fresh consume
10	Bahcallek	FGPXH	Fresh consume
100	Drishte	FGSH	Fresh consume
100	Drishte	FGMC	Dry
260	Tamare	FGW	Caprification
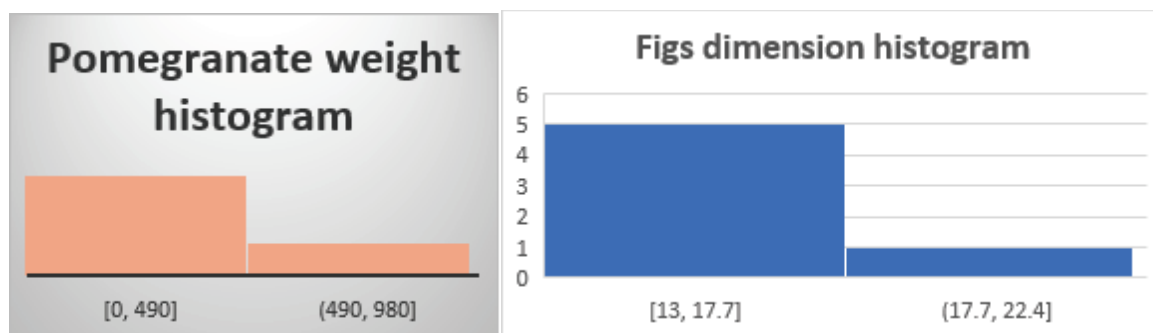
Conclusion

Shkordra and its villages are typical areas of subtropical trees such as cultivated and wild pomegranate, cultivated and wild fig. As well as olive trees, quince, jujube, loquat, mulberry, plum, kiwi. It is a very rich area with sources of these trees. Mainly pomegranates and figs. The terrain and climate have favored these species to be present. But what is most important is the increase of interest and their increase. In the area of Postribes, Drishte is a massive interweaving of these species, which are spread all along the road on both sides, which have given the terrain awonderful landscape. This is a typical tourist area. I think that we should continue the study of this area from the genotypic side and create a factory for the processing of pomegranates as syrup and wine, figs for jam.

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Punica granatum

Ficus carica

Morus Alba   **Morus Rosa**

VARIABILITY AND DIVERSITY THROUGH EVALUATION AND CHARACTERIZATION OF THE TRAITS OF SOYBEAN GENOTYPES (*GLYCINE MAX* L.) OF ALBANIA

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Abstract

Although it originates from the Far East, soy is cultivated everywhere in the world. In Albania, introduced cultivars are cultivated, but since they have been adapted to the conditions of our country and are cultivated successfully. The study was undertaken to recognize the morphological characteristics, as well as to evaluate the genetic variation of the genotypes with the aim of increasing the effectiveness of their inclusion in possible programs of different studies. The field trial was set up according to randomized block designs with 12 accessions, in two replications. In the study, 10 characterization features and 9 quantitative features were recorded. Through the study, good variation of the studied traits was found between the genotypes.

Keywords: genotype, accessions, descriptor, characterization,evaluation, variation.

Introduction

Soybean, an annual legume of the Fabaceae (Leguminosae) family, is the most economically important legume in the world, providing plant protein for millions of people. The origin of the soybean is not clear, but many botanists believe it was first domesticated in central China as early as 7000 BC. There is also evidence of its domestication between 7000 and 6600 BC in China, between 5000 and 3000 BC in Japan, and in 1000 BC in Korea [8]. Although it originates from the Far East, soy is cultivated in almost every country in the world. The countries that produce the most soybeans, according to 2023 data, are Brazil with 125,887,672 tons, the United States of America 123,664,230 tons, Argentina 37,787,927 tons, China 14,193,621 tons, India 13,786,000 tons, etc. [6]. It is one of the richest and cheapest sources of protein and a main element in human and animal diets [1, 2, 5]. During World War II, soybeans became important in both North America and Europe, primarily as a substitute for other protein foods and as a source of edible oil [8].

In Albania, before the 90s of the last century, soy was massively cultivated, today it is cultivated only in a few regions of the country and the production is at low levels [4]. Introduced cultivars are cultivated in Albania, but since they have been adapted to the country's conditions and are cultivated successfully, keeping in mind the possible introduction of other materials, the Genetic Bank of Albania maintains 12 soybean accessions for using them in the case of the possibility of cultivation more widely in Albania. The aim of the study was to identify the characterization and evaluation features of the germplasm stored in the Albanian Genetic Bank. Through the study, the knowledge of the morphological characteristics and the quantitative features of the soybean germplasm in the conditions of Albania were achieved. Of interest in this study was the recognition of the diversity of soybeans to increase the possibility of their use in the future.

Materials and methods

In the study, 12 accessions of soybean were taken from the basic collection of the Genetic Bank, specifically: AGB2464, AGB2465, AGB2466, AGB2467, AGB2468, AGB2469, AGB2470, AGB2471, AGB2472, AGB2473, AGB2474 and AGB2474.
The study was conducted at the Experimental Base of the Institute of Plant Genetic Resources in Tirana [longitude 19°43'59.90"E; latitude 41024'04.30"N; altitude 39 m]. The establishment of the field test was based on international standards (FAO, 2014.) and the characterization and evaluation were done according to "Descriptors for Soybean", IBPGR SECRETARIAT, Rome, 1984. The field trial was set up according to randomized block designs with 12 accessions, in two replications. Each variant in each replication was represented by 2.8 m2 (4 x 0.7 m). Sowing was done in April of 2022, sowing the seeds at a distance of 10 cm from each other and at a depth of 4–5 cm. During the vegetation, two field descriptions were made. 10 characterization features were recorded: Plant growth type, plant pubescence, pubescence density, pubescence color, corolla color, mature pod color, seed coat color, seed coat pattern, hilum color and seed coat surface luster. Quantitative traits were obtained, calculated and recorded: stem determination and development stages (germination–flowering, flowering–maturity and germination–maturity periods), as well as plant height, number of primary branches per plant, number of nodes on the main stem, number of leaflet, leaflet size seed weight [3].

Results and Discussion

Characterization of soybean accessions

Regarding the characterization of soybean accessions, out of 10 traits analyzed, three showed no variation.
For plant growth type, good variation was shown; thus, eg, genotypes expressed variation in two growth types. Most of the material appeared with limited plant growth. The rest had plants of semi-restricted growth; there was no genotype with unlimited plant growth (graph no. 1). For the presence of fluff on the plant, the genotypes were divided into both descriptor statuses (table no. 1), which expresses wide variation for this trait.
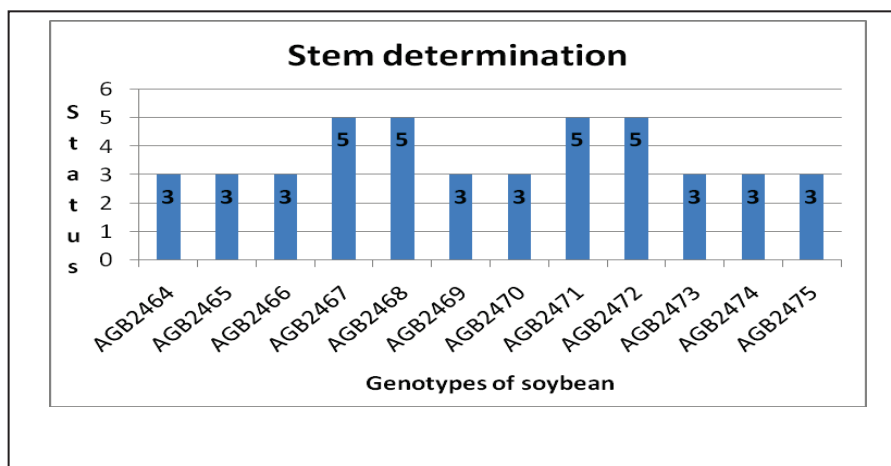
Table no. 1: Variation of soybean accessions according to characterization descriptors

Characterization descriptors	
Descriptors number and name	**Status = Number of accessions**
4.1.4 Pubescence	0=8 accessions; +=4 accessions
4.1.5 Pubescence density	3=4 accessions
4.1.6 Pubescence colour	1=4 accessions
4.2.1 Corolla colour	3=9 accessions; 7=3 accessions
4.2.2 Mature pod colour	5=12 accessions
4.3.1 Seed coat colour	1=10 accessions; 2=1 accession; 8=1 accession
4.3.2 Seed coat pattern	1=11 accessions; 2=1accession
4.3.3 Hilum colour	1=1 accession; 3=4 accessions; 5=7 accessions
4.3.4 Seed coat surface luster	3=5 accessions; 5=7 accessions

For the density and color of the fluff, as well as for the color of the mature pod, there was no variation. For the color of the flower crown, the genotypes showed significant variation in the two statuses. Good variation was found for the color of the grain cover, expressed in three statuses. For the type of grain cover, two statuses appeared, for the color of the hilum in three statuses, and for the brightness of the grain cover in two statuses (table no. 1).

Genetic variation of soybean accessions according to quantitative traits (evaluation descriptors).

According to the analysis of variance for quantitative traits, genotypic differences were confirmed at the P<0.01 level [7]. Quantitative traits expressed very good variation. Thus, e.g. for plant height, accession AGB2475 had the tallest plant, while accession AGB2464 had the shortest plant (table no. 2). The smallest number of first branches was in 5 accessions, while the largest number was only in accession AGB2469 (table no. 2). There was good variation in the number of nodes on the main stem. Thus, the smallest number was in accession AGB2468, while the largest number was in AGB2465 and AGB2474. For the number of leaves and the size of leaf, the accessions were divided into two statuses, 3 and 5 (table no. 2).

Table no. 2: Mean values of soybean quantitative traits, Valias 2022

Accessions	Average values of quantitative traits					
	Plant high (cm)	Primary branch/plant	Nodes on the main stem	Number of leaflets	Leaflet size	mg/seed
AGB2464	**62,5de**	5,5b	9,5ab	5a	3Ñó	159,0ef
AGB2465	**73,0bc**	6,0b	11,5a	3Ñó	5a	178,5a
AGB2466	**82,5a**	5,5b	11,0a	5a	5a	149,0gi
AGB2467	**72,0bc**	5,5b	8,5b	5a	3Ñó	158,5eg
AGB2468	**67,5cd**	6,0b	7,5bc	5a	3Ñó	160,5df
AGB2469	**79,0b**	7,5a	8,0b	3Ñó	3Ñó	171,0bc
AGB2470	**71,0c**	5,5b	9,5ab	3Ñó	5a	159,5ef
AGB2471	**81,0ab**	6,0b	11,0a	5a	3Ñó	149,5gi
AGB2472	**73,5bc**	5,5b	9,5ab	5a	3Ñó	151,0fi
AGB2473	**76,0bc**	6,0b	9,0b	5a	3Ñó	160,5df
AGB2474	**71,0c**	7,0a	11,5a	3Ñó	5a	161,0df
AGB2475	**88,5a**	6,5a	11,0a	3Ñó	3Ñó	151,5fi

** = according to variance analysis, data are validated at the P<0.01 level

CONCLUSION

It is important that the genotypes have good variation, both for characterization and evaluation traits. According to plant growth type, two descriptor statuses were found. There was also a wide variation in the pubescence of the plant. For flower color, white flower soybean accessions predominated. The height of plant has a significant variation, where the accessions were divided into four groups (according to P<0.01). According to the number of first branches and nodes on the main stem, soybean accessions were divided into two groups. According to the number of leaves and the size of the leaf, the accessions were divided into two statuses. According to grain weight, soybean accessions showed significant variation. The genetic variation on soybean can be useful for studies, use in genetic improvement programs, or in other studies.

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Cu, Zn, Mn AND Fe CONTENT OF ORIENTAL TOBACCO- EVALUATION OVER DIFFERENT NUTRITION RATES

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Abstract
Given the fact that Cu, Zn, Mn and Fe are known as the most important micro elements for the development of tobacco plants, this study presents evaluation on number of factors that affects their elemental composition. Field experiments were carried to study the influence of different soil properties and increasing nitrogen rates on the content and availability of the microelement content on four varieties of oriental tobacco. The investigation includes two different locations with typical non contaminated agricultural soil, varieties P-23, P-79, Basma and Elenski and two nitrogen rates (20 and 30 kg/ha). Total content and mobile forms of Cu, Zn, Mn and Fe were determined in soil samples, and their content in the leaves from three sections. It has been determined that bioaccumulation capabilities differ with respect to individual elements. Compared to other varieties, it was found that Basma variety has highest bioaccumulation factors for Cu, Zn and Mn. All other three oriental varieties bioaccumulation factors are in the following sequence: Cu>Mn>Zn>Fe. It was found that the content of Fe in all tobacco varieties, from both locations linearly increases with the increasement of the doses of nitrogen fertilizer. Zn and Cu content of oriental tobacco leaves for most of the tested varieties decreases upon the higher nitrogen dosage.

Key words: soil parameters, elements, plants

Introduction
Micronutrients such as iron, manganese, copper and zinc as active centers of enzymes are essential for plants growth and yield. In order to meet sustainable agriculture goal, targeted fertilization and breeding, it is important to understand the mechanisms of micronutrients uptake, distribution and their availability to plants. Many factors such as soil properties, plant genetics and nutrition practices are crucial and affect their availability [12, 3, 4, 5]. Variation among plants in their ability to absorb micronutrients is not always consistent and is influenced by the changing conditions of the soil and climate and by the stages of plant growth. In the commercial crops as oriental tobacco, plant nutrition management and monitoring are crucial as the impact of certain micro and macro nutrient has the direct reflection on the quality of the raw material [1, 7, 8, 9, 10].
This study provides analyze on the relationships between factors that have a crucial role in the availability and uptake of Cu, Zn, Mn and Fe. The main purpose was to determine availably of selected microelements for four oriental tobacco varieties, considering soil characteristics and different fertilization rates.

Material and Methods
Two filed experiments were set on two different locations, one at the experimental field at Scientific Tobacco Institute – Prilep and the other in locality Dobrushevo. Four oriental tobacco varieties were grown under the same agrotechnical practices [11]. Both experiments were set as randomized complete block design with three replications. Different nitrogen rates (0, 20, and 30 kg/ha) and constant amount of phosphorus (60 kg/ha) and potassium (40 kg/ha) were used to study the availability of the selected microelements.
Soil samples were collected before and after harvesting from both locations and analyzed for the following parameters: soil texture, pH, humus content, carbonates [6]. Soil samples were digested on the hot plate in order to determine the total macronutrient determination (ISO 14869-1). Plant available fractions of the elements were determined by extraction method using buffered solution of diethylentetraaminepentaacetic acid (DTPA) at pH 7.3 (ISO 14870). Harvesting of the mature tobacco leafs was done manualy in 5 harvests and the plant material was dried and homogenized to a constant weight. In order to analyse macronutrient content, plant samples were digestet in Teflon vessels with HNO_3 and H_2O_2 using the Mars microwave system (CEM, USA). The investigated elements were analyzed by the application of atomic emission spectrometry with inductively coupled plasma, ICP-AES (Varian, 715-ES). Plant material was analyzed by ICP-AES with ultrasonic nebulizer CETAC (ICP/U-5000 AT).

Results and Discussion
Soils samples from both localities have different characteristics (Table 1). Soil samples were collected after harvesting and the end of the vegetation (Table 2). Micronutrients of the tobacco leaves are given in Table 3. Almost all investigated elements of the tested varieties differ and are uneven regarding the fertilized variants. For some of the tested tobacco varieties micronutrient content increases in the variant fertilized with 20 kg of nitrogen, and there is slight decrease in the variant fertilized with 30 kg of nitrogen, however, there is no regularity. Based on the available and total content of the studied elements in soil samples, we calculated the availability ratio (Fig. 1).

Table 1. Basic soil properties and microelement content from both locations before planting

	Prilep	Dobrushevo
Cu, mg/kg	24.2	16.4
Zn, mg/kg	55.4	61.2
Mn, mg.kg	477	480
Fe, %	1.8	0.9
ACu, mg/kg	1.23	1.39
AZn, mg/kg	1.26	1.40
AMn, mg/kg	27	29
AFe, mg/kg	28	30
pH (H_2O)	6.64	7.15
pH (KCl)	5.98	6.18
Humus (%)	0.81	1.77
Physical clay, %	24.50	25.70

*AZn, ACu.. – plant available fractions

Table 2. Micronutrient content and soil properties after harvesting on different variant plots
(locality Prilep and Dobrushevo)

Studied element	Prilep			Dobrushevo		
	Ø	$N_{20}P_{60}K_{40,}$	$N_{30}P_{60}K_{40}$	Ø	$N_{20}P_{60}K_{40,}$	$N_{30}P_{60}K_{40}$
Cu, mg/kg	24.2	24.5	23.9	16.4	16.8	17.2
Zn, mg/kg	55.4	55.6	54.6	61.2	62.3	60.2
Mn, mg/kg	470	485	520	480	482	489
Fe, %	0.9	0.9	0.9	1.8	1.3	1.5
ACu, mg/kg	1.23	1.40	1.28	1.39	1.58	2.1
AZn, mg/kg	1.26	1.35	1.29	1.40	1.32	1.28
AMn, mg/kg	27	32	38	29	27	28
AFe, mg/kg	28	23	19	30	28	27
pH (H_2O)	6.12	6.02	6.02	6.58	6.70	6.70
pH (KCl)	5.96	5.86	5.86	6.10	6.12	6.12
Humus, %	0.62	0.60	0.60	0.96	0.92	0.92

*Ø- unfertilized control, $N_{20}P_{60}K_{40}$ (Nitrogen, phosphorus and potassium doses in kg)
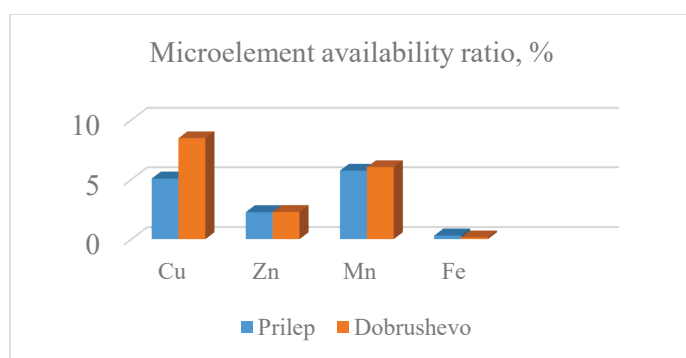
Figure 1. Availability of studied elements calculated as a ratio of available concentration and total concentration of each element in soil, given in percentage (%) before planting

Table 3. Cu, Zn, Mn and Fe content of tobacco leaves from both experimental fields

Variant	Variety	Cu, mg/kg		Zn, mg/kg		Mn, mg/kg		Fe, mg/kg	
		PP	DB	PP	DB	PP	DB	PP	DB
Ø		7.0	15	55	60	155	147	624	1149
$N_{20}P_{60}K_{40}$	P-23	6.1	15	40	69	165	150	535	918
$N_{30}P_{60}K_{40}$		5.3	14	40	76	198	136	932	840
Ø		7.1	18	69	65	200	150	875	1255
$N_{20}P_{60}K_{40}$	P-79-94	5.7	14	43	55	243	162	1050	1047
$N_{30}P_{60}K_{40}$		6.0	17	51	55	204	164	1121	1289
Ø	Dzhebel	3.3	38	54	72	190	146	669	917
$N_{20}P_{60}K_{40}$	Basma 1	3.2	20	45	71	197	161	828	1083
$N_{30}P_{60}K_{40}$		4.5	16	58	63	204	179	1036	1235
Ø	Elenski	7.7	20	60	88	189	159	691	698
$N_{20}P_{60}K_{40}$	817	10.4	14	44	70	152	140	686	751
$N_{30}P_{60}K_{40}$		5.1	15	65	73	197	154	716	969

Scientific
DB-

*PP- tobacco filed; Dobsuhevo

Conclusions

It has been determined that for any given tobacco variety, absorption capabilities differ with respect to individual elements. Cu, Zn, Mn and Fe content in all studied varieties and in soil samples are consistent with the data reported in other reference sources. Nitrogen fertilization had a significant effect on the Mn content in the soil samples. Increasing level of nitrogen increased Mn content in samples from both experimental fields. Differences of the microelement content between all studied varieties can be observed in the Cu content from the experimental field in Prilep where lower content was determined. It was found that the content of Fe in all tobacco varieties, from both locations linearly increases with the increasement of the doses of nitrogen fertilizer, except for variety P-23 and P-79-94 from the experimental field in Dolneni. For the rest of the studied elements there is no significant pattern, since lower doses of this fertilizer contributed to growth, while higher doses lead to a decrease in their content in the plant material.

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COMPARATIVE STUDIES ON MORPHO-PHYSIOLOGICAL TRAITS OF *AEGILOPS* ACCESSIONS FROM AUT COLLECTION

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Abstract

Crop wild relatives possess unique and valuable genetic traits not present in modern crop varieties that can be used to develop new crop varieties with improved yield, nutritional quality, and resilience. It was proven that the *Aegilops genera* possess useful traits not present in wheat or barley, such as diseases resistance, tolerance to abiotic stresses, and high grain quality. The scope of this study is to find out if the *Aegilops* accessions collected in the territory of Albania, show any significant trait related to ears, seeds and seedlings morphological and physiological parameters. A comparison among *Aegilops* accessions for their germinability and seedling's vigour was conducted in Petri dishes in chamber conditions. The probe included several biometric evaluations on seeds and seedlings, too. Some agronomic evaluations have been performed on *Aegilops* accessions planted *ex situ* at AUT Botanical Garden. From the results of the numerous data processing, it is concluded that among *Aegilops* accessions, included in the study, significant differences exist related their seeds and seedlings biometric traits. The conical ear *Aegilops* accessions show advantages toward the cylindrical ones related the ear weight, dry seeds weight, the seeds weight after imbibition and the speed of seedling foliation, but the cylindrical ear *Aegilops* accessions show longer ears, a greater seed number per ear, stronger imbibition abilities and higher one-week seedlings. The results of these studies help to choose the useful plant materials and to elucidate the possibilities for more molecular and genetic studies in the future.

Key words: *Aegilops* accessions, biometric parameters, seed, seedling.

Introduction

Wheat is one of the crops, which due to modern cultivation techniques, has suffered genetic erosion and narrowing of the genetic base. Efficient strategy to solve loss of plant diversity consists of exploiting wild germplasm genomes of wheat species, which preserve a good part of their adaptive factor and diseases tolerance [1, 2]. The genus *Aegilops* contains 22 species comprising both diploids and polyploids [3]. *Aegilops tauschii* is the progenitor of the wheat D genome, which is a major source of genetic diversity in modern bread wheat [4]. To meet the demand for developing high yielding and stress-resistant wheat cultivars, it is desirable to increase the genetic base of this crop [5]. The rich natural variation in species of genus *Aegilops,* some of their physio-morphological traits can be used for wheat breeding through the production of synthetic hexaploid wheat [6, 7].

Material and methods

The study aims to perform a comparative assessment on some morpho-physiological traits of seeds and seedlings of 24 *Aegilops* accessions from the collection of Botanical Garden "Xhaferr Qosja" at Agricultural University of Tirana. The seeds germination was performed in chamber conditions, in Petri dishes (10 seed each). Evaluated seeds and seedlings biometric traits include seed dry weights (SDW), imbibed seed weights (ISW), imbibition potential as % ISW to SDW, seed germination velocity (GV) and germination power (GP), seedling height (Sdl H) and seedling foliation (Sdl F). All assessments were performed on 24 *Aegilops* accessions in three repetitions. The data of evaluated traits were subjected to variance and correlation analysis.
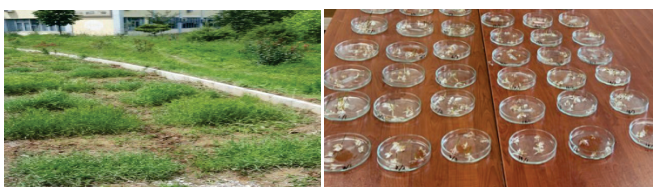
Figure 1. Views from experimental probes.

Results and discussions

The graphics below show that among *Aegilops* accessions taken in consideration significant differences exist related their seeds dry weights. Very similar is the situation of seed weights after imbibitions (Figure 2; Table 1), but the % of weight increases are greater for small seeds of accessions 5, 9, 10, 12, 15, 20, 21, 22 and 25, with cylindrical shape ears (Figure 3). These results are in conformity with earlier reported ones [7].
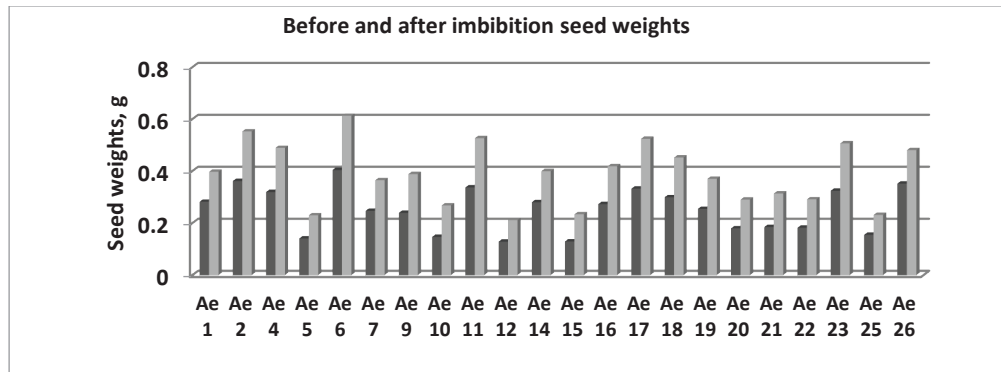
Figure 2. *Aegilops* accessions seed weights before and after their imbibition.
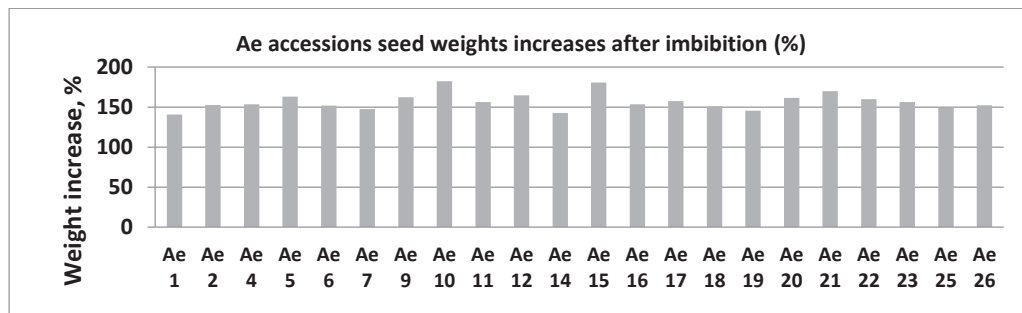
Figure 3. *Aegilops* accessions seed weights increase after imbibition (%).

Significant differences are found for *Aegilops* accessions seeds germinability, including GV and GP. The small seeds of cylindrical ear accessions show lower germination ability (Figure 4), but on the other side they have higher first week seedlings (Figure 5). The seedlings foliation is faster then those coming from conical ear accessions (Figure 6).
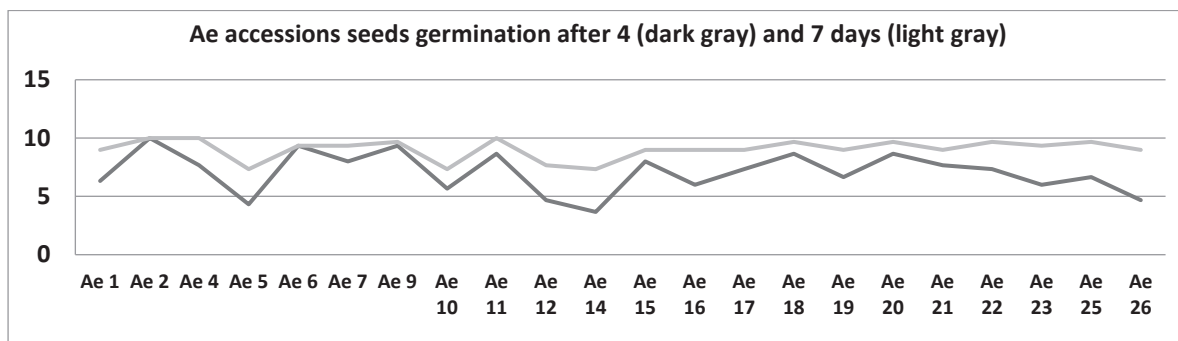
Figure 4. *Aegilops* accessions seeds germination after 4 and 7 days.
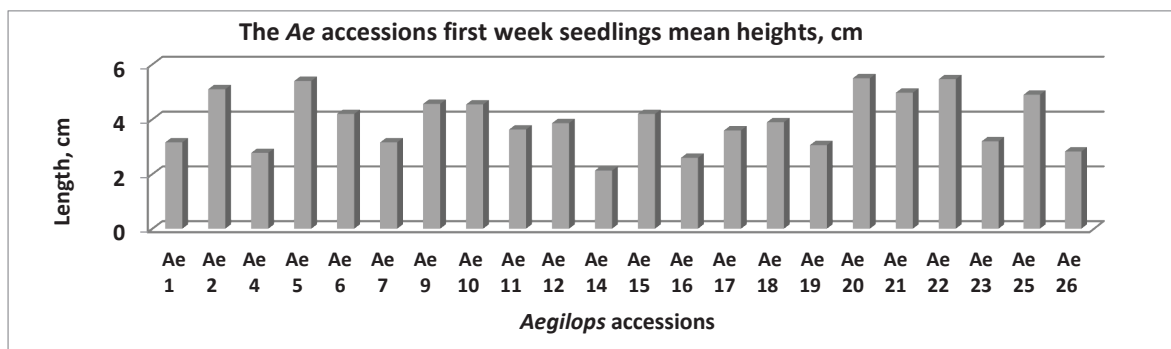
Figure 5. The *Aegilops* accessions first week seedlings mean heights.
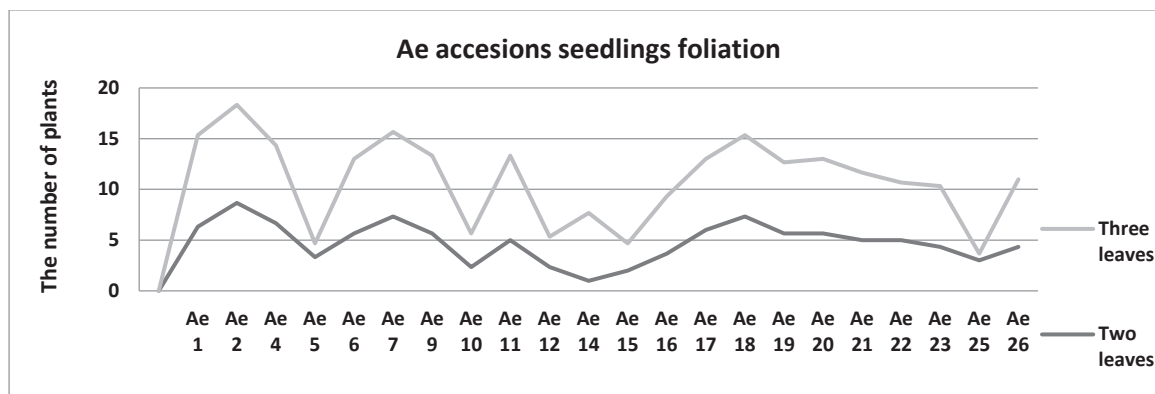
Figure 6. *Aegilops* accessions seedlings foliation (with two and three leaves).

Table 1. A*egilops* accessions different traits variance analysis results.

Physio-morphological traits /	SS	df	MS	F	P-value	F crit
Seed Dry Weights (SDW)	0.45187	21	0.021518	27.32292	1.1E-18	1.800885
Imbibed Seed Weights (ISW)	0.892422	21	0.042496	20.01826	4.5E-16	1.800885
Germination Velocity (GV)	194.4242	21	9.258297	3.795327	9.5E-05	1.800885
Seedling Height (Sdl H)	64.38453	21	3.06593	6.963251	3.5E-08	1.800885
Seedling Foliation 2leaves (Sdl 2l)	239.1667	21	11.38889	4.319923	2.2E-05	1.800885
Seedling Foliation 3leaves (Sdl 3l)	380.5	21	18.11905	6.606946	7.6E-08	1.800885

Table 2. The values of correlation coefficients among *Aegilops* accessions different evaluated traits.

	SDW	Imbibition	GV	GP	Sdl H	Sdl F 2-l	Sdl F 3-l
SDW	1	-0.58709	0.302755	0.440888	-0.48311	0.543485	0.733248
Imbibition		1	0.045252	-0.27326	0.508559	-0.39013	-0.39013
GV			1	0.7908	0.375298	0.70643	0.518402
GP				1	0.110789	0.703701	0.525455
Sdl H					1	0.09215	-0.30421
Sdl F 2-l						1	0.759668
Sdl F 3-l							1

   The results of statistical data processing regarding the seeds and seedlings physio-morphological traits evaluated (Table 1) speak of distinct differences between estimated Aegilops accessions. Table 2 gives the values of the correlation coefficients among the traits being assessed.

Conclusions

From the results of the numerous data processing, it is concluded that among *Aegilops* accessions, included in the study exist significant differences related to their seeds and seedlings biometric traits. The conical ear *Aegilops* accessions show advantages toward the cylindrical ones related the ear weights, dry seed weights, the seed weights after imbibition and the speed of seedling foliation, but the cylindrical ear *Aegilops* accessions show longer ears, a greater seed number per ear, stronger imbibition abilities and higher one-week seedlings. Some of these results will help to choose the useful plant materials and to elucidate the possibilities for more molecular and genetic studies in the future.

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ASSESSING NITROGEN UTILIZATION AND YIELD STRUCTURE OF WHEAT IN THE CONTEXT OF SUSTAINABLE AGRICULTURAL INTENSIFICATION

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The agricultural production system faces a growing demand and mounting environmental challenges. An urgent need is for eco-friendly and efficient production techniques to boost winter wheat yields while mitigating adverse environmental effects. In this context, we assessed how sustainable intensification measures affect wheat productivity. This research primarily focuses on the impact of the preceding crop on these objectives. Sustainable intensification strategies were implemented, encompassing a more diverse crop rotation involving legumes, reduced soil tillage, and greater use of catch and cover crops. This long-term field study took place near Tulln an der Donau in Lower Austria, and with data on crop yields and nitrogen usage were recorded. The results exhibited significant variation from year to year, likely attributable to fluctuations in temperature, precipitation, and planting times. Notably, there was an increase in wheat yield and nitrogen usage following legume crops, although this effect on wheat was somewhat attenuated due to adequate nitrogen fertilization. Additionally, no noticeable trends were detected with catch and cover crops

Keywords: Nitrogen utilization, sustainable agricultural intensification, ecological sustainability, nitrogen management practices

EXPLORATION, EVALUATION AND CONSERVATION OF LOCAL LANDRACE KALE (*BRASSICA OLERACEA* VAR. *ACEPHALA*) IN SOME MOUNTAIN VILLAGES OF NORTHERN ALBANIA

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Abstract

Kale *(Brassica oleracea* var. *acephala)* is a cruciferous vegetable, characterized by the successive arrangement of leaves along the stem. It belongs to the group of non-heading cabbage with smooth leaves. The local kale landrace grown in several villages in the north Albania has repeatedly shown its potential to contain beneficial alleles for biotic and abiotic resistance, but also for beneficial nutritional or health traits. This local kale landrace has been traditionally cultivated by farmers on small plots mainly for family consumption, from late autumn to early spring next season, cooked with smoked pork. Our field missions aimed at the evaluation and collecting for long-term conservation of some old populations of kale that are poorly represented in the Plant Gene Bank of Tirana. This was also the case to monitor the status of known populations, as well as to discover populations growing in localities that had never been documented before. The old local kale landrace, as well as for many other crops, are endangered by their replacement with modern varieties, the abandonment of agriculture by young people, the moving of residents from hilly and mountainous areas. But, as it is already known, the fact that the early forms can be a good basis for genetic work in the future, and a great asset of the genetic diversity of the country, which must be preserved from the genetic erosion that is becoming more severe with time. This paper contributes to the recognition and assessment of the distribution range and population status of the aforementioned old kale.

Keywords: assessment; consumption; collecting; conservation.

Introduction

Kale, which in some countries is called Kale (*Brassica oleracea var. acephala*) is a leafy vegetable of the genus Brassica of great interest for its nutritional value [7]. It is considered an ideal source of vitamins, essential minerals and fatty acids [6]. Since it has been known, cultivated and used for many centuries, it has been included in many traditional foods, especially in the Mediterranean area [4]. This is also due to the good tolerance it has to extreme temperature fluctuations, caused by climate changes in recent times. For decades, kale has been a very popular crop among farmers. They are available for consumption all year round, but are tastiest and most nutritious in the cold months, after the first frost. For better quality, the leaves are distinguished which are collected before they reach their maximum size. In northern Albania, as well as in Europe, green cabbage is often served with smoked pork [7].

Once upon a time, in the countries of the Mediterranean area, but also beyond, a large number of local varieties (landrace) existed and were used for consumption [2]. Green cabbages having a long history of horticultural use, has enabled them to have a large genetic variability and therefore a large number of populations/landraces worldwide [1]. As the population in the villages decreased and people moved to the cities, the number of varieties under cultivation also decreased. However, some local varieties remained in use by individual farmers. In these last two decades, starting from its nutritional and health values, interest in cultivation has increased and a large number of Kale varieties have appeared on the market, mainly hybrid varieties created by large seed companies. The marketing of modern varieties, the abandonment of agriculture by young people, the migration of residents from the hilly and mountainous areas to the cities, has caused that, as for many other crops, many old landraces of green cabbage are in danger of disappearing. From the early 2000s onwards there have been several projects to explore, evaluate and preserve the seeds of unusual varieties and also to enable the return of as many old varieties into cultivation as possible.

Materials and methods

During a previous study, in September-October 2019, in some villages of the Catholic faith in the area of the Albanian Alps, in the northern part of the country, an exploratory mission and collection of old local varieties of vegetable crops, among others, found in some gardens of the house, some green cabbage plants. From further study and communication with specialists and residents of the area, we learn that we are dealing with an old variety, cultivated and used for food in this vast area, since the 15th century. Based on the above information, in July 2022, a mission of the Institute of Genetic Resources of Tirana, after collecting other additional information about this cabbage, went to the villages of Mnelë, Hajmel and Toplan of the Shkodër District, as well as Palc of the Tropoja Municipality, Kukës district, and closely observed the populations of this plant cultivated in home gardens.

The objective of the current survey was to collect seeds from already known sites and to explore the rest of the area for other possible population sites. Mature siliques were collected from individual plants and kept in separate paper bags. GPS coordinates are obtained with a mobile phone. After returning from the field, silicates were hand-picked and the seeds, after being cleaned, were sent for long-term storage to the fund of the Plant Genetic Bank in Tirana.

In October 2022, another mission went to the already known villages, studied and assessed the situation, the state of the vegetation and their field characterization. In the present study, a large set of quantitative and qualitative agro-morphological traits were used to assess the genetic diversity of populations of *B. oleracea* L. var. *acephala* found in some mountain villages

of northern Albania. Each plant was characterized using 10 quantitative and 18 qualitative descriptors of Brassica spp, according to Descriptor of Brassica, 1990 [3] and UPOV, 2021 [8]. The results obtained are described below and presented in tables 1 and 2. The results of the study will be useful for their conservation and further use in breeding programs in the future.

Results and discussion

In fact we saw, characterized and evaluated plants of leafy kale populations that grew inside the villages where farmers tended their home gardens. The old landrace is still consumed by humans. Some people like their taste, although generally the 'sweeter' taste of the domesticated leafy kale is preferred. This trait has possibly been the first criterion of selection by farmers. The conscious selection made by farmers that eliminate 'off type' plants bearing undesirable traits from their fields is known at times [5]. A total of 28 quantitative and qualitative morpho-agronomic descriptors related to plants, leaves, leaf blades, and petioles were evaluated for these 4 kale accessions originating from local sites.

For the qualitative traits, plant shape was either inverted pyramid or a dome in four accessions. Regarding leaf shape, the leaf margin was mostly entire or crenate, while the incision was mostly lyrate and sinuate (2 and 2 acc, respectively). Moreover, all acc exhibited either a rounded or broadly rounded leaf apex, and the lamina was mostly either concave drooping or straight lamina (H'=0.91). The blade shape was obovate, while blade blistering was mostly low (3 acc) and intermediate (1 acc). In addition, anthocyanin was very weak in the leaves of all accessions. In most accessions, leaf colour was mostly green. Petiole color was mostly light green, while petiole and/or midvein enlargement was intermediate in all accessions (Table 1).

Descriptive statistics revealed that the 10 quantitative traits had moderate (5%≤CV≤15%) to very high (CV≥25%) morpho-agronomic variation for all traits with an average coefficient of variation (CV) of 23.5% (Table 2).

Plant height was from 81 to 102 cm in 4 accessions with a mean value of 93 cm and, plant diameter exceeded 60 cm in 4 acc with an average of 69.0 cm and a CV of 21,59 %, while height/diameter was above the average (1.35). As for leaf characteristics, the length in all accessions was 60-68 cm with a mean value of 62.25 cm and a CV of 12.6%. Phenotypic evaluation of leaf blade showed that leaf blade length ranged from 45 to 48 cm, with an average of 46.25 cm and a CV of 13,6% for all collection. Leaf blade width was from 21 to 26 cm in 4 acc with an average of 23.75 cm and a CV of 23.76%, while had a width/length ratio above the average (1.95). As for petiole, length in most accessions was between 14 and 20 cm with an average of 16.0 cm, width in all acc was above average (1.08), while length/width ratio in 4 accessions was above average (14.8) with CV of 34.89%.

As you can see, the differences between the 4 acc (in fact, they are populations of an old landrace) are few and these differences are mostly related to the selection of plant material over the years by the farmers who cultivate it and multiply the seed for planting in subsequent years. However, this kale is valuable for cultivation, use and breeding programs in the future.

Conclusions

In general, the study showed that the kale populations, collected in four villages of the Albanian Alps, characterized and evaluated, represent a valuable reservoir of genetic and agro-morphological variability that can be used for future breeding initiatives.

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Table 1. Qualitative traits in local Kale populations,

Nr	Plant traits	Code	Locality of population			
			Mnele	Hajmel	Toplane	Palc
1	Morphotype uniformity	4.2.1	1	1	1	2
2	Branching plant		0	0	0	0
3	Plant growth habit	4.2.2	1	1	1	1
4	Leaf scars	4.2.10	0	0	0	0

5	Number of leaves	4.2.11	7	5	5	5
6	Angle of petiole	4.2.15	3	3	3	3
7	Leaf blade shape	4.2.16	3	3	3	3
8	Leaf margin	4.2.17	0	0	0	0
9	Leaf division (incision)	4.2.18	3	2	2	3
10	Leaf blade thickness	4.2.20	5	5	5	5
11	Leaf blade blistering	4.2.21	3	3	3	5
12	Leaf lamina attitude	4.2.23	3	3	3	3
13	Leaf color	4.2.24	3	3	3	3
14	Leaf hairiness	4.2.25	0	0	0	0
15	Petiole enlargement	4.2.27	5	5	5	5
16	Leaf anthocyanin	UPOV5	1	1	1	1
17	Leaf blade density of curling	UPOV_14	3	3	3	3
18	Folding leaf section	UPOV_15	5	5	5	5

Table 2. Quantitative traits in local Kale populations

Nr	Plant traits	Code	Locality of population			
			Mnele	Hajmel	Toplane	Palc
1	Plant height, cm	4.2.3	102	94	81	95
2	Plant diameter ,cm	4.2.4	76	70	62	68
3	Average no of leaves	4.2.11	53	48	33	41
4	Leaf blade length, cm	4.2.12	48	45	45	47
5	Leaf length		68	60	60	61
6	Leaf blade width , cm	4.2.13	24	24	21	26
7	Petiole length, cm	4.2.28	20	15	15	14
8	Petiole width, mm	4.2.29	10	10	11	12
9	Vegetative stem width, cm	4.2.55	36	32	28	30
10	Length/ diameter ratio	4.2.56	1,34	1,34	1,31	1,40

INSIGHTS ON LANDSCAPE TRANSFORMATION (2012-2018) ALONG THE MEDITERRANEAN COASTAL ZONE: CASE OF ALBANIA

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Abstract

The landscape change is harsher in regions of remarkable touristic interest, like the Mediterranean coast. In this study, we bring evidence from the Albanian coastal zone. We utilize the pan-European land use land cover data of the coastal zone (CZ-LULC) provided by the European Environment Agency. CZ-LULCincludes all land surfaces within 10km from the coastline. First, we bring the share of landscape types within the Albanian coastal zone based on data from 2018. Our results show that out of 3965km^2, 39% of the Albanian coastal zone is covered by cropland, 16% by woodland and forest, 12.2% by grassland, 9.58% by open spaces with little or no vegetation, 9.25% heathland and scrub, 6.42% by urban, 4.99% by water, and 2.74% by wetlands. Then, we investigate the transformation trends between specific landscape types between 2012 and 2018. According to our results, 8289 Ha of coastal landscapes have been altered to other LULC. Open spaces with little or no vegetation (56.41%), woodland and forest (19.84%), and water surfaces (8.08%) are the leading altered landscape types. Furthermore, we analyze the changes within each class to figure out the replacement of LULC classes. For instance, 46.41% of the altered woodland and forest surfaces (2012) were transformed to urban land use (2018). Similarly, 93.17% of the altered water surfaces (2012) are changed to open spaces with little or no vegetation (2018). Our findings can urge further detailed investigation, as they can reveal alarming reduction rates in water and other natural resources.

Introduction

Historically, coastal zone has been among the most attractive landscapes to humans. Today, about 40% of the global population is reported to live in the coastal zone within 100km from the coastline [1]. While the coastal zone covers only about 20% of the global terrestrial surface area. Yet, the population growth in the coastal zone is estimated to significantly increase in the upcoming decades [7]. Besides the increase of the domestic urban population, coastal areas are increasingly under pressure of touristic services demand. Special regions like the Mediterranean coastal landscapes are significantly transforming by mass tourism developments, rising pressure on vulnerable natural and man-made ecosystems [6].Similarly, the Albanian coastal zone is experiencing intensive land use change due to the rising touristic demand. According to the World Bank statistics the number of accommodation facilities in 2019 was five times higher than 2000[5]. As the touristic demand and supply is increasing, it is vital to monitor the spatial impact of this development. In this study we aim to highlight the landscape transformation along the Albanian coastal zone based on the Coastal Zone land use land cover (CZ-LULC) data provided by European Environment Agency (EEA) for years 2012 and 2018.

Materials and Methods

Study area

Albania is located in the western Balkans along the Mediterranean coast (see Figure 1). According to Coastal Zone data by European Environment Agency (EEA) the Albania covers an area of 3945 km^2 (about 14% of the national surface area), and a total continental coastline of 424 km (about 40% of the total national borders). In recent years Albania has experienced not only elevated touristic interest rates but also fundamental local administrative changes (territorial reform in 2014), affecting the natural resources distribution [4]. We use the CZ-LULC data of 2018 to reveal the main surface types distribution. Then, we give insights about the landscape change based on CZ-LULC change data comparing between 2012 and 2018 records. Furthermore, we juxtapose our results with the local administrative map to compare at municipality level.
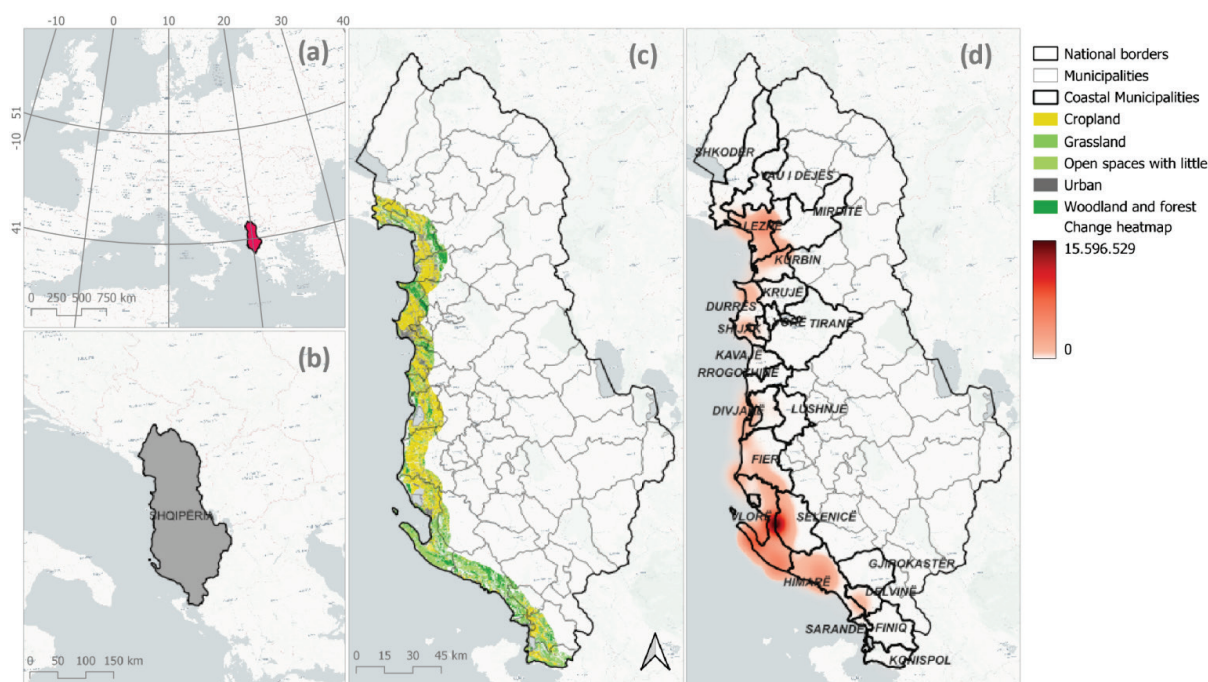
Figure 1. Albania within (a) Europe and the (b) Balkans, (c) the main land use and land cover distribution within the Albanian coastal zone (CZ 2018), and (d) the heatmap of changed surfaces by surface area (2012-2018).

Results and Discussion

The Albanian coastal zone is dominated by cropland (39%), followed by woodland & forest (16%), grassland (12%), open space with little or no vegetation (10%), heathland and scrub (9%), water and wetlands (9%), and only 6% by urban lands (see Figure 2d) at main category level. Even though the share of natural and semi-natural surfaces is promising, at this stage we cannot provide any clue on how much these surfaces are environmentally effective. The distribution within main categories (level 2) shows that urban surfaces are dominated by building construction (84%), followed by transportation infrastructure (9.5%). Urban green spaces cover only 1.45% of the urban surfaces (see Figure 2a).Wild vegetated surfaces are dominated by broadleaved forest (77.03%, see Figure 2b). The most present water surface is transition waters (68.86%), followed by water courses (23.08%).
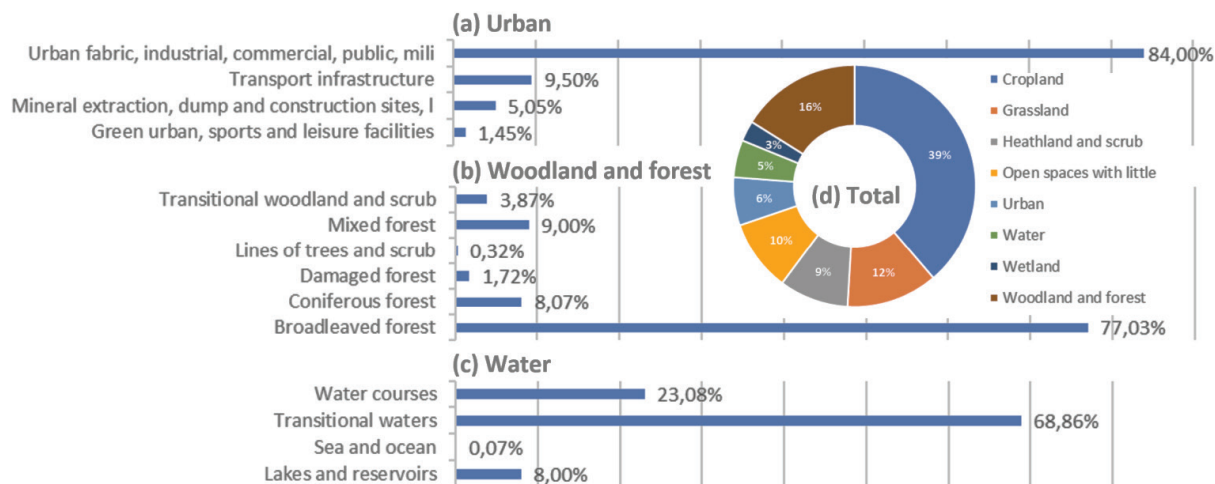
Figure 2. LULC distribution within selectedcategories (a) Urban, (b) Woodland and forest, (c) Water, and (d) the main land use and land cover distribution within the Albanian coastal zone (CZ 2018)

21 out of 61 municipalities overlap with the Albanian coastal zone. Yet, only 15 municipalities experienced significant CZ-LULC change during the period 2012-2018 (see Table 1).Vlora has faced the most remarkable transformation, with a changed surface area of 3479 Ha (42% of the total change). Almost half of it was transformed from natural land cover and one fifth from water surfaces. Durres has the highest urbanization expansion as 25% of changed surfaces from 2012 transformed to urban land in 2018.This is in the same line with the change density mapin Figure 1d. On the other hand, Fier leads the change to agricultural surfaces and the highest reduction in water surfaces. Similar comparisons are possible based on our data revealed in Table 1.

Table 1. Coastal landscape transformation change at municipality level based on CZ-LULC change data (2012-2018).

	Municipality	Area (Ha)	Total change 2012-2018	to urban 2018	to cropland 2018	from water 2012	from natural 2012
1	Delvinë	114	1,39%	1,62%	16,04%	20,18%	1,59%
2	Divjakë	291	3,53%	3,77%	17,89%	0,00%	1,07%
3	Durrës	278	3,38%	25,47%	0,64%	4,88%	1,58%
4	Fier	485	5,89%	18,33%	38,66%	21,49%	1,33%
5	Himarë	912	11,07%	10,53%	6,81%	0,00%	12,88%
6	Kavajë	44	0,53%	3,21%	0,97%	1,54%	0,21%
7	Konispol	22	0,27%	0,72%	8,97%	0,00%	0,33%
8	Kurbin	369	4,48%	3,99%	0,46%	13,74%	3,44%
9	Lezhë	971	11,79%	4,15%	0,51%	2,49%	13,73%
10	Rrogozhinë	49	0,60%	0,38%	0,00%	5,36%	0,08%
11	Sarandë	8	0,09%	0,86%	0,00%	0,00%	0,08%
12	Selenicë	976	11,86%	0,54%	0,00%	1,93%	14,11%
13	Shkodër	52	0,63%	2,45%	0,00%	2,46%	0,35%
14	Vau iDejës	64	0,78%	1,30%	0,00%	0,00%	0,51%
15	Vlorë	3479	42,24%	15,11%	1,77%	17,05%	48,23%

Conclusions and Outlook

Our results show that the Albanian coastal zone is still dominated by natural and semi-natural surfaces. However we also report that during a relatively short period of six years (2012-2018) there have been remarkable landscape transformations. Considering that the touristic interest is accelerating, monitoring of the Albanian coastal zone is vital to minimize the environmental impact of the new touristic infrastructure. Yet, the surface area distribution is not enough to show the degree of a broader environmental impact of land use change. Next steps of the research should consider analyzing the habitat fragmentation. Previous studies have shown that transportation network investments have caused considerable habitat fragmentation in Albania [3]. Similarly, simple methods like transversal connectivity index can provide insights on fragmentation among blue-green infrastructure [2] along the coastal zone.We hope our study will draw attention to governing bodies responsible of Albanian coastal zone management, about the fragility of coastal landscapes and their vulnerability to anthropogenic development.

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REVIEW OF AGRONOMIC AND GENETIC DIVERSITY OF MOROCCAN RICE VARIETIES, AND THEIR RESISTANCE TO BLAST DISEASE (PYRICULARIA ORYZAE)

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The study on agronomic and genetic characteristics of rice has given us scope to select varieties with desirable characteristics to mitigate various constraints. Rice (*Oryza sativa*) is the staple food for half of the world's population. However, its production is hampered by a variety of biological constraints. The Blast disease (*Pyricularia oryzae*) is an important rice disease, and one of the most effective control methods is to use resistant varieties. Study areas in Morocco include the Gharb plains. For all methods, cultural practises like soil levelling seem to be important, but biological control is not widely adopted due to cost, efficacy, and climatic conditions. The bibliographic synthesis was carried out in this context with the main goals of contributing to a better understanding of rice cultivation in Morocco; to identify and characterize the structure of the rice blast pathogen (*Pyricularia oryzae*), which will allow us to characterize the effects of rice blast; and to research on the Gharb rice field, which resulted in resistant varieties, which will potentially allow producers to have resistant varieties to overcome the diseases. The introduction and development of new rice varieties with high agronomic and socioeconomic value; the selection of lines with high yield, good grain quality, and precocity that are adapted to Moroccan conditions; as well as the development of new lines from Moroccan rice, are among the specific goals.

Key words: rice's agronomic and genetic, control methods, *pyricularia oryzae*, resistant varieties, morocco.

EVALUATING THE SUITABILITY OF PHYTOGENIC AS NATURAL FEED ADDITIVES IN PIGS AND THEIR IMPACT ON PERFORMANCE PARAMETERS.

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Abstract

The feed industry is currently looking for efficacious, safe and cost-efficient additives with a clearly defined mode of action and proven benefits. Over the years, the use of prophylactic drugs and antibiotic growth promoters in animal feeding has become commonplace. However, the continuous use of these compounds resulted in outcomes such as the emergence of resistant bacteria and antibiotic residues in meat and other livestock products which pose a risk to public health and the environment. This concern has led many countries to restrict the use of antibiotics in animal feed. Accordingly, it is necessary to identify cost-effective, safe, and eco-friendly alternatives to antibiotics. The term "phytogenics", also referred to as botanicals or phytobiotics, describes plant-derived compounds incorporated in animal feed to improve productivity of livestock through amelioration of feed properties and promotion of the animal's production performance, with the potentially positive application in animal nutrition. The possible mechanisms of action of these products are antioxidant and antimicrobial effects, resulting in the improvement of intestinal health. The main objective of this study was to investigate important mechanisms and of effects of phytogenics on performance parameters of pigs, under consideration of the extensive and semi-intensive pig production conditions like these in Albanian livestock farms.

Key words: piglets, phytogenics, feed additives, performance parameters.

1. Introduction

The term "phytogenics", also referred to as botanicals or phytobiotics, describes plant-derived compounds incorporated in animal feed to improve productivity of livestock through amelioration of feed properties and promotion of the animal's production performance. Phytogenics include a broad range of plant materials, most of which have a long history in human nutrition, where they have been used as flavours, food preservatives and medicines since ancient times. These plant materials usually contain a cocktail of numerous different active principles (e.g. eugenol, cinnamaldehyde, carvacrol or thymol), which all play together to determine a specific flavor or scent. Indeed, phytogenics are commonly known for their flavouring properties, thus having impact on the palatability of diets. On the other hand, phytogenics exert a range of distinct biological activities, therefore having the potential to positively affect gut health and increase performance.

The in vitro antimicrobial, antiviral, antifungal, antioxidant and other activities of phytogenic compounds are well described and backed up by numerous scientific reports (Burt 2004, Franz et al., 2010, Wallace et al., 2010, Lang &Buchbauer., 2012). In the meanwhile, an increasing number of studies addressing the gastrointestinal effects of phytogenics under in vivo conditions, i.e. in animal feeding experiments, are available. The intestinal microflora, gut morphology, gastric emptying, activity of endogenous digestive secretions and, finally, performance parameters are considered to be influenced by dietary phytogenics.

2. Material and Methods

2.1. Keeping conditions

The animal trials were carried out in a private farm of pigs. Forty piglets (Large White x Duroc) of four litters were transferred after weaning (28 days) to Flat-Deck and randomly allocated to 2 groups with 20 animals (10 male and 10 female). The control group was fed with standard mixtures (see Table 1), whereas the experimental groupreceived the same mixtures, but supplemented withthyme (*Thymus vulgaris*),

(1 g kg^{-1} feed). The diet was offered ad libitum and animals had free access to water. The environmental and microclimatic conditions have been at optimal levels, according to the requirements for weaned piglets.

Table 1. Diet composition (g/kg feed)

Diet composition (g/kg feed)	
Maize	600
Soybean meal	270
Soya oil	30
Fish meal	30
Limestone	10
Monocalcium phosphate	15

Vitamin -mineral premix[a]	12
L-Lysine	10
Methionine+cystine	10
Threonine	10
Tryptophane	3

[a] Contents in 1 kg: 1,200,000 IE vit. A, 120,000 IE vit. D_3, 4000 mg vit. E, 200 mg vit. B_1, 600 mg Vit. B_2, 2500 mg Niacin, 400 mg Vit. B_6, 4500 µg Vit. B_{12}, 20,000 µg Biotin, 1800 mg Pantothenic acid, 160 g Na, 50 g Mg,10,000 mg Zn, 7500 mg Fe, 7500 mg Mn, 150 mg J, 70 mg Co and 40 mg Se.

2.2. Experiment design

Table 2. The experiment design**.**

Period	Day	Control group	Experimental group
Preparatory	5	Basic diet	Basic diet
Experimental	42	Basic diet	Supply with feed additive

During six weeks period of trials, Body Weight (BW), Daily Weight Gain (DWG) and Feed Conversion Ratio (FCR), kg feed/kg body weight gains were measured weekly. Recording of live weight and feed intake data, piglets were weighed on the day of weaning, followed by weekly weighing thereafter. An ear tag identified individual animals. Once the animals were weaned, feed refusals were weighed back on a weekly basis during the post weaning period. This allowed calculations of apparent feed intake and feed conversion ratios to be made.Data are presented as arithmetic means with standard deviations (Mean ± SD). One-way analysis of variance "ANOVA" (ANOVA-single factor) and Student's t-test ($P < 0.05$) were performed to test the differences between two groups.

3. Results and discussions

Table 3. The effect of phytogenic on production parameters.

Parameters		Control group	Experimental group
Production	n[1]	X ± SD	X ± SD
-Initial BW, kg	20	6.7 ± 1.01	6.8 ± 1.07
-BW 6th week [2]		20.8 ± 5.10	21.3 ± 5.83
DWG, g [3]		335.7 ± 36	345.2 ± 35
FCR [4]		1.90 ± 0.48	1.85 ± 0.31

4. Conclusions

Based on the achieved results in the present investigations, it could be concluded that the utilization of phytogenics led to an improvement of the production parameters of piglets, especially under the extensive farm conditions, like these in Albanian farms of pig production.

The utilization of thyme (*Thymus vulgaris*), induced slightly the performance parameters like: Body weight, daily weight gain and feed conversion ratio. Because of the high coefficient of variation, the differences were not significant.

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IMPROVING SOIL FERTILITY BY SOIL AND CROP MANAGEMENT

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The increase in soil organic carbon (SOC) storage is currently a focus of climate change mitigation in agriculture. Soil organic carbon is critical to agriculture for soil health and climate change adaptation. On-farm studies including 21 locations in Austria were conducted to study soil health-oriented pioneer systems in comparison to conventional standard systems and natural reference sites. It could be shown that SOC storage significantly increased in pioneer systems, especially at sites with lighter soil texture. In particular, a parameter indicative for good soil structure, the proposed organic carbon to clay ratio, showed significant improvement in soil structure for pioneer systems in light and medium textured soils. The soil health-oriented management in pioneer farms was also able to generate a positive effect on microbial biomass and necromass. For farmers, however, the main aim of SOC management is climate change adaptation. Based on this on-farm comparison of soil health-oriented pioneer systems with conventional standard systems, it was also shown that pioneer systems enhanced the volume of water-storing pores. Parameters with a strong influence on soil structure, such as water-soluble carbon, were revealed as key drivers to increase functionally important pore spaces for water storage and soil microbiology. The overall results show that soil health-oriented management can optimize physical and biological soil functions with relevance for climate change adaptation and sustainable yield.

Key Words: climate change adaptation, soil organic carbon, soil structure, soil microbial biomass

ENERGY RECOVERY FROM ORGANIC WASTE

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Abstract

Producing green energy from renewable raw materials, organic waste and energy crops, will benefit society. Industrial biofuels might be sustainable and non-polluting if they are correctly integrated with the natural ecological cycles. In this context biomass thermal and bio processing, could convert biowaste into sustainable energy feedstocks. This review aims to present what has been done on the energy conversion of biomass, and what are the current challenges and future ideas. Green energy production through hybrid renewable energy systems. Integrated renewable energy systems can increase energy storage capacity, reduce energy production costs, and improve the quality of generated power. More work should be done on the ways to maximize renewable sources fraction while minimizing the costs, real-life testing, as well as on combining these technologies with carbon capture and storage.

Keywords: bio conversion, organic waste, green energy

DISCOVERING POTENTIAL RESISTANCE MECHANISMS IN LARGE-SEEDED LEGUMES AGAINST THE PEA APHID *ACYRTHOSIPHON PISUM* (HARRIS)

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Pulses, the large-seeded species of legumes (Fabaceae), are grown mainly as a source of plant proteins for human and animal consumption but they function also as natural fertilizers due to their ability to fix atmospheric nitrogen. Currently, grain legumes are a major part of many people's diet worldwide and an important element in peoples' food security, especially in semi- and arid climates. The feeding activities of sucking insects combine two kinds of harmful effects on plants: the feeding affects plant condition directly due to the removal of nutrients and/or the otherwise interference with plant physiology, and, indirectly, by contributing to viral diseases dispersal. The pea aphid *Acyrthosiphon pisum* (Harris) alone is able to transmit over 40 different plant pathogenic viruses. Due to its worldwide distribution, *A. pisum* is considered one of the most important pest insects of leguminous plants. One of the alternative methods to the use of insecticides is the exploitation of the natural or bred traits that enable plants to defend themselves against herbivores. The aim of the present work was to determine the existence and the localization of the potential antixenosis factors in different tissues of eleven species and cultivars of grain legumes. We applied the technique of electronic monitoring of aphid probing known as EPG. We discussed the results in respect to inter- and intraspecies variation in susceptibility to the pea aphid infestation and the probability of virus transmission to and from these plants in non-persistent, semi-persistent and persistent ways by *A. pisum*.

Key words: plant resistance, antixenosis, electropenetrography

GRAIN OF HYBRIDS BETWEEN SPELT (*Triticum spelta* L.) AND BREAD WHEAT (*Triticum aestivum* L.) AS A NEW RAW MATERIAL FOR BREADMAKING

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The aim of this study was to determine differences in the technological quality of grain of hybrids between spelt (*Triticum spelta*) and bread wheat (*T. aestivum*) as compared with the grain of their parental forms, i.e., modern bread wheat cultivars and spelt breeding lines. The content of basic nutrients in grain, milling quality of grain, rheological properties of dough, and bread quality were evaluated. Grain yields were around 18% lower in hybrid lines than in bread wheat. Gluten content was significantly higher in the grain of hybrid lines (34.0 *vs*. 27.5 g/100 g), and it did not differ significantly from that noted in spelt grain (36.1 g/100 g). The gluten index did not differ significantly between hybrid lines and bread wheat cultivars (77 *vs*. 85), and it was significantly higher than in spelt (43). Protein content was significantly higher in the flour obtained from hybrid lines than from bread wheat. Analyzed dough parameters in hybrid lines assumed intermediate values relative to parental forms, and protein parameters had a stronger discriminatory power than starch parameters. Bread made from the grain of single-cross hybrids between spelt and bread wheat was characterized by high quality and in many cases superior attributes relative to bread made from spelt flour.

The study demonstrated that hybrids between *T. spelta* and *T. aestivum* can become a new, valuable source of grain for bread production.

KEYWORDS: bread wheat, spelt, hybrids, technological quality, rheological properties

SESSION

"Rural Development Policies and Agribusiness Management Strategies"

SUSTAINABLE AGRICULTURE: FUTURE CHALLENGES

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This paper aims to introduce a research project titled SOFT (Smart Organic Farming Techniques) funded by the Apulian Region (Italy) in the context of Rural Development Program 2014/2020 - Measure 16 – Cooperation - Submeasure 16.2 "Support for pilot projects and the development of new products, practices, processes and technologies". One of the main SOFT goals is to assess sustainability of agro-ecological models based on crop rotation (cereals/legumes, cereals/tomatoes). Many studies highlighted that the interactions between crops become an important component that can change the agro-economic and environmental performance of the overall cropping system. Indeed, the real innovative approach of the sustainability assessment proposed by SOFT is to consider the entire agro-ecological model with a life cycle perspective. Therefore, by adopting a life cycle assessment (LCA) approach is possible to calculate an eco-indicator that could be elaborated with an economic and a social approach, in order to obtain a life cycle sustainability assessment (LCSA) by combining environmental impacts with economic and social aspects. The results of the LCSA could be the basis for implementing a useful instrument easy to understand and able to valorise sustainable agriculture and, in particular, for organic farms.
Keywords: Organic Farming, Life Cycle Sustainability Assessment (LCSA), Eco indicator, Sustainability

Introduction

An important objective of modern agriculture is to reduce environmental impacts, especially those on climate change, and ensure the economic and social sustainability of farms and rural areas. [Gennari et al., 2019; Ladha et al., 2020]. The Life Cycle Assessment is probably the more compliant approach capable of addressing the SDG in evaluating sustainability in agriculture [Russell et al., 2005].

Starting from these premises the research project SOFT aims to assess sustainability of agro-ecological organic models based on crop rotation. This paper describes the methodological life cycle based approach used during the experimentation phase in order to gather an eco-indicator that could be elaborated with an economic and a social approach, in order to carry out a LCSA, by combining environmental impacts with economic and social aspects.

Methods

The LCA is a well-known analytical tool, standardized in ISO 14040-14044, to assess potential environmental impacts of the entire life-cycle of a product, process or service. The LCA considers the product as a system, by analyzing the path and the transformations of matter and energy flows, from the time of their removal from the environment, to the obtaining of the product, to final disposal.

The LCC methodology is used to calculate all costs related to the product life considering the costs of design, construction costs of the production, management costs and disposal costs. This analysis will be functional in order to evaluate and compare different investments and to draw up economic and financial lists as useful tools to support business decisions. According to the data available and collected during the overall life cycle, all cash flows are evaluated in terms of economic and financial impacts (Cash Flow Analysis) in a reasonable period. This period will be calculated by evaluating the timing of amortization of the innovations and according to this, calibrating the activity and forecasts.

The S-LCA is a methodology to assess and report about social impacts of products and service across their life cycle. S-LCA differs from other social impact assessment techniques by its object (products or services and their life cycle), by its scope (the entire life cycle) and its systematic nature (systematic process of collecting and reporting about social impacts and benefits across the life cycle). Results of S-LCA study is effective social impacts if these are assessed with observed and verified primary specific data collected directly from stakeholders. The goal and scope of the LCSA is usually based on a baseline situation from which the innovation is analyzed. The goal and scope define all methodological choices related to the LCSA and guide the elaboration of the LCSA throughout the project.

The LCA is usually carried out according to the International Reference Life Cycle Data System (ILCD) Handbook and following the ISO standards on LCA (ISO 14040-14044). The LCC could refer to the SETAC handbook on LCC, while the S-LCA follows the UNEP guidelines on S-LCA. All these activities will comply with the provisions of the Product Environmental Footprint Guidelines - PEF.

Results and Discussion

According to the above described life cycle methodology, organic crop rotation-based agricultural systems were investigated (durum wheat, legumes, and tomatoes). The functional units (FU) adopted were: a) one hectare of cultivated surface, b) one kilogram of final product. The reference flows refer to all material and energy resources needed for cultivating crops "from cradle to farm gate", therefore in the system boundaries, the transportation of final product and by-products management were

also taken into account. The collection of data was carried out by using surveys directly delivered to farmers. This allowed us to create a databank of primary data (such as yield or the amount of electricity), therefore secondary data deriving from Ecoinvent v.3.3 and Sphera dataset were also used [Nemecek & Kagi, 2007; www.sphera.com, n.d.]. In particular secondary data were adopted for calculating emissions deriving from the cultivating practices (use of tractor and equipment) or for modelling the production and use of fertilizers and pesticides. In order to calculate the emissions (in air, soil and water) linked to the use of fertilizers and pesticides functions and parameters were adopted, as well.

As for the impact assessment, the PEF impact categories were adopted, after the normalization and weighting of the absolute values the PEF Eco indicator was obtained.

As far as, the LCC methodology, the same assumptions of LCA were done for the choice of FU and system boundaries. As well as LCA for the LCC primary and secondary data were employed. In particular according to Zira et al. [2021], some cost categories such as interest, depreciation, rent and taxes, value of land, buildings, tractors and equipment were excluded. At the same way only labor cost was taken into account. According to Tamburini et al. [2015] for each process sub-phase, costs were grouped in order to better present the cost impact categories.

As concerning S-LCA after the stakeholder engagement, surveys were used for collecting data by choosing as stakeholder category the owner and laborers. According to UNEP methodological sheet, the definition of the subcategory, the purpose and approach of the evaluation of the indicators and the inventory indicators (and source of the data) were defined. At the same way the questions in the survey were set according Goedkoop et al. [2020] and for each subcategory the evaluation was compared in order to carrying out a triangulation and validate the stakeholder category "laborer". At the end the social assessment was performed according to the latest scale od values (-2;+2).

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DIGITIZATION IN ALBANIAN AGRICULTURE, THE CASE OF FARMS INTEGRATION IN THE VALUE CHAIN.

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Abstract

The agricultural production sector contributes more than one-fifth to the country's GDP, but it continues to face structural and development problems. Increasing productivity, promoting economies of scale through cooperation between small farmers, increasing access to financing, modernizing the value chain (VC), and marketing and selling agricultural products are some of the main sector challenges. An important instrument to face these challenges is the digitization of agriculture through the use of technology and information systems as an important instrument for increasing the competitiveness and sustainability of the rural sector. Digital agriculture represents new knowledge or new combinations of existing knowledge transformed into technologies applied on agricultural activities and, as a result, aims to improve the sector's performance. In developing countries, ICT platforms increase access to information and capacity-building opportunities, bringing tangible benefits to farmers, in terms of better quality inputs, increased productivity, reduced post-harvest losses, and better market access.

In this context, the aim of this paper is to examine the importance and level of application of digital technology along the value chain in the agricultural sector. In this context, a questionnaire was designed to provide and collect information on the importance of the application of the digitization of agriculture, through the use of technology and information systems by agricultural farms and farmers in our country. Based on the data of (INSTAT, 2022) for the dominant activities and the typology of farms according to the regions, the study areas have been determined: Kukës and Gjirokastër, districts for livestock production farms, Fier and Berat, districts (for vegetables in greenhouses), Korçë, district (for fruit cultivation). The completion of the questionnaires was carried out, face-to-face with the farmers, for the five districts. In total, 938 questionnaires were completed, which were analyzed with the SPSS program, in accordance with the research objectives of the study. The indicators used are evaluated with the Likert scale: [1-5].

Keywords: *Agricultural digitalisation, ICT, productivity, digital technologies, value chain.*
JEL Code: *Q12, Q16*

Introduction

The agriculture remains one of the most important sectors in the country's economy, contributing 19% of Albania's GDP. Around 35 % of Albania's labour force is engaged in agricultural and livestock activities, in the rural sector of the country (INSTAT, 2023; World Bank, 2023). Agriculture is becoming more and more knowledge-intensive: farmers must make increasingly complex decisions about the use of their farms, the agricultural commodities they plant, the markets on which to sell their agricultural products and other major issues that affect their livelihoods and the well-being of society. (ITU and FAO, 2020).

However, agriculture development is facing several challenges such as uncertainties about agricultural land ownership, market access for agricultural products, low levels of use of modern technologies, lack of cooperation among farmers (ITU and FAO, 2020), small size of the farms, price-cost squeezes, rural exodus and youth abandonment, high informality (Domi et al., 2020). An important component to face these challenges and problems is the digitization of agriculture using technology and information systems as an important instrument of modernizing the value chain and increasing the competitiveness of the agricultural sector in the country. Information and communication technology (ICT) helps improve the effectiveness and efficiency of the agri-food value chain as well as agricultural activities, in terms of data on input purchase prices, their quality, product sales and food safety standards. Digital technologies (e.g., artificial intelligence, robotics, innovation, Internet of Things, drones, etc.) are applied along the agricultural value chain to address challenges related to the food production system (Benke et al., 2017). ICT includes different types of applications and platforms, from computers and the Internet, radio, and television to mobile telephony. Their role and impact vary widely depending on the specific technology used by farmers. Digital agricultural technologies, innovations and data are transforming business models and practices across entire value chains. They are helping to address bottlenecks in productivity, postharvest handling, market access, finance and supply chain management (Sylvester et al., 2021). Referring to the rapid changes that have occurred in the agri-food sector during the last two decades, the development and modernization of the value chain is a strategy for increasing income and well-being in rural areas.

Based on the above discussion, the purpose of this study is, to the evaluation of the impact of digitization on the level of competitiveness as well as the productivity of farmers and agricultural farms along the value chain in the agricultural sector. To achieve this purpose, the main objectives are: evaluating the level of digitization of the value chain in agriculture with a focus on the agricultural farm, the level of the knowledge and skills of farmers in the application of digital technology in the rural sector; evaluating the activity-technology adaptation by farmers according to the respective districts.

Literature review

Digital agriculture represents new knowledge or new combinations of existing knowledge transformed into technologies applied to agriculture activities and, as a result, aims to improve the sector's performance. There are several definitions used to describe the digitalization of agriculture. Digital agriculture according to (Wolfert et al., 2017; Shepherd et al., 2020), precision agriculture (Rolandi et al., 2021), smart farming (Wolfert et al. 2017) are used to describe the innovation in agriculture. In fact, the digital agriculture (DA) concept includes broad changes along the entire agricultural value chain

(Rolandi et al., 2021). DA is defined by Shepherd et al. (2020) "as the use of detailed digital information to guide decisions along the agricultural value chain".

Digitalisation, as in other sectors, it will have important impacts on agriculture. Digitalisation refers to the adoption of information communication technologies, including the internet, mobile technologies and devices, as well as data analytics, to improve the collection, exchange, aggregation, combination, analysis, access, and searchability, including for the development of services and applications.The spread of the internet and mobile telephony in rural areas has already brought significant changes in the rural sector. ICT increases access to information and capacity-building opportunities, bringing tangible benefits to farmers, in terms of better quality inputs, increased productivity, reduced post-harvest losses, and better market access (Torero, 2014). Economic growth is driven by the advancement of ICTs, which are also a key driver for innovation and change (ITU and FAO, 2020).

For farmers, digital technologies and the insights that are generated from agricultural data could support better decision-making on farms, helping to boost innovation and improve agricultural productivity, and sustainability (OECD, 2022). Digital technologies could also offer opportunities for new sources of efficiency, supporting research and innovation, the creation of new services for the sector, and improved traceability and more efficient transactions in value chains.

Agricultural farms and agribusinesses, through digital platforms, access a wealth of information and services that directly connect the farmer with other actors along the value chain. The Internet of Things (IoT) has drawn attention in recent years for its potential to transform agriculture and food systems (Mahdad et al., 2022). Most of the empirical research that examines the implementation of information and communication technology in agriculture, mainly considers the impact that ICT has on the sustainable development of the rural sector, the modernization of the value chain, on innovative approaches in rural enterprises as well as on the well-being of farmers (Aker, 2011; Burkitbayeva and Swinnen, 2018; Nakasone et al., 2014).

According to Poppe et al. (2021), the future monitoring system should result in a smart combination of innovations in current statistics, combined with data from satellites and sensors, and a better overall harnessing of data flows within the agricultural sector. Increasing the productivity of Albania's agriculture will require greater use of modern inputs (improved seeds, fertilizer, irrigation, mechanization) as well as better access to markets. The essence of the more integrated VCD models is to involve all actors in the value chain and link smallholders with input suppliers, processing factories or marketing agents (Devaux et al., 2018). The benefits of applying digital technologies along the agriculture value chain are mainly in the economic, environmental, governance, and social domains (Rolandi et al., 2021). This data exchange between farmers and other actors increasingly occurs through digital means. Agriculture has already undergone numerous changes that have led to a significant transformation of its production steps (Lieder and Schlaack, 2021). Digitalization of agriculture enhances efficiency through precise mechanization, automation, and improved decision-making (Fielke et al., 2020). More specifically, digital technologies implemented can promote cooperation among stakeholders in the agriculture value chain, and increase the market access and the bargaining power of small farmers (Rolandi et al., 2021).

Methodology

In order to achieve the objectives of the study a questionnaire was designed to provide and collect information on the importance of the application of the digitalization of agriculture, through the use of technology and information systems by agricultural farms and farmers in our country.

The questionnaire is composed of five main sections, to provide information on:
▪ farmers and agricultural farms, (family members, gender, age, education, employment and income);
▪ data on productive resources (land, owned/leased, activities, capacity, investments);
▪ technology data (devices, applications, platforms, etc.);

Based on the data of INSTAT, (2022) for the dominant activities and the typology of farms according to the regions, the study areas have been determined: Kukesi and Gjirokastra districts, for livestock production farms, Fier and Berat, districts, (for vegetables in greenhouses), Korça district, (for fruit cultivation). The completion of the questionnaires was carried out, face-to-face with the farmers, for the five districts (Kukës, Gjirokastër, Fier, Berat and Korçë). This process took two months. In total 938 questionnaires were filled in all the regions selected as study areas. After completing the questionnaires, the data were entered into the database and analyzed with the SPSS program. The indicators used are evaluated with the Likert scale: [1-5].

The main research questions of the study are:
a. What is the level of use of digital technology by farmers and agricultural farms in the targeted regions?
b. What impact does digitization have on the productivity level of agricultural farms, and on the modernization of the value chain in the rural sector?
c. Why is digitization and the use of communication and information technology important in the development of the rural sector?
d. What are the policies and strategies that the government and public agencies should undertake to support digitization in the rural sector?

Results

Some of the results of the analysed data are described below:
Adaptation of activity-technology by farmers is evaluated in percentage, with Likert scale: [1] Strongly against, [2] Against, [3] Neutral, [4] Agree, [5] Strongly agree.

Key observations. In total, the majority of interviewed farmers agree (45%), Strongly agree (12%), while (11%) of them are against (6%) or strongly against (5%).

The three indicators; 1) the assessment of the use of technology, 2) the exchange of information technology, and 3) the activity-technology adaptation, by the interviewed farmers according to the respective districts, are presented as follows:
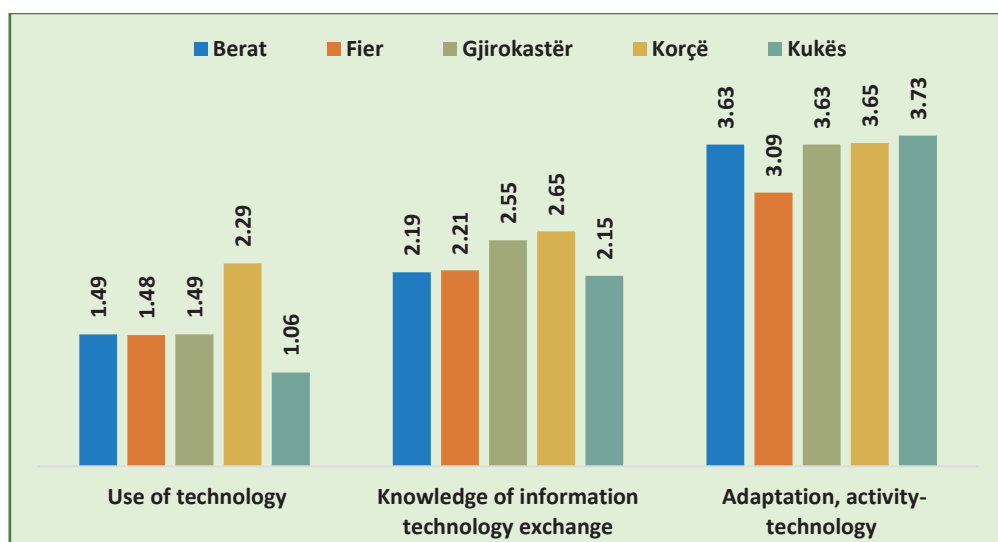
Figure 1. Indicators related to the use of technology, information exchange and activity-technology adaptation, according to districts

Source: Authors' results, 2023

Referring to the data in the figure above, on average, the highest value is for the "activity-technological adaptation" indicator, and the lowest value is for the "use of technology". As for the values of indicators, according to the districts, they are higher for the district of Korça, respectively for the indicators, "the use of technology and knowledge for information technology exchange", and the district of Kukës for the indicator, "the activity-technology adaptation".

From the data analysis, we conclude on some main findings:
In total, 938 questionnaires were filled out, and distributed in 5 districts: Gjirokastër (21.3%), Berat (21.2%), Fier (20.1%), Korçë (19.5%) and Kukës (17.8%).
The average size of the farmers' families interviewed for the districts selected in the study consists of 4.3 members. Of the interviewed farmers, it turns out that only (6.4%) of them are managed by women. The average age of the interviewed farm managers is (57 years old).
The data show that (37%) of the farm managers interviewed have basic education, (43%) of farm managers have secondary education, (12%) of them have finished vocational secondary education and only (8%) of them have higher education. The above data shows that (80%) of the interviewed farmers have as their main activity, work on the farm.
Regarding the use of technology by the interviewed farmers, the average of this indicator is (1.55), which reflects a relatively low level of technology use. In relation to the level of knowledge about the information technology exchange, this indicator results in an average degree (2.35), of use by the interviewed farmers. The average of the adaptation activity-technology indicator is (3.54), which reflects a level above average.

Conclusions and recommendations
Based on the data collected in this study, digital technology in agriculture is perceived positively by all interviewed farmers. They see it as an opportunity to optimize inputs, increase productivity and business competitiveness, improve resources, and efficiency and speed up work processes.
The digitization of economic activities, especially of small farms, increases the potential to strengthen and diversify agriculture as part of a sustainable development model that will improve livelihoods and create more jobs in rural areas.
Most respondents have shown a high interest in applying technology in their business, but on the other hand, they also face difficulties in accessing information about digitization. Our results provide suggestions for policy-makers on how governments can contribute to further strengthening the digitalisation process for agriculture.
The main obstacle to the application and maintenance of technology is the lack of knowledge and skills. Training is the right way to increase the digital competencies (i.e. knowledge and skills) of stakeholders along the target value chains.
In order to address the challenges facing the digitalization of the agricultural value chain in Albania, it would be reasonable to undertake training related to innovation and different types of digital technologies along the agricultural value chains. This multi-stakeholder approach would ensure the inclusiveness of those stakeholders related to the development of the agricultural value chain and accelerate the acceleration of digital technologies.
The digitization of agriculture must be inclusive, equipping those stakeholders especially smallholder farmers, with the necessary digital competencies. Policymakers should consider digital technologies as a tool to transform the labor market and attract youth engagement in rural areas.
Digitalisation and the use of digital platforms is an important instrument for increasing the productivity of agricultural farms and the sustainable development of the rural sector.

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E-AGRICULTURE: EXPLORING THE ICT-AGRICULTURE NEXUS IN ECONOMIC CONTRIBUTIONS

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Abstract

This paper examines the impact of Information Communication Technologies (ICTs) and e-government advancements on the agricultural sectors of Albania and the Western Balkans. Utilizing 2022 data from the World Bank, UN databases, and the Network Readiness Index, with key metrics like the E-Government Development Index and agriculture's GDP contribution, the research uncovers a strong negative correlation between ICT adoption, E-government development, and the economic contribution of agriculture in the European Region. Despite regional ICT growth, its integration into agriculture is inconsistent, reducing economic emphasis on agriculture as other sectors benefit.

Keywords: E-agriculture, E-government, ICT, Western Balkans Countries, agriculture's economic contribution

Introduction

E-agriculture, driven by ICT, integrates digital technologies into agriculture, enhancing efficiency, productivity, and sustainability. Beyond tools, it includes precision farming and real-time livestock monitoring, providing data-driven insights to empower farmers [1], [2]. In the face of global challenges like climate change and population growth, e-agriculture offers sustainable solutions, especially in resource-scarce developing nations [3], [4]. Merging e-government with agriculture streamlines administration, promoting transparency and inclusive growth [5]. This study investigates the relationship between ICT adoption and e-government advancements in Europe's agricultural sector to determine whether these technological advances correlate with the sector's economic contribution.

E-agriculture and e-government strategies and policies in the Western Balkans

E-agriculture leverages ICTs, like mobile market pricing apps and satellite crop monitoring [6], to enhance agricultural yields and food security [7]. It provides timely, data-driven insights despite market fluctuations and climate change challenges [8], addressing information disparities in developing regions [3]. Globally, governments and organizations champion e-agriculture to align ICTs with developmental objectives [9]. Beyond technology, e-agriculture represents a revolutionary approach to information utilization in agriculture. Agriculture is central to the Western Balkans, including Albania, Bosnia and Herzegovina, and Serbia. As these nations strive to modernize and align with European standards, the significance of e-agriculture grows. ICTs play a transformative role in fostering agricultural growth, ensuring food security, and nurturing rural development [10]. For example, Serbia's "E-agriculture" platform offers real-time data and easier subsidy access, while North Macedonia's pilot projects leverage precision agriculture and digital services to enhance farmer productivity [11], [12]. To align with the EU's digital ambitions, the Western Balkans must develop coherent e-agriculture policies addressing obstacles such as infrastructure and training [13]. Such strategies promise benefits such as increased market ties and resilience to climate change. Important e-government infrastructures, such as Albania's "e-Albania" portal, Bosnia's Integrated Business Registry System, and Serbia's robust eGovernment platform, indicate the region's dogged pursuit of modern governance [14]. Concurrently, the e-agriculture landscape is characterized by precision farming initiatives, digital agricultural databases, and real-time market analytics platforms. However, several challenges, including a pronounced rural-urban digital divide, disparities in digital literacy amongst agrarian communities, and the need for harmonized policy frameworks, mitigate these advancements [15]. While the Western Balkans exhibit promising momentum in e-government and e-agriculture, a judicious combination of infrastructural improvements, policy refinement, and stakeholder collaboration is essential to realize their maximum potential [13].

Methodology

The approach in the paper was influenced by [16]. The ICT Development Index(IDI) was changed with the Network Readiness Index since the IDI calculation methodology is being changed. This paper analyzes data for 38 European countries out of 44 due to the lack of data for six countries.

Agricultural Contribution: Represented by "agriculture, forestry, and fishing, value added (% of GDP)"; **ICT Development**: Measured using NRI (Network Readiness Index) from the World Economic Forum; **E-Government Progression**: Gauged by the EGDI score, E-Participation Index and other subcomponents like Online Service Index, Human Capital Index, Telecommunication Infrastructure Index. Using 2022 data from the World Bank and the UN's e-Government Database, the study performs correlation analyses on one sample of 38 countries. Hypotheses:

H1: A country's e-government development relates to its agricultural sector's economic input.
H2: ICT engagement in a country correlates with its agricultural contribution to the economy.

Results and Discussions

The collected data on agriculture, forestry, and fishing, value added (% of GDP) from the World Bank data website[1], and development of ICTs engagement indices in a country came from the UN e-government knowledgebase website[2] and Network Readiness Index[3]. The outcomes of the correlation analysis conducted on these data using the SPSS program are presented in Table 1.

Table 1 Correlations EGDI score, E-Participation Index, On-line Service Index, Telecommunication Infrastructure Index and Agriculture, Network Readiness Index, forestry, and fishing Value Added (% of GDP) in 2022

Correlations							
		E-Government Index (2022).	E-Participation Index	Online Service Index	Human Capital Index	Telecommunication Infrastructure Index	Network Readiness Index 2022
Agriculture, forestry, and fishing, value added (% of GDP) 2022	Pearson Correlation	-.560**	-0.120	-0.234	-.507**	-.729**	-.717**
	Sig. (2-tailed)	0.000	0.474	0.158	0.001	0.000	0.000
	N	38	38	38	38	38	38
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Table 1 shows a strong negative correlation between agriculture's GDP contribution and Telecommunication Infrastructure. There is also a moderate negative correlation with the E-Government and Human Capital Indexes and a weak one with Online Services and E-Participation Index. It also reveals a strong negative correlation between agriculture's GDP contribution and the Network Readiness Index. Consequently, the research supports both hypotheses, confirming a strong negative relationship between a country's ICT engagement development and its agricultural sector's economic contribution and a strong negative correlation with its e-government development.

Conclusions

The study found a moderate negative correlation between the e-government indices and a country's agricultural economic contribution in Europe. There is a strong negative correlation between ICT Development and the country's agricultural economic contribution. ICT engagement in agriculture lags behind other sectors capitalizing on technological advancements, diminishing the agricultural sector's economic contribution. Despite high ICT and e-government development, countries are not focusing these advancements on agriculture unless their economy heavily relies on it. Considering the great potential of e-agriculture to address agricultural challenges, it is evident that its utilization remains significantly limited. The paper emphasizes regular evaluations of e-agriculture progress.

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IS THE STUDY PROGRAMME IMPACTING STUDENTS' PREFERENCES: USING EXPECTATION DISCONFIRMATION THEORY ON HONEY

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Abstract

This research aims to determine the impact of taste and type of honey on the liking scores of students following two study programs of the Faculty of Biotechnology and Food through the Disconfirmation of Expectation Theory (DET). The design applied is 2x6x3. Ninety students enrolled, respectively forty-four, in Food Science and Nutrition (FSN, group one) and students of Agrifood Technology (TA, group two) forty-six participated in a taste experiment. Six types of honey are evaluated 1. Filtered monofloral honey, 2.Monofloral honey with honeycombs, 3.Unfiltered monofloral honey, 4. Polyfloral, 5. Polyfloral crystallised, 6—industrial honey in three information conditions, blind evaluation (taste), labelled test (type of honey), and the provision of complete information- type and taste information simultaneously. The results show significant differences among the liking score of the two groups of students in the three information conditions. In the blind test, TA students give a higher liking score to monofloral honey with honeycombs than FSN students; the same tendency is also observed in polyfloral honey type. In contrast, the industrial honey-type scoring is higher among the students enrolled in FSN. The difference in scoring can be influenced by various factors such as educational focus, nutritional considerations, consumer perspective, industry exposure and personal values and interests. Students with a strong interest in nutrition might scrutinize honey products for their health-related attributes, while those with a focus on artisanal products might focus on other aspects. The DET approach helps understand in small samples how information on the same products is processed differently due to the student's education program.

Keywords: taste, honey type, disconfirmation expectation theory, information interpretation, liking scores

Introduction

Consumer satisfaction (CS) is considered a pivotal concept in contemporary marketing, owing to its reputation as a predictor of forthcoming company profits and customers' probability of repurchasing (Anderson et al., 1994; Anderson & Sullivan, 1993). Another definition posits that CS is an evaluation process whereby the selected alternative aligns with previous beliefs and views CS as a result of expectations Anderson & Sullivan, 1993; Deliza & MacFie 1996. Discrepancies between the expectations and the true performance of the product are known as the disconfirmation of expectancies (DET). The theoretical approach proposes that the degree of discrepancy between expectation and actual performance can determine the final consumer behavior and therefore the level of expectation becomes a standard for product evaluation (Deliza R & MacFie H.J.H, 1996; D'Hauteville et al., 2006; Schifferstein & Mojet, 1999). The DET can serve as a valuable approach to comprehending how the respondent's context, especially their educational background, can impact their anticipations and evaluation of a product. This research aims to determine the impact of taste and type of honey on the liking scores of students following two study programs of the Faculty of Biotechnology and Food through the Disconfirmation of Expectation Theory (DET). In the following section are presented the methodology and the discussion of results.

Material and Method

The experiment followed a 2x6x3 design, with forty-four students enrolled in Food Science and Nutrition (FSN) group one, and forty-six participants from Agrifood Technology (TA, group two). Six different types of honey were assessed, 1. filtered monofloral honey, 2. monofloral honey with honeycombs, 3. unfiltered monofloral honey, 4. polyfloral, 5. polyfloral crystallised, 6-industrial honey. The honey samples were evaluated under three information conditions: blind evaluation (taste), labelled test (type of honey), and complete information (both type and taste information provided simultaneously). Participants rated the taste of honey using a Likert scale, ranging from one (strongly dislike) to five (strongly like), under blind conditions. In labelled conditions, participants evaluated the type of honey, while in full information condition, they rated both taste and type at the same time. The sessions took place at the Agriculture University of Tirana's campus in May 2023. Repeated measures ANOVA is utilised to examine the impact of information regarding different types of honey on product evaluation. This effect on participant liking score is estimated as a within-subject factor as the liking means that are tested derive from the same subject measured in blind, labelled and full information tests with the product. Then, a Paired T-

test was performed to detect differences in the liking scores between the participants following the FSN and the AT study programme.

Results and Discussion

As shown in Table 1, In blind condition, Monofloral honey with honeycombs is the most preferred honey among the six experimented honey types, while the industrial honey the less preferred. Same result are also observed during the label test and full information test.

Table 2: The liking scores of honey types

Honey types	Blind score	Type score	Full score	Wilks' lambda	F(Values)	sig
Industrial honey	2.5	1.6	2.5	0.683	20.408[b]	0.001
Unfiltered monofloral honey	3.5	2.7	3.5	0.747	14.881[a]	0.001
Polifloreal	3.9	4	3.9	0.993	.300[a]	0.741
Polyfloral crystallized	2.7	3.3	3.	0.864	6.954[b]	0.002
Monofloral honey with honeycombs	4.3	4.2	4.1	0.975	1.107[a]	0.335
Filtered monofloral honey	3.9	3.6	3.9	0.948	2.434[a]	0.094

The results show significant differences among the liking score of the two groups of students in the three information conditions. In the blind test, TA students give a higher liking score to monofloral honey with honeycombs than FSN ,the same tendency is also observed in polyfloral honey type. Agrifood Technology students might have a greater appreciation for the texture and mouth feel of food products. They may enjoy the sensory experience of consuming honey with honeycombs, finding it enjoyable while Food Science and Nutrition students may place a higher emphasis on the nutritional profile and health benefits of food.

In contrast, the industrial honey-type scoring is higher among the students enrolled in FSN. FSN students may be more oriented towards assessing industrial honey products based on their technical attributes, such as processing methods, quality standards, and adherence to regulatory requirements. Meanwhile, TA students may place less emphasis on the nutritional aspects and instead focus on the general quality of the product.

Table 3: Scoring differences according to study program in the label test

Type of honey	Study program	N	Mean	Std. Deviation	F (value)	Sig
Monofloral honey with honeycombs	TA	46	4.48	0.752	6.515	0.012
Unfiltered monofloral honey	TA	46	2.48	1.516	4.045	0.047
Polyfloral	FSN	44	4.27	0.758	4.150	0.045
	TA	46	3.78	1.413		
Polyfloral crystallized	FSN	44	3.64	0.990	3.918	0.051
	TA	46	3.11	1.479		

Source: Authors elaboration

The DET approach helps understand in small samples how information on the same products is processed differently due to the student's education program. The scoring difference for honey-type products between students enrolled in FSN and those enrolled in TA may be influenced by various factors such as educational focus, nutritional considerations, consumer perspective, industry exposure and personal values and interests. Individuals with a keen interest in nutrition may analyse honey products for their health-related qualities, whilst advocates for artisanal products may consider other factors. Although the curriculum and emphasis of the course may affect their assessments, personal preferences and experiences also hold considerable effect. Additional studies will further explore how the information is processed using multi attribute setting experiments.

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INVESTIGATING CONSUMER PERCEPTIONS OF FOOD SAFETY RISKS IN ALBANIA (TIRANA)

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Abstract. Food safety incidents, such as outbreaks of foodborne illnesses or contamination of products, can have serious consequences for both consumers and agribusinesses. Consumer perceptions of food safety risks can impact the demand for agribusiness products, which in turn can affect the financial performance of agribusinesses. Therefore, understanding how consumers perceive food safety risks is important for agribusiness management. This study, through a structured questionnaire, aims to investigate how consumers perceive food safety risks associated with agribusiness products and how these perceptions influence their purchasing behavior. The findings suggest that 52% of consumers are very concerned about food safety in Albania. The most vulnerable food categories that are perceived to be at risk are meat and poultry products, milk products, and conserved foods. Around 80% have encountered a food safety incident, such as contamination, spoilage, or wrong labelling, that has influenced their future buying behavior. The results indicate that a significant portion of Albanian consumers (70%) lack knowledge about food safety standards. The key factors that consumers prioritize most when making food purchasing decisions are the expiration date, labeling information, and certification.
Key Words. *food safety, agribusiness products, perception, consumer behavior*

Introduction. When you think of "food", the first thing that comes to mind is that it is a basic need for humans. And indeed, that's the case, as one cannot live without food. However, with the rapid development of society, food is now seen (and this holds true especially for consumers in modern and wealthy societes) not just as a necessity, but as a desire or demand to fulfill more aspects of what people seek when buying food, beyond simply satisfying hunger.

We have seen a gradual change in how food is perceived and purchased during the decades. Technology and innovations in food production have brought forth a wide range of products and opportunities that are often presented to us as more than just food. Therefore, food now serves as a means to promote health, express lifestyle, personal preferences, and to explore new tastes.

Consumers consider numerous attributes when making food purchases, but the most critical one is that food should not cause any harm to them. This is why food safety has become a crucial part of food quality (Röhr, 2005). Lot of studies have continuously explored the factors that influence consumers purchasing decision with regard to food safety. According to Brewer et al (1994), there are six important factors that consumers consider, as following: chemical issues, health issues, spoilage issues, food regulatory issues, deceptive practices and ideal situations. Röhr (2005) found out that some of the most relevant purchase criterias for consumers food choice are price, freshness, quality, apperance and ingridients.

Foods of animal origin can be more vulnerable to certain food safety issues compared to other food categories(Ergönül, 2013; Piochi et al., 2022). In developing countries, such as Albania, food quality and safety are very problematic issues. Increased access to information channels and education has led consumers toward more careful choices when it comes to food purchasing. Consumer perceptions of food safety risks can impact the demand for agribusiness products, which in turn can affect the financial performance of agribusinesses.

Several papers collectively provide insights into consumer perceptions of food safety risks in Albania (Zhllima et al, 2015; Haas, 2019; Vercuni et al, 2016; Osmani et al, 2020). While previous studies have focused on particular food products, this study aims to provide valuable insights into the food safety concerns with regard to several food product categories and the influence of these concerns on the buying behaviours of the consumers. Additionally, consumer perceptions evolve over time due to changes in food production practices, regulations, public awareness campaigns, foodborne illness outbreaks etc. Therefore, further research is needed to capture these evolving dynamics and provide up-to-date insights.

Materials and Methods. To meet the objectives of this study, we used a structured questionnaire, which consisted on 20 closed and 2 open questions. The questions were related to demographic characteristics of the respondents, knowledge and awareness with regard to food safety, perception of risks and decision-making questions. The questionnaire was built in Google Forms and distributed online and face to face to a total of 313 consumers living in Tirana during June 2023. Excel and SPSS were used for the processing of the collected data and running statistical tests.

Results and Discussion. This chapter will shortly present the main findings of the study. From a total of 313 respondents, 63% were female and 35% were male (2% did not declare their gender). The largest proportion of participants, representing the majority, fell into the age group of 18–24 years, comprising 48% of the total respondents, and 25–34 years, compromising 22.5%. The participation rate was lowest among individuals aged 35–44, with only 8.5%. Meanwhile, age groups 45–54 and older than 55 consisted, respectively, of 9% and 12%. Regarding the education background, the majority of respondents have completed either a bachelor's or master's degree. Specifically, 50.3% of those surveyed have completed their bachelor's degree; 31.7% of the respondents have obtained a master's degree; and 12.7% have completed their high school education.

Table 4 Food categories perceived as not safe
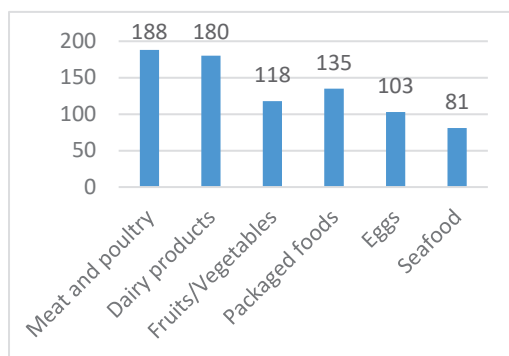
Our results showed that 52% are very concerned about the safety of the food products in Albania, 43% are little concerned, and only 5% are not concerned at all. The respondents were asked to choose the food categories from a total of six that they perceived to be mostly at risk. As Table 1 shows, meat and poultry, dairy products, and packaged food are the products for which consumers have more concerns about their safety. These concerns are related to contamination with bacteria or pathogens, pesticide residues, and mislabeling of ingredients.

In our study, we wanted to observe if there were any differences in food safety perceptions among different age groups and educational backgrounds. Therefore, the following hypotheses were built: H1: Food safety risk perceptions vary significantly among different age groups.

H2: Education level influences food safety risk perceptions.

A chi-square test was performed to test the hypothesis. In both cases, the p-values are greater than 0.05, which indicates that there is no statistically significant difference in risk perceptions among different age groups and educational backgrounds.

80.6% of the respondents have encountered food safety problems, as shown in Table 2. Concerns over safety and bad experiences influence the buying behaviors of consumers, making them change or improve their food safety practices. The changes include: purchasing agribusiness products from different brands or suppliers; avoiding purchasing certain types of agribusiness products; seeking more information about the sources and production methods of agribusiness products; and buying organic or locally produced agribusiness productss

Table 5 Food safety issues encountered
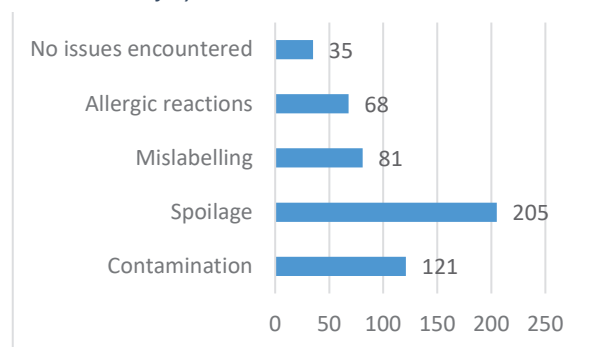
To have a better understanding, the following hypotheses were built:
H3: Consumers who have experienced food safety issues have a higher risk perception.
H4: Consumers who have experienced food safety issues have changed their buying behaviours.
A Spearman test was used to observe the correlation between the variables at a significance level of 0.05 or less ($p < 0.05$). The correlation coefficient between "experienced food safety issues" and "risk perception" is 0.278. The p-value associated with the correlation between the variables is 0.000, which means it is highly statistically significant. The correlation coefficient between "experienced food safety issues" and "changing buying decisions" is 0.360. The p-value associated with the correlation between the variables is 0.000, which means it is highly statistically significant. `

As a conclusion, our study reveals a significant level of risk perception among consumers regarding various food categories in Albania. This heightened perception of risk can be attributed to several factors, including the increasing awareness of food safety issues, past negative experiences related to food consumption, and a prevailing sense of mistrust in regulatory bodies.

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INNOVATION FRAMEWORKS FOR ADDRESSING SYSTEMIC ISSUES IN ALBANIA'S OLIVE OIL SUPPLY CHAIN

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KEYWORDS

SHORTER ABSTRACT (249 words)

Albania boasts a rich history of olive cultivation and has one of the highest per capita consumption ranges of olive oil in the world. However, Albania finds itself importing substantial quantities of olive oil from Italy, Spain, Greece, Turkey, Tunisia, and Portugal.

Numerous interventions have been attempted to address the challenges in the Albania olive oil industry at the: (1) processing, (2) consumption, and (3) production levels of the supply chain. These interventions have yielded limited success because solving an issue at one segment of the value chain does not alleviate barriers in other segments.

Through an exhaustive review of country reports, scientific literature, public databases, and expert consultations, we applied an innovation framework to systematically assess issues across the three levels of the supply chain, adopting a systems perspective and interlinking them to identify strategic leverage points for implementing effective interventions.

Our findings reveal three pivotal leverage points at the intersections of the three topic areas: "Quality Ranking of Olive (for Processing) from Farming Population," "Technology Phase of Equipment (i.e., 3 Phase = Old vs 2 Phase = New)," and "Price Difference Between Imported 'Virgin' Olive Oil vs Albanian Virgin Olive Oil."

We recommend a new approach for improving the Olive Oil value chain that builds the knowledge, skills, and abilities of individuals and institutions to produce innovations in a coordinated manner that changes the nature of key decisions for producers, processors, and consumers. Our framework highlights opportunities for public private partnership and fosters an innovation ecosystem around agriculture in Albania.

ANALYSIS OF THE VALUE CHAIN OF MEDICINAL AND AROMATIC PLANTS IN ALBANIA WITH A FOCUS ON QUALITY, ENVIRONMENTAL, SOCIAL AND SUSTAINABLE REQUIREMENTS

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Abstract

The Medicinal and Aromatic Plants (MAPs) sector is one of the leading export-oriented agrifood sectors in Albania. The main markets for dried MAPs (as well as for essential oils) are in the US and the EU (mainly Germany). For some MAPs, such as sage, Albania is a key global player (about ¾ of the sage imported by US is sourced from Albania). Despite export growth over the years, the added value in processing is limited, as distillation is the only processing Albanian producers use, while standards play an essential role in this global value chain. This contribution analysis the challenges based on a field survey using semi-structured questionnaires targeting 20 exporters which was carried out during 2022 – 2023 and extensive literature review. The data was subject to descriptive statistical analysis. The study findings show that there are serious quality-related challenges along the MAPs value chain. The most critical issues include a lack of traceability, high levels of foreign materials within the product. In addition to insufficient capital investments in technologies and facilities, the need for a proper legal framework and enforcement, fierce competition between buyers, informality and other market dynamics have contributed to quality issues. Albanian MAPs sector needs to further improve its performance regarding compliance with requirements, which has increased the attention of exporters to quality, investments in technologies and, last but not least, the demand for lab tests and analyses. The study provides a set of recommendations for donors and policy-makers to upgrade quality standards of the sector.

Key words: MAPs, export, sustainability, quality standards.

Introduction

The MAPs (Medicinal and Aromatic Plants) sector is one of the leading export-oriented agrifood sectors in Albania. The main markets for dried MAPs (as well as for essential oils) are in the US and the EU (mainly Germany). For some MAPs, such as sage, Albania is a key global player (about ¾ of the sage imported by US is sourced from Albania).

On the other hand, the production and trade of MAPs is a strategic sector for Albanian agricultural and rural development, in terms of contribution to agri-food production, employment and particularly exports (AGT-DSA, 2021). Albania has a long-standing tradition in the production and export of MAPs.

The main driver of development in the sector is export, as more than 90% of the total MAPs output is exported. In the last two decades, all performance indicators in the MAPs sector show a positive trend in terms of output growth and trade balance (imports decline or exports increase), as well as in terms of investments (AGT-DSA, 2021).

The MAPs value chain encompasses multiple stages and associated businesses and is labour-intensive. As a whole, it is estimated that the MAPs value chain in Albania contributes to the income of about 20,000 households (AASF, 2019).

Despite the progress achieved in the agrifood sector in Albania, compliance with food safety and quality standards remains a challenge in terms of both EU approximation and export market requirements. The slow process of consolidation and improvement of the Quality Infrastructure (QI), partially attributed to inadequate public investments, has also played a role in impeding the growth of the MAPs sector, fuelled in part by the mutual distrust or scarce cooperation between public institutions, independent service providers and leading value chain operators.

There have been repeated instances of Albanian MAPs export rejections, mainly due to non-compliance with safety standards, leading to significant financial losses for the traders and frequently impacting primary producers (i.e., farmers) as well. On the other hand, consumers in both export markets and the domestic market are becoming increasingly aware of the importance of ensuring high food safety and quality standards. This growing awareness is evident in the rising adoption of international or private standards. Products intended for foreign markets must adhere not only to health and safety regulations, but also to the escalating number of additional requirements from international buyers. In many instances, this translates into the necessity to apply voluntary international standards (UNIDO, 2016).

Materials and Methods

This study is based on the UNIDO Quality Along the Value Chain (QI4VC) approach (UNIDO, 2023). The analysis of selected value chains with a focus on quality infrastructure systems constitutes the conceptual base of this approach.

To ensure comparability between global and Albanian trends, secondary data were retrieved mainly from international databases. In addition, a thorough review of other relevant studies and reports was carried out.

The primary data collection consisted of semi-structured in-depth interviews carried out with key informants. More than 50 value chain actors, mainly processors/exporters (with most of the value chain operators of this category included in the sample), as well as experts/stakeholders, were interviewed using two distinct types of questionnaires – the semi-structured survey questionnaire which targeted exporters was based on the QI4VC approach.

Secondary statistical data and structured questions from the survey have been subjected to a standard descriptive analysis, including tables and graphs depicting statistics and historical trends. The information/notes from the interviews were analysed using a content-summarizing approach and qualitative content analysis techniques, with the aim of condensing the most relevant and interesting topics that surfaced during the interviews.

Results and Discussion

Overall relations between MAPs exporters and international buyers are relatively solid. However, even when contracts are in place, it is uncommon for these contracts to specify precise quantities and prices in advance. Exporters are also unable to arrange long term contracts with buyers. Even in instances where arrangements have been made to purchase crops of significant interest for more than one season, the price of the crop has been subject to reduction. The position of the exporters in the international market chain is still weak.

Traceability is very difficult. For example, each MAPs exporter typically has over 1500 farmer suppliers, even though many of these farmers, especially in the case of wild MAPs, provide relatively small quantities of produce. Furthermore, there are many exchanges between collection points and exporters. That also raises concerns about quality assurance. To mitigate risks, exporters often aggregate the products by dividing them into small lots and categorize the output based on the microregion of origin (typically comprising groups of villages that correspond to 15-20 farmers). Quality assurance is also difficult due to market behaviours of other stakeholders. There is significant competition at the horizontal level, which reduces the efforts for maintaining quality standards. The absence of contract farming reduces the possibility of the exporters to keep suppliers under pressure. Punishment effects are not effective, since the supplier would choose another consolidator or exporter to sell the produce. If laboratory analyses reveal that the product quality is poor, products that have been packaged in bulk may need to be unpacked, sorted, and cleaned. This results in additional labour costs, loss of quantity and energy costs.

Main buyers, are defining the quality standards and prices. There is limited bargaining power when it comes to setting prices and securing advance contracts.

Information on quality standards is accessible mainly through the buyers and the certification bodies. There are cases where exporters are not able to defend themselves due to limited know-how and information on market requirements.

Most exporters (especially in the case of MAPs) have liquidity problems – this weakens their position/power to negotiate with buyers on one hand, and impose standards to farmers on the other hand (since they often buy from farmers who accept late payments, an attribute for exporters that is equally important compared to compliance with quality standards). Thereby, prices are often not linked to quality.

The vast majority of interviewed operators in the MAPs sector reported that their business has a quality management system and that they have someone who is responsible for quality management.

The main recommendations are grouped into the three following key areas:

Enhancing the Quality Infrastructure with an emphasis on bolstering capacities related to certification (GDA and TIC), as well as testing and inspection (including laboratories and other state inspection institutions). Recommendations on other key QIS institutions are elaborated in the main sections.

Promoting private sector compliance through the engagement of MAPs value chain operators and their associations in the development and management of the Quality Infrastructure and fostering a culture of quality along the entire value chain, as well as among consumers, through capacity building and awareness raising.

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DESCRIPTIVE ANALYSIS OF OPEN CALLS UNDER IPARD II PROGRAMME - ALBANIAN CASE

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Abstract

The aim of this paper is to sort out and analyze the secondary data resulting from the implementation of IPARD II Programme (Instrument of Pre-Accession for Rural Development) in Albania, emphasizing the sectors in need for support according to farmer's/agriculture entities requests. Under this programme the total budget available is 94 mln Eur whereas so far there have been three open calls and there are received 1189 applications in total. The methodology is desk research based in the secondary data of the applications through comparative data analysis. First and second call has been published for three measures (1,3,7), meanwhile third call has been published only for two measures (1,3) and the fourth call has been published for one measure (7), including two sectors only investments in Rural Tourism and investments in Handicrafts and Manufacturing.

Even though the second call has the highest number of applications we can confirm that the number of applications from the first call to the third call has increased, because the third call was opened only for 2 measures and had 369 applications.

From the first call 42 % of received applications have been contracted. For the second call 52 % of the received applications were contracted. From the third call 46 % of the received applications have been contracted. From the fourth call 31% of the received applications have been contracted.

Meanwhile successful finalized investments from contracted applications up to now; call I 97 %, call II 89 %, call III 57 %, call IV contracts are still under process and there are not finalized investments.

From the comparative analysis between measures and sectors, it results that the highest applications are received in measure one, in the sector of fruits and vegetables.

Key words: IPARD II, rural development, support measures

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I.   Introduction

This study aims to give descriptive analyses of IPARD Program II (Instrument of Pre-Accession for Rural Development) financed by European Commission.

More specifically, the objectives are:

Sorting out and analyzing the secondary data resulting from the implementation of IPARD II Programme (Instrument of Pre-Accession for Rural Development), emphasizing the sectors in need for support according to farmer's/agriculture entities requests.

Analyzing support, including various aspects related to the process of applying and implementing IPARD measures in beneficiary countries-focusing in Western Balkan case of Albania.

The IPARD II programme started the implementation at the end of 2018, after receiving the Entrustment Budget Implementation Tasks. The following calls were opened respectively:

- In 2018, call I, 317 applications were received out of which 42 % of received applications were contracted. Meanwhile out of contracted projects 97% projects were successfully implemented.
- In 2019, call II with 371 applications received, out of which 52 % were contracted. Meanwhile out of contracted projects 89% projects were successfully implemented.
- In 2020, call III with 369 applications received, out of which 46 % of received applications were contracted. Meanwhile out of contracted projects 57 % of the projects were successfully implemented.
- In 2022, call IV with 132 applications received, out of which 31% were contracted. Up to date the implementation of the contracted projects is ongoing and there are not fully finalized projects yet.

Indicators reached through implemented and finalized investment, as targeted in IPARD Programm, are periodically reported on yearly bases to DG Agri, which serves for monitoring of the programm by EU Commission.

The launch of the call is announced through the prior notice published one month before the first date of the application, where the target group is informed about the possibility for application.

The call is open to all persons (natural and legal persons) registered in National Business Centre, whose work and activity takes place within the territory of the Republic of Albania in the fields of agricultural and/or agro-processing and rural production with a focus on the following measures:

Measure 1: "Investments in physical assets of agricultural farms" with special focus on the sectors of milk, meat, fruit and vegetables, and vineyards.

Measure 3: "Investments in processing and marketing of agricultural products" with special focus on the sectors of dairy processing, meat processing, fruit and vegetable processing, wine

Measure 7: "Farm diversification and business development" with special focus on the following sectors;

- Production of aromatic medicinal plants, mushrooms, honey, ornamental plants and snails;

- Processing and marketing of wild and cultivated medicinal and aromatic plants, mushrooms and honey;

- Processing at farm level and marketing of agricultural products

- Aquaculture;

- Nature and rural tourism;

- Services for the population and rural businesses;

- Handicraft industry and production workshops;

- Production and use of renewable energy.

During this period, Measure 9 was also accredited: "Technical Assistance". The aim of this measure is to assist in the implementation and monitoring of the programme.

Relevant structures are working on other measures to be accredited under IPARD III program, which will include existing measures as well as Measure 4: Agri-environment-climate and organic farming measures, Measure 5: Implementation of local development strategies - LEADER approach, Measure 6: Investments in rural public infrastructure, Measure 10: Advisory service, Measure 11: Creation and protection of forests.

Chart 1: Budget breakdown by measure, IPARD II 2014-2020
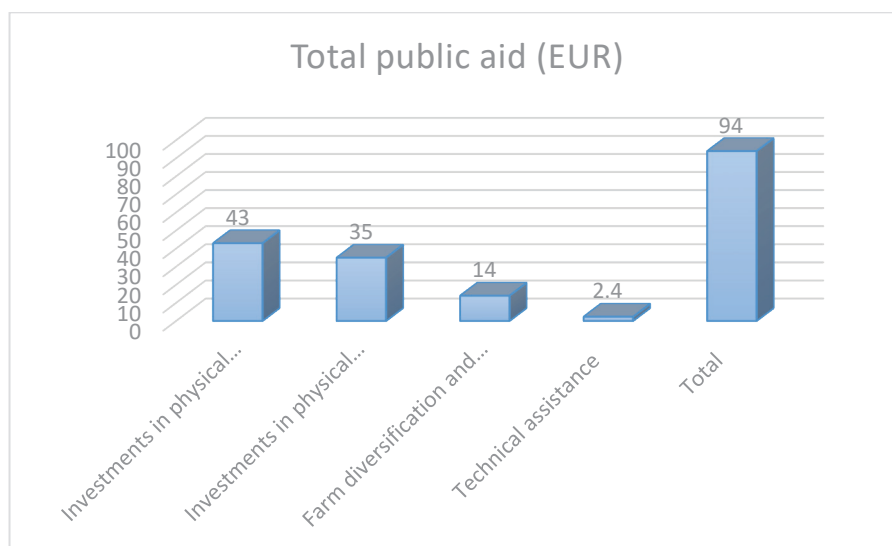
Source: IPARD Program web//mbzhr.gov.al

The total budget allocated to this program is 94 million Euros. If we compare the allocated budget per each measure, Measure 1 has the highest fund available, 46 % of total fund is targeted under measure 1.

During the implementation of the program there has been allocation of budget approved by Dg-Agri, based on IPARD II program amended. Part of the dedicated budget from measure 1 and measure 9 has been reallocated to measure 3 and 7.

II. Material and Methods

Methods

Sorting out and analyzing the secondary data resulting from the implementation of IPARD II Programme (Instrument of Pre-Accession for Rural Development) in Albania.

III. Results and Discussion

There are given statistical data under the fourth open calls for application, during the implementation of IPARD II Program.

Chart 2: Number of applications during four opened calls
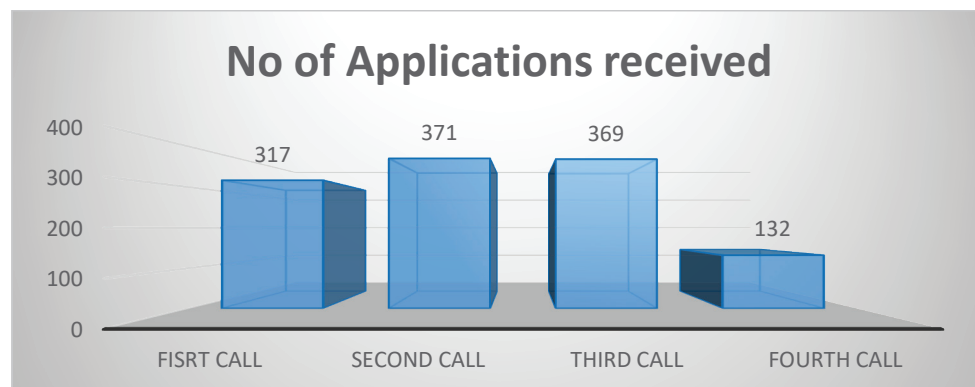
Source: Annual Report of MARD, 2019-2022

Based on the statistical data, the highest number of applications has been through the second call. And also the highest percentage of successful contracted applications up to 50 %.

Even though the second call has the highest number of applications we can confirm that the number of applications from the first call to the third call has increased, because the third call was opened only for 2 measures (Measure 1-all sectors, Measure 3 - only fruit and vegetable sector) and had 369 applications.

First call IPARD II

The first call was opened in 2018. Regarding the contracts of the first call of the IPARD Program, 75 contracts were concluded in 2019 and 65 within 2020 reaching 135 contracts the total amount of grants contracted by the agency for the first call at 23,5 mln Euros. From 135 contracts, there resulted 123 successfully implemented projects, meanwhile 9% of contracted projects were cancelled, due to infringement of the eligibility conditions.

Chart 3: First call, number of applications per region
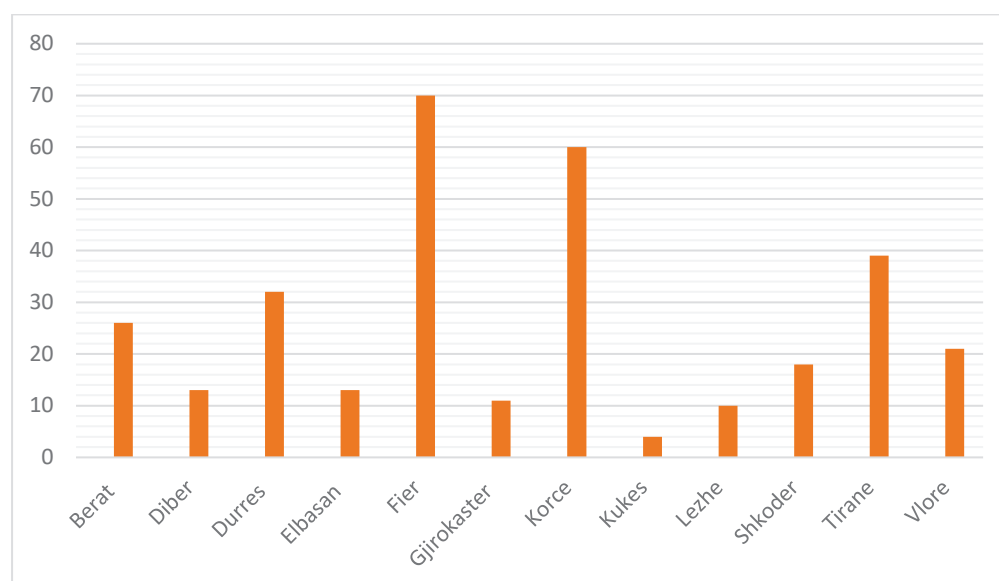
Source: Annual Report of MARD, 2020

Based on the available data, it is noticed that the highest number of applications is in Fier region, followed by Korca region if we analyze the reason this is because of Fier region has the biggest part of the vegetable production for the domestic and foreign

market and its climatic and soil conditions of the region are representative for the western lowland where agricultural activities in Albania are concentrated. The lowest rate of applications received is noticed in region of Kukes, Diber, Lezha and Shkodra, and if we analyze the reason, most of the applicants couldn't reach the objectives and rules set in IPARD program, mainly related to land ownership.

Table 1: First call, sectors by measures

Measure	Sector	Total
Measure 1	M1 - Fruit and Vegetables	150
	M1 - Meat	8
	M1 - Milk	17
	M1 - Vineyard	14
Measure 1 Total		189
Measure 3	M3 - Fruit and vegetables processing	31
	M3 - Meat processing	18
	M3 - Milk processing	5
	M3 - Wine	10
Measure 3 Total		64
Measure 7	M7 - Handcrafts and manufacturing industry sector	1
	M7 - Nature and rural tourism sector	32
	M7 - Processing and marketing of Agricultural Products (such as milk, meat, fruit and vegetables, wine)	3
	M7 - Processing and marketing of wild medicinal and aromatic plants (MAPs), mushrooms, honey	10
	M7 - Production of medicinal and aromatic plants (MAPs), mushrooms, honey, ornamental plants and snails sector	13
	M7 - Services for rural population and business sector	3
	M7 -Creation of new or extension of the production of existing aquaculture farms sector	2
Measure 7 Total		64
Total		317

Based on the available data the sector with the highest number of applications is Fruit and Vegetables under Measure 1, which is a indicator of the high number of small farmers in Albania. This could reach the objective of the program to support the small farmers, in way for them to access also the scheme for higher support under other measures in the future calls.

Second Call IPARD II

The second call IPARD II scheduled until December 15, 2019, postponed until January 15, 2020 due to the natural disaster (November 29 Earthquake), achieved high success in the number of applications administered. 371 applications were administered, these applications are divided by measures and regions as in the following tables;

Chart 4: Second Call, number of applications per region
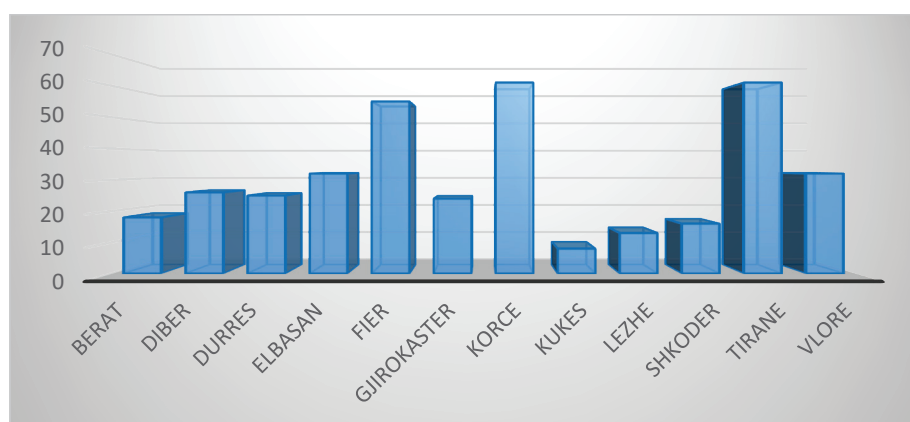
Source: Annual Report of MARD, 2020

Based on the available data, it is noticed that the highest number of applications is in Korca and Tirana region, followed by Fier region. The factors that impacted this spread over the regions of the applications are same as in the first call. On the other

hand, compared to the first call we can notice an increased number of applications in all regions, namely Diber, Lezhe, Kukes and Shkodra.

Table 2: Second call, sectors by measures

Measure	Sector	No . Applications
1	M1 - Fruit and Vegetables	117
	M1 - Meat	4
	M1 - Milk	13
	M1 - Vineyard	14
Measure 1 Total		148
3	M3 - Fruit and vegetables processing	43
	M3 - Meat processing	20
	M3 - Milk processing	13
	M3 - Wine	17
Measure 3 Total		93
7	M7 - Handcrafts and manufacturing industry sector	1
	M7 - Nature and rural tourism sector	85
	M7 - Processing and marketing of Agricultural Products (such as milk, meat, fruit and vegetables, wine)	15
	M7 - Processing and marketing of wild medicinal and aromatic plants (MAPs), mushrooms, honey	8
	M7 - Production of medicinal and aromatic plants (MAPs), mushrooms, honey, ornamental plants and snails sector	13
	M7 - Services for rural population and business sector	5
	M7 -Creation of new or extension of the production of existing aquaculture farms sector	3
Measure 7 Total		130
Total Application		371

Based on data we notice that in Albania due to climate and soil factors and also cultural/educational related to agriculture sector the farmers are focused on cultivation of fruits and vegetables under measure 1 or lives stock. Even though on the last years is noticed an increased interest on the natural and rural tourism investments, which are being successfully implemented.

Third Call IPARD II

The third IPARD II call which began with the acceptance of applications on 10 December 2020 until 25th January 2021, it achieved a high success in the number of applications. 369 applications were received.

Chart 5: Third Call, number of applications per region
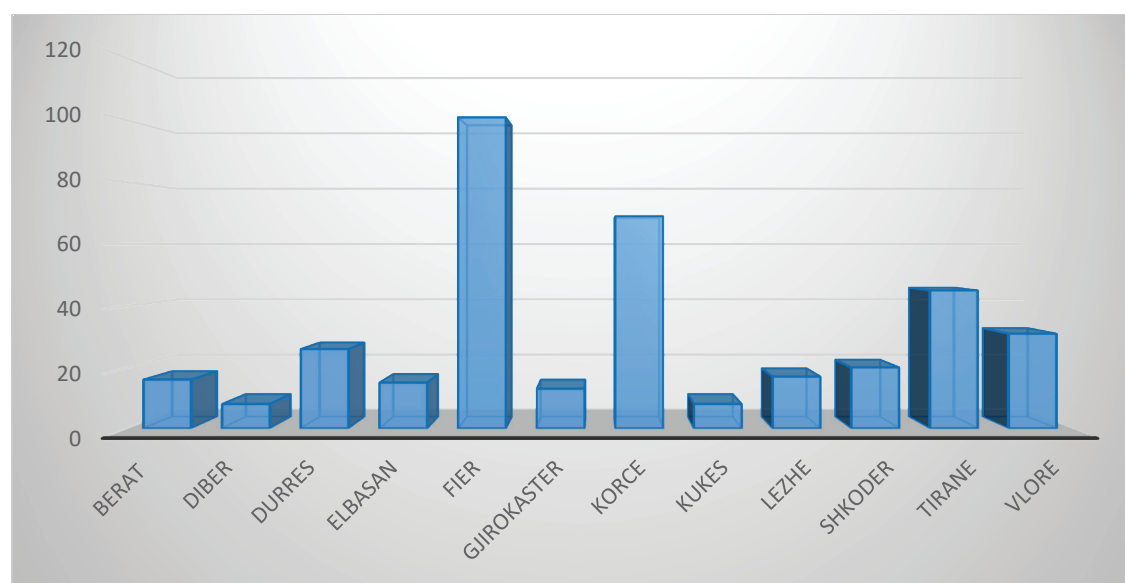
Source: Annual Report MARDA, 2021

Table 3: Third call, applications by measures and sectors

Measure	Sector	Applications
Masa 1	M1 - Fruit and Vegetables	220
	M1 - Meat	26
	M1 - Milk	37
	M1 - Vineyard	23
Masa 1 Total		306
Masa 3	M3 - Fruit and vegetables processing	63
Masa 3 Total		63
Total Application		369

Source: Annual Report MARDA, 2021

The third call was opened only for 2 measures and had 369 applications, based on the sectorial analyses it has targeted the fruit and vegetable processing sector to be available for application under measure 3 during the third call. A high number of applications were received which shows a high interest of Albanian agro-processors in fruit and vegetables.

Chart 6: Fourth call, Number of applications per region
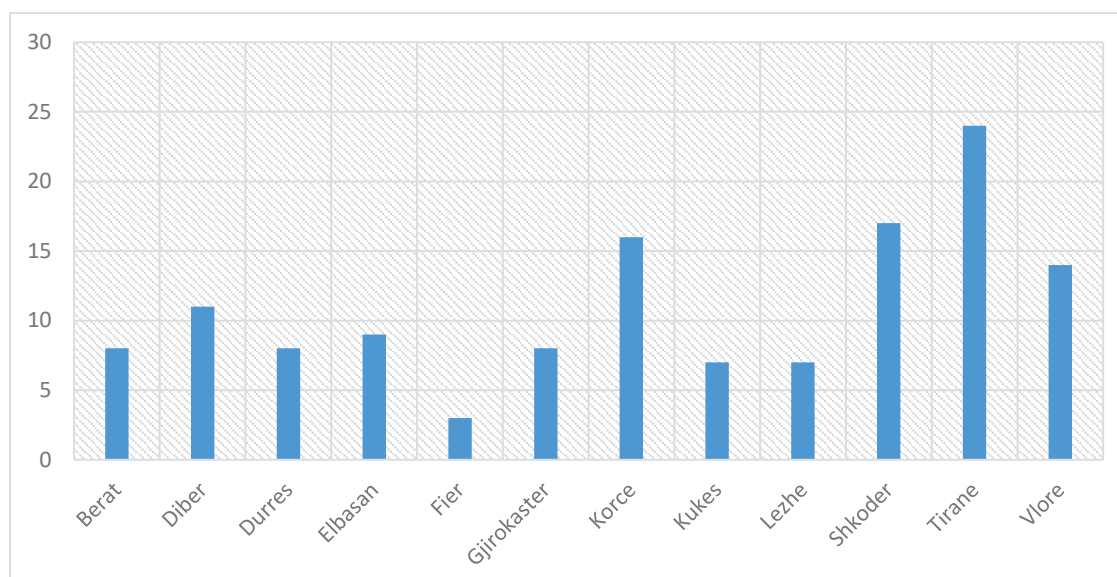
Source: Annual Report MARDA, 2022

Based on the available data, it is noticed that the highest number of applications is in Tirana region, followed by Korca region. The geographical position and the infrastructure of this area creates opportunities to develop investments under the sector of nature and rural tourism.

Table 4: Fourth call, sectors by measures.

Measure	Sector	Applications
	M7 - Handcrafts and manufacturing industry sector	7
Measure 7	M7 - Nature and rural tourism sector	125
Total Application		132

Source: Annual Report MARDA, 2022

Comparing the number of applications received by sector its clear that 94 % of applications is under nature and rural tourism sector, but it's a point of discussion and impact should be measured on how these number will be reaching the objectives in the future.

Conclusions and recommendations

- From the review of the literature, there is still no in-depth analysis on the impact of these investment schemes, further in-depth studies on the impact of the implementation of the investments financed by the IPARD Program are recommended.
- During the application administration process, there have often been delays in meeting the deadlines for concluding the grant contract, it is recommended that there be separate calls for special measures from the institutions that implement IPARD, as this would reduce the time for concluding the contract and investment implementation.
- Based also on the criteria for reporting on the indicators in the reporting framework for the program, there is no accuracy in the identification of measures according to direct payments or investment measures, it is recommended that the IPARD Program have a clearer analysis of direct payments and investment measures.
- Based on the interviews with target group interested in investing in agriculture sector, it is recommended to increase the involvement of interest groups on the prior preparation of IPARD Program.

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LITERATURE REVIEW ON ACADEMIC STAFF PERFORMANCE EVALUATION MODELS_A COMPARATIVE ANALYSIS.

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The evaluation of the performance of the academic staff constitutes one of the important instruments of the internal evaluation of HEIs.

Appreciating the fact that the activities of Higher Education Institutions are deeply focused on three main components, teaching, scientific research and service for third parties, performance evaluation is a process that is carried out based on the educational systems of each country as well as legal acts and their regulations.

The performance evaluation system varies in different countries and universities, however, it includes a series of specifications and indicators that are used to evaluate the performance of academic staff. These indicators aim to assess in a measurable way the quality of teaching, the contribution to scientific research, publications, grants as well as other academic activities. This process, which includes a large part of the academic structures, contributes not only to the internal evaluation but also to the ranking of the universities indirectly, as well as to the construction of remuneration policies, as well as to the organization and regulation of the activity of the academic staff.

In different countries and different educational systems, based on the objectives of each system, different performance evaluation models are used, such as those based on quantitative methods and qualitative methods. Based on the two main European education systems:

1. British education system;

2. The educational system of Continental Europe;

it is intended to concretely highlight the indicators for some typical models.

Through this study, we want to build a comparative analysis between the models followed in public and non-public Higher Education Institutions in our country, with the aim of modestly contributing to providing valuable and effective suggestions to be used in the evaluation of academic staff performance.

Key Words: Academic Personnel, Performance Evaluation Models, Performance Indicators.

Circular Economy and Industry 4.0 integration in manufacturing sector: An open innovation perspective for stakeholder's collaboration.

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Developing economies are characterized by fragmented incentives towards any systemic or structural change. In those contexts, different actors show preliminary attempts toward systemic shifts like Circular economy, one of which are SMEs. Recognizing the fact that those firms may not possess adequate resources and proper infrastructure to develop those practices alone open innovation approach is advocated. Open innovation involves different functional process which rely on the collaboration of stakeholders, for this reason this study aims to analyze how different forms of collaboration can contribute in proper implementation of CE and industry 4.0 in manufacturing sector through open innovation processes. Focusing on manufacturing sector, this research aims to evaluate how those firms "internalize the innovation" coming from external ideas and know-how, and; expand their market to turn this innovation into higher profits considering the sensitivity towards the environmental issues. Considering three Albanian cases this study comprehensively tackle how multi-faceted collaboration can deeply amplify innovative ideas and decomposes/simply the complex challenges of sustainable development. Moreover, it brings insides how SMEs can be engaged in open innovation practices.

Key words: circular economy, industry 4.0, open innovation, sustainable development

SMART TOURISM TECHNOLOGIES AFTER COVID–19: EVIDENCES FROM ALBANIA

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Abstract

The notion of tourism represents a vast field of research and development, especially given its the global dimensions. Tourism has emerged as one of Albania's most significant economic growth areas, particularly in recent years as worldwide interest has grown. When practically all data in the tourist components show increase, the financial and social impact has begun to be felt. During the COVID-19 outbreak, smart rural tourism destinations were established in various parts of the world. These destinations attempted to attract those tourists who intended to ensure the least contact with others by offering smart services. The standardization of services has come as a result of awareness of development opportunities, but also as a result of constant demands and models borrowed from other countries, where digital transformation also undoubtedly plays a role. The COVID-19 pandemic gave rural areas the opportunity to and improve their information and communication technology (ICT) infrastructure. ICT development in these destinations appears to facilitate tourists' exposure to unique experiences, a phenomenon that was not feasible before the pandemic. This implies that the characteristics of smart tourism technologies (STTs) in developing and smart rural locations might provide visitors with flexible mobility alternatives, allowing them to change their itineraries, lodgings, or forms of travel in the face of crises or unanticipated challenges. This study investigates the impact of smart tourism technologies' (STTs) varied qualities on visitors' desire to return to areas.

Key Words: Smart tourism, Smart cities, ICT, Smart Services. Albania, Covid-19.

CONSUMER AWARENESS ABOUT THE DEGREE OF FOOD PROCESSING IN ALBANIA

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Abstract

Due to high urbanization and lifestyle, the degree of use of processed food products has increased. The terms used in relation to food varies from highly processed products, industrially processed products, food additives, organic products, territorial products, local products, etc. The consumer uses these terms in different ways and situations. The purpose of this presentation is to research the literature regarding the consumer perception of the degree of processing of the food products that they consume every day. Food processing refers to any transformation from agricultural products to foods, which includes simple techniques such as cutting or heating at a household level, to highly advanced techniques at the industrial level. The industrial processing of foods and the negative relationship that the consumer associates with its impact on health have been widely debated in the scientific literature. Consumers include, to some extent, the degree of industrial processing when evaluating the healthiness of food products. The number of classifications related to the degree of processing are different. The Nova classification is widely accepted as the classification that represents food processing classes. The group "Food and non-alcoholic drinks" occupies a share of 41.3% in the budget of Albanian families. Enterprises related to food service occupy a significant percentage ranging from 17-20% of the total active enterprises for the last five years. This presentation contributes to the evaluation of consumer perception regarding food processing and the distribution of information for its production and processing companies.

Keywords: Consumer awareness, processed food, NOVA classification, health

Introduction

The process of food selection and consumption has been presented in a variety of ways in recent years. The decrease in the preparation of food at home and the consumption of packaged foods has led to an increase in the role of food package labels. Information about the composition of the foods that consumers choose, buy and consume has changed significantly in recent years (National Public Health Partnership, 2005; National Heart Foundation of Australia, 2003; World Cancer Research Fund, 2008). Improvements in agricultural practices, food transportation, food processing, and food storage have increased food diversity (Southgate *et al.,* 2010). At first glance, the progress of science in the field of food has been embraced by scientists, but it has consumed conservatism by not accepting these products very quickly (Sonne*et al.,* 2012).

Classifications of processing food products

The U.S. Department of Agriculture (USDA) defines a processed food as one that has undergone any changes to its natural state—that is, any raw agricultural commodity subjected to washing, cleaning, milling, cutting, chopping, heating, pasteurizing, blanching, cooking, canning, freezing, drying, dehydrating, mixing, packaging, or other procedures that alter the food from its natural state. The food may include the addition of other ingredients such as preservatives, flavors, nutrients and other food additives or substances approved for use in food products, such as salt, sugars, and fats (USDA, 2023) According to USDA the classifications of processing food products start from Unprocessed foods, processed culinary ingredients, processed foods, ultra-processed foods

The first category includes the natural edible food parts of plants and animals. Minimally processed foods have been slightly altered so they can be more easily stored, prepared, and eaten; this processing level does not substantially change the nutritional content of the food. The second category includes food ingredients used in kitchens to prepare and season foods that are derived from minimally processed foods by pressing, refining, grinding, or milling. The third category means that the processing increases the durability of foods or modifies or enhances their flavor and texture. The fourth category referred to as "highly processed foods," these are foods from the prior group that go beyond the incorporation of salt, sugar, and fat to include artificial colors and flavors, preservatives, thickeners, emulsifiers, and artificial sweeteners that promote shelf stability, preserve and enhance texture, and increase palatability.

A classification system well known as NOVA was initially published as a work in progress in 2009, (Monteiro CA 2009) and 2010 (Monteiro *et al.,*2009, 2010), and later revised (Monteiro *et al.,*2012)

Consumer awareness for food processing

Consumer perception regarding food processing shows that they tend to look for foods that are as little processed as possible and even organic.Epidemiological evidence has previously demonstrated that ultra-processed food consumption is associated with poorer diet quality (Kelly, B., & Jacoby, E., 2018). Lack of information about the technologies used to processing food product is viewed as the main disadvantages in consumer perception and attitude. In a potential buying situation the participants

said that quality and especially taste play a critical role in accepting and maintaining the commercial marketability of these novel products (Nielsen *et al.,* 2009).

According to Nielsen, the perception towards a product, is formed based on the knowledge about the product. Consumers form perception about the product based on their characteristics some of them they like, whereas others they do not like (Nielsen *et al.,* 2009).According to Fishbein, creating an attitude for a product is a weighted average of the assessment of its perceived risks and benefits (Fishbein, 1963). In the case of food processing technologies, consumers can form an attitude by learning about certain characteristics of the processing process, about how the technologies differ from conventional production methods. According to Crino. M, 2017, there is confusion in the exciting classifications for the degree of processing of products. For this reason, the in-depth study of the consumer's knowledge about the concepts presented by each of the classifications is very interesting (Crino M*et al.,* 2017). Empirical evidence from Verneau (2014), confirms that components of fear and knowledge about product processing influence behavioral choices of the considered food categories and, in doing so, act as two separate but somewhat interdependent forces. Consumers with a higher frequency of food consumption have a lower level of fear and a higher level of patterns of adaptation to foods and their processing (Verneauet al., 2014)
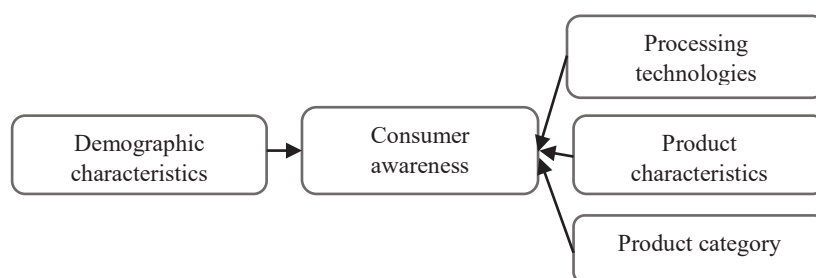
Figure 1: Factors that impact consumer awareness about food processing

Conclusions

To the best of our knowledge there are no research studies on consumers attitudes toward industrial food process in the case of Albania. Except for in the literature on food science and technology, the significance and importance of industrial food processing, consumers awareness aboud the degree of food procesing, dietary habits, individual and population health, well-being is still underappreciated and ignored. The factors that impact consumer awareness are interconnected and can shape consumer choices and perceptions of food product processing. Understanding these relation can help businesses and policymakers make informed decisions about product development, marketing and consumer education initiatives.

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FROM PANDEMIC TO WARFARE: UNDERSTANDING THE COMPLEX TRAJECTORY OF EXTERNAL SHOCKS ON ALBANIA'S AGRICULTURAL SECTOR.

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Abstract

This study examines how the COVID-19 epidemic and the war in Ukraine have affected Albania's agricultural sector. It is based on secondary data and primary collection done during two time periods 2020 (520 questionnaires) and 2023 (488 questionnaires). A combination of time series analytic methods (e.g., ARIMA – applied to trade data), and Difference-in-Differences analysis (applied to primary cross-sectional data), highlighting major changes in trade volumes with EU nations and increased stress on farmers as a result of fluctuating market prices and sales throughout the epidemic. Albania saw a major change in trade dynamics at the start of the pandemic, including a sharp decline in export and import values and a rise in latent unemployment, which mostly affected the tourism, transport, and trade sectors. Furthermore, the war in Ukraine has also made already increased input costs straining the profitability of small farmers, and accelerating the abandonment of livestock and agricultural activities. The analysis paints a grim picture of the agriculture sector's trajectory, emphasizing the critical need for interventions to prevent vulnerable groups from falling below the poverty line, offering a crucial roadmap for policy formulation and future research.

Key Words: External Shocks, Trade Dynamics, Agricultural Resilience, Agri-food value chains, Sectoral Analysis.

1   Introduction

Multiple shocks, such as the earthquake in 2019, COVID-19, the impact of the war in Ukraine and climate change-related events have exacerbated vulnerabilities of the smallholder farmers, contributing family members, and especially women, at the same time also increasing the cost of living of the Albania population. The COVID-19 pandemic caused a significant socio-economic impact on the entire society, which was still reeling from a devastating November 2019 earthquake. Moreover, the Ukraine war crisis added another layer of complexity. With rising production and living costs, coupled with inflationary repercussions, smaller farmers faced increasing pressures, leading to concerns about the sustainability of Albania's agricultural labor force. The purpose of this paper is to delve into these shifts, exploring their causes, implications, and potential trajectories, while offering a comprehensive analysis of Albania's agricultural sector during these tumultuous times.

2   Material and Methods

This paper is based on the analysis and findings of two unpublished FAO reports from 2021 and 2023, both authored by the contributors of this paper. The reports incorporate both primary and secondary data. The initial report amassed data from 520 questionnaires collected in 2020, whereas the subsequent study gathered information from 488 questionnaires in 2023. Analytical techniques employed include time series methods, such as ARIMA (utilized for trade data), and Difference-in-Differences analysis, which was applied to the primary cross-sectional data. Additionally, semi-structured interviews were conducted with various agri-food stakeholders. These qualitative interviews provided contextual insights and facilitated a deeper understanding of emerging issues within the sector.

3   Results and Discussion

The COVID-19 pandemic has cast profound challenges across global sectors, notably in agriculture. Albania, despite its agricultural resilience, experienced significant hurdles during this crisis. Early stages of the pandemic saw a sharp rise in food demand, largely spurred by panic buying. However, as the pandemic's effects became more apparent, a downturn emerged, chiefly due to decreased exports and a suppressed tourism industry. Interestingly, Albania bolstered its exports of select agri-food items to affluent areas like Northern Europe, even though these areas form a minor segment of its total exports. In contrast, exports to WB countries and lower GDP EU nations, traditionally dominant contributors to Albania's exports, saw a notable shrinkage. This scenario accentuates the need for strategic market diversification. While border impositions adversely impacted input quality and variety (for farmers close to the border who go and buy inputs abroad), they inadvertently retained a substantial domestic labor force for 2020 by deterring emigration. These dynamic underscores the interdependencies between mobility and markets and the importance of a accessible infrastructure.

More specifically, various agri-food value chains faced distinct challenges, emphasizing the need for better targeted interventions. Thus, **greenhouse vegetables** like tomatoes and cucumbers initially thrived, but as consumer purchasing power declined, sales fell, leading to a rise in post-harvest losses in 2020. A pronounced price drop in 2020, coupled with escalating production costs, signaled economic strains. **Watermelons and melons** witnessed altered sales dynamics and reduced early-season prices. Conversely, **strawberries** faced a yield drop, predominantly because farmers, under economic constraints, shifted to more cost-effective multiplication methods. **Apple** production remained consistent, but sales suffered post-winter, with movement constraints further complicating the sector. The **chestnut** sector, primarily reliant on wild collection, navigated the pandemic with moderate disruption, but domestic demand dropped due to chestnuts' premium

pricing. Meanwhile, exports dwindled, reflecting increased availability in primary markets like Italy. Tangerines, rather than being affected by the pandemic, suffered a profit decline from the quality damaged by hail damage. **Medicinal and Aromatic Plants** (MAPs) enjoyed heightened domestic sales, credited to growing health awareness. However, international sales faced disruptions, barring certain contracted exporters. **Olive oil's** price descent is attributed to regional overproduction, while the **wine and rakia** sectors grappled with the ramifications of a tourism slump. Lastly, **the processed fruit and vegetable sector** was faced with a reduced demand due to consumer shift towards fresh produce and a decline in tourism. Border closures further hindered direct sales, especially to ethnic consumers.

On the other hand, the Ukraine war's repercussions have reshaped Albania's agricultural sector. An accelerated consolidation trend has emerged, with larger entities thriving and smaller farmers, already under several constrains, further pressured by the inflationary repercussions of the Ukraine conflict. This crisis escalated both production and living costs, accelerating the exodus of smaller farmers, thereby threatening the sustainability of Albania's agricultural labor force.

Between 2019 and 2022, the average land used by farmers has increased, largely due to land rentals and accelerated by rural outmigration. The dairy, wheat and maize producers have expanded the most the land used, while greenhouse and apple producers revealed stagnation, casting doubt on Albania's future agricultural competitiveness. The stagnation in land used for greenhouse and apple producers is related to the high uncertainties to invest in rented lands due to problems with land titles. Labor saw declines in both full-time and part-time roles during this period, further aggravated by wage inflation. On the capital front, rising production costs, especially in the greenhouse and dairy sectors, necessitate policy intervention. With the war intensifying inflationary trends, overall investments dwindled, and the limited access to government grants, especially for smaller farms, paints a grim picture.

An interesting trend emerges when analyzing investment behaviors over two distinct periods: 2012-2019 and 2020-2022. From 2012 to 2019, the annual investment rate across all sectors averaged 10.6%. However, this rate dropped sharply to 5.0% between 2020 and 2022 (the values are obtained by dividing the share of investment done during 2012-2019 by 8 years and by 3 years for 2020-2022, which is based on the assumption of a linear and constant investment rate per year). The Ukraine war has led to a surge in fertilizer prices, impacting farmers across sectors. In wheat and maize farming, 47% and 43% of farmers, respectively, have reduced their fertilizer use. Interestingly, 93% of greenhouse farmers have not changed their fertilizer usage, likely due to elevated vegetable prices offsetting increased input costs. In terms of economic viability, gross margins per full-time worker increased in the dairy and greenhouse sectors but decreased significantly in the apple, wheat, and maize sectors. The wage disparity between these agricultural sectors and the broader Albanian economy remains a concern and a factor to rural outmigration.

Trade-wise, the Ukrainian war crisis has had nuanced impacts on Albania's agricultural trade balance. The export-to-import ratio has also shown signs of stagnation between 2020 and 2022, which is concerning given the inflationary pressures on imports. Albania's food security landscape presents a complex interplay between self-sufficiency and dependency, particularly visible in key staples like wheat and maize. Over the years from 2018 to 2022, Albania has been making slow yet promising strides in self-sufficiency for wheat, rising from 49% to 61%. This increase could be attributed to various factors, such as demographic shifts caused by mass outmigration, which could have reduced overall domestic demand. However, the data reveals a nuance: while domestic wheat production remains stable, it is mostly consumed in rural areas, and urban centers continue to rely heavily on imports. Thus, it appears that the increased self-sufficiency is more a reflection of reduced urban demand than an uptick in domestic production replacing imports. This makes urban populations particularly vulnerable to shocks in the import supply chain.

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THE ROLE OF FARM DIVERSIFICATION ON FOSTERING INNOVATION; THE CASE OF AGRITOURISM

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Abstract

Although the obvious innovative nature of agritourism activities, there is a scant of researches that examines the level and types of innovations, which in turn, it is assumed to facilitate growth.

The purpose of this research, therefore, is to examine the typology of agritourism innovation based on Schumpeterian approach and OECD guidelines.

The study is based on qualitative data analysis, and thus, one case study was in-depth investigated. The case was randomly selected on the official list of certified agritourism in Albania. However, the target case was an agritourism that previously was operating as agricultural farm. The Nvivo Qualitative Data Analysis Software was utilized to conduct thematic analysis.

Results indicated that examined agritourism entity, had experienced incremental and also radical innovation on new products, processes, managerial, marketing and organizational dimensions. However, new products was the most frequent innovation happening.

Keywords: Agritourism, innovation, growth.

Introduction

To have a viable growth and to effectively meet new societal demands, many small farms have considered diversification of their offerings, through adopting tourism activities into their farms' operations. This diversification has prompted farm to be a more service-intensive businesses, which in turn, enables innovation within it (Cassel and Pettersson, 2015). In fact, agritourism is considered a radical product innovation in agriculture (Esposti, 2012). More specifically, farms' transformation into agritourism, is considered by Cassel and Pettersson (2015) as the opportunity where new products and activities were continuously introduced. Indeed, consistent innovation activity is the key source of long-term success (Schumpeter, 1934).

Our study considered the integrative and cross-disciplinary definition of innovation for organizations, as pointed out by Baregheh et al. (2009, p. 1334) "innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace."

Although there are a diverse classification of innovation (see e.g., Domi et al., 2019), to operationalize innovation it within the agritourism activities, the Schumpeterian approach and OECD (2005) guidelines that have categorized innovations into; product, process, management, market and institutional innovations. We referred to the most widely accepted definitions, made by Hjalager, 2010 (see Table 1).

Table 1. Defining types of innovation

Types of innovation	Definition	Source
Product/service innovation	Changes directly observed by the customer and regarded as new; either in the sense of never seen before, or new to the particular enterprise or destination	Hjalager, 2010, p. 2
Process innovation	Backstage initiatives which aim at escalating efficiency, productivity and flow	Hjalager, 2010, p. 2
Managerial innovations	Internal oriented and focus mostly on empowering staff through new ways of organizing, building careers, and compensating work with benefits	Hjalager, 2010; Ottenbacher and Gnoth, 2005
Market innovations	More external oriented and include those innovations that intend to identify the businesses as innovative in an attempt to identify with a new segment of customers or redirect existing messages and strengthen brands	Hjalager, 2010, p.3
Institutional innovations	Is a new, embracing collaborative/organizational structure or legal framework that efficiently redirects or enhances the business in certain fields of tourism	Hjalager, 2010, p.3

Although the introduction of such topology of innovation are positively associated with the firm growth in SMEs (Lee et al., 2016; Varis and Littunen, 2010), there is a scant of researches that examined the level and types of innovations are fostered by agritourism activities. We also examined if the types of innovations were incremental (minor improvements or simple adjustments) or radical (fundamental changes).

The purpose of this research project, therefore, is to examine the typology of agritourism innovation. To address this goal, two main objectives are developed (1) to identify the new activities that took shape after farm transformation into agritourism entity; and (2) to identify and examine the type of innovations that has taken shape on agritourism activities, after the transformation process.

Material and Methods

The specific target group was defined (i.e., certified agritourism in Albania). The initial list of 52 agritourism entities, was retrieved from the Ministry of Tourism and Environment. Based on phone call contact with all of them, we identified the appropriate case, which was previously operating as a farm, and later it was transformed into certified agritourism entity. More specifically, we examined "Farma Sotira" agritourism. Then a semi-structured questionnaire was compiled.

Two techniques, online and off-line (paper), was used to administer the questionnaire. The questionnaire, designed on the online Google Form platform, was send via e-mail to the abovementioned agritourisms.

In order to better examine the types of innovation that happened at the target case, qualitative information was also gathered with the aim to complete the results obtained from the semi-structured online questionnaire. Personal semi-structured in-depth interviews with the targeted case, were conducted. Finally, the data analysis was undertaken. To analyze the qualitative data, the Nvivo Qualitative Data Analysis Software was utilized.

Results and Discussion

It resulted that "Farma Sotira" agritourism was previously engaged only on agricultural activities. "Farma Sotira" was previously engaged on aquaculture (trout breeding) and other farm based animal breeding. After it started to host tourists, mostly due to the food and beverage services, and later started providing accommodation and recreational activities.

Table 2. Profile of targeted agritourism

	"Farma Sotira" Agritourism
Operating as a farm	Since 2000
Officially recognized as agritourism entity	2018
Current activities:	
o *Agricultural production*	Animal breeding; cows, sheep, horses, pigs, chicken, ducks, fish, patato production
o *Food and beverage services*	✓
o *Accommodation services*	✓
o *Recreational activities*	✓
Land surface	60 ha
Number of permanent employees	20
Accommodation rooms	8 rooms
Location	Korça District

Table 3 indicates the types of innovation that target case had on its activities, after their transformation from a farm into an agritourism. Generally speaking, this agritourism has experienced diverse types of innovation in terms of new product, process, managerial, market and institutional innovations.

Table 3. Types of innovation at the targeted cases

	Types of innovation				
	Product/Services	Process	Managerial	Market	Institutional
Agricultural production	*Autochthonous seeds and races*	*Story telling Social Media Using Online Travel Agents*	*New structure of the business management Staff training due to the service activities, local based culinary, staff training about hospitality*	*From the Farm to the Table Approach Eco-friendly business*	*Certification as a Agritourism entity Cooperation with tourism Agencies Part of Agritourism association*
Food and beverage services	*Adding value to the products (processing) Revitalizing traditional dishes*				
Accommodation services	*Bed and breakfast, camping and bungalow*				
Recreational activities	*Horsing, fishing, Apitherapy*				

Operationalizing and examining types of innovation implemented into the agritourism activities, based on Schumpeterian approach and OECD (2005) guidelines, it represent a novelty in terms of advancing the theory in the field of agritourism. Future studies may consider this typology to deeply investigate their role on the agritourism success.

Identifying, examining and concluding about an agritourism innovation typology, will serve as a strong instrument to be exploited by agripreuners in order to improve their offer.

Within the multifunctional approach of agriculture development, the agritourism innovation typology will be a strong instrument for policymakers to foster rural development based on local resources.

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FACTORS ASSOCIATED WITH SMALLHOLDER FARMERS' FINANCIAL ILLITERACY

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Abstract

Access to finance is one of the biggest challenges facing smallholder farmers and conditions their opportunities for livelihood improvement. A better financial literacy is a key for achieving access to finance and contributes in economic stability. The objective of this study is to create and understanding of the financial literacy level of smallholder farmers and explore empirically the factors associated with the financial literacy. The study is based on a field survey using semi-structured questionnaires targeting 506 smallholder farmers. The study found that approximately, 72% of the respondents are able to correctly calculate the yearly credit. The ability to correctly calculate the value of the credit obligation is negatively associated with the access to assets and need for credit as well as positively associated with the access in previous training, their access to bank account, their habit of keeping records.

Key words: financial illiteracy, credit, Albania.

Introduction

Access to financing is one of the key factors that conditions the development of the agricultural sector. Poor financial literacy is a common constrain for credit, especially in developing or emerging economies, particularly among rural households (Murendo & Mutsonziwa, 2017). It influences the well-being of farmers differently, depending on personal characteristics and behaviours and farm characteristics (Thongrak et al., 2021). While the literature refers to the importance to measure financial literacy components, there are no frequent studies estimating and understanding farmers' capacity to calculate (Adomako et al., 2016; Bongomin et al., 2017). The objective of this study is to create and understanding of the financial literacy level of smallholder farmers and explore empirically the factors associated with the financial literacy. The study is based on a field survey carried in Albania, a country with low access to financing and relatively high financial illiteracy (Hoxha et al, 2023).

Literature review

As presented in the introduction, access to finance and overall farm performance are closely tied to financial literacy and to the ability of the farmers to calculate (Adomako et al., 2016; Bongomin et al., 2017). Farmers chacacteristics and behaviours are associated with farmers literacy (Levantesi & Zacchia, 2021). Other studies emphasise the factors related to household namely household size, household education, size of labor used in the farm or size of the farm (Lalrinmawia & Gupta, 2015).

Following Su et al (2018) and Sivakumar et al (2013) we explore also the effect of previous participation in training programme and possession of a banking account as factors significantly influencing the financial literacy of the farmer. However few studies assess the role of competence in mathematics in achieving accurate financial decisions (Yildirim and Vardari, 2020). Therefore, we contribute to the literature by exploring the ability to calculate based on a simple direct test question made to the farmers.

Methodology

This paper is based on a structured face-to-face survey conducted in 2020 with 516 farmers in remote areas of Albania namely Peshkopi, Librazhd, Maliq and Kurbin. The selection of farms was purposive and the survey was implemented by the World Vision staff, upon close guidance of the authors if this study. Survey data were collected through the use of tablets and transferred to SPSS.

The structured survey data were subject to descriptive statistics analyses through frequencies and regresion analyses.

In order to explorefinancial literacy two approaches were followed. The first approach for assessing farmers illiteracy was to ask farmers if they are able to calculate the obligations created when receiving a credit. In addition, farmers were asked if they can choose the best type of loan in the financial market in their region. A second approach was to carry an exercise to farmers where they should calculate the credit repayment for a year for a credit amount of 10000 ALL subject to a yearly interest rate of 12%.

In order to analyse the factors influencing the capability of the farmer to assess credit costs, a binarry logit regresion is used. The farmers ability to calculate is the depended variabel which takes the value 1 in case the calculation made is correct and the value 0 if calculation was mistaken.

Table 6. List of variables used in the regression

Independent Variable	Question	Operationalisation

Age	Age of household head/farm manager	Scale variable expressed in number (of years)
Family size	Number of members in the family	Scale variable expressed in number
Education	Education of the head of the household	Categorized (ordinal) variable Elementary; 8-Years; High School, Professional High School; University
Land area	Cultivated land surface	Scale variable expressed in number (dynym)
Experience in support	Have you ever applied for any government support scheme for agriculture	Categorized variable No=0, Yes=1
Need for credit	Do you usually need small loans to buy inputs	Categorized (ordinal) variable; 1= Never, 2=Rarely, 3=Somewhat, 4=Often, 5= Always
Internet access	Smart phone with internet	Categorized variable No=0, Yes=1
Bank account	Bank account in the family	Categorized variable No=0, Yes=1
Deposit	Do you save money	Categorized (ordinal) variable; 1= Never, 2=Rarely, 3=Somewhat, 4=Often, 5= Always
Credit experience	Have you applied for any loan in the last 5 years	Categorized variable No=0, Yes=1
Keep records (expenses and income)	Do you (you or your family) keep records of the farm's expenses and income	Categorized (ordinal) variable; 1= Never, 2=Rarely, 3=Somewhat, 4=Often, 5= Always
Training experience	Have you or other members of your family ever been trained to calculate costs, profit	Categorized variable No=0, Yes=1

Results

Farmers financial literacy

Using the first approach for assessing financial literacy, it is noted that less than 45% of those surveyed declare that they are able to calculate the amount of credit payments required for a bank credit. In addition, circa 35% of the farmers are able to assess the best credit offer in the market. Approximately, 40% of the farmers are aware on the extra interests' costs as part of credit costs (Table 2). Using the second approach, the study found that slightly more than 28% of the farmers have mistakenly calculated the amount of credit costs to be repaid (Table 3).

Table 7. Farmers selfstated ability to calculate credit costs

	Yes	Not
Ability to calculate the amount of credit payments required for a bank credit	43.70%	56.30%
Ability to select the best credit offer	35.80%	64.20%
Farmers aware on the extra interests costs as part of credit costs	39.90%	60.10%

Source. DSA Survey, 2021

Table 8. Farmers assesed ability to calculate credit costs based on a hypothetically defined interest rate

Correct answer	Frequency	Valid Percent
Not	124	28.1
Yes	318	71.9
Total	442	100.0

Source. DSA Survey, 2021

Factors associated with ability to calculate credit

The results of the regression analysis show farmers' ability to correctly calculate credit costs is negatively related with family size and credit demand, meaning that this group are less vulnerable compared to the rest. In addition farmers who are already accessing bank sevrices, keep records systematical on expenditures and incomes and have previously accessed trainings for increasing financial and non-financial capacities have an accurate calculation ability.

Table 9 Regression analysis of the factors associated with the ability to calculate correctly the credit interests

Variables in the Equation	B	S.E.	Wald	Sig.	Exp(B)
Age	-0,009	0,010	0,658	0,417	0,992
Family size	-0,143	0,088	2,638	0,104	0,867
Education	-0,070	0,165	0,180	0,672	0,933
Land area	0,058	0,025	5,598	0,018	1,060

Experience in government support	0,581	0,335	3,001	0,083	1,787
Need for credit	-0,216	0,110	3,847	0,050	0,806
Internet access	0,385	0,322	1,424	0,233	1,469
Bank account	0,633	0,342	3,421	0,064	1,883
Deposit	-0,081	0,127	0,412	0,521	0,922
Credit experience	-0,162	0,440	0,136	0,712	0,850
Keep records (expenses and income)	0,271	0,125	4,670	0,031	1,311
Training experience	1,431	0,299	22,949	0,000	4,185

Source. DSA Survey, 2021

Omnibus Tests of Model Coefficients Chi-square=146.522, sig=,000; Cox & Snell R Square=0.346; Nagelkerke R Square=0.461; Hosmer and Lemeshow Test Chi-square=11,040, sig=,199

Conclusions and recommendations

The topic of financial literacy has gained increasing research interest, particularly in the context of credit market development. There is scarce knowledge on the farmers behaviours ad ability to calculate the credit costs. In order to fill the gap on the literature, the study assessed the farmers ability to calculate credit costs using simple excercise and the associated factors related with this ability. The analysis reflect on the multifaceted nature of financial literacy's role, showcasing the complex interplay of various factors namely access to training, record keeping habit and access to bank account. The findings of the study emphasize the necessity of designing inclusive financial systems that consider the cognitive and informational limitations of rural households.

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IS IT POSSIBLE TO HAVE A NON-OIL PALM DIET - ANALYSIS FROM CONSUMERS' AND FOOD PRODUCERS' SIDE

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Abstract

Palm oil is a complex and controversial issue at a time when health and environmental protection are at the heart of the debate on sustainable food systems. The aim of this paper is to identify opportunities for improvement in the current use and production of palm oil by analysing the perceptions of consumers and producers in Albania. One hundred fifteen questionnaires were administered to consumers to assess their willingness to pay for products that do not contain palm oil. Similarly, thirty surveys were conducted with palm oil users in the food industry. The results show that from the food producers' side palm oil is an attractive choice because of its lower price. Similarly, the majority of manufacturers are not aware of the importance of sustainable palm oil use for the environment. This indicates that awareness of the environmental impact of palm oil use varies from producer to producer. On the consumer side, the analysis suggests that the price premium is an indication of high-risk perception and lack of information about the product. The analysis of variance by age shows that people aged 55 and over are willing to pay a higher premium for alternative palm oil products (about 70-80%). Based on the survey results, some suggestions for addressing consumer preferences and concerns regarding the use of palm oil in food products are linked to – 1. Information and awareness, 2. Sustainability standards, 3. Certification information, 4. Labelling and understanding of the negative impact of palm oil use on the environment rather than on health should be emphasised.

Keywords: Palm oil, CVM, consumer, producer, information, health, environment

Introduction

The production and use of palm oil in the food market has increased in recent decades (more than 60 million tonnes in 2017 (IndexMundi, 2017). In 2018, food, animal feed and other industrial uses such as cosmetics accounted for around 40% of all palm oil imported into Europe (Oil World, 2018). However, the use of palm oil in food has raised concerns about its impact on human health, society and the environment (Capecchi et al., 2019; Gellert, 2015, Rist et al., 2010). Therefore, it is interesting to understand which factors may contribute to consumer acceptance in a context where this food alternative is controversial. Several factors, including personal values, awareness of the environmental and social impacts of palm oil, the availability of alternative products and consumer purchasing power, can influence consumers' willingness to pay to avoid palm oil. Studies show that consumers are willing to pay a higher price for products that do not contain palm oil, or where palm oil is replaced by an alternative product. However, the level of willingness varies from consumer to consumer. Research also shows that consumers who are more aware of environmental issues tend to be more willing to pay a premium to avoid the use of palm oil (Fabrizzi et al. 2019). They may actively seek out products with palm oil-free labelling or certification from sustainable palm oil certification schemes, such as the RSPO (Wassmann 2023). Environmental protection, biodiversity conservation and ethical sourcing are more important to these consumers.

On the other hand, price sensitivity may play an important role. Some consumers may be less willing or able to pay a premium for palm oil-free products, especially if they have limited disposable income or face higher prices in their local market. Overall, there is a segment of consumers who are willing to pay more to avoid palm oil. However, the willingness to pay may vary from individual to individual. As consumer awareness and understanding of palm oil issues continues to grow, it is likely that demand for sustainable alternatives and the willingness to pay a premium will increase. This, in turn, could encourage companies to adopt more sustainable sourcing practices and offer more palm oil-free options in the marketplace. The aim of this paper is to explore the perceptions of consumers and producers in Albania. The contingent valuation method will provide insights into consumer and producer behaviour towards palm oil in Albania.

Material and method

The contingent valuation method (CVM) is widely used in environmental economics, public policy analysis and decision-making. It involves surveying individuals or households to obtain their stated preferences for a particular non-market good or service. A structured questionnaire is used for both consumers and producers in the food sector toward palm oil. The first part of the questionnaire covers socio-demographics, while the second part collects the awareness, attitudes and information on Palm Oil while the third one presents the willingness to pay scenario. The survey was distributed over a period of 12 days, resulting in 115 completed surveys for consumers and 31 completed surveys for food palm oil users. The respondents come from different cities in Albania, but the most significant results are from the city of Tirana.

Results and conclusions

On the production side, the results of the study show that manufacturers prefer to use palm oil because of its low price, durability and high resistance. Palm oil is an attractive choice for manufacturers because of its lower price. However, some manufacturers prefer to use other alternatives to palm oil. This indicates that there is a preference among manufacturers for other solutions that are more sustainable and sensitive to environmental issues. Some manufacturers use labels to inform consumers about their palm oil policy. However, the majority do not. This shows that there is room for improvement in the transparency of information provided to consumers. Similarly, the majority of manufacturers are not aware of the importance of sustainable palm oil use for the environment. This indicates that awareness of the environmental impact of palm oil use varies from producer to producer. However, if asked to do so by consumers, 60% of producers would be willing to change their palm oil policy. This would however be at the cost of a significant increase in the price of the product on offer (70-80%). This shows that changes in palm oil policy can have significant financial costs.

On the consumer side, the analysis of variance by age shows that people aged 55 and over are willing to pay a higher premium for the alternative palm oil product (70-80% to be precise). Similarly, a higher premium price of 50-60% is paid by people with the lowest level of education. There is no statistically significant relationship between place of residence and willingness to pay. An interesting result is observed in relation to the income of the consumers interviewed. Contrary to what might be expected, it is consumers with a low income who are willing to pay a higher premium to buy an alternative palm oil product. By the same logic, people with a higher proportion of food expenditure in total family expenditure offer a higher premium for an alternative product. This behaviour is related to high perceived risk and lack of experience and information about the product. A high level of willingness indicates a perceived risk, and the fact that the contingency assessment is a hypothetical assessment can lead to such behaviour. This is confirmed by the willingness to pay in relation to knowledge about palm oil, with individuals who have no information about this product having the highest willingness to pay. Consumers who do not know whether palm oil is harmful to their health also show a higher willingness to pay than those who think it is harmful. Again, these results show that the price premium is an indication of the high risk perception and lack of information about this product. In conclusion, consumers who do not consult labels are those who are willing to pay a higher price for an alternative product.

Based on the survey results, some suggestions for addressing consumer preferences and concerns regarding the use of palm oil in food products are linked to - Information and awareness, sustainability standards and certification information, labelling and understanding of the negative impact of palm oil use on the environment rather than on health should be emphasised.

Table 10: Willingness to pay for an alternative product to palm oil and demographic characteristics

Indicators	F value	P(value)
Age	2.550	.043
Education	5.092	.026
Revenues	2.293	.064
% of food expenditures	3.366	.021
Existing information on Plam oil (Yes, No)	8.292	.005
Impact on Health	5.678	.004
Impact on Environment	3.837	.006
Information on the product label	3.796	.012

Source: author's elaboration

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FACTORS INFLUENCING TOURIST ACCOMMODATION PERCEPTIONS THROUGH ONLINE REVIEWS IN THE VLORA REGION: SENTIMENT ANALYSIS AND E.L. PROFICIENCY

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Abstract

This paper presents an analysis of online reviews submitted by tourists for various types of accommodations in the Vlora Region. The data was collected from the Booking.com webpage, and a sentiment analysis was conducted through application of Azure Machine Learning.. Comparing the sentiments for each establishment, the brand-name hotel received the highest score, while the family owned/budget hotel followed closely with a slightly lower sentiment score, suggesting a positive sentiment but not as high as the brand-name hotels. In contrast, houses and *apartments to let* received lower sentiment scores, implying a somewhat less positive sentiment in the reviews compared to hotels. In order to analyse the impact of various factors with a focus on English language skills on perception of tourists for brand-name hotels (limited to one type of accommodation) the paper applied semantic differential scales. The findings revealed that the "Location" and "Views" categories received primarily positive comments and the highest number of mentions. In contrast, the "Facilities" category had a more mixed sentiment, with significant negative mentions. The "Staff" category maintained a generally positive sentiment. Notably, the "English Language (EL) Skills" category received 100% positive comments, yet the lowest number of mentions at just 8. This study provides valuable insights into the factors influencing tourists' perceptions and the importance of English language skills in the Vlora Region's hospitality & tourism industry, with implications for needs analysis for such competences and skills among accommodation sector.

Key words: review, perception, sentiment analysis, determining factor, tourism.

Introduction

The Albanian tourism sector has experienced an unparallel boom in the number of tourists visiting the country throughout the year 2023. The latest data released by INSTAT reveal a remarkable 33% increase in foreign nationals visiting the country during the first six months (2023), totalling around 3.4 million visitors (Euronews 2023). Forecasts of growth have fuelled concerns for shortage of staff and the need for skilled personnel. Of those surveyed in the UNDP survey carried out in Autumn 2022, 56% believe the lack of labour to be the main issue hampering Albania's expansion of tourism, while 26% view the lack of skills as the problem (Taylor, 2023). The effectiveness of any tourism enterprise relies on its capacity to find staff capable of filling job vacancies as well as staff that have command of skills in foreign languages, given the diverse numbers of foreign nationals visiting. The location, view as well as services are the most important factor of the tourism industry (Suanmali, 2014. When tourists come to the hotels, it is important that the staff is friendly and responsive to the customer's needs so as to be satisfied about their behaviour. Excellent communication skill is more important because customers pay not only for the product, food, rooms, but also for the *quality* of services (Gnanapala, 2016). Tourism and language are interrelated and is therefore important to study the nature of the relationship that exists between the two disciplines (Hass, 2016). Previous studies have indicated that foreign language skills do influence tourists' perceptions of hotel performances and even guarantee positive online reviews concerning the hotel staff. According to Crystal (1989), knowledge of foreign languages creates customer satisfaction which leads to increased competitiveness, which can happen only if the company handles its customers well.

Material and Methods

An analysis of online reviews was conducted to ascertain which accommodation sectors garnered the most favourable sentiment scores. These online reviews were sourced from Booking.com, one of the largest online travel agencies. To achieve this, Azure Machine Learning was applied to measure sentiments and assign corresponding scores, as depicted in Figure 1 below.

Fig.1. Analysis of reviews through application of Azure Machine Learning

An in-depth analysis of tourists' perceptions of various hotel factors, such as location, views, attitudes, and English language skills, was conducted using the *semantic differential scale*, a crucial measurement tool. Pioneered by Charles Osgood in 1952, semantic differential scales are a popular technique for measuring people's attitudes toward nearly anything (Rosenberg & Navarro, 2018). The application of semantic differential scales utilizes a series of bipolar adjectives commonly found in online reviews as illustrated in fig.2.

Terrible	o	o	o	o	o	Exeellent
Amateur	o	o	o	o	o	Professional
Dirty	o	o	o	o	o	Clean
Unfriendly	o	o	o	o	o	Friendly
Cheap	o	o	o	o	o	Expensive

Fig. 2. Use of semantic differential scale to measure attitudes and perceptions

Discussion

. By utilizing sentiment analysis from online reviews by tourists, derived through the application of Azure Machine Learning, we present below statistical analysis of various accommodations.

Name of establishment	Overall: Sentiment	Score
Brand-name hotel	Positive	0.79
Family owned/budget hotel	Positive	0.65
Houses	Positive	0.55
Apartments to let	Positive	0.49

Table 1. Sentiment analysis of reviews using Azure Machine Learning

Comparing the sentiment for each of the above tourism establishments, we can observe that the "Brandname hotel" earned the highest score, with a sentiment score of 0.79 indicating that the reviews for this type of establishment were particularly positive and well-received. Trailing behind is the "Family owned/budget hotel," which received a sentiment score of 0.65. This score is slightly lower than that of the brand-name hotel, suggesting a positive sentiment but not quite as high as the former. In contrast, "Houses" and "Apartments to let" received lower sentiment scores of 0.55 and 0.49, respectively. These scores imply a somewhat less positive sentiment in the reviews compared to hotels, indicating that reviewers may have expressed a milder degree of positivity toward these types of accommodations. It's worth noting that while the "Brandname hotel" had the highest sentiment score, the difference between its score and that of the "Family owned/budget hotel" is not substantial.

Based on the contents of online reviews (total of 50 randomly selected reviews) we applied the semantic differential scales (see below table 2) by using biploar pairs of adjectives (good-bad, pleasant-unpleasant, cheap-expensive etc) used to describe factors such as location, views, facilities, staff and English language skills. The factors below received various mentions characterized by a mixed number of adjectives with positive and negative connotations.

	Adjectives with positive connotation Adj/very + adj		Adjectives with negative connotations		Total mentions
Brandname hotels					
*Location	40	10			50
**Views	35	15			50
***Facilities	8	6	12	9	35
****Staff	11	8	9	3	30
*****English languages	8				8

Table 2. An analysis of factors to measure perception

Following an analysis of semantic differential scales, it is evident that the categories of "location" and "views" are characterized by a predominantly positive sentiment. Tourists overwhelmingly express their appreciation for the convenient locations, with approximately 80% of mentions conveying positive sentiments. Similarly, views elicit positive responses, with 70% of mentions indicating a sense of satisfaction. Notably, some visitors even go as far as describing these aspects as "very positive," signifying a high level of contentment.

In contrast, the "facilities" category presents a more mixed sentiment. While 23% of mentions lean towards positivity, indicating favourable opinions about the facilities, a significant 34% express negative sentiments. Particularly noteworthy is the 26% of mentions falling into the "very negative" category, underscoring the presence of significant issues related to facilities, such as maintenance or cleanliness, which require immediate attention.

Conversely, the "Staff" category maintains a generally positive sentiment, with 36% of mentions reflecting positive interactions between guests and hotel employees. Around 26% of mentions even fall into the "very positive" category, suggesting that a substantial portion of guests has experienced exceptionally good service.

In the "English Language Skills" category, all mentions are positive, indicating that guests highly value the hotel's proficiency in English language services, which is crucial for international tourists.

Conclusions

In summary, the statistical analysis of sentiment scores from Azure Machine Learning reveals a consistent trend of positive sentiments across all types of establishments. Brand-name hotels and family-owned/budget hotels received the highest scores, with houses and apartments to let receiving slightly lower scores, indicating a marginally less positive sentiment in the reviews for these accommodation types compared to hotels. Tourists in Vlora express a general appreciation for the location, views, and staff at hotels. However, there is a substantial need for improvement in the "facilities" category, particularly concerning issues. Language skills were considered positive yet not enjoying an equal number of mentions as other factors. Nevertheless, the overall sentiment remains predominantly positive, reflecting a generally satisfactory experience for the majority of guests.

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FINANCIAL SUSTAINABILITY OF RURAL MICROFINANCE INSTITUTIONS AN IMPORTANT FACTOR OF FINANCING FARMING ECONOMICS

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Abstract

Increasing financing for farming economies through microfinance institutions (MFI) requires, first of all, that these institutions themselves be financially stable and able to meet the needs of their clients.

A microfinance institution with financial stability faces the dilemma between the increase in lending to farmers and the subsequent increase in risk and the relatively high cost of lending.

Under these conditions, we propose that the Credit Savings Association (SCA) model as a microfinance institution that attracts deposits and offers loans be included in the support scheme of the government guarantee fund or donor projects, by covering a part of the cost of lending.

This would be considered direct support for the farming economies that receive loans from this microfinance institution model. This coordination is based on the fact that SCAs already have many years of experience lending to farmers (eg SCA Fed Invest has 30 years of experience in the rural lending market). In this fashion, the possibility of loan payback by the farmers will increase, hence an increase in the income of the microfinance institutions.

Keywords: Microfinance institution (MFI), rural sector, Saving and Credit Associations (SCAs);.Fed Invest; farmer economy, rural credit.

Introduction

The financial support of farm economies during the last decade has been realized mainly from two funding sources: through donor projects and borrowing from financial institutions. Microfinance institutions also account for the majority of lending to farmers.

Approximately 83% of the farmers who received a loan secured it from microfinance institutions. The rural sector, due to its particularities, is faced with a high level of risk, which is also reflected in a relatively high cost of borrowing.

This is the key reason that the financial support from the banking system is at its minimum for the rural sector, occupying on average, about 1.2% of the lending market. On the other hand, it is the microfinance institutions that better fill this deficiency, increasing their role in the credit market.

The microfinance institutions operating in Albania have their own preference as to which segments of the credit market they should engage. Based on the operating data of the main microfinance institutions in the Albanian economy, only SHKK Fed Invest owns about 50% of the rural credit market share, while the others account for the other 50%. Savings and Credit Societies model (SCA) is the only one that offers loans and accepts deposits from farmers. All other microfinance institutions only offer loans in the market.

The growth of the role of MFIs in the rural market is primarily related to their financial stability. Sustainability generally means the ability to continue a program of activities and services in pursuit of institutional objectives. For an MFI this means the operational sustainability capability of a financial institution for the development of the rural poor (Khandker and Khalily, 1995).

Methodology

The methodology of the work is designed as an integration of all the components of the previous studies carried out related to the crediting of the rural sector. Analysis of the data of the financial statements of the MFIs, the data of the Bank of Albania for this information and the World Bank are the basis of the conclusions and recommendations in the paper.

o   Secondary data were provided through financial statement documents for certain periods of time for MFIs.
o   Descriptive, statistical, and regression analyses were carried out

o   Relationships and interdependencies between the variables selected in the study were studied, for which we explained the relationships between them and determined the performance of MFIs.

The activity of MFIs has increased during the last decade. An important segment of their operation in the market is SCA; the number of witch at the end of the first 6 months of 2023 is 16, as well as one of their unions. SCA Fed Invest has the largest share of operations in the rural sector.

The following chart shows the role of the main MFIs in the rural sector compared to the banking system.

Chart 1 Main MFIs in the rural sector compared to the banking system.
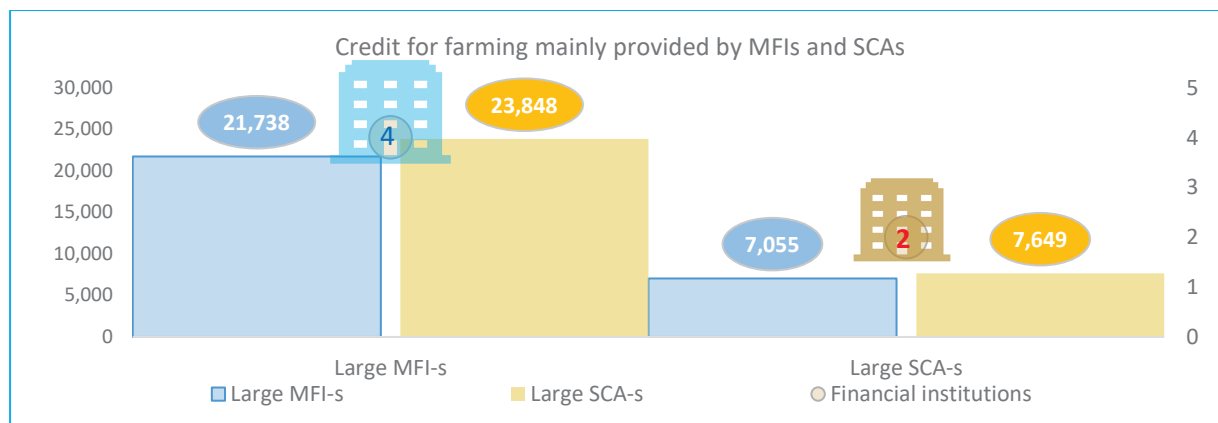
Source: World Bank calculations based on the results of a 2022 survey for this study of all 12 Albanian banks, four of the largest MFIs, and two of the largest SCAs.

It can be observed that about 53% of the loan portfolio in the rural sector was granted by the 2 main SCAs operating in the market. Focusing on SCA Fed Invest, which owns the main part of financing in the rural sector, the table below presents indicators of the activity and performance of this financial institution.

Chart2-2.1. Activity and performance indicator of SCA Fed Invest
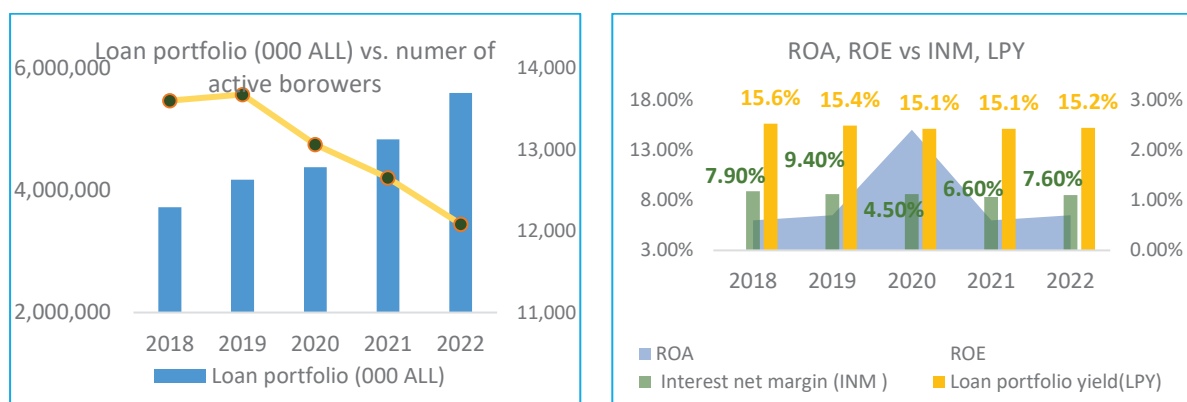
Source. Annual Reports SCA Fed Invest

Based on the analysis of the above data, we see that:

o   During the last 5 years, the institution has increased its loan portfolio by about 52% compared to 2018.
o   The number of active clients has remained almost at the same level. This has come as a result of the increase in the average amount of credit for customers from 274,000 ALL in 2018 to 463,000 ALL at the end of 2022. This is an indicator of the use of credit by farmers to finance investments aimed at increasing production for the market.
o   Although the net interest margin is considered relatively satisfactory, the volume of the loan portfolio reflects relatively high-interest rates. This is a consequence of the high risk of rural credit as well as the high operational expenses of the institution that operates mainly in the rural sector.

Results and discussions

o   MFIs have increased their activity in the rural sector, but their financial sustainability is a key factor for further success.
o   Although the net interest margin for SCAs is considered optimal, the loan interest rates are high, increasing the cost of borrowing for farmers. This further increases the credit risk and the worsening of the non-performing loan indicator.

o Financial indicators ROA and ROE have been low but positive with small fluctuations throughout this period. However, these important indicators of the institution's performance reflect the high risk of the granted rural credit as well as the high operational expenses of the institution that operates mainly in the rural sector.

o Under these conditions, we recommend the inclusion of SCAs in the financial support scheme through the Guarantee Fund alongside the banking institutions that are already part of this scheme. Providing a guarantee for loans granted by SCAs as well as financing part of the interest on loans received by farmers will further increase their demand for credit, but on the other hand, it will improve the financial performance of SCAs by guaranteeing the expansion of rural sector financing.

o Reducing the cost of borrowing for farmers through inclusion in this guarantee fund is considered as a direct support for their economies, giving them the opportunity to increase investments in agriculture or livestock with the aim of increasing production for the market.

o Another mechanism that would help mitigate the risks of taking credit from farmers is the application of farmer insurance products, which is still in its early stages. Since the insurance premiums in agriculture are relatively high, the subsidization of a part of the insurance premiums from state funds designated for this purpose would be another way of supporting farmers who receive loans. This would significantly reduce the risk for MFIs, and at the same time, it would increase the demand of farmers for loans.

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A SURVEY OF SHARING COOPERATION RESULTS IN A SUPPLY CHAIN. CASE STUDY: APPLE FRUIT IN THE KORCA DISTRICT.

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Abstract

The Korca district is one of the four most important areas for the agricultural sector in Albania. In this area, the main fruit produced is the apple, which in the country occupies approximately half of the total production of apple varieties. In our research, we have concentrated on gathering information from local farmers and cold storage facilities in order to come to conclusions for supply chain collaboration. The questionnaires were created in order to identify some of the issues that prevent refrigerated warehouses, farmers, or both refrigerated warehouses and farmers from working together successfully.

Farmers and cold storage facilities indicate that their incomes have declined dramatically in recent years for a variety of reasons, which has an impact on this result due to the rise in production or collection costs. In these circumstances, the respondents are willing to cooperate in order to increase revenue, but there is an obvious lack of strategies for sharing the rewards of the cooperation. In most cases, they simply make a proportional division or a slight differentiation among the personal contributors, even though they do not agree with the benefit. The interviewees are open to implementing well-studied methods for the distribution of benefits in order to maintain the sustainability of the cooperation.

The authors recommend the application of the cooperative game theory model adapted to the case of the supply chain and offer a variety of solutions.

Key words: Apple fruit, Supply chain, Cooperation, Cooperative game theory,

Introduction

The supply chain (Sarmah et al., 2006) is a network of organizations (supplier of raw materials, manufacturer, transporter, retailer, etc.) that are in charge of transforming raw resources into finished goods. These entities may be limited to individuals, groups of people, or corporations. The most commonly used supply chains have a structure with three components: the supplier, the retailer, and the customer (consumer). The supplier provides goods or services, and the retailer sells the consumer goods or services to customers by satisfying their wants and needs. Delivering the items that consumers desire at the appropriate time and in the most effective and profitable manner is the key objective of an efficient supply chain. The application of cooperative game theory as one of the primary approaches for supply chain analysis is outlined in the work of (Thun, 2005). In terms of cooperative game theory, a supply chain can be modeled as a coalition of members who pool their resources and share the same profit function (Hennet & Mahjoub, 2010). Several supply chain models have used cooperative game theory for solving a variety of problems, including coordination, risk management, and sustainability. The study (Dobos & Pintér, 2013) integrates ideas from cooperative game theory to supply chain analysis. The centralized and the decentralized Arrow-Karlin-type supply chain models have both been established. The issue of profit sharing in the supply chain is examined from the perspective of cooperative game theory in the study by (Chen et al., 2010).

Material and methods

In the Korca district, we considered major farmers (cultivating apples on more than two hectares) and storage facilities with a capacity of more than 100 tons. The purpose of the interviews was to get an idea of how supply chain management worked and the difficulties in cooperation. Two questionnaires were conducted, one for farmers and one for cold store owners. We must emphasize the fact that the farmers who were interviewed were selected in advance by the directorate of agriculture in Korca, adapting to the needs of the authors. Farmers who have over 2 ha of land planted mainly with apple fruit trees were taken into consideration. At the same time, the selection for refrigerated warehouses was made with the same logic as for those warehouses with a capacity greater than 100 tons. This type of selection is not random because this paper is a continuation of the doctoral study on the application of the cooperative game theory model in cooperative situations in the agricultural sector. Through the results obtained from this paper, we aim to justify the application of our model in a real and concrete situation that will be effective for farmers and warehouse structures. According to the results of both questionnaires, nearly all of the participants were men, and more than 95% of the respondents were owners of farms and cold storage facilities. Regarding the interviewees' educational backgrounds, it can be shown that 33% of farmers have completed a high school diploma or a cycle of higher education. This ratio is greater, at about 47%, in the case of owners of refrigerated warehouses. Additionally, it appears that the agriculture industry is not particularly attractive to young people. According to the questionnaires, farmers between the ages of 55 and 64 predominate. Approximately 62% of warehouse refrigerators in the same age range show the same trend. In terms of longevity, farms and refrigerated warehouses interviewed are market leaders with more than 15 years of experience. The method we used to demonstrate the results is that of descriptive statistics, focusing on the graphic presentation with the aim of providing the best possible visual presentation.

Results and discussion

In recent years, affected by the consequences of the pandemic, farmers and cold stores have stated that their levels of satisfaction with the income they receive from their activity remain mainly at or above average levels (Fig. 1).

Figure 1. Level of satisfaction for the farmer and refrigerated warehouses from the apple product

According to farmers and owners of cold storage facilities, their overall expenses have significantly grown in recent years (Fig. 2). Although a sizable portion of them (about 75%) participated in the government's oil support program, they also experienced a labor shortage and higher wages for seasonal workers.
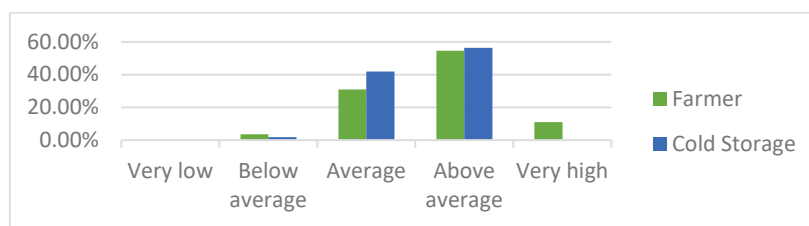
Figure 2. Costs spent by the farmer and the refrigerated warehouses for the apple product

All of the interviewees have not applied, and none of them are aware of a suitable scientific model that splits the benefits according to standards that all participants can agree upon. The owners of the refrigerated warehouses argue that, in most circumstances, they must agree to accept a smaller profit than what they declare in order to maintain the partnerships. In the two cases of cooperation that we have interviewed, the members have expressed that they share the costs of the cold storage (energy, environmental maintenance, etc.) equally, and each of them covers the extra costs of the quantity of their own product. Farmers and cold stores maintain that the number of members with whom they wish to work should be minimal (maximum 5 members), since they are strict and pessimistic about the proper sharing of benefits in a cooperative environment (Fig. 3).
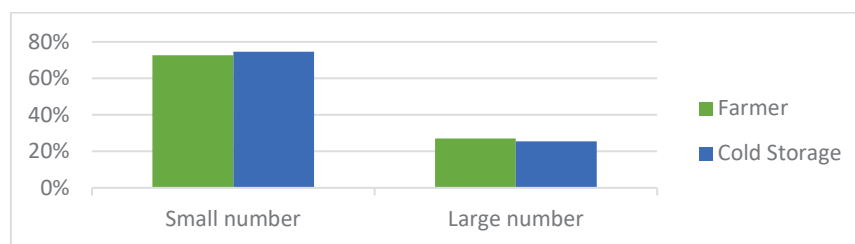
Figure 3. Preferences for the number of partners in cooperation

As for the contracts between the farmer and the cold stores, non-written agreements and written contracts with a 1-year agreement lead the way. The farmers' stock product has been one of the issues that we have identified. Farmers are frequently forced to throw away their produce since the government's efforts to address this issue have been essentially minimal. To agree on the compensation of unsold product and, on the other hand, to sell the products to them at the lowest price, farmers are more willing to enter into cooperative agreements with storekeepers. Storekeepers are more skeptical about these agreements, where only 60% (Fig. 4) of those interviewed are ready to participate in a pilot application.
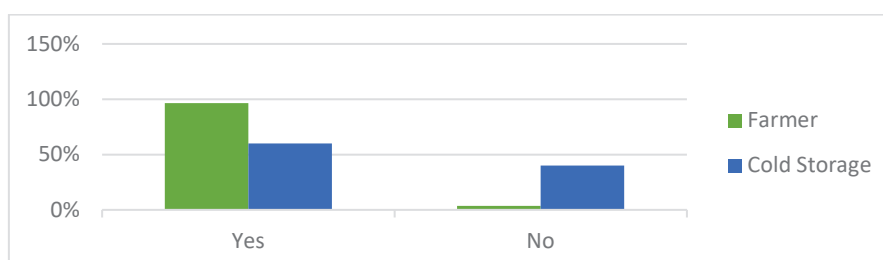
Figure 4. Cooperation agreement for stock product compensation

Farmers and storekeepers are ready to cooperate with government structures to achieve success. Even though they accept the fact that they have little knowledge about the right distribution of benefits, they are ready to be offered a supervisor by the government to guide them in the fairest decision-making and provide advice that will enable them to increase their benefits as much as possible.

Conclusion and recommendations

The income of the agricultural industry in the Korca area is significantly influenced by farms and cold storage facilities for apple produce. The goal of the interviews was to focus attention to the issues with cooperation that arise when the rewards of cooperation are distributed. Farmers in Albania generally have a negative impression of agricultural cooperatives and are hesitant to use them. Consultations on modern scientific methods used to distribute advantages among cooperative members should be a part of supportive government policy. The farmers will be more inclined to work together in order to achieve mutually beneficial benefits that are agreeable to everybody.

In the interviews, the participants prioritized decisions that motivated long-term cooperation and agreement between members. One of the main models that analyzes cooperative situations and offers a variety of solutions for the distribution of the result among the members is the cooperative game theory model. This model is based on principles that aim to motivate the members of the cooperatives and make each one of them as satisfied as possible with the result. We suggest that it be precisely the government structures that initiate such an initiative, assuming the risks of the pilot application of the model and then its extension throughout the country.

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REVIEW OF RHETORICAL DEVICES IN THE ADVERTISING DISCOURSE AND PRELIMINARY USAGE IN ALBANIA

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Abstract

Rhetorical devices in the advertising discourse are ubiquitous and manifold in our daily life. Long appreciated for their colorful tonality in imbuing the advertisement or product packaging with memorability, this article sketches a review of McQuarrie and Mick's (1996) taxonomy of rhetorical figures which organizes them along the dimensions of complexity, regularity and deviation. Their taxonomy provides a theoretical framework for rhetorical figures' cognitive and persuasive effects or in a more symbolic term, what the semiotician Barthes (1985) called the "pleasure of the text". Taking cue from their increasing employment in the Albanian advertising landscape, this paper also offers a modest list ($n=25$) of the Albanian ads that employ rhetorical devices in their food advertisements to influence consumer perception. These rhetorical devices range from simple ones that are more repetitive and reverse in nature (*e.g.,* metonymy, parison and onomatopoeia) to more complex ones such as wordplay, metaphors and idioms. By providing a succinct review of these figures in the discourse of advertising, we aim to show their relevance and offer a promising avenue for further scrutiny and research. We prudently conclude that their employment in the advertising discourse has been on the rise in Albania in the last decade.

Keyword: advertising, consumer, rhetoric, stylistic, device.

Introduction

Stylistic figures are ubiquitous and manifold in the daily life and they affect the thinking process (Fillis and Rentschler, 2008). Under the umbrella of marketing, they are defined as "artistic deviations from audience's expectations" (Corbett, 1990). Marketers are often perceived as artists who employ language in order to create a certain identity. Leigh (1994) found that stylistic figures configured in over 74% of the ads (n=2183) analyzed, which proves the hypothesis that stylistic figures are widely associated with the world of advertising. And according to Leig (1994), the main function of figurative stylistics in advertising is "to convey the salient and desired product features in such a way that it encourages the consumer to consider purchasing the product".

Stylistic devices are ubiquitous and come in a vast repertoire in our daily life which influence our process of thinking. Below, we briefly mentioned two of them:

Metaphor

Being among the most used stylistic figures, metaphor is defined as a figurative use of naming something for another through comparison according to similarity in a mainly external. Toncar and Munch (2001) postulate that metaphor stimulates curiosity towards advertising and increases satisfaction by making them even more memorable. Also, metaphor resonates longer in people's memory as it evokes what the semiotician Ronald Barthes (1985) calls "the pleasure of the text" or the reward that comes from the clever and figurative positioning of signs and words. Consequently, it gives color and beauty to the spoken and written discourse and makes the brand stand out by giving it personality and influencing consumer perception (Ang and Lim 2006).

Pun

Another stylistic figure quite used in advertisements are puns or "wordplays" which contain the quintessence of metaphor in meaning but with humorous notes. The word game is defined as "a stylistic figure which expresses several meanings in one and with humorous notes" (Djafarova, 2008). Redfern (1982) calls wordplay a "recycling of language" but its relevance cannot still be underestimated as it infuses the advertising text with the seed of freshness, ambiguity and multifaceted humor.

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In rhetorical marketing, stylistic figures imbue brands with cultural and social meanings as they capture the consumer's time, attention, and income. This impact on the consumer comes as a result of an artistic complexity and linguistic deviation that stylistic figures transmit in advertisements. McQuarrie and Mick (1996) devised a taxonomy on the use of stylistic figures in advertisements where they divided them into two main columns: systematic figures for less nuanced words and tropes for more ambiguous meaning (*figure 1*):
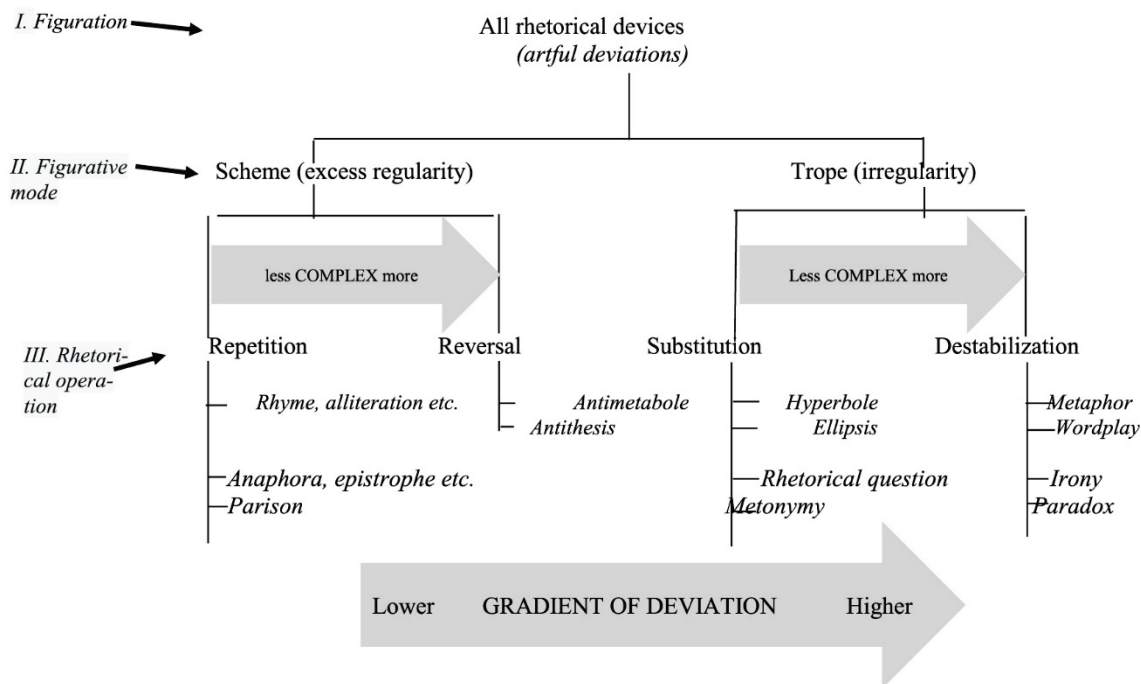
Figure 1. *Taxonomy of rhetorical figures in advertising*
Source: *McQuarrie, E. F., & Mick, D. G. (1996)*

Aims: This article has two aims: 1) to present a synthesized summary of the main stylistic devices and their salient features and relevant taxonomy encompassing them; 2) to provide a modest list of the stylistic devices used in the Albanian advertising landscape and encourage further research on their growing use by marketers and food operators.

Materials and Methods: In our search for qualitative data, we retrieved relevant literature through electronic databases, international marketing journals in particular. The sample (*n*=26) of stylistic devices used in the paper were retrieved through various media outlets such as TV ads, YouTube and social media.

Results and discussion: Notwithstanding the modest sample size of the above stylistic figures in Albanian advertisements, we can, nonetheless, emphasize that an increasing trend of their use has been observed throughout the last years. We assume this trend is due to the sophistication of Albanian operators, marketing departments and advertising agencies, who have updated their marketing strategies and aligned them with international standards on influencing consumer perception.

The array of stylistic figures that appear in advertisements and marketing campaigns, including Albanian ones, are diverse in variety and application. Due to their diversity and complexity, a modest list of artistic figures used in Albanian advertisements has been compiled below (*table 1*). In general, the stylistic figures "produce a more positive perception towards the brand and its advertising and are part of the rhetoric of the language that the above actors use, but not only. Further research with a larger sample size is needed in order to determine their diffusion in the Albanian advertising landscape.

Stylistic figures	*Text*	*Product or brand*
Pun	*S'ka nevojë për luftra, ne hamë kosin LUFRA!*	*Lufra*
Rhetorical question	*"Ore, kosi hahet apo pihet?"*	Lufra
Metonymy	*Ne të gjithë jemi Kockë e Fortë dhe çdo ditë zgjedhim mënyrën më të mirë për të qenë të tillë, qumështin LUFRA. Bëhu Kockë e Fortë!*	Lufra
Idiom	*Çdo gjë shkon mirë kur ke shokë për kokë!*	Elbar
Metaphor	*Spring, pranverë në trupin tënd!*	Spring
Parison	*Kap motivin, shijo ivin!*	Ivi
Metaphor	*Zemer u be dreka, se s'mban më ujë pilafi*	Orizi "Diamond"
metonymy	*Në mes të petave të brumit, fshihet një zemër e urtë plot krem!*	**7 Days Croissant**
Metaphor	*Redbull të bën me kraahë!*	Redbull
Idiom	*Për kokërr të qejfit*	Vezë Beata
Metaphor	*Bio Rea's; Ka diellin brenda!*	Vezë Rea's

Idiom	*Moda ecën mbi tapet!*	Pierre Cardin
Comparison	*Ndriço Kaiser and shkëlqe si një yll I vërtetë*	Kaiser
Metonymy	*Butësia shijon më shumë.*	Milka
Pun	*Je pa filtra kur ke uri.*	Snickers
Parison	*Bëj gol me golapiol*	Golapiol
Metaphor	*I etur për jetë!*	Uji Dukat
Metaphor	*Ndiz të ardhmen!*	Tring
Metaphor	*Ndërroni marshin e internetit tuaj!*	Abissnet
Metaphor	*Është e bukur që të thehet akulli.*	Super Snickers Super +1
Metaphor	*Zhytu në shijen e replaychips, të paharrueshme si stina e verës*	Replay
Metaphor	*Miku më i mirë i kafes*	7 Days Croissant
Onomatopoeia	*Pelenat në formë mbathje kundër pupunami-t!*	Pampers pants
Metaphor	*Krem Kakao në zemër.*	Molto
Metaphor	*Gatuaj me zemër.*	Diamond Pasta

***Table 1.** Stylistic devices used in Albanian ads*
***Source**: media outlet*

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ILLEGAL, UNREPORTED, AND UNREGULATED FISHING. A COMPARATIVE STUDY ON THE SANCTIONING SYSTEM OF ITALY AND ALBANIA

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Abstract

With over one-third of marine living resources exploited beyond safe biological limits, the impact of Illegal, Unreported and Unregulated (IUU) fishing on the sustainability of commercial fish stocks is even more concerning. Already in 2008, the European Union (EU) adopted specific legislation (Regulation (EC) 1005/2008) to prevent, deter and eliminate IUU fishing. These rules have been complemented by other important pieces of EU legislation, which contribute at reinforcing the fisheries control and sanctioning system of Member States, including Italy. The Italian fishing fleet is one of the largest in the Mediterranean area. Focusing on the Adriatic Sea, the fisheries sector plays a relevant role also for the economy of Albania, which is an EU candidate State. Against this backdrop, the paper will first focus on the regulatory framework in place at EU level to fight IUU fishing. Then, it will look at the fisheries sanctioning legislations of Italy and Albania from a comparative lens, in order to assess challenges and opportunities connected with their actual implementation, and to understand whether the legislations can be considered sufficiently effective in terms of deterrence and able to prevent and counteract the IUU fishing crimes that most damage the sustainability of the fisheries sector. This study is carried out in view of all the difficulties related to the harmonization of the laws and taking into account the proposal to reform the Common Fisheries Policy (CFP) that have been presented in the last period.

Key Words: Sustainability – Common Fisheries Policy – Member State – EU Candidate

Introduction

According to data reported by the Food and Agriculture Organization of the United Nations (FAO), the percentage of stocks fished at biologically unsustainable levels has been increased, from 10 percent in 1974 to 35.4 percent in 2019[6]. The presence of Illegal, Unreported and Unregulated (IUU) fishing is one of the factors that undermines the sustainability of the fisheries sector.

Fisheries is considered:

1) **illegal**, when it is conducted without a license or authorization, against conservation and management measures, or against national laws/ international obligations;
2) **unreported,** when it's not reported or misreported to the relevant authorities;
3) **unregulated,** when it's conducted in areas with no applicable conservation and management measures and conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources, or when the fishing vessel has no nationality[7].

The European union is one of the major global players in the fisheries sector, both in terms of its fishing fleet and as the world's largest importer of seafood products. The goal of ending IUU fishing has not yet been achieved, unsustainable fishing persists, and there is a risk of products from illegal fishing being sold on the market[8].

This study aims to analyze on three fronts - EU, Italy and Albania - the legislation related to fishing activities and, in particular, the part related to the sanction system aimed at combating illegal fishing, in an attempt to examine its critical issues and opportunities for improvement.

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Subjects and Methods

The research has been carried out through a comparative analysis of legal frameworks and a review was conducted to identify data and results reported by official institutions. First, investigating the regulatory framework in place at EU level to fight IUU fishing. Then, it has been analyzed the legislation of Italy, as one of the EU member states with the largest fishing fleets both in Europe and in the Mediterranean area. Finally, keeping the focus on the Adriatic Sea, a look has been turned at the Albanian legislation, as a EU Candidate State, to see what was the national legislature's choice in regulating the sanctioning system.

Results and Discussion

In 2008, the European Union (EU) adopted a specific legislation (Regulation (EC) 1005/2008) to prevent, deter and eliminate IUU fishing, which has been complemented by the Regulation (EC) n. 1224/2009 which establishes a community control system for ensuring compliance with the rules of the common fisheries policy and by the Regulation (EU) n. 1380/2013 on the Common Fisheries Policy (CFP). This latter provides that "Compliance with the CFP rules shall be ensured through an effective Union fisheries control system, including the fight against IUU fishing" (article 36). Whereas the title VIII of Reg. 1224/2009 sets out the enforcement system and, in article 89(1), it establishes that "Member States shall ensure that appropriate measures are systematically taken, including administrative action or criminal proceedings in conformity with their national law, against the natural or legal persons suspected of a breach of any of the rules of the common fisheries policy".

Meanwhile, Article 90 of Regulation 1224/2009 and article 42 of Regulation 1005/2008 establish what are considered "serious infringements", leaving it up to the member states how to intervene and which kind of sanction apply.Member states, therefore, provide within their national regulations different measures to deal with infringements of the Common Fisheries Policy, that could consist in administrative and/or criminal sanction.

The fishing sector in Italy has found its national discipline over the years in a plurality of regulatory texts, not always characterized by organicity and unity. The main law related to this matter is the Legislative decree 4/2012, which regulates the activity of fishing and aquaculture and the related system of sanctions. This law has been later amended by Article 39 of Law n. 154 of 2016 and Law n. 44 of 2019.

Law 154/2016 rewrote Articles 7-12 of Legislative Decree 4/2012, distinguishing between contraventions (7-9) and administrative offenses (10-12) and establishing the main and accessory penalties. It is possible to say, therefore, that it prevails a penalty system based on administrative fines, which has raised doubts regarding efficiency in terms of deterrence[9].

In Albania, the main national regulation on fisheries is Law No. 64/2012, which has also been amended many times and which regulates the activity of fisheries, its management, ensures the protection of marine life and inland waters through the promotion of sustainable development of the activity in the maritime space and inland waters of the Republic of Albania (article 1). The part relating to the sanctioning system is regulated by the articles from 126 to 130. Once again, looking at this law, it is possible to see that are predominantly provided administrative penalties.

In a study carried out by the European Commission regarding the sanction systems of member states, it has been observed some difficulties in harmonization of laws among EU member states. In particular it differs greatly, from State to State, the level of sanctions applied for similar types of infringements and there is also a wide variation in the use of the point system across Member States[10].

These difficulties also affect those EU candidate countries, such as Albania, which need to align their regulations with those of the European Union. In 2018, a reform proposal has been presented to amend the Common Fisheries Policy. This reform also includes the regulations of the European Union described above and the aspects related to the sanctioning system. The regulations, therefore, might be amended, and the difficulties associated with the harmonization could be reduced creating a uniform and more efficient system to fight IUU fishing.

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ABSTRACT

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This research aims to comprehensively explore the dynamic relationship between innovation and transformational leadership within Albanian organizations, with a specific focus on the agribusiness sector. Employing a mixed-methods approach that encompasses qualitative interviews and quantitative surveys, this study seeks to unveil a nuanced understanding of prevalent leadership styles across diverse organizational levels. By investigating autocratic, democratic, and liberal leadership styles, the research aims to discern their potential implications for fostering innovation and driving transformative change. Furthermore, this study intends to uncover potential variations in leadership approaches across organizations of varying types and sizes, providing insights into the consistency or divergence of leadership dynamics within different contexts. The outcomes of this research are expected to offer valuable insights for enhancing organizational development, strategic decision-making, and leadership effectiveness in Albanian organizations. Ultimately, this study contributes to the broader discourse on leadership, innovation, and organizational success, offering practical implications to navigate and thrive in the evolving Albanian business landscape.

Key words: Leadership Styles, Organizational Innovation, Agribusiness Sector, Transformational Change, Leadership Dynamics, Albanian Organizations

FACTORS INFLUENCING MIGRATION FROM RURAL AREAS OF ALBANIA.

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Abstract

Migration is a complex phenomenon influenced by many different factors, especially in developing or emerging economies. This paper aims to investigate the factors that influence migration from rural areas of Albania, an emerging / transition economy. The research combines linear regression analysis and descriptive statistics in order to identify both push and pull factors that influence the tendency to migrate. The study is based on an analysis of a sample of 100 farmers operating in two intensive areas of agriculture oriented in the cultivation of fruits and vegetables. The study found that perceived living conditions, the trend of village population, and the number of family members who have migrated are factors of influence on the tendency of the farmer to migrate. These factors were identified as key push and pull factors for migration. The study's findings have significant implications for policymakers and other stakeholders. The results suggest that policies and programs aimed at improve living conditions, reduce poverty, and support the agricultural sector growth are likely to decelerate the flow of migration from rural Albania.

Keywords: push factors, pull factors, migration, linear regression.

1. Introduction

Migration is a significant demographic phenomenon in Albania, particularly in rural areas. Since the fall of communism, Albania has experienced many immigration waves. Even after many years of transition, Albania is still a country with high levels of migration, with approximately one-third of its population living outside the country's borders (IOM, 2023). The main reason of migration, particularly from rural areas are socio-economic factors. According to different studies there are significant differences in socio-economic indicators between rural and urban areas. Poverty is higher in rural areas and the rural population tends to live in worse conditions than those in urban areas. Other challenges that hinder rural development and thereby push migration include small size of agricultural farm, property rights, underdeveloped agricultural infrastructure, low access to/low use of technology, low access to public services, lack of cooperation between farmers and social capital (Azizaj, 2019).

Many authors, including Stark and Levhari (1982), Mendola et al. (2004), de Haas (2006), Urbanski (2022), de Miguel Calvo (2021), and Gjongecaj (2018) have analysed this issue. However, studies that focus on the factors that cause migration from rural areas, especially those with intensive agricultural activities in Albania, are very rare, if not absent. This study aims to analyse the factors that influence migration from rural areas of Albania, particularly among fruit and vegetable growers.

Migration is a strategic decision that people make to improve their life quality by taking advantage of opportunities that are not available in their country. There are many reasons why people choose to migrate, such as economic, social, and political factors. For instance, poverty, political instability, and social conflicts can be the push factors that force individuals and families to leave their homes (Urbanski, 2022; Radel, 2018). Developed countries offer better employment opportunities which is why they are the preferred destination for many migrants (Llull, 2017; Gjongecaj's, 2018). Another important factor is the trend of the village population. If there is a fast decline of the population, there will be a higher tendency to migrate. This factor can be analysed in several dimensions such as the reduction of employment opportunities (Drouhin, 2013), reduction in services and increased social isolation (Bock et al., 2014). On the other hand pull factors refer to aspects that attract people to a particular country. According to Gjongecaj (2018), social and economic factors are the main factors that attract migrants. People may migrate to be closer to family and friends or to join a community with similar values. Former family migrants can serve as a moving bridge by providing information, temporary accommodation, and orientation to the labour market in the host country.

Methods

Data

This study focuses on migration trends and behaviour linked among farmers specialized in apple and vegetable production (53 and 47 farms respectively), using a structured questionnaire designed based on literature review. The interviews were conducted through phone calls with respondents who were previously part of another study in 2020. The majority of the respondents are from the villages of Korca and Fier, which are two of the most important counties for the agriculture sector in Albania. However, farmers in these areas are facing many difficulties, which have been worsening year after year.

The empirical model

To understand the relationships between the dependent and independent variables, a multiple linear regression analysis was performed. This method was used by Urbanzki (2022) and Zanabazar (2020) in their studies regarding the factors influencing migration.

The general form of this model is : $Y = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 X_5 + a_6 X_6$

Where: a_0 is the constant and shows the expected value of Y when all the independent factors are 0.

- parameters for=1,2,3,4....n are the partial regression coefficients. (Osmani, 2017).

2. Results and Discussion

Based on the regression analysis, there is a significant relationship between the perception of living conditions and farmers' tendency to migrate. This means that when farmers feel that their living conditions are better, they are less likely to leave rural areas. The impact of the perception of living conditions on the tendency to migrate is statistically significant (p=0.006). Furthermore, the regression analysis shows that the trend of the population in the village over the last ten years is an important factor (p=0.007). This means that the reduction of the population in rural areas has a significant impact on the increase of the tendency to migrate from rural areas.

Table 2. Regression analyses results

Dependent variables	B	SE	Beta	t	Sig.
Constant	5,733	1,381		4,153	,000
Change in cultivated area	-0,100	0,252	-0,046	-0,398	0,692
Production costs	0,080	0,206	0,038	0,390	0,698
Family members in migration	**0,617**	**0,257**	**0,251**	**2,396**	**0,019**
Cultivated area in 2022	0,017	0,012	0,143	1,466	0,147
Population trend during the last 10 years	**-0,563**	**0,202**	**-0,273**	**-2,784**	**0,007**
Age	0,002	0,009	0,022	,217	0,829
Education	-0,091	0,109	-0,081	-,838	0,405
Change in yield	-0,142	0,256	-0,064	-,556	0,580
Living conditions	**-0,546**	**0,194**	**-0,343**	**-2,817**	**0,006**
Relative poverty	-0,199	0,195	-0,124	-1,021	0,311

Source: Author

The regression analysis indicates that the presence of family members who have migrated before has a significant impact on the stated likelihood of other family members to migrate (p-value is 0.019). The other variables included in the model were not significant in explaining the tendency to migrate from rural areas.

3. Conclusions

The aim of this paper was to analyze the factors that influence migration from rural areas of Albania, with a focus on fruit and vegetable farmers. The study found that having family members who have already migrated, perception of living conditions, and the trend of population in the village were the main factors that influence the migration from rural areas. Additionally, the study suggests that policies and programs that improve living conditions, reduce poverty, and support the agricultural sector can help reduce the rate of out-migration from rural areas. Providing financial and technical assistance to farmers, investing in rural infrastructure, and improving access to education and healthcare in rural areas are some of the important implications for policymakers. However, the study has some limitations, such as a small sample size of only 100 farmers or the number of factors included in the study.

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IMPROVING THE POSTAL TRANSPORT NETWORK USING GRAPH THEORY.

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ABSTRACT

Graph theory and technological tools for modeling distance networks help in the study and optimization of these networks with the aim of increasing the efficiency of various services. In practice, various problems are often encountered that are well reflected by schemes such as: the transport scheme between several centers, the scheme of the water supply network, the electrical network, the scheme of work operations in the process of production, construction or repair of a factory, factory etc.

A wide range of systems, from social networks to computer networks can be analyzed using different algorithms and techniques.

This study presents a new and effective methodology for finding the shortest distance between two postal points of the Albanian Post in the city of Tirana, using the C++ programming language (Floyd algorithm).

The purpose of the study consists in finding the shortest distance in time values by optimizing the transport time. A database was built with the necessary data for 24 postal points regarding their exact location, addresses, distance and travel time between them, postal codes and services offered by each office.

Through Google Map, data on the approximate distances of the postal points taken in the study have been collected.

The results of the study aim to draw conclusions and proposals for improving the chain of movement between postal points but can also be applied to similar studies.

Keywords: Graphs, distance, C++, algorithm, optimization, postal points.

Introduction.

Albanian Post is the largest commercial company operating in the postal and financial services market in Albania. There are 533 post offices, 100 postal services and about 2,500 employees.

One of the companys objectives is to minimize the cost of postal services, reducing transport costs by finding the shortest routes. To achieve this objective of the company in this study we used mathematical optimization and graphs.

Graphs are a way to model the real systems that are objects of study. A graph is a diagram constructed from a set of points and a set of connecting lines, directed or not, connecting each of these points.

In the case of the Albanian Post, the post offices in the city of Tirana serve as facilities, while the links are the roads directly connected to them.

Using mathematical optimization and graphs, in this study we find the shortest routes between post offices, which will help minimize the cost of postal services.

Material and Methods.

Mathematical optimization is evolving every day, merging with the characteristics of various computer systems and software.

As we have emphasized, the main objective of the study is: finding the optimal time of movement at the postal points of the Albanian Post in the city of Tirana. We referred you to 24 main points with great activity in its services.

The data is primarily collected by the work group through direct information from the central post office as well as through Google Maps. Information was obtained from the central office related to postal points, postal code and other services, while distance and time interval were obtained from Google Maps.

Graph theory, specifically the Floyd Algorithm, was used to solve the problem. This algorithm finds in a single process the shortest path between each pair of nodes in the network. In this study, the nodes are represented by postal points, while the courses, by the time needed to move between them. The basic idea of the algorithm is to replace a direct path between two nodes with a shorter path through a third node, if the latter exists.

For the given graph, we first build the distance matrix $A=(l_{ij})$, where l_{ij} is the distance between point i and point j. Which is accompanied by $S=(s_{ij})$ the matrix with elements $s_{ij}=j$ for each ij.

The algorithm works in this way:

The initial step is zero where $l_{ij}=l_{ij}$ and $s_{ij}=s_{ij}$. The k-th step where k=1, 2,...,n is such that: $l_{ij}^{(k)}= \min \{l_{ij}^{(k-1)}, l_{ik}^{(k-1)} + l_{kj}^{(k-1)}\}$ for i,j≠ k. Matrix S in this step acts as follows: $s_{ij}^{(k)}=k$ if $l_{ij}^{(k)} \neq l_{ij}^{(k-1)}$ while $s_{ij}^{(k)}= s_{ij}^{(k-1)}$ if $l_{ij}^{(k)} = l_{ij}^{(k-1)}$.

After performing the steps of the algorithm for the A matrix, we find $l_{ij}^{(n)} = l^{ij}*$. This means that element ij of the matrix A(n)=A* gives the minimum distance from vertex (i) to vertex (j). The matrix A* is called the minimum distance matrix. The matrix S*=S(n), which is found after performing n steps of the algorithm for the matrix S, serves to find the shortest paths from vertex x_i to vertex x_j. If $s_{ij}* = j$ then the shortest path from x_i to x_j, is the arc (x_i,x_j). If $s_{ij}* = r \neq j$ then vertex x_r is an intermediate vertex of the shortest path from x_i to x_j and the shortest path from x_i to x_j has the form of: $\mu_{ij} * = \{x_i,...,x_r,...,x_j\}$. Further, in an analogous way, if there are intermediate vertices, the shortest paths from x_i to x_j are found. After a finite number of steps, the shortest path is found.

The application for finding the shortest route for the Albanian Post Offices in Tirana, is presented in the section below.

Results and Discussion.

To achieve the result, we first built the accompanying graph matrix, taking as its element the transit time between two postal points. The accompanying matrix S_1 is presented in Table 2.

Table 1: Data matrix A_1

Table 2: Accompanying matrix S_1

Source: Data processed by the authors

Source: Data processed by the authors

The changes that were made in the next step are marked with □, and the row and column I take into consideration are marked with the blue color. After 22 steps, we reached the final matrix A_{22} which is found in Table 3 and its accompanying matrix S_{22}, which is found in Table 4.

Table 3: Matrix A_{22}

Table 4: Associated matrix S_{22}

Source: Data processed by the authors

Source: Data processed by the authors

With the last matrix of results, A_{22}, we easily find the time needed to pass between every 2 nodes. Since it does not contain any ∞ element, it means that all nodes are connected to each other by a finite path.

For example, the time needed to go from node 3 to node 19, results in 25 min ($l_{3\,19}*=25$). We have also found, by means of matrix S_{22}, that to go from point 3 to point 19, we must take the following path:

$\mu_{3\,19} * = \{x_3, x_7, x_{12}, x_{17}, x_{18}, x_{19}\}$. To find the points where we must pass, we acted in this way: We went to the matrix S_{22} to the element $s_{3\,19}$ which has the value 18, and is different from the ending node 19. After that we checked the element $s_{3\,18}=$ 17 which is different from 18. Also, after checking element $s_{3\,17}$, which resulted in 12 and different from 17, we continued checking the element $s_{3\,12}=7$ and this resulted different from 12. We checked $s_{3\,7}=7$. Since the value of $s_{3\,7}$ is 7, same as the end node. After that we stop the search and write the path that goes from node 3 to node 7 and then to nodes 17, 18 and 19 respectively.

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PROSPECTS AND CHALLENGES OF E-BANKING IN ALBANIA

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Abstract

The digital transformation experienced by all economic entities, families, individuals, but also society itself, is becoming more and more sophisticated in all aspects of money management. We live in the time of artificial intelligence technology and digital implementation requires a higher degree of technological understanding from both banks and individuals, further increasing the complexity for the banking system in the role of implementer. These requirements, combined with ongoing developments in banking regulation, (including Basel III and changes to money market fund rules) have already had an impact on bank and customer behavior. Nowadays, the aim for the total digitalization of the banking system has made the banks to be more oriented towards consultancy compared to the service that it currently offers. But how ready are Albanian citizens to accept the new digital reality in the banking system? This paper aims to fully analyze the possible implementation that digital innovations will have on the client (Albanian individuals), the perception that Albanian citizens have towards this drastic change in the banking system and how ready they are to accept it, all these questions will be analyzed through a survey addressed to a large number of individuals of different age groups about the changes that banks have in focus to carry out. Finally, the research question, digitization: Positive or negative for the Albanian banking industry?

Key Words: E-banking, Digitization, bank customers, bank online services, pandemic

Introduction

We have officially entered the digital era, digital economy, digital education, and definitely digital banking services. In our society, for more than 20 years, banks have led the market in terms of service innovation, implementation of rules and standards, application of European financial reporting directives, but also in providing contemporary services to their clients. Online banking services were initially not welcomed by the large clients to whom they were initially introduced, mainly due to security and a complete lack of information. The purpose of this paper is to analyze the impact of digitization in the banking sector, focusing on the perception that Albanian consumers have towards this change, affecting the impact of the pandemic in this process, in the end we will look at it from the perspective of the banks. The pandemic was the biggest health concern worldwide, after the Spanish Flu, also known as the deadliest flu pandemic of 1918, after World War I. The effects of the pandemic are not limited to human health; they also affect the health of companies, and even the economic and social health of countries. As the world overcomes the 18-month milestone in the Covid-19 crisis, some long-term consequences for its banking industry are becoming increasingly apparent. Some of them cannot be accurately measured, yet, due to physiological delays in official statistics. Anyway, one of the effects, let's say positive, from the impact of Covid-19 in the banking industry is the acceleration towards the world of virtual banking.

Methodology

The methodology used is a combination of primary and secondary data. The first part is built on the basis of theory using relevant literature for the topic argument that has been chosen. The research was done electronically, being very current as a study, there is still no concrete book. The second part was built by developing a survey which was completed by individuals of different age groups. The research method selected in this paper is quantitative. Quantitative data collection methods rely on random and structured sampling of data that fit different experiences into predetermined categories. These methods produce results that are easier to summarize, compare and generalize. The realization of the research was designed in such a way as to facilitate the cost of gathering information and at the same time achieve satisfactory results that would help draw the most accurate conclusions. The instrument used in the study to collect information is the realization of a survey. This quantitative method is an easy-to-use and effective tool to obtain respondents' opinions and attitudes. The number of questions is limited, namely 13 questions, which allow for a modest analysis and to generalize the data from the sample to the entire population. It took about 2 weeks to reach this number of respondents. However, for the very nature of the topic, we think that this instrument is the right one to use, considering the topic and what we intend to study in this paper. The survey was created electronically through the Google Forms platform and distributed online through the link to individuals of different age groups. The survey was completed by 374 people and we cannot say that this questionnaire has generalizable results, taking into account the aforementioned fact regarding completion by a not very large number of individuals.

Results

According to results of the survey, the majority of respondents were 18-30 years old, namely 98.10%, this is because young people spend more time on social networks where the survey was distributed. 1.6% were in the 31-40 age group and the rest of 0.30% were over 40 years old. Most of the respondents were female, namely 65% and the rest male 35%. Women are more inclined to spend time on social networks compared to men, which is why this high rate of participation by women in the survey occurs. The majority of respondents had a Bachelor's degree with a percentage of 57.5%. With a big difference compared to secondary education, where it occupies a percentage of 21%, and an almost the same difference with Masters, PHD, where it occupies a percentage of 21.6%. Most of the respondents, namely 54.1% of them, were employed, so most have a salary and contact with banks that can guide them towards using digital banking even for minimal actions. The rest of 45.9%, which mainly includes those who are in the process of studying and have not yet completed them, are those who are not employed. Respondents were asked if they are aware of the digital innovations that are expected to happen in the banking system in our country, 62% answered Yes while 38% answered No. All those who stated that they are aware, are those who have bachelor's and master's education, PhD. Respondents were asked how much they agree with banks operating only online, turning branches into financial consultation centers, 48.60% of respondents answered that they do not agree because they are of the opinion that there is still a lack of technological systems to fully apply this method new and lack of knowledge in using this method.

Conclusion

The total shutdown during the pandemic, the time zone pushed Albanian individuals and not only, towards the installation, until the use of the application almost every day, accelerated the digitization process by several steps forward and with a high incentive. When the respondents were asked if they consider total involvement towards digitization in the banking sector as a possibility in the future, according to the results of the respondents who answered with YES, the reliability and opinion they have towards the total digitization of banking services is at a high level, and only 18% were of the opinion that it cannot be completely replaced. Concluding this paper, we want to emphasize that the integration in the digital world is challenging as well as hopeful, where with its challenges and difficulties it will lead the world towards simplicity, transparency and with many opportunities, waiting for the results of digitization not only in the banking sector but in every area of life.

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GREEN FINANCE (GF) AND CHALLENGES FOR ALBANIA

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Climate change is at the heart of global policies. Monitoring and raising awareness of the problems to be overcome boosted Green Finance (GF). Innovation at the service of sustainable development is also currently a challenge for our country. Albania, as well as a candidate country for EU membership, has ratified a series of important environmental conventions in which sustainable development is required. GF is seen as the main tool in achieving sustainable development goals. Due to the lack of studies and discussions concerning accounting and GF, the aim of this article is to present arguments in favor of promoting them and to develop guidelines on how to develop CF in Albania. The reflection of the lessons learned by international organizations and the respective methodologies forms the basis of our analysis. Furthermore, the current situation in Albania related to environmental investments and initiatives has been analyzed.

In addition, we conclude and highlight the challenges ahead, the emergency needs and imperative obligation for institutional collaboration to strengthen the legal bases and create a new culture related to the implementation of GF. Developing a regulatory framework and ensuring the state support towards the private initiatives regarding green finance would help booster green economy. In the infancy phase of GF in Albania, there is the need for strengthening the network between universities and business sector in order to further promote green finance.

Key words: Green Finance, environmental sustainability, regulations, public and private institutions, university and business.

1. Introduction

The negative effects of climate have pushed policymakers to consider sustainable development in their development strategies, respecting the rules of nature.

Resource efficiency is an essential component of the European Union's strategy 2020 for sustainable, smart and inclusive growth[11]. In this initiative, the policy framework has been developed that will be reflected in strategies that address climate, energy, transport and broader resource challenges.

In global level nearly 200 countries have agreed on implementation of Intended Nationally Contributions (INDCs) in terms of greenhouse reduction. In developing countries these requires the contribution of developed countries to provide them the necessary funds on conducting their adaptation and mitigation projects. (UNFCCC 2009). The Green Climate Fund (GCF) is one of the largest climate funds following the Paris Agreement, mandated to support developing countries raise and realize their Nationally Determined Contributions (NDC) ambitions towards low-emissions, climate-resilient pathways. The developing countries are more reluctant in achieving their emissions reduction targets solely relying on these summit commitments (King 2017 and Pickering et al 2015). New financing mechanism are recommended to address the climate change and green finance recently.

Green finance is the way to increase the level of financial flows (banking, micro-credit, insurance, and investment) from the public, private and not for profit sectors to promote sustainable development priorities (UNEP 2020).

2. Why it is important Green Finance for Albania?

While the economy in Albania is developing and oriented more and more in the regional market, the national development strategies of the country emphasize the importance of a sustainable development in respect of nature and the acceptance of climatic changes. During the last thirty years, Albania has drafted ambitious policies regarding climate change.

On the other hand, according to International Monetary Fund (IMF), 2022, "*on average, Albania is hit by close to one disaster per year, 3 with each natural disaster causing damage of about 1.3 percent of GDP and affecting about 5000 per 100,000 inhabitants. While the frequency of natural disasters in Albania is lower than in the European Union, the impact of each event is about twice as large in percent of GDP and affects a greater share of the population.* "[12]

Besides, *Albania is vulnerable to the impacts of climate change, with increased vulnerability due to its infrastructure needs, and poverty in rural areas*[13].

The negative effects of climate change in Albania have been evident in recent years. In addition to the strategies draw up at the national level, the financial institutions also have their role influencing the mitigation of environmental risks, through the undertaking of appropriate investments.

3. Material and methodology

Principal aim of this paper is to present GF, its aspects and instruments and methodologies to evaluate. Furthermore, we identify the problems related to the institutions responsible for GF in Albania and provide recommendations regarding opportunities

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[11] COM (2010) 2020

[12] IMF Country Report No. 22/363

[13] World Bank Group 2021 CLIMATE RISK COUNTRY PROFILE: ALBANIA

for improvement. The mechanism of GF for sustainable development in Albania case is emergent. But the studies addressing GF and embracement from policies and companies are limited.

For this reason, our support methodology is the study of different international resources in Albania case, foreign scientific articles and practices that can identify in our reality.

4. Results and discussions

According to World Bank, Albania's economy, like other countries in the region, is recovering faster than expected after the historic recession created by the COVID-19 pandemic. Following the contraction of the economy by 4 percent in 2020, GDP growth is projected to reach 7.2 percent in 2021, one of the highest among Western Balkans countries, says the latest edition of the Western Balkans Regular Economic Report [14].

As the economic models were developed in the age of resource abundance no environmental concerns were valued to these models, only labor and capital (Schoenmaker 2019). The environmental challenges require the transform to a zero-economy emission. In this approach sustainable finance can play an important role managing the investing and lending with economic, social and environmental issues.

In addition, we will discuss on opportunities and challenges that policy makers, government, financial system and companies encounter in Albania.

Albania has supported a series of international conventions that require the achievement of climate change objectives. But there is no coordination between the responsible institutions to achieve these indicators.

Sustainable finance includes financial activities that are products and services that are created to ensure better environmental impacts. So, loans, debt mechanism and investments intend to encourage the development of green projects or manage the impact of climate change has to be defined by the government in national level and attract the private investments.

Topalli suggests urgent planning and action from national authorities in addressing the challenges that climate change and the transition pose to the Albanian economy and its financial system. Green financing could be promoted through changes in countries' regulatory frameworks, harmonizing public financial incentives, increases in green financing from different sectors, alignment of public sector financing decision-making with the environmental dimension of the Sustainable Development Goals, increases in investment in clean and green technologies, financing for sustainable natural resource-based green economies and climate smart blue economy, increase use of green bonds, and so on.

We suggest some axes to accelerate the process:

Firstly, imperative need to construct a national strategy for GF

Second, to integrate GF in different sector development in order to realize a decision-making process respecting environment and to be able to overcome the climate risk effect

Also, the universities must guide the enterprises to adopt the instruments of GF for example in loan process respecting sustainable development, etc.

We constate also Albania has supported a series of international conventions that require the achievement of climate change objectives. But there is no coordination between the responsible institutions to achieve these indicators. Better support from Bank of Albania for application of financial instruments to applicate GF for financial institutions and enterprises must be real.

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UNHAPPY LEAVING THE YOUNG FROM ALBANIA - A STUDY ON THE REASONS AND THE INFLUENCE OF GOVERNMENT POLICIES ON THIS DECISION

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ABSTRACT

Migration is a powerful level of social and economic development, an important concern as it comes with many benefits but also significant challenges and inequalities[15].The study highlights the main factors of migration of leaving migrants the lack of prospects for development of the country, poor economic living conditions, unemployment, or few employment opportunities, which result in insufficient income for Albanian families. This research shows that people who are unemployed and those who were self-employed in their country of migration have a stronger tendency to leave. The existing literature on migration is dominated by the descriptive study approach and we hereby want to emphasize the importance and the need for greater use of modeling and statistical inference for identifying reciprocal relationships and obtaining more reliable results. This paper includes N=950 respondents from the age of 18-65, who were asked about the main reasons for emigrating outside of Albania. The results of the study present the reasons for the increase in the number of people who are leaving every day for EU countries. The data are collected through interviews face-to-face and Via E-mail (Google Forms) and calculated with the SPSS statistical program. Identification of the improvement of migration governance through effective national programs and policies on the return and integration of Albanian migrants.

Key Words: Emigration, migrants, leaving, government policies, Albania

INTRODUCTION

The migration of Albanians, which started in the early 1990s, was one of the most important human events of the post-socialist transition in Europe and helped define a new "map of European migration. The Albanian transition from communism to democracy after the fall of communism can also be shown as a history of migration, both internal and external because one of the most visible features of the Albanian transition has undoubtedly been migration(Osmani, 2022).

Images of overcrowded boats with thousands of Albanians fleeing to Italy to escape a country collapsing into political and economic chaos dominated the media and became part of the global iconography of migration in the 1990s (King, 2002)**.**

According to INSTAT8, five factors are estimated to currently influence emigration toward the EU, including; work opportunities abroad (84%), family reunification (4.6%), unemployment rates in Albania (4.2%), study opportunities abroad (3.5%) and other factors (3.6%). Additional pull factors are also a higher quality of training and educational opportunities abroad. In turn, shortcomings of public services have served as push factors, adversely affecting migrants' efforts and chances to return and settle in Albania (IOM 2. , 2019-2020). The number of migrants continued to increase every day. Research in this area could not only facilitate identifying the causes or reasons for re-leaving but also assess their relevance and contribute to a more complete and realistic investigation of the problem and to the most effective treatment of the problem of migration and, perhaps, in slowing down or overturning his tendencies(Osmani, 2022).The study also highlights the lack of effective policies in support of young Albanians who want to leave, also emigration has led to the maximization of the income of the Albanian state thanks to the sending of remittances.

The topic of migration, also for Albania, is one of the most prominent and developed topics today. It focuses mostly on poverty, its causes, factors, trends, and intensity, but also on policies, the role of the government, and their effectiveness.Around the world, more than 280 million people are international migrants(Nations, 2020). Migration is not a new phenomenon. Nowadays, migration is more complex and faceted, involving both societal macro-levels as well as an individual's reality. According to the International Organization for Migration (IOM), a migrant is '...any person moving or who has moved across an international border away from their habitual place of residence, regardless of whether the movement is voluntary or not, the causes of the movement or the length of the stay(IOM, 2018) . From the point of view of migration scholars, Albania is a wonderful laboratory for the study of migration in its various forms—international, internal, and return migration (IlirGedeshi& Russell King , 2018),(Heim, 2022). Albanian emigration represents a unique case in international migration due to the significant size of the population outflow and the type of migration that is almost exclusively directed toward two destination

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[15]Eda Gemi and Anna Triandafyllidou,' *Rethinking Migration and Return in Southeastern EuropeAlbanian Mobilities to and from Italy and Greece'* *https://www.routledge.com/Rethinking-Migration-and-Return-in-Southeastern-Europe-Albanian-Mobilities/Gemi-Triandafyllidou/p/book/9780367758509*

countries, Greece and Italy(J, 2013). This paper presents the main trends and drivers of migration in Albania over the last decade and significant insights into the economic and social impact that migration creates.

1. DATA AND METHODS

This study includes 950 respondents from the age of 18-65 years old, who were asked about the main reasons for emigrating outside of Albania. The results of the study present the reasons for the increase in the number of people who are leaving every day for EU countries. The questionnaire was delivered face-to-face with consumers, and a part of it was shared with Google Forms, as it is more accessible to get more effective answers. The duration of completing the questionnaire was the period January - June 2023. Then the most effective answers were selected and the data were processed with the statistical program SPSS.

Table 1: Current place of residence of the interviewers

	Description	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	256	26.9	26.9	26.9
	Urban	694	73.1	73.1	100.0
	Total	950	100.0	100.0	

Source: Author

The data above shows the current place of the interviewer. **73.1%** lives in urban area and **26.9%** lives in rural area.The focus of the study was to interview new generations why they have such a great desire to leave Albania.

Table 2: Education of the interviewers

	Description	Frequency	Percent	Valid Percent	Cumulative Percent
	Elementary school	26	2.7	2.7	2.7
	Middle school	127	13.4	13.4	16.1
Valid	Higher school	251	26.4	26.4	42.5
	University	546	57.5	57.5	100.0
	Total	950	100.0	100.0	

Source: Author

The data in table 3 show the education of the interviewees. After the 90's in Albania, a development was also noticed in education. That means young people are more aware of the path of higher education to increase their standard of living. **2.7 %** are with elementary school and **57.5 %** are with university from 950 respondents.

	Description	Frequency	Percent	Valid Percent	Cumulative Percent
	Unemployment	319	33.6	33.6	33.6
	High corruption	164	17.3	17.3	50.8
Valid	Insecurity of livelihood	298	31.4	31.4	82.2
	Expensive medical visits	169	17.7	17.7	100.0
	Total	950	100.0	100.0	

Source: Author

The data above show the reason why new generations are leaving from Albania. The first reason is unemployment, the seconds is insecurity of livelihood, the third high corruption and the expensive medical visits.

2. DISCUSSION AND CONCLUSIONS

From 950 selected interviews, 85% were answered by women and 15% by men. The main reasons for leaving are unemployment, security of living for a better future. From the result showed that leaving from Albania correlates positively with income with a sig. < 0.05, which means that Albanians want to maximize their income. Recent statistics show an increasing trend of the female gender to immigrate to EU countries. The main reason is the higher salary in EU countries. However, the interventions of the government with the increase of the minimum wage for the year 2022-2023 are not left behind. This was a positive support for all areas such as education, health, energy, industry, etc.

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THE POTENTIAL OF RURAL TOURISM ON SECURING THE HERITAGE OF ALBANIAN VILLAGES

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Abstract. The aim of the paper was to identify the challenges related to the main problems facing the heritage of Albanian rural communities. The relationship between rural cultural heritage and its preservation has been a topic of significant academic and sociological discussion. Many factors, such as migration, climate change and globalization are directly and indirectly threatening all forms of rural cultural heritage. The paper looks at the role played by rural tourism of rural regions as a driver for the sustainability challenge and regeneration of rural communities. It highlights how rural tourism impacts both sides of the sustainability equation, the development of rural communities and the safeguarding of the cultural heritage. The impact played by cultural tourism was studied through a survey on giving evidence how rural tourism contributes in the safeguarding process of cultural heritage. It has been shown that rural tourism constitute one of the catalyser for rural community valorisation.

Keywords: rural tourism, cultural heritage, valorisation, rural development, sustainability

Introduction

The nature of challenges now occurring simultaneously locally (depopulation, abandonment of rural communities) and globally (climate change, scarcity of resources, migrations, etc.) are key factors that societies are turning their attention to the main problems facing local communities, the environment and the loss of rural cultures and traditions [1]. The loss of cultural heritage has been observed to correlate with loss of social cohesion and a decreasing resilience to climate change, indicating the necessity of plans for the adaption of cultural heritage to the effects of depopulation, globalization, and climate change.

The process of urbanization in Albania has been accompanied with rapid demoghraphic changes, lack of economic competitiveness, and cultural transformation [2]. Rural people are leaving the countryside and many villages are facing with villagers abandoning their homes for new opportunities, education and a better quality of life [3]. The rural depopulation is intensifying due to deepening unfavourable trends in the demographic patterns and these local communities are facing a loss of cultural heritage practices, rural artefacts, and in some cases unique traditions which can lost forever [4].

Cultural heritage has been recognized as playing an important role in addressing global risks, especially for its ability to strengthen community awareness and engagement for the appropriate conservation of the historic environment and cultural landscapes, and the safeguarding of relevant traditional knowledge, values and practices, which enhance the resilience of communities to disasters and climate change [5].

Literature shows that rural tourism in various forms that it has: ecotourism, agritourism, and especially cultural tourism holds potential for supporting the development of local communities, safeguarding the risked traditional culture and improving the quality of life, which may alleviate depopulation in the villages [6]; [7]; [8]. The paper focuses on safeguarding the rural heritage through rural tourism which is an economic and social driver of developing opportunities, transforming everyday activities, ensuring the viability of the countryside, and fostering rural heritage resilience.

Theoretical framework

Culture is the core of our society. Cultural heritage can be a most valuable source of knowledge and inspiration for citizens, heritage managers, policy makers, and society as a whole [9].

The Council of Europe's Framework Convention on the Value of Cultural Heritage for Society defines 'heritage community' as a community that "values specific aspects of cultural heritage which it wishes, within the framework of public action, to sustain and transmit to future generations" [10]. A heritage community is characterized by awareness of the resource value of its cultural heritage, a sense of belonging, inclusiveness, collaboration at all levels, a common interest in heritage-led actions, shared civic responsibility towards important cultural assets, both tangible and intangible [5].

Albania's rural areas have gone through severe problems, including substantial depopulation, inadequate public services and low access to public services. Depopulation has become a signature demographic phenomenon in broad regions of rural Albania. Many rural areas are involved in an irreversible process that is reducing them to purely geographic denominations. In addition to this, globalization and climate change poses serious threats to the protection and preservation of cultural heritage and resources of rural villages [11]. Currently, climate change represents one of the biggest threats to culture and heritage, as physical damage and periodic damage due to changing weather conditions and recent cases of extreme impacts have increased [8]. However, the opportunities exist in rural development, due to abundant natural resources, rich cultural heritage and potential of the rural tourism sector. Focusing on rural tourism of these communities, economic development heavily relies on preserving and promoting their natural and cultural heritage.

The extent in which rural tourism positively contribute to the regeneration of rural areas, which have been subject to rural depopulation, economic decline, and multiple social and economic issues, has become a central concern of residents, academic and sector experts. This is so in view of the advancement of an integrated local strategy for rural tourism in terms of rural sustainable development. The role of rural tourism is to protect and reveal what already exists in the cultural heritage that can

attract visitors and generate economic activity, while protecting the environmental and cultural heritage [12]. Rural tourism is a driver in supporting sustainable local areas development maximising the economic, cultural and societal values of rural communities.

Table 11. Evidence of tourism's contribution in rural development

Physical regeneration	Economic regeneration	Social regeneration
Sustainable development	Competitiveness and growth	Social inclusion
Heritage conservation	Employement	Social cohesion
Quality of life	Regional development	Rural renewal
Diversity (eco-, agri-)	SMEs/micro-entereprises	Social capital
Land use	Job quality	Identity
Access and mobility	Skills and training	Health and well-being

Recent global policy frameworks underline that the role of cultural heritage in sustaining the development, requires enlargement and differentiation of the arena of actors, towards innovative partnerships between the heritage sector, on one hand, and the wide range of stakeholders, including local governments, humanitarian organizations and the private sector [13]. It is underlined also the role of educational and research institutions in supporting the various actors in the different phases. Understanding the current challenges facing cultural heritage is important as it is to be conserved and passed onto future generations.

Materials and methods

The research tests the relationship of rural tourism and heritage community indicators and highlights the characteristics and potential of the concept. The research method was a triangulation of content literature research, a study survey, and a series of semi-structured interviews. The research context is that of Albanian rural areas, proved to be an interesting laboratory for the crucial challenges facing these territories.

The objective of the survey, based on the theretical framework, was to elaborate the relationship between rural tourism and its role in the conservation of rural heritage and in the social and economic development of local communities. The interviews represented a necessary support for the interpretation of the results obtained through the questionnaire. The method was based on direct surveys, carried out throught distributed questionnares and interviews with selected stakeholders. The questionnaire was distributed to about 200 people and the 14 semi-structures interviews lasted between 20-30 minutes. For data interpretation, data were gathered and graphs were done to compare the results.

Findings and discussions

The questionnaire interviewed 200 people and received 187 responsed. From the answers received it is shown that Albanian rural communities have a touristic potential, given by a large majority of affirmative answers. According to the answers of the questionnaire, the main positive outcome of the rural communities was the enhacement on the beautiful landscapes, traditional culinary, hospitality, and the unique cultural dimension.

Data from interviews conducted to assess the impact of rural tourism in generating new job opportunities, rural economic growth and creating rural renewal through dynamic types of rural tourism, with respectively of 94% of the answers. Furthermore, the enhancement of local events, destination reputation, tourist experience, marketing, and promotional activities stand as key factors contributing to the development of rural tourism and its role as catalyser for rural community valorisation.

Better results were achieved for the relatiship between roural tourism that seems to help build a diverse and innovative economy through enhancing the cultural sector and the conservation of rural heritage. Almost all of the respondents, respectively 97% of them, believe that activities related to rural tourism have reinforced the tendency to develop heritage-led projects, as a result a better focus on the particular value of rural cultural values and traditions which lead to better conservation of the rural heritage community.

The interviewed stakeholders agreed on the ability of knowledge, skills and tourism practices to enhance the social capital, mobility accessibility and cultural heritage "…from a generation to the other". Finally, we noticed the strengthening of community awareness and networks and the building of an engaged participation in the local decision-making.

Conclusions

Rural migration process generates an array of different negative trends in socio-economic development, infrastructure, as well as the erasure of rural cultural heritage in many Albanian small villages. Rural tourism has full potential to maximise the economic, cultural and societal values of rural heritage, to stimulate and facilitate rural communities empowerment and engagement, and to support sustainable local communities development. On the other side, cultural heritage has the potential of catalysing rural revitalization and attracting different forms of tourism, making local communities more resilient to the challenges of rural depopulation, globalized systems of production, and climate change by preserving their unique cultural aspects.

The integration of these will ultimately pave the way for the safeguarding of Albanian rural heritage. Regional development plans need to embed measures for the development of various types of tourism, which will lead in the infrastructural development in order to attract and retain residents, utilizing natural and cultural-historical heritage, and stimulate social and economic development. The study shifts attention towards institutions, researchers, residents, sector experts, entrepreneurship, facilitators and their active participation in the process of recognizing the values held in rural communities and their transmission to future generations.

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INCREASING KNOWLEDGE TOWARDS HALTING FURTHER DETERIORATION OF TRANSBOARDARY LESSER PRESPA LAKE FOR SECURING BIODIVERSITY CONSERVATION GOALS.

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Abstract

The Large and Lesser Prespa Lakes are covering an area of 2,519 square kilometer within Prespa basin, being divided between Albania, Greece and North Macedonia. They comprise a complex natural habitat of thousands species, some of which are endemics, while due to the gradual loss of water, it risks losing its biodiversity. Additional to its natural beauty, Lake Lesser Prespa boasts significant archaeological value, especially from the late prehistoric era. Human interventions have adversely impacted the region's hydrological system, affecting its ecosystem functioning. A combination of desk and literature reviews was used to understand existing knowledge and research. The goal is to raise awareness of Lake Lesser Prespa's challenges and create comprehensive knowledge with clear goals and strategies to address biodiversity, legal, social, and economic aspects. Effective future management requires a deep understanding of the area, sustainable water management, institutional reforms supporting local community development, and responsible natural resource utilization,

Kywords: Conservation approach, ecosystem, socio-economic, community, degradation

Introduction

Global biodiversity loss, at the international context, represents one of the most pressing global threats to our society. Human activities have led to the destruction or deterioration of extensive portions of the Earth's terrestrial, marine, and other aquatic ecosystems. Biodiversity means the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems. Ecosystem means a dynamic complex of plant, animal. The ecosystem services means the benefits that people obtain from ecosystems. Natural capital means the stock of renewable and non-renewable natural resources that combine to yield a flow of benefits to people.Prespa Lake system is composed by Lesser Prespa ,surface 43 km^2 and Large Prespa, surface 276 km^2. This system has a catchment area of 1 363 km^3. It is located on 853 meters above the sea level. Great Prespa is a three national lake, lying in the territories of North Macedonia (68%), Greece (14%) and Albania (18%). Lesser Prespa is a two-national lake, lying in the territories of Albania (12.1%) and Greece (87.9%),[10],[3]. The flora of the entire area is estimated to be 2,500 species, from them, small isolated populations are relicts from the ice age. Among the 60 mammal species encountered in Prespa, some of them are of conservation concern. The avifauna of the region has both national and international importance, with over 280 species and the presence of significant populations of rare species of international importance, such as the Dalmatian pelican. The primary threats to this ecosystem emanate from climate change and human intervention. [7] The goal of this study is to offer a well-researched, concise summary of past conservation. It also aims to document the institutional memory of the actors involved. Furthermore, it seeks to provide a current overview of biodiversity status and its primary threats, and it will highlight key conservation challenges and requirements while listing potential interventions, identifying management gaps, outline conservation needs and propose potential solutions.

Material and Methods

Qualitative comparative analysis methods were employed to assess the gathered information. Two distinct approaches, desk review and literature review, were utilized to comprehend the existing knowledge and research related to the subject. Desk review involved the examination of existing documents and data pertaining to the topic to collect information. It's primary objective was to identify relevant data sources, evaluate data quality, and pinpoint lag for further research.Desk review was employed to generate research questions and formulate the research study.

Results and Discussion.

Economic and social development of the area. Around 5,000 people in the Albanian part of the basin are engaged mainly in subsistence farming, the former collective agricultural system having been abandoned since the collapse of the totalitarian regime. Subsistence based agriculture, mainly farming and livestock production, characterises the situation in the Albanian part of Prespa. In the past period 1950-1990 huge areas of pasture and forests in Albania were converted to arable land, 54% of which was irrigated from both lakes. Nowadays, about ⅔ of these areas have been abandoned and converted to pastures and meadows.[14] Rural depopulation and unemployment have characterized the region, especially in Greece. However, 75 per cent of the population (about 1,200 people in 13 villages) in the Greek sector continue to rely on agriculture, especially

mono-cultivation of beans, for their livelihoods, though increasing tourism offers alternative income generation. The portion of the basin within the territory North Macedonia is the most densely populated. Here, over 17,500 inhabitants live in some 40 settlements, though strong rural-urban migration is resulting in an ageing and declining population. Fruit growing is the major activity. The North Macedonia contributes to the increasing pollution load of Large Prespa through runoff of agricultural chemicals.[3] In Greece, 1,000ha of wetlands were drained and converted to farmland and in the mid-1980s, Greece received huge payments under the EU's Integrated Mediterranean Programme, resulting in degradation of farmland due to poor irrigation practices and a decline in water quality. In 1976, the Albanian authorities partially diverted the River Devolli into Lake Lesser Prespa and it was estimated that approximately 1.2 million cubic meters of sediment had been deposited in Lesser Prespa over a 25-year period.[10] Situation and threat-impact analysis identified that the aquatic ecosystems were degraded and that the main threats to waters included pollution, water abstraction and sedimentation from erosion. [4] The situation, especially in Albania and the North Macedonia, is characterised by increased emigration rates, particularly amongst younger generations as result of poor local economic conditions. [9] Civil society is overall considered to be weak in Albania and the North Macedonia,but the environmental non-governmental organisations in Greece are becaming more professional and they respond quickly to the environment issues.[2].The lack of integration of environmental values in socio-economic activities result in leaving traditional sectors such as farming by young people, and loss of social cohesion. Suport of sustainable and traditional farming, high nature value farmland systems and increase of friendly agricultural practices in these area must be very important in the future.

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FUZZY LOGIC IN HYPOTHESIS TESTING IN AGRICULTURE DATA

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ABSTRACT

Nowadays, handling large and complex data sets from multiple sources has become a necessity. Usage of the programs that handle big data are applied in different fields like in economics for the management, agriculture and the environment implications and many others. In this research work we are working with the hypothesis verification about different parameters in the Nigella sativa L. known as black seed (which is a medicinal plant grown in Mediterranean countries) and what we have taken from the yield by verifying our expectation with what actually we got. We used hypothesis testing with the classical approach and then performed the same tests with the Fuzzy Approach Hypothesis Testing. One of the hypothesis concerns the different location and land where the seeds get cultivated. As the seed need to be tested if it can be cultivated in our country with specific climate and solid conditions of the region where we have thought to cultivate it. In order to reach to certain conclusions, we need to compare the production data sheet of the seed which include its best production to what we get in our country. Our data were obtained for the period from May- August 2023 from the Didactic Experimental Field of the Agricultural University of Tirana. of May - August 2023 at the Didactic Experimental Field of the Agricultural University of Tirana. Both classical and fuzzy approaches are then compared to find out the differences between them.

Key Words: Fuzzy Logic, hypothesis testing, agro-morphological, black seed, Fuzzy hypothesis testing

1. INTRODUCTION

Studying, analyzing, drawing conclusions as well as making the right decisions about different phenomena in real life is one of the main challenges nowadays. Statistical hypothesis testing, which provides a framework for decision-making about the population where the user formulates a null hypothesis and an alternative hypothesis. These hypotheses are formulated to study a certain feature about the population with the collected data. Human opinion is in many cases is uncertain, where appropriate statistical tools in general and the laying of hypotheses in particular, which monitor these aspects must be well adapted and help to gain knowledge. In the classical approach, statistical tests require a well-defined model of hypotheses. In many cases the data contain ambiguities which may be caused by the way they were obtained. Fuzzy logic was introduced to deal with such problems [1, 2, 3]. Fuzzy statistics methods provide suitable techniques to deal with these different types of inaccuracies and uncertainties regarding the specification of hypotheses and information obtained from data. Numerous approaches have been proposed by many researchers to combine statistical inference with fuzzy statistics such as [4,5].

2. MATERIALS AND METHODS

a) Fuzzy Hypotheses testing

The traditional method is testing hypothesis "$H_0 : \mu = \mu_0$" against "$H_1 : \mu \neq \mu_0$", for a certain value μ_0, on the basis of a random sample X, where $X_i \sim N(\mu, \sigma^2)$, i = 1, ... , n. But obviously, if the mean of the given sample is slightly different from μ_0, then the null hypothesis is not rejected, and a considerable difference from μ_0 makes H_0 is rejected. Therefore, it is more appropriate and more reasonable to formulate the hypotheses H_0 and alternative one H_1 by fuzzy terms "near to μ_0" and "away from μ_0", respectively. In other words, more realistic hypotheses are: $\tilde{H}_0 : \mu \ is \ near \ to \ \mu_0$, $\tilde{H}_1 : \mu \ is \ away \ from \ \mu_0$. Having faced by such real situations leads statisticians to reformulate some classical and crisp hypotheses by using fuzzy hypotheses. The main problem is to test fuzzy hypotheses

$\tilde{H}_0 : \theta \ is \ H_0(\theta)$, $\tilde{H}_1 : \theta \ is \ H_1(\theta)$, based on a random sample from a probability density function (p.d.f.) or the probability mass function (p.m.f.) $f(x; \theta), \theta \in \Theta$. This problem is called the problem of testing fuzzy hypotheses based on the p-value approach. Concerning the common p-value-based methods, testing fuzzy hypotheses method has some important advantages. The main advantage is that it is based on both null and alternative hypotheses, while the common methods are based on null hypothesis only.

Decision Rule: In testing fuzzy hypothesis $\tilde{H}_0$ against $\tilde{H}_1$, suppose that p_{01} is the p-value in testing $\tilde{H}_0$ against $\tilde{H}_1$ and p10 is the p-value in testing $\tilde{H}_1$ versus $\tilde{H}_0$. Accept $\tilde{H}_1$ with a confidence factor $\frac{p_{10}}{p_{01}+p_{10}}$ $if \ p_{01} < p_{10}$; otherwise, accept $\tilde{H}_0$ with a CF $\frac{p_{01}}{p_{01}+p_{10}}$, [4, 5, 6].

3. RESULTS AND DISCUSSION

It is applied the classical approach and the fuzzy approach to see how some agro-morphological characteristics affect the yield (gram per plant) of black seed. The experiment was carried out in the Didactic Experimental Field of the Agricultural University of Tirana, in the surrounding of Tirana.

a) Classical hypothesis testing

Let (x_1, …, x_{15}) be a random sample. Based on the observation, we can consider that the yield per gram per plant of black seed has a normal distribution. The main goal is to test the following hypothesis: "Is it suitable or not to plant black seed in Albania?". The hypothesis testing for the seed with code 6, which corresponds to Turkey:

Testi 1: $H_0: \mu \geq 1.4362$ $H_1: \mu < 1.4362$

Testi 2: $H_0: \mu \leq 5.2376$ $H_1: \mu > 5.2376$

In the first test, we see that the alternative hypothesis has a left-sided critical area. T-test and t_{cr} are following: $t_{vr} = 4.579$ and $-t_{kr} = -t_{0.1; 14} = -1.76$.

Decision making: Since $t_{vr} = 4.579 \in \Delta_0$, then the null hypothesis is accepted, so the average of yield of black seeds is greater than or equal to 0.2 gram per plant. The second test: Since $t_{vr} = -9.9 \in \Delta_1$, then the null hypothesis is reject, so the average of yield of black seeds is smaller than to 5.2376 gram per plant. We get the same results if we use the p-value in the case of the left-sided critical zone. In our case, p-value= 4.84269E-08<0.05

We face a contradiction in the results of Tests 1 and 2 which is a consequence of the difference between the null hypothesis in Tests 1 and 2. Let's see next the results of the fuzzy approach:

b) Testing fuzzy hypotheses: Fuzzy p-value method

We find that the optimal range of black seed yield per plant, for code 6 Turkey, is [0.5, 1.3], and also its maximum is 5.3 grams per plant. Using fuzzy set theory, the optimal range and maximum amount of black seed yield per plant can be shown from the following fuzzy set, in which the membership is considered to be zero in the interval [0, 0.5], since we are interested in the yield for the plant to be as high as possible and at the maximum yield to be one.

$$H_0(\mu) = \begin{cases} 0 \text{ if } \mu \leq 1.3 \\ \dfrac{\mu - 1.3}{4} \text{ if } 1.3 < \mu \leq 5.3 \\ 1 \text{ if } \mu \geq 5.3 \end{cases}$$

We can test fuzzy hypotheses

$$\begin{cases} \widetilde{H}_0 : \mu \text{ është } H_0(\mu), \\ \widetilde{H}_1: \mu \text{ është } H_1(\mu) \end{cases}$$

where the membership functions of $\widetilde{H}_0(\mu)$ and $\widetilde{H}_1(\mu) = 1 - \widetilde{H}_0(\mu)$. This is an advantage of considering fuzzy hypotheses rather than crisp hypotheses in some practical problems. In this study, we assume that $X_i \sim N(\mu, s^2)$, for i = 1, … , 15. Considering that the form of fuzzy hypothesis $\widetilde{H}_0$ against $\widetilde{H}_1$ is (iv), hence the form of critical region is right side and one can compute p_{01} as follows:

$$p_{01} = P_{\widetilde{H}_{0b}}(\overline{X} \geq 2.63) = \int_\theta H_{0b}^*(\mu) P_\mu(\overline{X} \geq 2.63)d\mu = 0.8852$$

$$p_{10} = P_{\widetilde{H}_{0b}}(\overline{X} \leq 2.63) = \int_\theta H_{0b}^*(\mu) P_\mu(\overline{X} \leq 2.63)d\mu = 0.5502$$

Decision making: Therefore, $p_{01} > p_{10}$, and so $\widetilde{H}_0$ is accepted against $\widetilde{H}_1$ with confidence factor $CF = \dfrac{p10}{p01+p10} = 0.3833$. In other words, considering the confidence factor 0.3833, it can be asserted that the average yield per plant of black seed with code 6 using fuzzy set theory has the optimal range and maximum quantity proposed above.

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TERMINOLOGY EVOLUTION IN ECONOMIC DISCOURSE: UNRAVELLING RETERMINOLOGIZATION IN 'THE ECONOMIST' MAGAZINE

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Abstract

This paper examines the process of term-creation through the process of reterminologization in the field of economy and business, with a focus on terminology extracted from *'The Economist'* magazine. The research aims to unlock the workings of reterminologization in coining new terms to convey intricate economic concepts. Reterminologization involves borrowing a term from one subject field to yet another entirely different field or subfield within the same language. When a term is taken from one domain and applied in another, it is usually modified to suit the new context while preserving certain aspects of its initial meaning or associations. This adjustment of terms to other fields frequently entails changes to how the term is defined, used, or understood, ensuring it aligns with the principles and concepts relevant to the new field. Most of the terms in the field of economy and business are derived from other fields as diverse as agriculture, zoology, geology, motor-vehicles, medicine etc. Through the juxtaposition of terms the paper establishes the pairs of terms applicable across one or more fields/subfields within the same language. The paper concludes that reterminologization is one of the most productive tools of term-creation in the terminology of economy.

Key words: concept, term, term-extraction, terminology, reterminologisation, borrowing.

Introduction

With the rapid advance in technology and science and with automation taking over almost all sectors of economy from manufacturing, to mining, to farming there has been a rapid rise of new concepts which need to be matched with corresponding terms. Hence, one could witness an unparallel rise of terms across all domains of knowledge and science to allow for smooth understanding and communication among both specialists and non-specialists in any type of discourse, be it technical or nontechnical discourse (Cabré, 1999).

There has been no end of contribution of authors (L'Homme 2017, Temmerman 2000) to the field of terminology which primarily focus on highlighting the tools languages use to create new words in response to the new concepts.

According to Bodle (2014) new words at a rate of 1000 new ones are being added to the existing lexicon. Among the many tools that language uses to create and accommodate new w terms Bodle (2024) and Maxwell (2006) singled out the following term formation tools: (1) derivation (2) backformation (3) compounding (4) *repurposing/reterminologisation* (4) conversion (5) eponyms (6) abbreviations (7) loanword (8) reduplication.

For purposes of the study the <u>tool of repurposing</u> will be examined and considered at breadth since it counts as a very productive tool of term-formation. One term which is synonymous with Repoporsing is Reterminolgisation which has been widely used and applied by a large number of linguists and terminologists (Shumeli 2014, Mine 2014). Reterminologization is the process of transferring a term from one academic field to another academic field, in which a complete or partial change of meaning occurs (Christova, 2020). Reterminologization is a source of both internal systematicity and external systematicity (Popova 2012)

Material and methods

With precision, we combed through a multitude of articles, manually extracting terms that resonated with the field of economy and business. These terms were then subjected to meticulous analysis. Advanced text mining and linguistic techniques were employed to trace the terms, to better understand their transitions from other scientific fields to the field of economy. This research was akin to deciphering a complex family tree of language, revealing the intricate interplay between disciplines.

Discussion

The study indicates that languages do not open the doors to the influx of terms. They use their own mechanisms to create terms which are applicable across diverse domains of knowledge. One such mechanism which was put under the microscope was reterminologisation. *Reterminologisation* eases up the "overburden of terms" upon the language, since one specific term finds application across two or more domains of science. This prevents dictionaries from becoming swamped or inundated with new terms.

Our investigation of terms from *The Economist Magazine* revealed several categories of terms which were derevid from the following fields of science and knowledge.

(1) **Terms borrowed from agriculture into the realm of the economy and business:**
(agr.) "to harvest" (collect crops from a field);
(fin.) "to harvest" (reap the rewards of investment);
(agr.) "seed money"(capital used to buy seeds for planting);
(fin.) "seed money" (the initial capital or investment used to start a new business or project);
(agr.) "cultivate" (preparing and tending to land or crops);
(fin.) "cultivate" (used metaphorically to describe efforts to develop or improve economic opportunities);
(agr.) "weeding out" (the process of removing unwanted plants);
(fin) "weeding out" (elimination of unprofitable or underperforming assets or investments);
(2) **Terms borrowed from geology into the sphere of the economy**:
(geol.) "rock bottom" (lowest point of a rock structure);
(fin.) "rock bottom" (the lowest point of economic downturn);

(geol.) "reserves" (the amount of a resource that can be economically extracted);

(fin.) "reserves", (assets set aside for future use or contingencies);

(geol.) "liquidity", (geological term describing how easily a substance flows);

(fin.) "liquidity" (refer to how easily an asset can be bought or sold without affecting its price

(geol.) "deposits" (refers to the accumulation of minerals or sediments);

(fin.) "deposits" (refers to funds placed in a bank account);

(3) Terms borrowed from motor vehicles into the domain of the economy:

(veh.) "U-turn" (a reversal of direction);

(fin.) "U-turn" (policy reversals);

(veh.) "accelerate/rev up" (When you press the gas pedal, the car accelerates quickly down the highway);

(fin.) "accelerate/rev up" (the economy accelerates with robust job growth);

(veh.) "idles" (When stopped at a traffic light, the car idles quietly);

(fin.) "idles" (The economy idles as businesses postpone investments);

(veh.) "shifts gears"(To climb a steep hill, the driver shifts gears to gain more power);

(fin.) "shift gears" (The government shifts gears by focusing on diversifying export markets);

(veh.) "economy stalls" (Due to a mechanical issue, the car stalls at the intersection and won't start);

(fin.) "economy stalls" (Amid a financial crisis, the economy stalls);

(4) Terms borrowed from the animal kingdom/poultry into the context of the economy:

(anim) "vulture" (large bird of prey);

(fin) "vulture" (investor who seeks to extract value from companies in decline);

(anim.) "white elephant" (elephant which is white);

(fin) "white elephant" (property that is expensive to operate);

(anim.) "bear" (large, omnivorous mammal known for its strength and hibernation habits);

(fin.) "bear" (a "bear" refers to an investor or market sentiment that is pessimistic about the future performance of the stock market or a particular asset);

(anim.) "bull" (a male bovine known for its strength and reproductive role in breeding with cows to produce offspring);

(fin.) "bull" (represents an optimistic outlook on the stock market or an asset);

(5) Terms borrowed from medicine into the realm of the economy:

(med.) "Inoculation" (immunization);

(fin) "inoculation" (measures to protect the economy from shocks);

(med.) "injection" (a medical injection)

(fin.) "injection" (the infusion of capital or resources into the economy to stimulate growth);

(med.) "booster" (a booster shot in medicine)

(fin.) "booster" (describes additional measures or policies implemented to reinforce economic growth);

(med.) "ailing" (medical term "ailing,");

(fin.) "ailing" (economy that is experiencing significant challenges);

(med.) "recovery" (recovery process in medicine)

(fin.) (recovery" (economic recovery" signifies a period of growth);

Conclusion

In conclusion, our exploration into terminology's role in the realm of economics unveiled a captivating interplay between language and knowledge domains. We delved into term formation mechanisms, focusing on the highly productive tool of "repurposing" or "reterminologisation.". Our research, meticulously conducted through advanced text mining and linguistic techniques on articles from The Economist Magazine, uncovered a rich tapestry of terms borrowed from diverse scientific realms. These included agriculture, geology, motor vehicles, and the animal kingdom, each contributing to the economic lexicon's depth. It would be interesting to unlock another term-creation mechanism which is referred to as: *determinologisation*, which is a process of passing terms from a certain scientific or professional field to commonly used language.

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THE CONTEMPORARY UTILIZATION OF AUTOMATED TELLER MACHINES (ATMS) IN ALBANIA AND THE PROGRESSION TOWARDS FINGERPRINT RECOGNITION IN ATM SYSTEMS

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Abstract

The rapid evolution of banking technology has directed in a new era of customer-bank interactions in Albania. Central to this transformation is the widespread deployment of Automated Teller Machines (ATMs), which have revolutionized how individuals engage in banking activities. ATMs offer unparalleled convenience, enabling customers to perform a wide array of transactions, including currency withdrawals, fund transfers, and bill payments, all beyond traditional banking hours. This technology has become an indispensable part of modern banking. However, this convenience comes with security challenges, primarily revolving around Personal Identification Numbers (PINs). ATM-related crimes have surged, posing a significant threat to users and their financial assets. Card theft or PIN compromise can lead to unauthorized access and financial loss. Traditional ATMs predominantly rely on card-based authentication, making them vulnerable to theft and misuse. To address these vulnerabilities, biometric authentication, particularly fingerprint recognition, has emerged as a promising alternative. Biometrics offers a unique and immutable link between users and their accounts, immune to theft or replication. This study conducts a thorough comparative analysis of the two authentication paradigms: the established yet vulnerable PIN-based method and the emerging, more secure biometric approach. The primary aim is to discern the relative strengths and weaknesses of these authentication mechanisms within the context of ATM usage in Albania. The security of financial transactions in Albania, as well as the evolution toward biometric authentication, is central to the research.It explores the transition from PIN-based authentication to biometric fingerprint recognition, ultimately aiming to fortify security, instill user trust, and elevate the overall quality of the banking experience.

Key words: ATM Authentication, PIN, Fingerprint Recognition, ATM Security, Albania Banking Sector

Introduction

Banking technology in Albania has rapidly evolved, primarily due to extensive ATM deployment. This evolution has brought unparalleled convenience but has also introduced security challenges related to PIN-based authentication. It reflects broader shifts in the financial sector, driven by economic reforms, globalization, and technological advancements, transitioning from a state-controlled to a market-oriented economy.

ATMs have transformed modern banking in Albania, enhancing accessibility and financial inclusivity. However, their widespread adoption has led to security challenges, including card skimming and fraud. Albanian banks are actively enhancing ATM security by adopting various measures, such as:

- CCTV Cameras: Installing cameras inside ATM booths for fraud detection [1].
- PIN-Shields: Exploring PIN-shields to safeguard PIN entries from potential skimming.
- Anti-Skimming Devices: Evaluating the implementation of anti-skimming devices.
- EMV Chip Cards: Considering the use of EMV chip cards known for advanced transaction security.
- PCI DSS Certification: Investigating the requirements for Payment Card Industry Data Security Standard (PCIDSS) certification [5, 7].

The banking sector in Albania is also considering a transition to biometric authentication, which offers enhanced security and convenience by using unique physiological or behavioral traits like fingerprints. This shift addresses vulnerabilities associated with PIN-based authentication. The transition to biometric authentication represents a significant advancement in ATM security, promising improved security and user experiences while retaining important references.

ATM in Albania

The rise in ATM usage in Albania reflects global banking trends, driven by the country's shift to a market-oriented economy. The number of ATMs increased by 4.0% in 2022, meeting a growing demand for convenient banking services [4]. These ATMs, found in urban and rural areas, offer not only cash withdrawals but also deposit functions [3]. However, the convenience of ATMs has introduced security challenges, despite security measures such as data encryption, anti-skimming tech, and PIN

protection. ATM-related crimes, including card skimming, persist, resulting in losses for banks and customers. Exploring advanced security options, like biometric authentication, is essential in addressing these issues.

PIN-Based Authentication

PIN-based authentication is widely used in ATM transactions. While this method is familiar, it has vulnerabilities: Risk of Theft: PINs can be stolen physically or through phishing; Easy to Forget: Users may forget complex PINs; Limited Complexity: Simple PINs are susceptible to guessing; Shoulder Surfing: PINs can be observed during entry; PIN Reuse: Users may reuse PINs across accounts; Phishing: Criminals use various techniques to trick users into revealing PINs; Skimming Devices: Skimming devices on ATMs can capture card data and PINs; Real-world examples in Albania illustrate these vulnerabilities, emphasizing the need for more secure alternatives like biometric authentication. A study conducted by Ajazi, an IB student at UBT, on the use of PIN cards in Albania has yielded interesting findings. In this analysis, the mean duration of interaction was determined to be 54 seconds, with the swiftest completion observed at 28 seconds and the most protracted interaction recorded at 122 seconds. These delays manifest due to a multitude of factors, including but not limited to distractions, input errors, queuing behaviors, and other contributing variables. [2].

Biometric Authentication

Biometric authentication, such as fingerprint recognition, relies on unique physiological traits. Fingerprint recognition is highly accurate, secure, and user-friendly. Advantages include uniqueness, immutability, non-transferability, enhanced security, user convenience, reduced fraud, and efficiency [6]. In their studies of biometric authentication, Zhang and Yang employ CNN-SRU (Convolutional Neural Network-Simplified Recurrent Unit) deep learning for data preprocessing in the perceptual layer, resulting in improved biometric performance for fingerprint and face recognition, with CNN-LSTM (Long Short Term Memory), CNN-GRU (Gater Recurrent Unit), and CNN algorithms showing accuracy increases from 0.07 to 0.35, 0.19 to 0.58, and 0.15 to 0.38, respectively; furthermore, their research demonstrates that multifeature fusion achieves a remarkable recognition rate of 95.2%.[8].

Global and Albanian banks are adopting biometric authentication for ATM transactions, mobile banking, customer verification, and compliance with regulatory frameworks. This trend reflects the commitment to security and user experience, positioning biometric authentication as a trusted and widespread solution in the financial industry. Table 1 outlines key challenges encountered during the implementation of biometric authentication.

Table XII Implementation challenges of biometric authentication.

Technical Challenges in Implementing Biometric Authentication in ATMs	Hardware and Integration Complexity
	Accuracy and Reliability
	Scalability:
	Data Security
	User Experience
Regulatory and Legal Considerations	Data Privacy and Consent
	Security Standards
	Cross-Border Transactions
	Liability and Fraud
User Acceptance and Education	User Trust and Education
	Training and Support
	Accessibility
	Fallback Mechanisms

Conclusion

Albania's evolving ATM landscape reflects a country in transition towards a more inclusive, digital, and formalized economy. The increase in the number of ATMs, coupled with the expansion of their functionalities, demonstrates the banking sector's commitment to meeting the evolving needs of its customers. Banking technology in Albania has evolved rapidly, with ATMs becoming a cornerstone of modern banking. However, this convenience has brought about security challenges, particularly related to PIN-based authentication, resulting in a surge in ATM-related crimes. In response, biometric authentication, especially fingerprint recognition, has emerged as a promising alternative. The research conducted a comprehensive analysis, revealing key insights:

- PIN-Based Authentication Vulnerabilities: PINs are vulnerable to theft and misuse, necessitating improved security measures.
- Advantages of Biometric Authentication: Biometrics, like fingerprint recognition, offers uniqueness, enhanced security, and user convenience.
- Implementation Challenges: Transitioning to biometric authentication presents technical and regulatory hurdles.
- User Acceptance and Education: Building user trust through education is crucial for biometric adoption.
- Global and Albanian Banking Trends: Biometric authentication aligns with global banking trends and is progressively integrated into Albanian banking systems.

In conclusion, the shift from PIN-based to biometric authentication is pivotal in enhancing ATM security and the banking experience in Albania. While challenges remain, the advantages of biometric authentication make it a secure and user-friendly solution. This research contributes valuable insights, emphasizing the need for innovation, regulatory compliance, and user-centered design to secure financial transactions and foster trust in Albania's banking sector.

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EDUCATION FOR APPLYING NEW BUSINESS MODELS IN AGRITOURISM IN NORTH ALBANIA

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Abstract

Agritourism presents a robust opportunity for economic diversification, cultural preservation and sustainable rural development in north Albania. The promising sector demands the assimilation of innovative business models to bolster competitiveness and appeal. The core of this research is to explore the requisite educational and training frameworks that would enable farmers and local stakeholders in North Albania to efficiently apply new business models in agritourism. Utilizing a mixed-methods approach encompassing case studies and in-depth interviews, this study delves into the existing educational paradigms and identifies the gaps therein concerning agritourism and entrepreneurship. The findings underline a significant educational gap that impedes the effective assimilation of innovative business models (BMs) in agritourism ventures. There is an obvious need for a multidimensional educational framework, intertwining formal education, vocational training, and continuous professional development programs. The proposed framework advocates for fostering synergies among academic institutions, government bodies, and local communities to facilitate a culture of continuous learning, knowledge transfer, and sharing of best practices. By reinforcing the educational infrastructure, the region can adequately prepare the agritourism stakeholders to navigate the competitive market dynamics successfully. This research underscores education as a pivotal mechanism for stimulating a contributive ecosystem for the flourishing of agritourism in north Albania, with possible extension to the broader rural economy, with the preservation of the region's cultural and environmental heritage.

Key words: business model, agritourism, education, innovation

Introduction

Agritourism is emerging as a sustainable development strategy for rural areas in Albania, offering a platform for economic diversification, cultural preservation, and environmental conservation. This paper endeavors to analyze the educational needs for applying new business models in agritourism sector in north Albania. It also aims to propose a comprehensive educational framework to enhance the capacities of local farmers and stakeholders. The study among others acknowledges the underlying challenges of brain drain in the region and seeks to understand how education can serve as a catalyst for both retaining local talent and propelling the agritourism sector forward through the adoption of new business models (NBMs). The findings are intended to inform policymakers, educators, and agritourism operators, contributing to enhanced educational strategies and the sustainable development of agritourism in the region.

Literature review

Previous studies have highlighted the potential of agritourism as a vehicle for rural development in various contexts. Furthermore, the importance of education and training in promoting entrepreneurship and innovation in agritourism has been underscored. In North Albania, agritourism has emerged as a strategic approach to revitalize rural economies and preserve cultural heritage (Bosworth et al., 2016). There is a gap in the literature concerning the specific education needs and frameworks within the North Albanian context. Studies call for education that fosters entrepreneurial mindset, promotes sustainable practices, and facilitates technology adoption (Che et al., 2005; Ciolac et al., 2019; Zemlyak et al., 2022). The literature suggests opportunities in promoting indigenous products and cultural events, enhancing farm-based accommodations, and engaging diaspora for investments and tourism (Brau et al., 2007; Zhllima et al., 2021).

Materials and methods

This section outlines the research methodology adopted to investigate the educational frameworks necessary for applying new BMs in agritourism in Albania. The research question posed for the study is "How can educational programs be effectively designed and implemented to facilitate the application of innovative BMs in North Albania's agritourism sector, considering the challenges of brain drain and the current socio-economic context?". This research question aims to investigate the intersection between education, agritourism, and entrepreneurial innovation in North Albania.

The research is focused on North Albania, an area characterized by its rich cultural heritage, biodiversity, and a significant number of small to medium-sized farms engaged in or having potential for agritourism activities. Given the qualitative nature of the research question, a combination of case studies and in-depth interviews was utilized to provide a profound understanding of the subject matter.

Results and discussions

The reviewed literature underscores the transformative potential of agritourism in North Albania through the adoption of innovative business models. It highlights the critical role of education in fostering this transformation. The combination of case studies and in-depth interviews provided a multifaceted perspective on the education for applying NBMs in agritourism in North Albania. This method ensured that both macro (business level) and micro (individual level) aspects are explored, paving the way for comprehensive findings and actionable recommendations. The study indicates an urgent need for more supportive policies, including financial incentives, infrastructure developments, and educational programs tailored to agritourism. But on the other side, it also demonstrates the significant impact brain drain has in the agritourism sector.

The study acknowledges potential limitation, including generalizability of the results to other regions and possible biases inherent in self-reported data. Efforts to mitigate these included triangulating findings with existing literature and using multiple sources of data for validation.

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THE PHENOMENON AND MAIN TREND OF RAPID DEVELOPMENT AS A RESULT OF INTERNAL MIGRATION, THE CASE OF THE KAMZA AREA

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Abstract

This study deals with problems and phenomena of rapid urban developments in the city of Kamza after 1990. The purpose of the study is to explore some of the features of the urban developments of the city of Kamza on many levels. He has focused on the city of Kamza for the reason that he is faced with the largest population in the Republic of Albania, aiming to examine the migration process, the problems, the different forms of adaptation in the urban environment of Kamza, mainly the integration of families in the economic aspect , social, cultural and educational as well as profiles of their re-socialization. This study is based on cross-sectional methods. Qualitative methods and the academic literature on the urbanization of post-migration countries. This study highlights that the most numerous problems as a result of the migratory movement are related to the road infrastructure, the lack of green environments, irregular constructions and those that occupy the light of each other, mainly private dwellings (villas) with a irregular architectural structure, mainly the peripheral ones where the concentration of newcomers is greater.

Today, Kamza has turned from an agricultural land into one of the municipalities of Albania with the largest population. Kamza today offers a convenience in important vital services, such as schools, hospitals, infrastructure and the advantage is the fact that Kamza is only 7 km from the center of the Capital of Albania, Tirana.

The political and economic transformations that took place in Albanian society in 1990-1991 were accompanied by a series of demographic, social and cultural phenomena.

FIELD OF STUDY: Urban sociology, rural sociology, internal migration, socio-economic studies

KEY WORDS: Urbanization, village, migratory movement, country of origin, infrastructure, adaptation, transformation of rural society

Introduction

Migration is a fundamental human phenomenon that has shaped societies for centuries. This research proposal aims at the transformative effects of rural migration on society, including the social, economic, environmental and cultural dimensions in the Kamza area. Migration patterns have historically been shaped by factors such as economic opportunity, political stability, cultural ties, and environmental conditions. However, the motivations behind migration have evolved over time due to changing global dynamics. The displacement of the population from rural areas to the cities is often so virulent and irregular, so massive and immediate, that it can be characterized by the Albanian word, simple and meaningful: flight (Fuga and Dervishi, 2010:152). Almost all Albanians who are looking for a better life with high almost European standards are included in this migration. To see how the most important social institution such as the family has changed at the moment when the head of the family makes the decision to migrate and settle in the Kamza area. The law according to which "everyone has the right to choose their place of residence and to move freely in parts of the state's territory" (Parliament of Albania, 1993:166), was a delayed law because Albanian families had already massively populated Kamza according to their desires. There is an unprecedented change in population dynamics marked by a significant and continuous migration from rural to urban areas. This transformation is emblematic of the dynamic and urban-rural nature of society, with implications for both the areas of origin and destinations of these migrant populations (Sulaj and Themelko, 2015).

Review of Literature

Analyzing and reviewing literature from researchers and sociologists, economists, environmental engineers, anthropologists, social psychologists, and geographers, I come to the conclusion that two factors are responsible for internal migration and the impact on the family:

- First, the economic cost of moving (rural area-urban area, urban area-urban area) living in a family unit increases.
- Second, and quite importantly, the presence of additional family members means that as many ties to the country of origin have to be left behind and established in the destination.
- Thirdly, the method of the so-called "organic" school of sociology consists of attempts to understand social interaction using as a starting point the "whole", within which the individual acts. (Weber, M., 2004:26)

The urbanization was associated with the economic model that is reflected in rural areas versus wages and employment in urban areas), occurring as the phenomenon of increased unemployment in rural areas and also in urban areas, given that we

have an overpopulation and an overburden of labor market (Sulaj et. al., 2015). This research aims to provide a comprehensive understanding of the implications of this migration trend for societies in rural areas, providing insights that can guide policy makers, urban planners and communities in effectively managing the resulting transformations.

Methodology

The study relied on the use of several research methods. Several methods were used, not without purpose that my main focus was to make the findings as complete and varied as possible. The methods used in this study are: the analysis of secondary data and the qualitative method of collecting primary data through semi-structured individual interviews and free conversations with residents of the Kamza area, to create a clear logical concept in explaining the reason of making their decision to migrate to this area. The use of qualitative methods in this study aimed to describe, explain and create the process of integration of internal migrants in the family context in the area of Kamza, in Albania. The collection of data through qualitative methods in this study enabled the exploration of the experiences, feelings, opinions and personal thoughts of the participants in function of the understanding of the integration process, seeing it as a social phenomenon.

Findings and Discussions

In this study, one of the main findings is how these families were economically integrated in Kamez. As it has been extensively mentioned before, the families that came to Kamez after the 1990s were for economic reasons and for a better life. All the interviewees stated that we settled in Kamez for economic reasons and for a better life for our children. For people in rural areas of developing countries, finding a better-paying job or better education is often only possible by moving elsewhere. Moreover, agricultural production, in general, the main economic activity in rural areas of developing countries, is dangerous, as they are affected by droughts and, in the opposite case, by floods. Due to poverty and the limited availability of livelihood security, families are often supported by family members who decided long ago to "escape" from their country of origin, rural families are often supported by family members somewhat distant to provide an opportunity to start a business or in cases of buying a land or apartment for families who are in difficulty.

Conclusions and Suggestions

This study highlighted that migrant families and their members encounter the problem of not being integrated into society and their feeling as "foreigners" in the area where they have performed internal migration. Seen from the point of view of "foreigner" culturally, socially compared to others around them. In these conditions, the process of integration into society becomes difficult and quite complex. It should be left as a matter for solution not only by social researchers but by political instances to create a cultural, social and economic diversity where all the inhabitants of the area have the opportunity to find themselves and not to feel excluded from society.

This study was a qualitative study that did not provide statistical figures to explain specific phenomena related to the dimensions of integration, so the data of this qualitative study can serve as guiding data for the design of other sociological studies and the writing of sociological projects with quantitative or even qualitative nature in order to examine other dynamic forms of integration of incoming families not only in the Kamza area but also in other areas around Tirana and beyond. However, internal migration can reduce the well-being of migrants and their families. These include providing better information to potential migrants about conditions and opportunities in potential destination areas, increasing education for migrants and future migrants, as well as ensuring internal migrants, and of course adequate access to health services. Collecting more comprehensive data on internal migration will allow for further research.

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DATA VISUALIZATION IMPACT ON ALBANIAN AGRIBUSINESS: R VS. PYTHON ANALYSIS

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Abstract

Data visualization has emerged as a vital tool for facilitating the comprehension of information. Its applicability extends beyond statisticians, encompassing all individuals dealing with data, managers involved in data collection, and decision-makers. While data visualization is not a novel technology, its widespread adoption is evident across numerous domains. This scientific investigation focuses on evaluating the utilization of data visualization within the agribusiness sector. Albania has witnessed a significant surge in both tourism and agribusiness activities in recent years. Our study lies in the exploration of the complementary roles played by two leading programming languages, R and Python, in the realm of data visualization. These languages are renowned for their robust data analysis and visualization capabilities. Our analysis entails a comprehensive comparison of their utility in transforming raw data into actionable insights for agribusiness stakeholders.

Through a meticulous examination of data visualization tools, techniques, and best practices, we intend to shed light on the unique strengths and limitations of both R and Python in facilitating the presentation and interpretation of agricultural data. Furthermore, our research extends to interactive data visualization, exploring how these programming languages empower users to create dynamic, user-friendly representations of data.

Key words: Data Visualization, Agribusiness, R, Python and Comparative Analysis

Data visualisation evolution

Today, data visualization plays a critical role in various fields, from science and healthcare to business and journalism, helping individuals and organizations make sense of vast amounts of data and communicate insights effectively. Data visualization has a rich history dating back centuries, evolving alongside advancements in technology, science, and communication. In figure 1 is a history of data Visualisation.

Figure 1 Evolution of Data Visualization

In the future Data visualization continues to evolve with emerging technologies like AI and machine learning, allowing for automated insights and more advanced visual representations. Additionally, data visualization tools are becoming more integrated into business intelligence (BI) platforms and data analytics workflows.

Data visualization with R and Python

Data visualization has evolved significantly in both R and Python over the years, driven by advancements in technology, the growing importance of data in decision-making, and the open-source nature of these programming languages. Here's an overview of the evolution of data visualization with R and Python:

R language

R is a powerful programming language for data visualization. It offers a wide range of libraries and packages that enable users to create static and interactive data visualizations for exploratory data analysis, reporting, and presentations. In tabele 1 ara are some of the key libraries and packages in R for data visualization. These are just a few of the many packages available in R for data visualization. Depending on your specific needs and preferences, you can choose the package that best suits your Project.

Table XIII. Packages in R

Package	Description
Base Graphics	R has a built-in graphics system that allows you to create basic plots, such as scatter plots, line charts, bar charts, and histograms, using functions like plot(), hist(), and barplot().
ggplot2	Developed by Hadley Wickham, ggplot2 is one of the most popular data visualization packages in R.

Lattice	Lattice is another powerful package for creating trellis plots.
Plotly	Plotly is an interactive plotting library that allows you to create web-based, interactive visualizations.
Highcharter	Highcharter is a package that allows you to create interactive, JavaScript-based charts using Highcharts.
Shiny	Shiny is an R package for building interactive web applications.
Tidyverse	The Tidyverse, a collection of R packages that includes ggplot2, dplyr, and tidyr, promotes a tidy data structure and provides a seamless workflow for data manipulation and visualization.
htmlwidgets	This package allows you to integrate interactive JavaScript visualizations into R Markdown documents and Shiny applications. It supports a variety of JavaScript libraries for data visualization.

R's strong community support and active development ensure that it remains a popular choice for data visualization tasks.

Python language

Data visualization in Python is a powerful way to explore, analyze, and communicate insights from your data. Python offers a rich ecosystem of libraries and tools for creating various types of visualizations. Here are some of the most popular libraries and techniques for data visualization in Python:

Table XIV Packages in Python

Package	Description
Matplotlib	Matplotlib is one of the foundational libraries for data visualization in Python.
Seaborn	Seaborn is built on top of Matplotlib and provides a high-level interface for creating aesthetically pleasing statistical visualizations.
Pandas Plotting	The Pandas library provides convenient methods for data visualization directly from DataFrames.
Plotly	Plotly supports a wide range of chart types and offers features for creating dashboards and interactive applications (Franklin, 2023).
Bokeh	Bokeh is another library for creating interactive, web-ready visualizations.
Altair	Altair is a declarative statistical visualization library that simplifies the creation of complex charts by specifying the visualization in a concise and intuitive manner.
Plotnine	Plotnine is a Python implementation of the grammar of graphics similar to ggplot2 in R, making it easy to create complex, customized visualizations.

Case study; Data visulaisation in Python language

In the table below, data is provided for the number of tourists who have visited Albania in recent years. These are statistics published annually by the Institute of Statistics. Using Python, we have constructed a program to present this information in a clear and engaging manner.

Table XV Arrivals of foreigners in Albania by purpose of travel, 2014-2022 (Source INSTAT, 2022)

Description	2014	2015	2016	2017	2018	2019	2020	2021	2022
1. Holidays, visit to relatives, etc.	3,415,550	3,900,646	4,516,492	4,865,841	5,639,818	6,094,889	2,457,446	5,411,591	7,067,487

In Figure 2, the program implemented in Anaconda Spyder uses the Matplotlib library and provides the capability to write and improve code using the integrated editor, as well as visualize data through plotting. These libraries offer a wide range of options for data visualization in Py

thon, catering to different needs and preferences (Majumder, 2023).

The choice of library depends on the type of visualization you want to create and your familiarity with the library's syntax and capabilities (Jain, 2023).
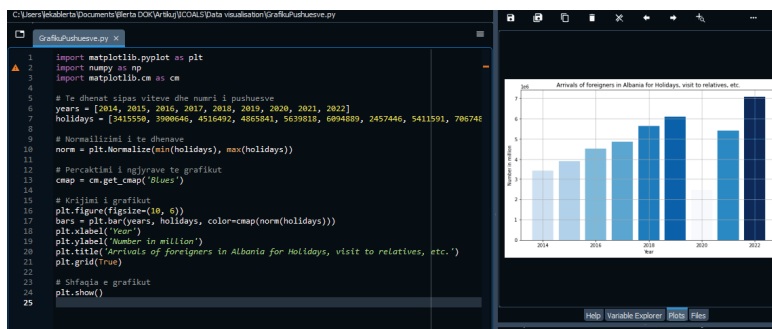
Figure 2 Python code and data visualisation to show the numër of arrivals of foreingners in Albania for Holidays

Both R and Python have vibrant communities and ecosystems, with ongoing developments in the field of data visualization. The choice between R and Python for data visualization often depends on personal preferences, existing skill sets, and specific project requirements (Data Science, 2022)**.**

Conclusion

Data visualization has evolved into a critical tool for comprehending complex information across various fields. It is no longer limited to statisticians but is essential for anyone dealing with data, including managers and decision-makers. This investigation specifically focuses on the role of data visualization in the agribusiness sector in Albania, a country experiencing growth in both tourism and agribusiness. The study explores how two prominent programming languages, R and Python, contribute to data visualization in this context. Both languages are renowned for their data analysis and visualization capabilities. The analysis encompasses a comprehensive comparison of their utility in transforming raw data into actionable insights for agribusiness stakeholders, including interactive data visualization (Malnik, 2021).

Key findings are summarized as follows:

- Evolution of Data Visualization: Data visualization has a rich history, from prehistoric cave paintings to modern interactive visualizations using AI and machine learning.
- Data Visualization with R and Python: Both R and Python have significantly contributed to the evolution of data visualization. R offers a wide range of packages like ggplot2 and Plotly, while Python provides libraries like Matplotlib, Seaborn, and Plotly. These libraries cater to different needs and preferencës (IBM, 2021).
- The choice between R and Python often depends on personal preferences, existing skill sets, and specific project requirements.

Figure 2 demonstrates a program in Anaconda Spyder that uses the Matplotlib library for data visualization, allowing users to write and improve code while creating clear and engaging visualizations. This approach serves as an example of how to leverage Python for data visualization tasks.

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THE IMPLEMENTATION OF A NEW FISCALIZATION PLATFORM IN ALBANIA: FINDINGS FROM THREE CASE STUDIES

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Abstract

The fiscal platform implementation in Albania is a multifaceted process involving institutional, socio–economic, legal, technological and instrumental aspects. The study aims to evaluate the progress of the fiscal reform, analyzing challenges and achievements and suggesting appropriate recommendations. Utilizing the literature review, expert assessment and analysis through case studies of three agribusinesses, we identify prevalent issues hindering business operations due to the fiscal platform. While periodic renewal of the fiscalization certificate is obligatory, we advocate for providing the certificate at the platform's outset. Conducting empirical research on public policy is essential to optimizing the fiscal platform in alignment with the context and EU standards.

Keywords: fiscalization, business environment, entrepreneurship, Albania.

Introduction

Albania's new fiscal platform requires continual analysis and updates, compelling businesses to adapt administrative practices. The fiscalization law mandates compliance, amidst internal and external challenges, making implementation demanding for legal, financial, and technological improvements aligning with European integration goals. Observing businesses highlights a technical issue: the 4,000 ALL fee for yearly fiscalization certificate renewal disrupts operations due to time-consuming processes. A suggested solution is a one-time certificate application, considering the fee as a tax, streamlining business functions and preventing losses. This issue fuels informality during the gap between certificate expiration and renewal. Businesses operate in cash during this period, and the Tax Directorate only recognizes electronic transactions via the fiscal platform. A potential solution is to obtain the certificate at the platform's onset and discontinue it with business closure, rather than yearly renewal. Many small businesses face delays in certificate renewal despite email notifications from the National Information Society Agency, suggesting a need for empirical research to address fiscalization challenges. In research evaluation, the approach through case studies and techniques (e.g., participant evaluation) [10], provides a comprehensive analysis of issues at the individual, group, or organizational level and is widely considered [2; 1] as a fundamental multidisciplinary method for generalizing the phenomena under study. Justifying the need for fiscal reform, the authors demonstrate the broad legal, institutional, technical, technological, economic, and financial advantages and consequences of this process for entrepreneurs, especially for small businesses [9]. The fiscalization reform improves tax procedure standards and participants, operational principles, etc. [4]. However, such reforms need faster adaptation between continuous changes (eg, legal and technical) and some controversial procedures that may remain undefined for business entrepreneurs [5; 7]. Furthermore, the research highlights concerns (e.g., technical, and technological) regarding the issue of implementation of a new fiscalization platform in Albania and the need for continuous assessments and adjustments to improve the system [6]. The study provides an assessment of the progress of the fiscal reform in Albania, analyzing the challenges and achievements so far and suggesting appropriate recommendations.

Materials and methods

The research method for studying the implementation of the fiscal platform in Albania through case studies involves the following steps:

*Case selection: **Referring to the large number of businesses in Albania that have implemented the fiscal platform [3], we have carefully selected three major companies operating in different sectors. Specifically, in the sector of fruit and vegetable collection, processing and trade, dairy products, and meat.***

*Data collection: **Information gathering for three case studies has been conducted by interviewing representatives (legal and administrative) of these businesses, based on the questionnaire designed for the realization of the study.***

*Data analysis: **After conducting the interviews, we analyzed and evaluated the information for each case studied. We have identified the general problems encountered in the business environment when using the fiscal platform and the specific cases and the implications for each company, also considering entrepreneurial ideas.***

The study methodology (figure 1) based on three case studies will provide a summary of the challenges and obstacles in the process of fiscal reform implementation in Albania, ensuring a valid database for reasoning and formulation of improvements, based on the observations and experiences of businesses during the current use of the fiscal platform.

Fig.1. A conceptual framework based on the case study design.
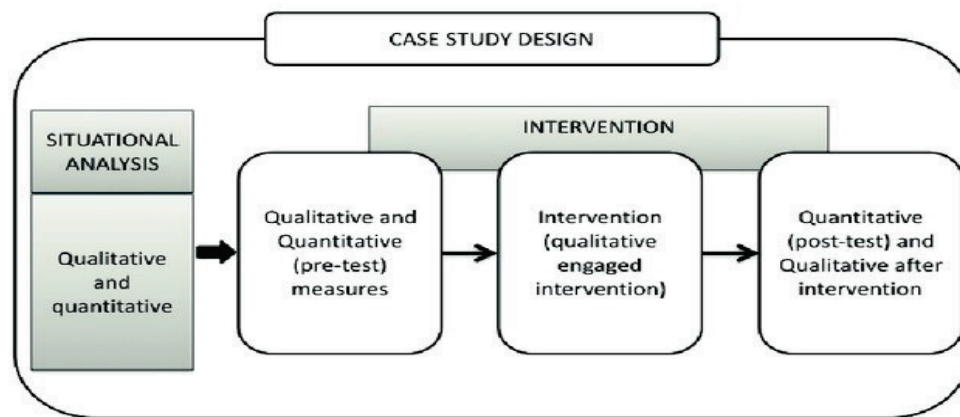
Source: [8].

For the completion of the work, a questionnaire has been designed, which is addressed to company representatives and is divided into several sections:

Part One: Provides general information about the agricultural enterprise, including questions regarding the type of activity, business size, number of employees, and the organizational form of the business.

Part Two: Provides information about the profile of the legal representatives of the enterprise, including questions related to their knowledge and competency level, professional characteristics based on various technologies, technical and instrumental specifications, etc.

Part Three of the questionnaire addresses questions related to the effects of implementing the fiscal platform. It provides data on infrastructure, access, and logistics for implementing the system, procedures, and the timeline of each enterprise's implementation process. It also includes questions that provide information on how the implementation will serve the future of the company.

The fourth and final section addresses questions about the issues arising from the implementation of the new digital system, the costs of implementation (which vary among medium and large companies), access to assistance and service providers who have carried out the implementation, the impact on the informal sector, and other difficulties during usage.

The selected case studies are from three different fields. "Sidney", a large business (50+ employees) and a turnover exceeding (14 million ALL), implemented the fiscal platform, streamlining operations and aiding tax collection, notably VAT. Despite facing higher implementation costs and challenges from informal sector competition, they deemed fiscalization a necessary reform aligning with European standards. "Erzeni" Dairy Processing Company, regardless challenges due to high implementation costs, evidence benefits of reduced informality and improved tax collection. The company stressed the importance of monitoring and encouraging compliance among competitors to maintain a fair market. "Hako" company swiftly implemented fiscalization, leveraging a well–established IT department and collaboration with Infosoft Software Developer. Although they acknowledged benefits like enhanced transparency and real–time VAT monitoring, they emphasized the challenge of high implementation and maintenance costs affecting product prices. They also highlighted complexities in using the Customs-Self-Care portal for extensive declarations.

Results and Discussion

The completion of the fiscalization reform in Albania necessitates continuous evaluations, analyses, and adjustments, accounting for various specifics like technical, legal, institutional, administrative, cultural, conceptual, formal, and informal aspects. The challenges faced in the business environment during this process call for professional responses. Deficiencies encountered in the implementation of the fiscalization system can be outlined as follows:

- **Export Transmission:** Lack of an option for exporting entities to transmit exports through the system.

- **Standardization and Data Synchronization:** Absence of standardized writing rules and data synchronization with e-filing.

- **Real-time Recording of Imports**: Imports in the last two days of the month are not transmitted in real-time, causing delays and a lack of reconciliation.

- **Inconsistencies in Service Billing**: Different requirements and rules for various service providers, resulting in billing inconsistencies.

- **Self-Supply Issue for VAT**: Unresolved self-supply issue for VAT purposes on services outside Albanian territory, impacting VAT goals.

- **Excessive Responsibility on Taxpayers**: Taxpayers are unnecessarily tasked with creating fiscal invoices for imports, burdening them and distorting reality.

- **Potential for Human Errors**: Possibility of human errors altering sales data, including changing fiscal periods with a wrong invoicing date.

- **Unjustified Reduction of Revenues**: Tax administration not acknowledging transactions properly, leading to an unjustified reduction of revenues and tax obligations.

- **Distortion of Import Data:** Potential to distort import data concerning supplier information, which should be verified by the customs authority, introducing errors in the system.

We propose regulations for fiscalization software providers, aligning with current legislation on writing style, size, date format, and billing periods. Recommendations include:

- **Invoice Correction**: Restrict corrections to invoices from closed fiscal years, providing explanatory references instead.

- **Adjusted Declaration Dates**: Shifting declaration book submission deadlines to the 20th of the following month, allowing necessary adjustments for the self-care system.

- **Simplified Invoicing for Imports**: Removing the mandatory self-fiscal invoicing option for imported goods and opting for automatic invoices from customs.

- **Efficient Export Transmission**: Adding an automatic real-time export transmission option based on customs export declarations.

- **Streamlined Customs Reconciliation**: Simplifying the customs declaration process by promoting a single, error–free declaration choice and avoiding declaration mistakes.

- **Unified Fiscalization Programs**: Ensuring consistency by unifying all fiscalization programs for direct transmission from the National Business Registration Center and minimizing data discrepancies in transactions and forms.

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OPERATIONAL PROBLEMS IN SECOND-LEVEL BANKS IN TIRANA, ALBANIA

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Abstract

Operational issues in second-level banks refer to any situation, difficulty, or obstacle that hinders normal bank operations and may result in financial losses, damage to reputation, or hindrance in achieving goals. These issues are associated with the processes of banks and may arise from various causes. This study aims to analyze the primary factors that lead to operational risk in second-level banks. The objective is to identify operational problems that banks can minimize to reduce operational risk. The methodology of this study involves literature review and quantitative analysis. The quantitative method identifies the primary operational risk factors and analyzes their impact on second level banks. The results indicate that personnel, fraud risk, internal factors, and the external environment are the primary contributors to operational risk in second-level banks. These factors may result in financial losses, damage to reputation, and operational issues. The study concludes that second level banks should utilize advanced security and control mechanisms, invest in staff training, establish clear operational policies, and monitor operational performance. Collaboration with regulatory authorities and the use of information technology are also recommended to reduce operational risk. The research highlights the importance of identifying and managing operational risk in second-level banks. It provides a foundation for further exploration in the field of operational risk and the financial sector.

Key words: Second-level banks, Operational problems, Financial sector, Tirana.

Introduction

Second-level banks are regional or local financial institutions that serve small and medium-sized businesses and customers in a specific geographic location, with a smaller asset base than large international banks. Their focus is on building strong relationships with customers, which is why they are often characterized by their local presence. Second-level banks are crucial to promoting regional economic growth, financial inclusion, and the distribution of credit locally. Banks process a high volume of transactions across different markets every day. As a result, they are exposed to operational risks related to maintenance, recording, and data storage activities. To maintain transaction volumes, ensure that each transaction is authorized, and accurately entered into the database, banks rely heavily on their employees' skills, automated systems, communication networks, and internal controls. Operational risk refers to the possibility of suffering a loss due to the failure of internal processes, inadequate personnel or systems, or external events. This definition encompasses legal risk, but not strategic or reputational risk. Legal risk involves the exposure to penalties or punitive damages from regulatory authorities or private collusion. Marrison defines operational risk as "the chance of experiencing direct or indirect loss due to deficient internal processes, personnel, or systems, as well as external events" (Marrison, Ch., 2002).

To effectively manage this risk, it is important to understand the institution's requirements, reliability, and respect for policies and strategies (Abdullah et al., 2011). Bank operations rely on various systems and processes, including IT, human resources, credit/market/insurance/liquidity management, and risk management. These systems may consist of different components, each requiring interaction with multiple processes (AL-kiyumi et al., 2021). Effective management of contractual agreements is necessary for maximizing profit and minimizing operational risk faced by banks.

According to Ghosh in 2012, many second-level banks lack advanced transaction management systems, which can lead to errors and possible misuse during the fund transfer process. Companies lose an estimated 550 billion dollars annually due to employee dissatisfaction. To address these issues, staff training in areas such as risk management, information security, and customer management can improve their competencies and skills. Additionally, providing evaluations, benefits, and psychological support can promote staff well-being and balance, ultimately leading to more efficient operations. One issue that second-level banks often face is a lack of transparency in the market. According to Eceiza et. al., (2020), this is a significant challenge for these banks, particularly when they provide services in new markets. It can cause customers and investors to feel distrustful and damage the bank's reputation.

Material and Methods

This study employs a methodology that involves reviewing relevant literature to enhance comprehension of operational issues in second level-banks in Tirana, Albania, as well as utilizing quantitative methods. The collection of primary data involves the use of a structured questionnaire that was designed to obtain information on operational problems in second-level banks in Tirana, Albania. This questionnaire contained structured questions with alternative options for customers of these banks and was tested for clarity, objectivity, and accuracy. Data was collected by distributing the questionnaire to 100 randomly selected customers on Google Forms, with respondents encouraged to express their honest opinions on operational issues. The study utilized a structured questionnaire sent to customers of banks in Tirana, Albania via the Google Forms platform, containing questions aimed at identifying and evaluating issues related to customer service, personal data security, technology and banking systems operations, fees and commissions, and the lack of opportunities to resolve complaints.

Results and Discussion

According to relevant literature, some of the most common operational issues faced by second-level banks include poor or slow service, inadequate security measures, malfunctioning technology and systems, excessive fees and commissions, and limited options for complaint resolution.
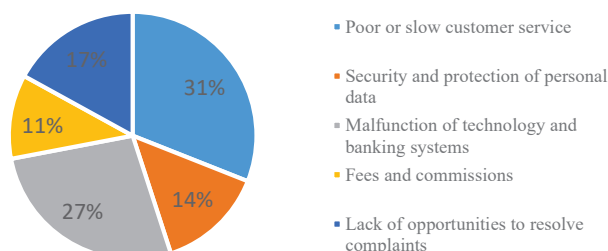
Figure 1. The prevalent operational issues faced by second-level banks in Tirana

Based on (Fig.1), the majority of respondents cited poor or slow customer service as the most common operational problem, accounting for 31% of cases. Malfunctioning technology and banking systems were reported in 27% of cases, while 17% mentioned the lack of opportunities to resolve complaints. Other issues such as security and protection of personal data were reported by 14% of respondents, and fees and commissions were cited by 11% of participants. These results clearly indicate that technological problems and poor service are the most frequent operational issues faced by customers in second-level banks.

Furthermore, ensuring the security of personal information and reducing fees are crucial factors that directly affect the overall customer experience. As such, banks must prioritize addressing and improving these operational aspects to provide a superior experience for their customers.
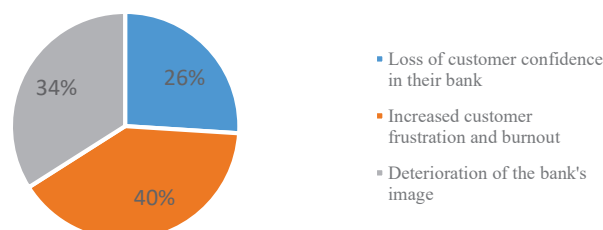
Figure 2. Impact of operational problems on customer experience in second-level banks in Tirana

Based on the data shown in (Fig.2), the primary concern that affects customers' experience in second-level banks is the rise in frustration and exhaustion, accounting for 40%. The second most common problem is the deterioration of the bank's image, which accounts for 34%. The third issue is the loss of customer trust in their bank, with a percentage of 26%. This analysis emphasizes how operational problems significantly impact customers' experience in second-level banks. The increase in frustration and exhaustion is the most significant issue as it leads to customer dissatisfaction and unnecessary strain. The deterioration of the bank's image is also a critical problem as it affects the bank's credibility and reputation. The loss of customer trust also has a considerable influence on their relationship with the bank.

It is clear from the analysis that second-level banks need to address operational issues in order to improve customer experience and regain trust.
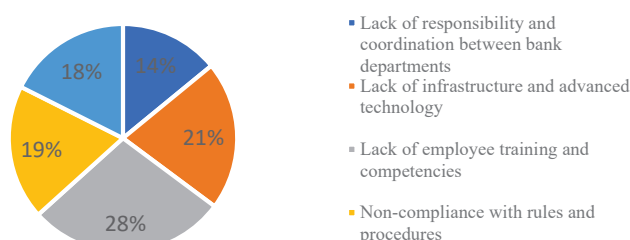
Figure 3. Reasons for operational issues in second-level banks as reported by customers

Based on (Fig.3), the primary cause of operational issues in customer experience at second-level banks is the inadequate training and competency of employees, accounting for 28%. This highlights the significant impact of employee training and competence on service quality and the ability to provide solutions to customers. Additionally, the lack of infrastructure and advanced technology is another important problem at 21% that requires attention to enhance effectiveness and customer experience. The third most crucial concern is service channel malfunctions contributing to 18%, while non-compliance with rules and procedures, and lack of responsibility and coordination between bank departments account for 19% and 14% of operational problems, respectively.
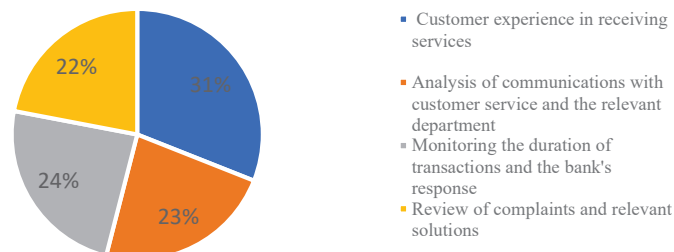
Figure 4. Assessing Operational Issues from the Customer's Perspective in Tirana

According to Fig.4, demonstrate that customer surveys are a popular method of identifying and assessing operational issues, with a 31% response rate. This data suggests that surveying customers about their service experience is crucial for identifying operational problems in second-tier banks. Additionally, 23% of respondents suggested analyzing communications with customer service and the relevant department, while 24% recommended monitoring transaction duration and bank response time. 22% of respondents suggested examining complaints and related solutions. Therefore, to enhance customer experience in second-level banks, it is important to address issues such as analyzing communications, monitoring transaction duration, and reviewing complaints and solutions.

To effectively manage operations, it is crucial to develop strategies and use suitable tools to address issues as they arise.
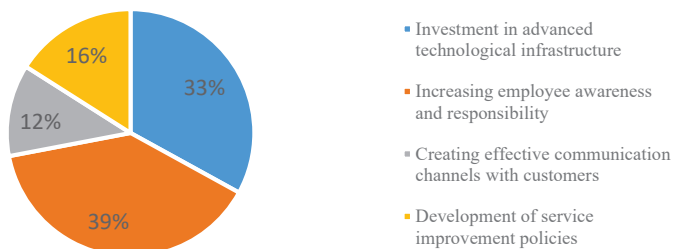
Figure 5. Strategies and tools that can be used to address operational problems in second-level banks from the customers' perspective

According to the information presented in the Fig.5, a crucial strategy for dealing with operational issues is to increase employee awareness and responsibility by 39%. This can be achieved by providing training and assigning clear roles and responsibilities to address problems, which can lead to better services and a culture of accountability in the bank. Additionally, investing in advanced technological infrastructure by 33% can significantly improve operational performance. To create effective communication with customers, it is important to establish dedicated hotlines, online communication platforms, and online chat, which comprises 12% of the strategy. Lastly, service improvement policies (16%) should be developed, which involves reviewing and enhancing operational processes, as well as setting high standards for banking services.

Conclusions and Recommendations

Investing in advanced technology can help to improve customer service by reducing issues with slow or inadequate service. Second-level banks can benefit from investing in advanced e-banking platforms and online service channels, which can enable customers to perform transactions quickly and receive more efficient services. As a result, there will be fewer service requests through traditional channels, allowing bank employees to focus on handling more complex requests and delivering value-added services.

Investing in the continuous training and development of employees' skills in financial services can significantly reduce operational problems for second-level banks. By having a qualified and competent staff, these banks can provide high-quality

services, resulting in fewer errors and increased reliability. Ultimately, this will lead to improved competencies and overall success for the banks.

Investing in infrastructure and advanced technology can help solve the issues of inadequate technology and weak systems. The use of integrated platforms and automated systems can enable second-level banks to minimize errors and problems caused by technology malfunctions. As a result, banks can improve their efficiency and productivity while significantly reducing operational difficulties.

By improving their service quality and investing in advanced technology, second-level banks in Albania can reap tangible benefits. This will boost their reputation, earn customer trust, and create a positive customer experience. Furthermore, these banks will have the chance to expand their market presence and grow their business.

To address operational issues, it is recommended that businesses invest in advanced technology. This can help alleviate problems such as slow or inadequate customer service. By utilizing advanced e-banking platforms and online service channels, many important services can be performed without the need to physically visit a bank branch. This can simplify procedures and enhance overall customer satisfaction.

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ANALYSIS OF THE VALUE CHAIN OF FRUITS AND VEGETABLE VALUE CHAIN IN ALBANIA WITH A FOCUS ON QUALITY, ENVIRONMENTAL, SOCIAL AND SUSTAINABLE REQUIREMENTS

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Abstract

Fruit and vegetables (F&V) is one of the main and most competitive agri-food sectors in Albania. It has been characterized by significant production and export growth over the past decade. Despite the potential and rising export trends to EU markets, regional/Western Balkan nations continue to be important destination markets since EU (especially richer/northern EU countries) markets are demanding in terms of criteria. The focus of this study is to identify challenge regarding the compliance with standards and provide recommendations. The study is based on a field survey using semi-structured questionnaires targeting two dozen exporters which was carried out during 2022 – 2023 as well as on extensive literature review. The data was subject to descriptive statistical analysis. The study show that production activities are often poorly planned, managed and controlled: use of inputs is not carefully measured and their quality not sufficiently ensured with consequent impacts on quantity, quality and safety of the production. Scarce culture for quality and consequently low compliance with standards results to lower quality and prices (profitability) of products. On the other hand, importers are increasingly demanding additional requirements, leading to the adoption of standards and certifications. GAP certification is almost universally required, while European and global markets demand certified adoption of food quality and safety standards. Demand for certified sustainability schemes is also increasing.

Key words: Fruits and vegetable, quality standards, sustainability.

CONSUMER PREFERENCE FOR PLACE OF PURCHASE FOR FRUITS AND VEGETABLES

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Abstract

The purchasing patterns of consumers regarding fresh products are different in appearance a preference for open markets. Albanian consumers spend a considerable part of their income for food products. The group "Food and non-alcoholic beverages", with an average monthly value of expenses, occupies a weight of 41.3% in the family budget. The subgroup that occupies a significant weight are fruits and vegetables with 17.4% of total. The consumer patterns towards place of purchase for food are divided between supermarkets and occasionally trades offering fresh food in the open air markets. In Albania, the presence of the shopping culture in supermarkets and hypermarkets has a late start due to isolation. The results suggest that to increase the loyalty of current customers, producers and sellers should emphasize the availability of fresh, superior, vitamin-rich and locally grown products in market locations through various forms of communication. Space where consumers interact with food, has an influence on consumer behavior. This paper aims to bring a literature review to understand which specific market attributes, internal, external and demographic, affect the probability of preference to buy fresh products, especially fruits and vegetables through different market channels, exploring the differences between to those who prefer to buy directly always, occasionally and never. This study contributes to the knowledge in behavior of consumers and retail formats towards fruits and vegetables.

Keywords: Consumer preference, place of purchase, fruits and vegetables, direct markets, supermarkets

1. Introduction

Consumption of fruits and vegetables varies between European countries, where 67.1% of the EU population aged 15 years and older reported eating at least one portion of fruit and vegetables on a daily basis [2]. Statistical data from INSTAT (2022) testify that in Albania there is a progressive growth of the fruit and vegetable sector, where in 2020 the total amount (in tons) of vegetables and fruits was 1,295,726 and 199,100 respectively [4]. Evidence shows that consumption of fresh fruits and vegetables in most low-and middle-income countries remains significantly below the recommended dietary requirements [18]. The consumption is attributed to multiple factors such as availability, accessibility, affordability, culture and preferences.

2. Consumer preference for fruits and vegetables

In non-European countries where there are doubts about the use of pesticides, attributes such as seasonality, locality, origin and organic certification play a role in the selection of products [16]. The freshness of fruits and vegetables through the analysis of the sensory and visual aspects of the product is used as a type of evaluation by the consumer [5,7]. The assessment of origin is closely related to the quality of the product evaluation. Consumers consider a national product to be of better quality and safer than imported products [14]. Seasonal fruit and vegetable consumption is linked with consumer choice behavior oriented. Customer seeks to avoid excessive processing of the product while maintaining organoleptic quality and freshness [10,17,15].

3. Place of purchase for fruits and vegetables

In Albania, the traditional markets still compete strongly in the fruit and vegetable sector. Buying fruits and vegetables in direct markets is a form of early purchase for the Albanian consumer. Supermarkets appeared in the late 2000s, competing for consumers with traditional markets. This is combined with the change in lifestyle, long hours at work and the reduction in the number of family members. Knowing the factors that the consumer uses as a guide for the selection of fruits and vegetables can also influence the place of purchase for them. Based on the literature section, consumer preferences for fruits and vegetable, we deduce that consumer preferences are mostly driven by attributes such as seasonality, freshness and origin.

Retail outlets specialize in selling a wide variety and range of fresh fruits and vegetables purchased directly from growers/producers or wholesalers for locally produced ones, while they source imported/exotic fruits and vegetables mainly from wholesalers and intermediaries [13]. These retailers are located in open markets in dedicated sections or found in small neighborhoods, street markets, and roadside kiosks.

Convenience stores are located in major urban centers and along highways for those consumers who prefer convenience [6]. Stephenson and Lev (1998) found that for consumers, fair price, social interaction, and location attributes are factors that drive purchases in farmers' markets [11]. Sunding (2003) determined that attributes such as nutritional content, cleanliness and freshness are important to consumers, although there is a growing awareness of labelled foods. Farmers' market customers are typically older and spend a larger portion of their food budget on fresh produce [1]. Consumers claims for more information about origin and product characteristics. This is the main disadvantage that this type of retail has.

Form the other side supermarkets are seen as shopping places where products are not very fresh and are preferred by consumers for processed products, contributing to unhealthy diets [3,8,13].

Consistencies across studies lend credence to the loose definition of a characteristic direct market channel user. Direct market sellers for fresh products have limited advertising and education budgets, limiting the information they can provide to consumers [1]. This reinforces the idea that demographic characteristics, lifestyle influence the preference for place of purchase for fruits and vegetables.
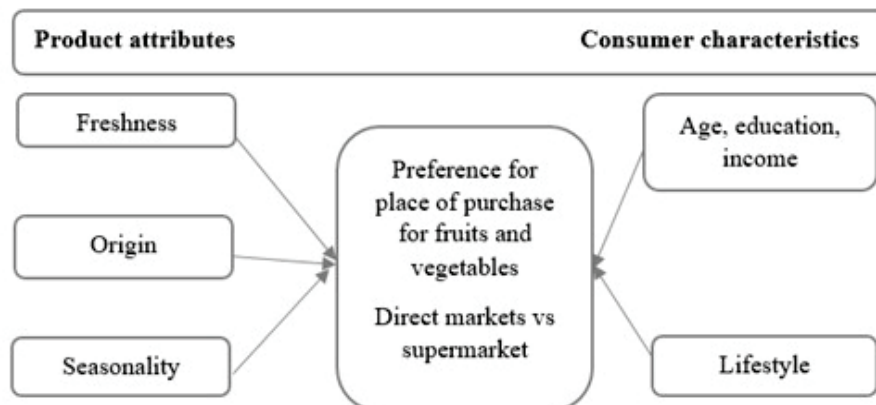
Figure 1. Preference for place of purchase for fruits and vegetables

4. Conclusion

The traditional markets still compete strongly in the fruit and vegetable sector. Due to the high degree of urbanization, the appearance of supermarkets has displaced the traditional form of buying fruits and vegetables from direct markets. It is estimated that consumers look for their freshness, origin and seasonality when choosing fruits and vegetables, as these attributes are associated with healthy living. Direct markets are preferred by older consumers who have more time to make purchases. Supermarkets are shopping places for young consumers. The challenge for direct markets is to improve marketing practices to meet consumers need for information regarding freshness, origin and seasonality.

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SMALLHOLDER FARMERS PREFERENCES AND TRUST TOWARD FORMAL CREDIT MARKET-THE CASE OF ALBANIA

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Abstract

Access to formal credit is one major constrains leaving smallholder farmers behind in their efforts to achieve growth and better livelihood in rural Albania. A better access to credit is a key for achieving access to capital and enabling economic empowerment. The objective of this study is to create and understanding of the farmers preferences to access formal credit market and explore empirically the factors associated with their preferences for financial credit. The study is based on a field survey using semi-structured questionnaires targeting 506 smallholder farmers in the rural areas of Peshkopi, Maliq, Librazhd and Kurbin. The sample selection was purposive and targeted households which have limited land area and are deprived from non-farm income resources. The descriptive analysis explore the relations between farmers preferences for credit and their characteristics, their farm characteristics as well as their status, knowledge and perceptions related to financial market institutions. The study found that more than 30% of the farmers have a bank account. Interestingly only 1.8% of the respondents are accessing a formal credit while more than 6% are using relatives financing transfers (informal debt) for investing or carrying the yearly operations in agriculture. The study contributes in better understanding farmers preferences toward credit and their main constrains in being integrated into financial markets. The results of the study provides recommendations for both banking institutions and policymakers on increasing access to credit for smallholders in remote area of Albania.

Key words: credit preferences, access to credit, trust, smallholder farmers, Albania.

TERRITORIAL BRANDING STRATEGIES: INCREASING ECONOMIC PERFORMANCE IN THE AGRO-PROCESSING INDUSTRIES OF VLORA

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Abstract

From the conducted research, it results that in the region of Vlora, the agro-processing industries of agricultural and livestock products turn out to have a low economic performance and there is a lack of detailed studies related to the causes of this phenomenon. After identifying the reasons for low economic performance in agro-processing industries, the study aims to offer one or several brand models for agricultural and livestock products with indicators for the region under study. The branding of products with a local indicator will influence the promotion of sales and therefore the increase in the income of industries and the economic development of the area. Also, branding with such an indicator will help in the integration of these products in other local and foreign markets. The methodology used is descriptive where it interweaves the cases examined, scientific procedures, literature, and appropriate tools in relation to the research objective. During the study, it emerges that the application of territorial marketing and the selection of special tools during the branding process such as: the typical features and symbols of the area, the traditional way of production, will serve agro-processing industries in improving economic performance. In the end, this paper will help future researchers for similar problems in other areas of Albania.

Keywords: agricultural and livestock products, branding, territorial marketing, local indicator

Introduction.

The aim of this paper is to provide an overview of the theoretical framework used in research on the role of territorial marketing and branding in local products. From the literature research, important developments and updates in this field emerge. This paper begins with theoretical approaches on the transition from general marketing to territorial marketing and historical development as well as its role in the development of local products. Continuing further with the methodology and types of data necessary for the case study. Territorial branding strategies are a way used by industries to differentiate products and significantly increase their value in the market. This concept can also be applied to the agro-processing industries of Vlora to increase the economic performance of this area. By applying strategies of this type in the agro-processing industries of Vlora, the income of this area can be increased, positively affecting the development of the local economy, attracting investors and increasing exports. The methodology used is descriptive where it looks at the cases examined, the phases chosen, the literature and the tools related to the research objective. Its main objective is the identification and analysis of the causes of low economic performance in the agro-processing industries of the Vlora region and the development of several branding models with local indicators for agricultural and livestock products in the study area. For this case study, secondary data were used such as literature review, reports, various statistics which are necessary to identify the causes of low economic performance in agro-processing industries in the study area.

From Traditional Marketing to Territorial Marketing.

"Territorial Marketing" is composed of two important elements such as "territory" and "marketing", where each of them has its own characteristics (Kolter et al., 1969). The methodologies, principles and goals of territorial marketing are not only implemented with the aim of profit in businesses but integrate the distinctive features of a locality aiming at the targeted consumer segment, (Guatri et al., 1999; Hunt, 2002). The problem of applying territorial marketing effectively consists in the lack of a theoretical framework which will influence the formation of this field (Golfetto, 2000). Different researchers claim that territorial marketing is a newly created discipline and as such it is difficult to form the general theoretical framework based on research-scientific data (Demattesi, 1994).

According to Caroli (2006), territorial marketing strategies aim at promoting the economic competitiveness of a territory. The territorial marketing function is based on sales or trade results. The purpose of territorial marketing is to empower certain categories of businesses/industries which will consequently affect the development of the territory. In addition to this territorial marketing goal, it aims to provide the opportunity to enter the international market of businesses/industries, thus bringing an increase in economic potential and local development (Cercola et al., 2017; Basile, 2021).

The role of marketing in the development of local products.

From the developed researches, a special importance has been given to the function of the country of origin, as a factor that is not affected by import products, taking into account the loyalty of consumers in favor of local products, (Tan et al., 1987). In the following years, marketing experts focused their attention on the commercial aspects of the notion of country of origin, after realizing that they could use the country of origin of a product as a quality indicator (Baker et al., 2002; Alon et al., 2022). The main message conveyed in it of the country of origin is the image of the country where the ideas and connotations associated with a country are attributed to the products it produces (Martin et al., 1993).

Methodology.

The methodology used is descriptive where it deals with the examined cases, procedures, literature, and appropriate tools in relation to the research objective (Mari 1994; Rini, 2019). At this stage, a review of existing literature and research related to the performance of agro-processing industries was carried out. This helps identify prior knowledge and gaps in the literature of the field. The main purpose of this study is to identify and analyze the causes of low economic performance in the agro-processing industries of the Vlora region and to develop some brand models with local indicators for agricultural and livestock products in the study area. Initially, the problem was identified, which consists in the low economic performance of the agro-processing industries in the Vlora region. Also, it is important to emphasize the lack of detailed studies on the causes of low economic performance in the study area. The sources of data needed for the case study are secondary data such as literature review, reports, various statistics (Mari, 1994; Bonoma, 1985;), which are necessary to identify the causes of low economic performance in industries. agro-processing in the district of Vlora.

Results and Conclusions.

The conducted study is part of a theoretical framework which is lacking in the study area. From this research, it emerges that territorial branding strategies with local indicators are an important tool to increase economic performance in agro-processing industries. These strategies include identifying the unique characteristics of the territory and promoting them in order to influence the growth of production and sales. In Vlora, agro-processing industries have a great potential to increase the economic performance of the locality. From the analysis of the literature, it appears that the branding of agricultural and livestock products with local indicators can also affect the district of Vlora in increasing demand for these products, identification of new markets and export of products to foreign markets, increase in production and increase in income and increasing employment in these industries in the study area. It also stands out that territorial branding strategies with area indicators are an important tool to increase economic performance in agro-processing industries in the Vlora area. The conducted study serves for future experimentation. It is important that territorial marketing extends to the entire territory of Albania and not only in the Vlora area and is treated according to the distinctive features of each area.

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THE SOCIAL AND ECONOMIC IMPACT OF THE RUSSIA-UKRAINE WAR ON THE CONSUMPTION OF BASIC BASKET PRODUCTS

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ABSTRACT

This paper will present some of the impacts that the Russia-Ukraine war created and continues to create in the economic development of Albania. The paper focuses on the impact that this war has had, especially on the Albanian consumer.The beginning of the Russia-Ukraine war immediately affected the economy of all countries, especially in European countries, but not only. Albania, as a developing country, being a country that imports more products than exports, immediately reflected the impact of this war. Thus, the markets immediately reflected price increases for all products, reaching in August an inflation level of 8% according to the data declared by the Bank of Albania and INSTAT. In this paper, a study was carried out on consumer behavior in the consumption of some basic basket products, in the face of very high inflation. The study mainly reflects the consumer's behavior towards the basic products in the basket.

What happened to the customer? Can they afford the high prices of the products? Has the consumption of basic products changed? These are some of the basic questions of this study, the answers to which in this study reflect a gray panorama of all the difficulties that the Albanian consumer is facing, but not only. The decline of economic well-being requires greater attention from the state, in its intervention through adequate policies to overcome these difficulties and others.

Keywords: *inflation, economic-social impact, basket products, consumers, adequate policy.*

Economic-statistical analysis of the impact of the Russia-Ukraine war on the consumption of some basic basket products

During the year 2022, the whole world felt the consequences of the Russia-Ukraine war, a war which still continues. It has deepened the negative consequences in the economy of many countries, consequences which are deepening. The negative impact caused by this war has been felt especially for developing countries such as Albania.

While our country had not yet recovered from the economic crisis caused by the global pandemic "Covid 19", it was found unprepared to face a very high inflation, inflation which reached about 8.3% in October 2022. The increase in inflation caused a chaos in our economy.

As a result, the confrontation between the West and Russia has greatly escalated, which will have a long-term, large-scale negative impact on most European companies and economies. (*Russia's War in Ukraine: Consequences for European Countries' Businesses and Economies Anatolijs Prohorovs*)

The Consumer Price Index in June 2022 reached 109.0 compared to December 2020. The annual change in the Consumer Price Index in June 2022 is 7.4%, a year ago this change was 1.6%. The monthly change of the consumer price index in June 2022, compared to May 2022, is -0.1%.

The annual price increase in June was mainly influenced by the "Food and non-alcoholic beverages" group with +4.38 percentage points, followed by the "Transport" group with +1.53 percentage points. Prices of the group "Rent, water, fuel and energy" with +0.54 percentage points. The prices of the "Furniture, home appliances and home maintenance" group increased by +0.28 percentage points. The prices of the "Hotels, cafes and restaurants" group contributed with +0.25 percentage points. The prices of the "Alcoholic beverages and tobacco" group increased by +0.23 percentage points.

The prices of the "Clothing and shoes" group increased by +0.07 percentage points. Prices of the group "Various goods and services" with +0.05 percentage points. The prices of the group "Communication" and "Educational service" with +0.02 percentage points each. Prices of the "Health" group with +0.01 percentage points. (Institute of Statistics info@instat.gov.al,

Table 1. Regresion results for the relation consumption and family income

Modello		Coefficienti non standardizzati		Coefficienti standardizzati	t	Sig.	Intervallo di confidenza 95.0% per B	
		B	Deviazione standard Errore	Beta			Limite inferiore	Limite superiore
1	(Costante)	1.028	.145		7.070	.000	.740	1.316
	family income	6.687	.000	.735	2.652	.009	.000	.000

a. Variabile dipendente: the consumption of the basic products of the basket before the price increase
www.instat.gov.al).

The conflict between Russia and Ukraine will affect the global economy through three main channels: financial sanctions, commodity prices and supply chain disruptions. (https://www.eiu.com/n/ economist intelligence).

The consumer faced an immediate increase in prices for all products while the wage level remained unchanged. As a developing country, the level of wages is not very high and the level of unemployment has been increasing. This immediate increase in prices had an immediate impact on the reduction of purchasing power. The consumer significantly reduced consumption for all goods. The decrease in consumption was very significant and for the basic products of the basket such as: flour, sugar, rice, pasta, eggs, milk, dairy products, as well as in the fruit and vegetable sector, there was a large decrease in consumption.

The situation of purchases and consumption of basic basket products before and after the price increase

To assess the impact of the Russia-Ukraine war on the impact it has had on the consumption of goods, mainly the basic basket of goods: flour, sugar, rice, oil, etc., 122 random consumers were surveyed. To evaluate the responses of consumers, regression analysis was used to see the impact of income on the consumption of the basic products of the basket.

Regression analysis is a parametric analysis which examines the relationship between the independent variable and the dependent variable, it shows the influence of the independent variable on the dependent variable. From the model, we notice that 73.5% is explained by the coefficient of determination, which shows that 73.5% of the consumption of basic products in the basket before the price increase is explained by the level of family income, while the rest is explained by the remaining factors. The correlation coefficient = 0.901 shows the strength of the connection between the variables included in the model. The closer this coefficient is to 1, the stronger the relationship between the variables. In this case the connection is strong and positive. As can be seen in the regression analysis table above, according to the level of security, the hypothesis: H1: Family income has an impact on the purchase of basic basket products; according to which family responsibilities have an impact on the amount of purchases of basic basket products and their consumption, remains true.

Model:Consumption of basic products in the basket before the price increase = 1.028 + 6.687* family income + e

The unforeseen inflation that faced our country, but not only, directly affected the decline in purchasing power. Consumers, for the same amount of income they received before inflation, now in the conditions of inflation manage to buy less goods, even an immediate reduction was observed for the purchase of basic basket products.

Table 2. Regression results for the relation between consumption and incomes

Modello		Coefficienti non standardizzati		Coefficienti standardizzati	t	Sig.	Intervallo di confidenza 95.0% per B	
		B	Deviazione standard Errore	Beta			Limite inferiore	Limite superiore
1	(Costante)	6834.810	1212.292		5.638	.000	4434.557	9235.063
	family income	.230	.021	.707	10.955	.000	.189	.272

a. Variabile dipendente: total cost for the base product of the basket before the price increase

Model: 6834.810 + 0.230* family income + e So the total costs of products depend positively on the level of income that consumers have. According to the security level, that the family income has a weight in the expenses made by the consumer for the purchase of the basic products of the basket.

Also, the weight of family income in the total expenses made by the consumer for the purchase of basic products in the conditions of inflation has been evaluated. Family income has an impact on the purchase costs of high-priced products.

Conclusion and Recomandation

This study aimed to study the effect of inflation on the demand for the basic goods of the basket such as flour, sugar, rice, oil, etc. to see if the consumption of these goods has changed with the increase in prices or not.The study proved the best that inflation affected the reduction of the well-being of consumers; decrease in demand in the market, decrease in purchasing power in the market. So inflation had a negative impact on the well-being of consumers.The hypotheses verified during this study showed the importance of the consumer's income in the consumption and purchase of basic basket products. In inflation conditions, consumers buy less due to the decrease in the purchasing power of the consumer's income, causing a change in demand. The consumer tends to replace a product with another one that has a lower selling price. Inflation negatively affected not only consumer welfare but the entire economy as a whole. Based on the negative impact that inflation has on the economy as a whole and specifically on the well-being of consumers, as the object of this study we recommend: Significant indexation of salaries for each category. Subsidizing the electricity bills of families who have a very low level of income. Increased control over product prices in the market to curb abuses of their increase. Keeping inflation under control through appropriate monetary policies. The intervention of the government and through certain policies that affect tax reliefs for producers or various subsidies so that the price for the consumer is as affordable as possible.

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CLIMATE CHANGE NOW OR IN THE FUTURE-WHO IS POSTPONING IT?

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Abstract

Understanding the factors that influence the translation of climate change knowledge into concrete actions is of key importance for effective environmental protection policies. Changes in the quality of life due to climate change have been identified in recent studies as an important pathway leading to environmental behaviour. The aim of this study is to explore the moderation of socio-demographic factors such as gender, age, education and income in the relationship between quality of life changes perceptions due to climate change and tax payment. About 310 questionnaires were collected through an online survey. Women, highly educated, and high income are more likely to pay the tax but less likely than men to translate perceptions of changes in quality of life into environmental behaviour. Older respondents, on the other hand, are less likely to pay the tax but show a small gap between knowledge and action. In addition, findings related to quality of life changes now and in the future show that participants are more concerned about the future. The postponement of the effects of climate change may widen the gap between knowledge and action, as individuals may perceive climate change as a distant problem, and if the effects are not felt immediately or are expected to occur far in the future, individuals may be less motivated to take action. Further studies are needed to explore the behavioural mechanisms that inhibit action on climate change.

Keywords: Climate change, tax payment, socio-demographics, simple moderation

Introduction

Awareness of climate change, as manifested by an understanding of its causes, consequences and the need for change, has grown considerably in many different societies(Gunningham, 2019; Whitmarsh, 2008; Otto et al., 2022; Samantray & Pin, 2019). Understanding the factors that influence the translation of climate change knowledge into tangible actions is of critical importance for effective environmental protection strategies. Researchers have examined the predictors of climate change knowledge, highlighting the role of education, media exposure and personal experience (Gunningham, 2019; Stuart, 2022; Stuart et al., 2020). This paper seeks to explore the moderating effect of demographics such as gender, age, education and income in the relationship between changes in quality of life due to climate change and tax payment.

Figure 3: The moderation of demographics in the
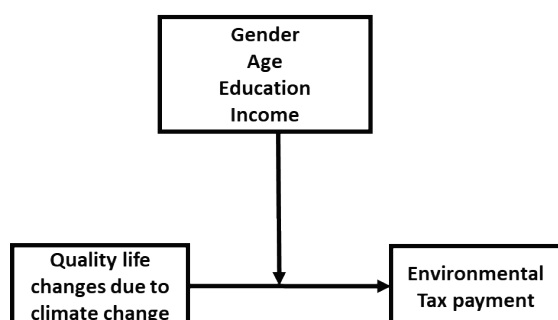
Source: Authors elaboration

Material and method

A structured survey instrument is designed to capture participants' levels of climate change knowledge focused only on quality life changes and willingness to pay a tax for environmental protection. About 310 questionnaires were collected through an online survey, ensuring accessibility and convenience for participants. A 5-point Likert scale is employed to measure the quality of life changes perceptions due to climate change and behavior, while the main demographics are gender, age, education and

income. Hayes Process Model 1 is used to examine whether the relationship between two variables (quality life changes and pro-environmental behavior is moderated by a third variable, in this case by gender, age, education and income see Figure 1. Significance levels will are set at $p < 0.05$ for all analyses.

Results and Discussion

Of the participants, 44% are male and 56% are female. In terms of their educational level, 56.4% have a university degree, 25.5% have a master's degree and 17.1% have completed high school. About 60% indicate a monthly income

The analysis revealed valuable insights into the moderating role of demographics in the relationship between climate change knowledge and pro-environmental behavior. The interaction effect between quality life changes due to climate change and gender was found to be statistically significant ($p < 0.05$), indicating that the demographics considered in this study moderate the strength of this relationship.

Table 16: The correlations between demographics and environmental behavior

Socio-demographic factors	Environmental problems, for example pollution, affect my health now	Environmental problems, for example pollution affects my health in the future	I agree to pay an environmental tax
Gender	.217**	.172**	.176**
Age	-.269**	-.190**	-.193**
Education	.177**	.138*	.152**
Income	0.048	0.036	.172**
**. Correlation is significant at the 0.01 level (2-tailed).			
*. Correlation is significant at the 0.05 level (2-tailed).			

Source: Authors elaboration

Compared to the men participating in this study, women are more willing to pay the tax (b=1.420; pvalue=0.009). However, women are less likely than men to translate perceptions of changes in quality of life into environmental behaviour (interaction effect b= -.280; p(value= .027). Older respondents show a lower inclination b= -.434; p (value= .019) to pay the tax for environmental protection, at the same time they positively moderate the relationship between knowledge and action (b= .084; p (value= .064). Similarly, highly educated people are more willing to pay the tax b= 1.499; p (value= .000), but they negatively moderate the relationship between knowledge and action (b=-.316; p (value= .000). Similarly, people with higher incomes are more willing to pay the tax (b= .448; p(value= .005), but they negatively impact the relationship between quality of life changes and environmental behaviour. Among the four demographic variables, only age shows a positive moderation between quality of life changes and behaviour. In addition, findings related to quality of life changes now and in the future show that participants are more concerned about the future. The postponement of the effects of climate change may widen the gap between knowledge and action, as individuals may perceive climate change as a distant problem, and if the effects are not felt immediately or are expected to occur far in the future, individuals may be less motivated to take action. Psychological distance and technological optimism lead people to believe that technological progress will solve the climate crisis without the need for political intervention. Some people may delay action because they believe that their individual contributions won't make a difference unless others also act. Further studies are needed to explore the behavioural mechanisms that inhibit action on climate change.

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FORECASTING FRUIT TREES PRODUCTION IN ALBANIA BY USING LOGISTIC EQUATION

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Abstract

Forecasting is of high importance for the development of a country for planning and decision making. Mathematical models are used in order to understand the agricultural systems. The main purpose of this paper is to apply logistic equation as a mathematical model in forecasting fruit trees production in Albania. In this paper, the focus is on the use of logistic curve to analyze and predict the future of the fruit trees production using mathematical methods. The data are taken from the database of Albanian Institute of Statistics for the years 1998-2022. In our study we have given comparisons of predicted data and actual data of fruit trees production. From the calculations with real data we see that from the years 1998-2014 we have $R^2 = 0.9868$ and correlation $= 0.9934$ and from the years 2015-2022 we have $R^2 = 0.9091$ and correlation $= 0.9535$. After the year 2014, other factors may have influenced the production of fruit trees which need further examination. These results show that logistic equation can be used to describe and predict the production of fruit trees in Albania.

Keywords: logistic equation, forecasting, fruit trees production.

Introduction

Albania, located in the Mediterranean region, has a favorable position for the production of great diversity of types of fruit trees [1] from ancient times and are still recommended today by folk medicine [2]. Trees have been mainly cultivated for the fruits, which are rich in different types of nutrients. The main goal of farmers who are engaged in the cultivation of fruit trees is to obtain the maximum production and to meet the always-increasing needs of consumers and the agro-processing industry with fresh products [3]. In agriculture, is a necessity to think in terms of future possibilities, to decide what to do for the coming year. Forecasting is of high importance for the development of a country for planning and decision making. Agricultural forecasting can be made more accurate by making statistical analysis of historical data in an attempt to discover a systematic sequence of events [4]. It is necessary to look for a method which will give forecasts of what might happen in the future. A lot of mathematical models are used in order to understand the agricultural systems. Majority of the models developed express the relationships between the variables in terms of equations and systems of equations.

Material and Methods

The logistic equation

In this paper we have applied logistic equation as a mathematical model in forecasting fruit trees production in Albania. The logistic equation has been firstly introduced by a Belgian mathematician Pierre François Verhulst. In 1838 he published an article [5] in which he proposed a model to describe human population growth, which was called the logistic model (equation):

$$\frac{dP(t)}{dt} = rP(t)\left(1 - \frac{P(t)}{K}\right) \quad (1)$$

where $P(t)$ is the population size at time t, r is the growth rate and K is the carrying capacity (the maximum size of the population being studied). The solution of equation (1) is:

$$P(t) = \frac{KP_0e^{rt}}{K + P_0(e^{rt} - 1)} \quad (2)$$

The parameters of the specific solution, which are determined using data points of equal time interval $\{(t_0, P_0), (t_1, P_1), (t_2, P_2)\}$ are given by the following formulae [6]:

$$r = \frac{1}{t_1}ln\left|\frac{P_2(P_1 - P_0)}{P_0(P_2 - P_1)}\right| \quad (3) \quad \text{and} \quad K = \frac{P_1(P_0P_1 + P_1P_2 - 2P_0P_2)}{P_1^2 - P_0P_2} \quad (4)$$

where $t_1 \neq 0$ and $P_0, P_1, P_2 \neq 0$.

The data

We have taken the data about the production of fruit trees in Albania from the database of Albanian Institute of Statistics (INSTAT) for the years 1998-2022 [7]. We have calculated the parameters of the model and the predicted values from logistic equation using Excel. Fruits are healthy and therefore the cultivation of fruit trees has always been increasing, as can be seen

from Figure 1. This figure provides a graphic representation of the progress of the production of fruit trees in Albania for the years 1998-2022.
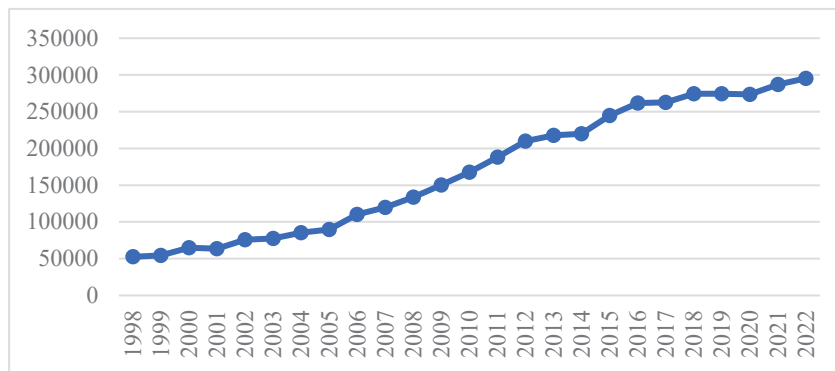
Figure 4. *Fruit trees production (ton) in Albania, 1998-2022.*

Source: Developed by the authors based on the data from INSTAT.

Results and Discussion

After processing the real data, we have calculated approximated data of production of fruit trees using logistic equation until the year 2050. For this we had to calculate first the parameter values for r and K in the logistic equation. There are taken three different time intervals to make comparisons for the approximated values of production of fruit trees as shown in Table 1 below:

Table 17. *The r, K parameter values and R^2, correlation coefficients at different time intervals.*

Parameter values	Time interval $t_1 = 8$	Time interval $t_1 = 10$	Time interval $t_1 = 12$
r	0.098741148	0.110110485	0.13536237
K	1271154.629	577245.433	363259.077
R^2	0.9319	0.9657	0.9883
correlation	0.965370922	0.982695708	0.994140001

Source: Developed by the authors.

In Table 1 are also shown the R^2 and correlation coefficients between real data and logistic model approximations for years 1998-2022 in three different time intervals (years) $t_1 = 8$, $t_1 = 10$ and $t_1 = 12$. For time interval $t_1 = 8$, from the calculations with real data we see: $R^2 = 0.9868$ and correlation $= 0.9934$ (years 1998-2014); $R^2 = 0.9091$ and correlation $= 0.9535$ (years 2015-2022). We have improved these results and have compared the coefficients in different time intervals. The best results are those of time interval twelve years. This is shown clearly below from the Figure 2 where is shown the logistic curves at different values of r with the initial value $P_0 = 52541$ ton. In Table 2 below are shown the actual and approximated/predicted data of production of fruit trees at different time intervals until the year 2050. We see that the approximations made at time intervals of eight and ten years agrees quite well with the observed data of productions of fruit trees (years 1998-2014), but the approximation thereafter are not quite good. Compared with the first two approximations, the values of approximations at time interval of twelve years gives the closest approximated values to the actual data of production of fruit trees. In Figure 2 we see how close is the logistic curve at time interval of twelve years with the curve of actual values of production of fruit trees. The logistic curve intersects the curve of actual level of production of fruit trees. We see also that the maximum capacity is not achieved yet. The maximum level of production of 363259 ton, if the same conditions hold, can be achieved after the year 2050. Figure 2 shows that the logistic curve predicts the values quite close to the original values of production of fruit trees in Albania.
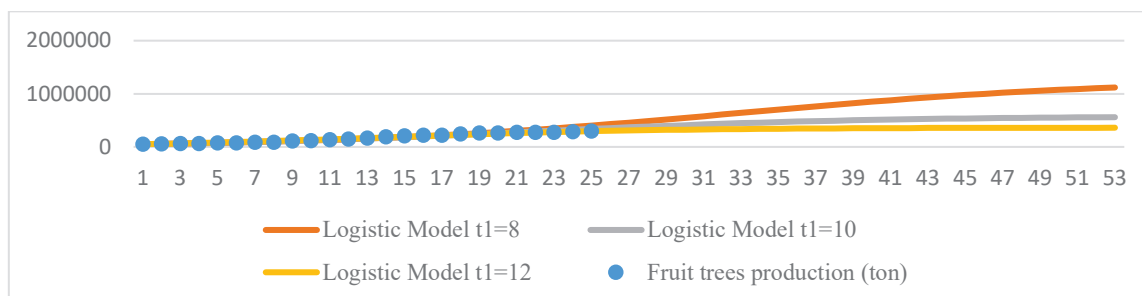
Figure 5. *Actual and approximate values of production of fruit trees for different time intervals until year 2050.*

Source: Developed by the authors.

***Table 2.** Actual and forecasting data of production of fruit trees using logistic equation until the year 2050.*

Year	Actual Production (ton)	Logistic Model $t_1 = 8$	Logistic Model $t_1 = 10$	Logistic Model $t_1 = 12$	Year	Actual Production (ton)	Logistic Model $t_1 = 8$	Logistic Model $t_1 = 10$	Logistic Model $t_1 = 12$
1998	52541	52541	52541	52541	2025		486543	382075	315063
1999	54339	57746	58042	58922	2026		516519	396036	320445
2000	64906	63440	64048	65913	2027		547054	409437	325299
2001	63797	69663	70592	73533	2028		578012	422235	329660
2002	75824	76458	77703	81792	2029		609248	434398	333566
2003	77368	83869	85409	90688	2030		640611	445903	337054
2004	85267	91943	93737	100207	2031		671951	456739	340161
2005	89957	100729	102707	110321	2032		703113	466901	342921
2006	110276	110276	112335	120986	2033		733951	476396	345369
2007	120032	120634	122633	132143	2034		764321	485235	347536
2008	133604	131855	133604	143720	2035		794091	493436	349451
2009	150380	143989	145243	155627	2036		823136	501020	351141
2010	167767	157086	157535	167767	2037		851349	508015	352630
2011	188071	171193	170458	180033	2038		878632	514448	353941
2012	210054	186355	183975	192313	2039		904904	520350	355094
2013	218000	202612	198043	204497	2040		930101	525753	356108
2014	220000	220000	212605	216474	2041		954171	530689	356997
2015	245000	238547	227595	228146	2042		977080	535189	357778
2016	261754	258274	242938	239420	2043		998806	539286	358463
2017	262609	279190	258551	250219	2044		1019340	543009	359063
2018	274343	301297	274343	260481	2045		1038686	546388	359589
2019	274423	324582	290222	270158	2046		1056859	549450	360049
2020	273749	349018	306090	279218	2047		1073881	552223	360453
2021	287210	374566	321854	287642	2048		1089782	554730	360806
2022	295428	401171	337419	295428	2049		1104601	556995	361114
2023		428761	352697	302581	2050		1118379	559040	361384
2024		457252	367607	309118					

Source: Developed by the authors.

Conclusions

Based on the findings, the logistic function can be used as a good forecasting model. This model gives close approximations of the actual values of fruit trees production in Albania. Looking at the results we have achieved, we notice that the appropriate choice of time interval should be considered as it affects greatly the predicted values from the logistic equation. The object of the paper was the forecasting of fruit trees production in Albania. We have taken some different time intervals to see the comparisons between the real data of the fruit trees production and the approximated data. We have calculated approximated data of production of fruit trees using logistic model until the year 2050. The best forecasting results from logistic model (with time interval twelve years) indicate that the maximum level of production of fruit trees is 363259 ton and can be achieved after the year 2050. Forecasting the production of fruit trees is necessary since this sector helps the development of the economic and commercial perspectives of our country, improving the lifestyle and therefore the well-being of the population.

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INSTITUTIONS ROLE ON GIS SCHEME PROMOTION AND DEVELOPMENT

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ABSTRACT

Identification and promotion of Geographical indications (GIs) are a very important instrument for development and promotion of local economy. This is well proven from many experiences worldwide where Europe and especially Italy and France have the best and most known experiences. Thus, engagement and coordination of all actors, including public institutions is very important. This paper will analyse the situation of GIs in Albania, the state of art related to the legal harmonisation with the EU acquis and its implementation. This study mostly uses descriptive and statistical data. The main reason of the underdevelopment of GIs in Albania, are the lack of awareness on its importance, the underdeveloped system of producer organisations, the small processing capacities etc.

As far as producers and consumers do not know much about GIs quality schemes and registered products, very few products are known and certified thus in Albania. In this regard, for the ongoing development of GIs there is a strong need for legal, financial support and practical alignment to that of EU successful countries.

Keywords: typical products, origin, rural development, quality schemes, GI etc.

TITLE: "TAX BURDEN AND ITS IMPACT ON ECONOMIC INVESTMENT "

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Abstract

Tax burden is a term used to describe the fiscal burden or taxation burden imposed on individuals, companies, or economic sectors by a country's fiscal system. This includes taxes on income, property, consumption, etc. The aim of this article is to study this impact on the Albanian economy by using questionaries and interviews. The methodology used is mainly empiric and descriptive.A high fiscal burden, such as a high level of taxation, can deter investment in several ways. If an individual, company or economic sector is obliged to pay a large amount of taxes, then the capital available for new investments is reduced. This can hinder economic growth and development, reducing investment in infrastructure, technology and business development.A high fiscal burden can also reduce investors' motivation to invest. If an investor anticipates that the potential profit from an investment will be greatly reduced by fiscal burdens, he may lose interest in investing. This can affect the lack of investment needed to increase production,innovation and competitiveness in an economy. If a country has an underdeveloped, unpredictable or corrupted fiscal system, investors may lack confidence in the government and the taxation system.. Although high fiscal burdens can badly impact investment, it is important to mention that the fiscal system is not the only factor influencing investors' decision-making.

Keywords: fiscal system, investment, macroeconomics, stability, tax burden

Introduction

The purpose of this paper   is to explain the fiscal burden and the impact it has on investments. The topic aims to provide a clear understanding to the reader about the concept of fiscal burden and show how it can affect the decision-making of individuals, companies and economic sectors to invest. By explaining the fiscal burden and its impact, it is intended to understand that a high level of taxation may deter investment and reduce the availability of capital for new investment. Also, it is intended to emphasize that the motivation to invest may decrease if investors anticipate that the potential profit will be greatly affected by fiscal burdens.At the same time, it is intended to show that mistrust of the fiscal system, as a result of an underdeveloped, unpredictable or corrupted system, can affect the lack of confidence of investors and their departure from a certain country. Meaning of the impact of the fiscal burden on investment is important for policy makers, economists and investors in general so the main objectives of this paper are as follow:

 1.Explain the concept of fiscal burden: It is intended to provide a clear and defined understanding of fiscal burden, including taxes on income, property, consumption, and any other relevant taxes.

2. Describe the impact of the fiscal burden on investment: It is intended to show how a high fiscal burden can inhibit investment, reducing the availability of capital for new investments and reducing the motivation of investors to invest.

3. Show the link between fiscal burden and economic development: It is intended to emphasize that a high fiscal burden can negatively affect the economic growth and development of a country, reducing investments in infrastructure, technology and business development.

5. Identify other factors that influence investors' decision-making: In addition to the fiscal burden, it is intended to show that other factors, such as macroeconomic policies, political stability, infrastructure, human resources and business climate, also have a significant impact on investors' decision-making.

6.Provide a broad understanding to the readers: It is intended to provide clear and comprehensible information to the readers so that they have a proper understanding of the relationship between fiscal burden and investments.

Material and methods.

The methods used include:

  Literature research: Through the study of scientific literature, articles and specialized books, relevant concepts and theories about fiscal burden and investments have been identified and analyzed. This has helped create a strong base of knowledge and understanding of the subject.

Analysis of reports and studies: Reports and studies published by international organizations, governments and academic institutions were used to obtain a broad overview of the impact of fiscal burdens on investment. These sources provide fresh and verified data that helps determine current trends and changes in the field of taxation and investments.

Data analysis: Through the analysis of data obtained from the research questions and questionnaires used, trends, impacts and possible links between the fiscal burden and investments have been identified and analyzed. This has helped to define the arguments and conclusions presented in the paper.

Interpretation and conclusions: Through data analysis and literature research, interpretation and conclusions have been made regarding the impact of the fiscal burden on investments. These conclusions are based on the information collected and the analysis done objectively and accurately.

Results and discussion

In conclusion, it is clear that fiscal burdens have a significant impact on business investment. If fiscal burdens are too high, they can inhibit investment, making it more difficult for businesses to increase production and expand their activity. On the other hand, a low fiscal burden or tax breaks can encourage business investment by giving it more disposable income to invest.

Facilitative fiscal policies, such as lowering investment tax rates in certain sectors, can be an effective tool to stimulate investment and improve economic performance. This can lead to increased production, job creation and development of new sectors.

However, it is important to understand that fiscal burdens are not the only factor influencing investors' decision-making. Other factors such as labor market policies, infrastructure, political stability and business climate also have a significant impact on investment.

Therefore, to improve the investment climate, all these factors should be considered and integrated and coordinated policies should be developed to encourage business investments in a sustainable manner and create a favorable environment for economic development.

The impact of the fiscal burden on business investments is important for the economic performance and development of the country. If fiscal burdens are high, they can inhibit investment and economic development, while reducing them can encourage investment and bring progress to the economy.

Beneficial fiscal policies, such as lowering tax rates and easing administrative procedures, can be effective in stimulating business investment and creating a favorable environment for economic development. This can lead to increased production, job creation and development of new sectors.

To sum up, it is important to consider other factors that influence investors' decision-making, such as labor market policies, infrastructure, political stability and business climate. In order to achieve sustainable economic performance and encourage business investment, integrated and coordinated policies must be created to encourage business investment effectively and create favorable conditions for the country's economic development.

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ANALYSIS OF FACTORS AFFECTING LIFE INSURANCE: THE CASE OF ALBANIA

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The insurance market in Albania is in a nascent stage of development, relative to its global counterparts. The vulnerabilities that life faces, along with our material prosperity, are subject to diverse influences. In Albania, the insurance industry assumes a contemporary presence, thereby warranting requisite support, initiatives, guiding policies, and legislative alignment to conform to regional, European, and broader international standards. The significance of its role, both acknowledged by the public and endorsed by governmental bodies, in fostering economic progress and fortifying the holistic financial system underscores the need to cultivate an environment conducive to its expansion. This involves a profound comprehension of the industry's developmental challenges and instituting corresponding mechanisms. To substantiate the hypothesized premises of this study, is conducted a rigorous data examination, scrutinizing the repercussions of GDP fluctuations, unemployment rates, real interest rates, wage dynamics, and inflation rates on aggregate life insurance premiums within Albania, during recent years. Furthermore, the objectives of this paper are related with life insurance in Albania through empirical analysis of the sector's evolution, dynamics, and key performance indicators during 2000-2019.

Keywords: Life insurance market, macroeconomic factors, GDP, Financial Supervision Authority, Emergencies Situations.

Introduction
The insurance market is a very important part of the financial system. Recently, insurance constitutes an economic sector that summarizes all the activities of conception, production, and trading of this type of service, which is of public interest, but in generally carried out by private entities. Insurance has played an important role in providing credit support and trade finance, as well as in the long-term development of debt and capital markets **(Trichet, J. C. (2005).** The last financial crisis during 2008 - 2011 also showed that banks cannot be considered a reliable source of money under the pressure and importance of resource development of long-term funds **(Dabrowski, M. (2010).**

Life insurance companies offer more than insurance for premature deaths, so we can say that they serve as financial intermediaries.The insurance market has a long development and growth in terms of the wide range of products and services it offers. This insurance market in Albania, with low incomes, with a declining perspective, with a turbulent political environment, changes in legislation, chaotic developments dictated mainly by the transitional and post-transition period, affect the development of the life insurance market **(Biçoku, J. & Memaj, F. (2022).**

Methodology
The data used in this study were taken from the official reports of the regulatory institutions in the Albanian financial market, the Financial Supervision Authority, INSTAT and World Bank database. The series were used to build the econometric model for a period of 21 years from 2000-2019. The dependent variable analyzed is the gross written premium for life insurance **(Andreeski et al (2012).** The independent variables are gross domestic product (GDP), inflation rate, wages, unemployment rate and real interest rate. The model will be treated with the method of least squares with the multifactorial logarithmic model (log-log) so the interpretation is in percentage. This type of model was also chosen since the time series of independent variables may have a trend or relationship between them. Through the logarithmic model, multicollinearity is significantly reduced.

Results
A country's economic development, which can be measured through GDP and money supply, is a major economic determinant of life insurance demand. Regarding the impact of inflation, it is expected that its impact will be negative based on the literature and rational judgment since an increase in inflation discourages people's incentives to save, leading to monetary uncertainty, thus leading to a negative impact on demand for life insurance. Unemployment is a very important economic variable that greatly affects the social and psychological aspect not only of the unemployed person, but also of his family members. With the increase of unemployment, the income of the family decreases and at the same time the savings. In this way, it is expected that incentives to seek life insurance are reduced. The expected effect of the real interest rate on life insurance has sometimes resulted in a positive and sometimes negative impact.

Model 1: OLS, using observations 2000-2019 (T = 20)
Dependent variable: l_Lifeinsurancepremio

Tabela1: Regression analysis results

	Coefficient	Std. Error	t-ratio	p-value
Constant	−5.04490	3.03439	−1.663	0.1186
l_GDP	0.164929	0.229189	0.7196	0.4836
l_Unemployment	0.879293	0.946982	0.9285	0.3689
l_Inflation	0.545407	0.0642266	8.492	<0.0001
l_Realinterestrate	0.791543	0.297397	2.662	0.0186
l_wages	1.40437	0.327138	4.293	0.0007

Mean dependent var	1.776993	S.D. dependent var	0.743018
Sum squared resid	0.889937	S.E. of regression	0.252125
R-squared	0.915159	Adjusted R-squared	0.884858
F(5, 14)	30.20282	P-value(F)	5.02e-07
Log-likelihood	2.744596	Akaike criterion	6.510807
Schwarz criterion	12.48520	Hannan-Quinn	7.677072
Rho	−0.047338	Durbin-Watson	2.016785

Source: Authors

The general form of the log-log model is given in the following formula (Arifin et al (2022).

$$log\ y = \beta 0 + \beta 1\ logx1 + \beta 2\ logx2 + \beta 3\ logx3 + \beta 4\ logx4 + \beta 5\ logx5$$

The form of the log-log model obtained in the study is expressed as:

Log(Lifeinsurancepremio) = -5.04 + 0.165*log(GDP) + 0.879*log(Unemployment)+ 0.545*log(Inflationi) + 0.792*log(realinteresrate) + 1.40*log(Wages). With a 95% confidence level or a 5% significance level, alpha=0.05, we can say that the coefficient before the GDP variable is insignificant, so the probability of this coefficient is 0.4836>0.05. With a confidence level of 95%, we say that the impact of the gross domestic product is insignificant **(Kenneth, G. E. (2021).** The unemployment rate, which is an independent variable, is also insignificant in this model since the probability of the coefficient before it is greater than the confidence level 0.3689>0.05. The coefficient before the inflation rate has a probability smaller than alpha (0.0001<0.05), so the inflation rate has a statistically significant impact on the life insurance premium. With a confidence level of 95%, we can say that with the increase in inflation by 1%, it is expected that the life insurance premium will increase by 0.54% **(Ilollari, O. et al (2023).** The results highlight the importance of price stability and the development of the banking sector in fully realizing the saving and investment functions of life insurance in an economy.

Conclusions

The focus of this paper is the connection between macroeconomic factors and life insurance premio. The regression coefficient shows that the independent macroeconomic variables are relevant, determining about 91.5% of the variance of the premium for life insurance.

Despite the positive developments on insurance market, there is still much to do in terms of increasing consumer confidence and improving services toward potential customers.

This process requires a strong commitment both insurance companies operating in the market but also of the state bodies that draft and approve the policies that affect the Albanian insurance market.

Albania should have initiatives to increase the level of life insurance. In this regard, there is still a lot of work to do in raising the awareness and financial education of the population on the necessity of life insurance as a financial guarantee of their future.

There is a lack of legal and regulatory framework on public responsibilities to ensure any event or infrastructure by providing financial protection in possible damages.

In a small and developing country such as Albania, social, demographic and institutional factors have a significant impact.

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TEACHING APPROACHES AND METHODS IN BUSINESS ENGLISH, IS THERE AN "ONE SIZE   FITS ALL" CASE?

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ABSTRACT

Since the emerge of Business English, a branch of ESP (English for Specific Purposes) after the second world war and the new economic developments that followed, there has been an expanding demand and urge of the labour market for communication competence in English language which has pushed the language specialist, course designers and course instructors to hone their teaching practices towards better and more up to date teaching methods in order to enhance the students' communicative skills. This has also led to a linear steadiness when it comes to approaches and methodologies used in teaching English as a Foreign Language. Approaches and methods pursued each other while in development and adaptation to the cultural climates and changing needs.

The research will focus on providing an overall outlook of the teaching methods and approaches in ESP, putting a special importance on the Business English setting on two major stakeholder and agents in the context of Business English. This paper will investigate in order to pinpoint the most efficacious approach(es) according to different scholars, prominent in the area of EFL.

This review of approaches and methods, through desk review and literature study will unfold a set of benchmarks to be considered such as students' needs for learning, student centeredness in the process of teaching BE and so on before reaching a conclusion about the most successful approaches to be applied in classrooms where BE is taught.

Keywords: English for Specific Purposes, Business English, English as a foreign Language, Teaching methods and approaches.

Introduction

Acquiring a business education bears no similarities with other domains. In the modern way of tackling business, the companies demand the graduates to be equipped with certain skills such as teamwork, leadership skills, work etiquettes, analytical skills and good communication skills among other. These are highly sought after in a business milieu which boasts to be increasingly competitive. Therefore, teaching BE should focus on honing these skills of students so they would be able to cope with real life business situation rather than trying to learn by heart word translation and text memorisation. This requires the adaptation of more appropriate approaches and methods in teaching English. As Business English serves a specific purpose, the language instructor must carry out needs analysis prior to designing the course in order to fit the students' needs. When talking about Business English textbook, the issue is similar to the teaching methods and practices, there is no 'one-size-fits-all'.

Approaches and Methodologies in BE Instruction

Case Study: Workplace is where the real communication happens. Case studies enable learners to face communicative situations in business companies. They provide a clear indication of the skill and business tactics demanded from a business graduate when a student enters the real working environment. While using case studies in BE classes, the course instructor encourages debate among the learners. Case study approach aims at bridging the gap between English language and business content when focusing on solving problems analytically, analysing situations and negotiating, hence making it a most appropriate approach to teach BE.

Projects based: These learning activities, which can be individual and/or group based focus on research and projects to provide ample opportunities for learners to work on problems faced in the real business world. Course instructors bring in project ideas which are authentic and used in workplaces and real world and assist the lerarners in identifying the simiarities between the acctivities carried out in the the classroom and those of a practical environment (Mohammad, 2015). Project based activities push the students towards setting goals and working n the skills needed to reach those goals. It could also result fruitful in raising the learners interest in in core subjects. It is paramount that learners get sufficient guidance before commencing projects. They must be provided with training in questionnaire developing, sample survey, data analysis, report writing etc..

Role play: Although this is a technique widely used in all types of language instruction, it has resulted quite sucessful in teaching BE. Some typical business English role plays might include negotiating a contract, complaining about services rendered, giving a product presentation, asking for additional resources, job interviews, delegating tasks, recruit possible employees, etc For instance, putting learners in the role of a salesperson and sell product to another learner who plays the role of a customer.

Problem-Based Learning: in problem-based approach, the course instructor avoids engaging in direct teaching of content but acts as assistant and cognitive coach. The role of the languauge instructor is to assist the students by asking them to highlight

and analyse the problem, come up with ideas and identify learning matters to help solve the problem. Course instructors adopt active learning in business English teaching to trigger tstudents' ability to think and explore the effectiveness and necessity of soft skills, which ultimately improves business English teaching. The method of problem-based learning is instructional in the sense that it orientates the learners to understand more about the proces of language acquisitionn. The course instructor encourages students to work in groups to find solutions to the problems in real world. Problem-based learning actively involves the learner to learn the core subject.

Seminars and workshops: Inviting prominent business people and experts from the corporate sector to give a speech or conduct seminars and workshops is important, and students must be encouraged to take part actively in these activities. Participation in workshops help in bringing the best out of students by enhancing their public speaking skills (Mohammad, 2015).

Simulations and business games: The use of games boost student motivation to sharpen the skills and reinforce concepts learned. Everybody loves games. They are always fun and exciting for everybody, irrespective of thei age. There is a high chance of involvement form the learner. The objective of the course instructor is to link the purpose of the game and the concept derived out of it. There is a variety of games available, starting from ice breaking to risk taking and playing. They may be designed with the objective of teaching facts, sharpening skills, analysing processes and behaviours as well as problem solving, critical thinking and teaching creativity.

Team /group learning): Team learning or in simpler terms, learning with peers, either through cooperation in a group project, or practising discussion in small-groups provides variety to students' learning experience. Learners may improve social and motivational and communicative skills, while getting exposed to, team-working and exercising critical thinking and problem solving skills. It is important to distinguish that when a course instructor groups learners, they are a considered a "group," not a "team." They become a team once they start trusting each other and develop a sense of commitment to the goals and objectives of the group. Once they consider themselves a team, they can do things that neither a single individual nor a newly-formed group can do alone. Teambased learning initiates with groups and then produces conditions that enable them to become real teams. The tasks designed create both team attachment and can benefit learners for taking responsibility.

Conclusion: There is no single panacea to teaching BE

Historically, In the process of economic globalization and the business discourse there has been a strong continuity in the approaches and methodologies of English Language Teaching. These approaches and methodologies came up as a chain reaction to or the upgrading of previous ones. The different approaches and methodologies have emerged as a response to changing needs is language use in all economic and social interactions centering on trade, commerce, investment, management, finance, marketing, tourism, etc. Richards & Rodgers pointed out that the commonest solution to the "language teaching problem was seen to lie in the adoption of a new teaching approach or method (Richards & Rodgers, 2001, 244). However the teaching problems cannot be solved by resorting to any single particular approach. All of them play an important role, since good communication skills in English are vital for our graduates in Business

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A METHODOLOGICAL APPROACH ON RETROSPECTIVE DATA COLLECTION AND ANALYSIS

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Abstract

This is a methodological contribution that refers to research that was accompanied with students and alumni from an Albanian public university who entered a local labour market. My co-author and I wanted to estimate the impact of political clientelism on university-to-work transition and employment pathways for actual and graduated students. We suspected that those students who are more prone to engage politically have a higher incidence of following pathways characterized by employment in public sector jobs.

Keywords: sequence analysis; occupational history calendars; Albania; pathways; clientelism; difference-in-differences

Introduction

To assess the effects of active political engagement on the university-to-work transition we required objective, quantitative information about labour market histories. To meet these requirements, the methodology of the study adopted a mono-method, survey-based design (Saunders et al., 2015). The survey collected retrospective labour market information over two equal time periods, 16 months before and 16 months after the June 2013 elections, covering the period from January 2012 to December 2014. The sample of participants included two groups of young people. First, students who were potentially more affected by the central election since it took place in the final year of their degree. Students in Albania usually work full-time while studying for their degree. A high degree of flexibility over hours, the duration of programmes and assessments facilitates this. Entry onto a university programme is also seen as a way of accessing some jobs that students in other countries might not be able to access until they had finished their degree programme. The second group was alumni who had already embarked on the career pathways prior to the election and were therefore potentially less affected by the event.

Research Design

Data collection method

The data collection method employed a questionnaire design. The researchers designed a structured questionnaire that embedded occupational history calendars (OHCs) (Birkett et al., 2017; Carmichael et al., 2019; Porcellato et al., 2016). The records comprise factual information about occupational histories that required little subjective judgment thus providing sufficiently reliable and objective information (Brewin et al., 1993).

The OHC was introduced at the beginning of the survey and was completed by moving backwards from the present, the time of the data collection (December 2014), to January 2012 as this helps respondents to retrospectively construct their 36 month employment histories using meaningful reference points (Lilley et al., 2011). It also included our reference point of interest, the month of central elections (June 2013). Occupational histories were recorded using six categories standardly used to capture labour market status: 1 'employee (wage employment)', 2 'solo self-employment (own-account workers or micro-entrepreneurs)', 3 'self-employed with employees (self-employed managers)', 4 'unemployed, 5 'unpaid domestic worker', and 6 'student'. Records were collected on a month-by-month basis.

Data analysis methods

To analyse the OHC data, we followed the methodology used by Carmichael and Ercolani (2016) which applies four integrated stages.

Stage 1: sequence construction: Students' occupational histories were constructed as chronological sequences over the whole 36 months period. This ensures that the monthly records are not reduced to single events. In practice this meant that the data had to be coded manually and matched to the relevant month.

Stage 2: sequence analysis: The constructed sequences were subjected to non-parametric optimal matching which uses the Needleman-Wunsch algorithm to construct a distance or dissimilarity matrix recording the minimal distances between pairs of sequences. In the optimal matching the insertion-deletion (indel) costs were set to 1 and the substitution costs to 2. The distances were standardised by dividing each distance by the length of the longest sequence in the dataset. The distance matrix was then used in standard cluster analysis procedures, using Ward's cluster linkage technique to group sequences of employment trajectories. This enables an objective identification of clusters of participants whose labour market histories are comparable. The optimal number of clusters was judged to be four based on the Duda/Hart Je(2)/Je(1) stopping rule index supported visually by dendograms.

The 4 clusters identified in the best-fit solution were: (i) Negatively affected post-election employees (n = 62), the largest cluster; (ii) Precarious employment and solo self-employment (n = 49); (iii) Positively affected post-election self-employment (n = 28); and (iv) Positively affected post-election students (n = 52). The third cluster was of particular interest to the study because it grouped the least politically engaged participants.

These procedures have been described in detail by Brzinsky-Fay et al. (2006), Anyadike-Danes and McVicar (2010), and others. This method of analysis has been used extensively to analyse aspects of life course histories including career mobility dynamics (Fuller & Stecy-Hildebrandt, 2015; Mattijssen et al., 2020; McVicar et al., 2019). An important advantage of using sequence analysis is that this method enables the sequences themselves (here, the labour market trajectories) to represent the

unit of analysis rather than the individual elements of sequences. Alternative methods, such as survival, duration, and hazard models focus on the timing of the individual elements as events within a sequence, rather than the sequences themselves.

Stage 3: regression analysis: Regression analysis was used to explore how political engagement was related to the 4 different employment pathways defined in the sequence analysis while controlling for other factors. In the regression analysis, the dependent variable is a categorical variable taking values 1-4 corresponding to the 4 cluster solutions (labour market pathways) identified in the previous stage. We used a Multinomial Logistic (MNL) regression with the reference category being cluster 3 (Long & Freese, 2014).

Stage 4: difference-in-differences estimation: This technique was used to examine whether evaluations of life satisfaction, migration intentions, and factors influencing success in life and employability changed after the elections and whether any such changes were linked to the different employment pathways.

Conclusion

It is important to optimize the use of researchers' scarce resources (including time) when conducting primary research. OHCs are a useful way to capture labour market or other life course histories in a retrospective way at a single point of time (e.g., in an interview). OHCs are well aligned with the requirements of data analysis tools such as sequence analysis. Used in this combination, the data collected using OHCs can be analysed quantitively and a focus on the life course history in its entirety is maintained, rather than adopting a simplified approach that focuses on elements within the life history. The analysis can also be validated and replicated. Sequence analysis can be undertaken using procedures available in Stata (and "R"). These procedures enable objective identification of clusters of participants whose life histories, in this study their labour market histories, are similar.

Finally, there are difficulties in trying to identify true reference groups in non-laboratory conditions and where a randomized control trial is not feasible. In this study, the analysis focused on labour market pathways from university studies into working life and political engagement, while the intervention was the elections. It was difficult to identify a group that was not potentially affected by the elections. Instead a group assumed to be least affected was selected as the reference group. The analysis also used retrospective data. These are limitations of the study.

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MONITORING THE LEVEL OF ENJOYMENT OF ECONOMIC AND SOCIAL RIGHTS IN ALBANIA

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Abstract

 Economic and social rights include rights related to housing, food, work, health care and education. Since 1991, Albania has ratified the International Covenant on Economic, Social, and Cultural Rights and at from that moment our state has accepted to respect, protect and fulfil the economic and social rights. The state's obligation "to respect" means that the state should not interfere in the citizens enjoyment of economic and social rights. Meanwhile, the obligation "to protect" represents all actions a government should take to prevent third parties from interfering with citizens' enjoyment of their economic and social rights. The last duty is "to fulfil" which requires the government to take measures that will guarantee citizens claim their economic and social rights.

Keywords

Economic Rights, Social Rights, Enjoyment, Albania, SDGs, Performance Score

1. Economic and social rights briefly explained

  Human rights are declared to be universal and claimed equally for all human beings, present and future (Weston, 2023). According to Karel Vasak, 1977, the human rights are divided into three main categories: civil-political, economic-social and cultural and for the purpose of this paper, we will focus on the second generation of human rights. Economic and social rights are defined as human rights that are related to our ability to live in dignity. These rights are included under the ICESCR, which Albania has ratified in 1991. At the moment a country ratifies the ICESCR, the state has accepted to complete three main duties under international law, to *respect, protect and fulfill* the economic and social rights. According to ICESCR, the state must take actions to ensure and improve the enjoyment of economic and social rights over time and this can be done in three steps:

- First, ratification of international human rights treaties, the codification of the economic and social rights in the national legislation, so they can be recognized as rights. Drafting and implementing strategies, policies and action plans, that help the state show its commitment to fulfilling these rights;
- Second, set a minimum core obligation for each specific economic and social rights, that ensure citizens will enjoy at least the basic and essential level of the right;
- Third, the state has an obligation to progressively fulfil the right to food, housing, work, health and education, by using its maximum available resources.

The objective of this research is to monitor the Albanian state's performance in meeting the obligations of ICESCR regarding economic and social rights. It's really important to underline that we can measure the Albanian state performance regarding the enjoyment of economic and social rights only if in the analysis we include both parts of the medal, the citizens and the state.

2. Albanian's performance evaluation methodology

Based on the literature review and conceptual framework we have decided to use the same methodology used by Mitchell, Baylis and Randolph in the research they have done in 2021 to monitor the enjoyment of rights in New Zealand. To understand if Albania has taken all necessary measures to complete the obligation "to respect", through ensuring codification of national legislation that explicitly recognizes the five economic and social rights and strategies, plans, policies explicitly acknowledge these rights, we will use structural indicators. Structural indicators will be divided into two groups: structural indicators about the codification of national legislation and structural indicators about setting up strategies, action plans, policies etc., then we will do a quantitative analysis.

The ICESCR requires from every state that has ratified the convent to ensure to all citizens a minimum essential level of enjoyment of economic and social rights, regardless of the country's resources. To achieve this, the Albanian state, should set a minimum core obligation for each right. During the second part of the research, we will do an observation regarding the minimum core of each right by using a binary assessment of compliance.

The third part of the research is related to the obligation of the state "to fulfil" and the assessment of Albanian's state performance in meeting this obligation by evaluating the compliance with the four criteria mentioned in ICESCR. In this case, we will use empirical methodologies as shown in the table below:

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Criteria as per ICERSC	Methodology	Aim
Progressive realization	Time series for a period of 10 years and comparison with other Western Balkan countries	To see if the indicator trend is moving as required by the convent.
Max use of the available resources	SERF Index and HRMI Score	Through using the SERF Index, we will assess if the rate of improvement of ESR is increasing faster/slower than the available resources of Albania.
Non-regression	Time series for a period of 10 years	We will see if the indicator trend is constant, improved or decreased over time.
Non-Discrimination	Time series and descriptive analysis	We will try to find if there is a gap or disparity within the time series representing sub-group discrimination.

We will use process indicators, to measure the ongoing efforts of the government to transform their structural indicator commitments into desired results. The indicators if taken apart don't give information and cannot be used to measure the performance of a country regarding the human rights fulfilment. For our analysis, we will use GDP per capita for Albania during the last 10 years to measure the economic resources of our country. We have chosen 5 indicators from the variety of economic and social indicators. The data will come from INSTAT and ILOSTAT and it will cover the same period. Based on the literature review, we have chosen to use the following indicators as shown in the table below:

ESR	SDG	Indicator
Right to food	1	1.4.1 Proportion of population living in households with access to basic services
Right to house	11	11.1.1 Proportion of urban population living in informal settlements
Right to health	3	3.c.1 Health worker density and distribution
Right to education	4	4.4.1 Proportion of youth and adults with technology skills
Right to work	8	8.8.2 Level of national compliance with labour rights based on International Labour Organization textual sources and national legislation

3. Conclusions and follow up

According to the Annual Reports of the Albanian NHRI, Albanian citizens complained about violations of economic and social rights only 8% out of 5,837 complaints registered during 2022 and 6% out of 6,264 complaints registered during 2021. We believe that figures show that Albanian citizens have a gap of information about economic and social rights in comparison with civil and political rights. For this reason, the responsible national institutions should be engaged in promoting economic and social rights. The official data published by the World Bank, shows GDP growth of 4.8%, at-risk poverty rate of 21.8%, unemployment rate of 11.8%, inflation rate of 6.7%, housing problems caused by the earthquake of November 2019 and the slow process of reconstruction, meanwhile there is a low level of complaints of Albanian citizens related to economic and social rights. According to Petel and Putten (2021) study about the relationship between economic growth and economic-social rights, countries that have a low level of economic growth or a decline in economic growth should have a high level of violation of economic and social rights, this happens because the state fails to complete its obligation to respect, protect and fulfil this category of rights. The data provided by the Albanian NHRI and official financial data published by national/international institutions do not show this kind of relationship for Albania and during this research, we aim to find out more about it. If economic and social rights are not promoted, protected and fulfilled, a negative effect will also be transferred also in political, civil and cultural rights.

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CONSUMER PREFERENCES ON ORGANIC PRODUCTS IN ALBANIA A LITERATURE REVIEW STUDY

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Abstract

Agriculture contributes with 20% to Albanian GDP and is a vital sector for economic growth and development of the country. These days, consumers are more inclined towards a healthy lifestyle. They understand that the quality of food intake directly affects their health. The organic agriculture in Albania it is a new industry and constraints abound including lack of consumer preferences information for organic products. Limited academic research has explored the buying behavior of consumers of organic food in Albania. The demand for organic food products have increased rapidly in recent years. Among the main factors contributed to the increasing global consumers' demand towards organic food products are food safety concern, health benefits, better quality, higher nutritional value and environmental concern. Research findings on consumer behavior towards organic products are still inconsistent. The theoretical part of this research deal with the concept of consumer behavior, based on the findings of the latest studies, dealing with this topic.In conclusion, the results of this study will be of interest to policymakers, traders and donor programs active in this sector, which play a key role in shaping the production of the agricultural sector in the context of market trends.

Keywords: Organic products; Albania; Consumer Behaviour; Agriculture Sector

Introduction

The organic food market is one of the fastest growing markets in the food industry. The organic foods are perceived as more nutritious, healthy, and nature-friendly than conventional food. It is estimated that the organic food market will grow by 10-20% per year due to the growing demand for organic products (Zepeda, 2007).Favorable conditions and a variety of climates and resources have made the agricultural sector one of the most important sectors in Albania. Organic production is considered as an advantage of increasing the possibility of export, thus enabling the increase of the competitiveness of Albanian products as well as influencing the reduction of import. The increasing demand for organic food products in different countries from the beginning of the 2000s is driven by the growing awareness of consumers about the quality and safety of organic food products and this trend will always increase (Vindigni et al., 2002). Albania has a low level of organic cultivation; and organic livestock almost does not exist (Arndt, 2022). Less than 700 ha of agricultural land is certified organic, which represent only 0.1% of the cultivated area (Commission, 2021). Organic farming has a short history and is not yet fully consolidated. The number of organic operators, the planted area as well as the harvested/wild harvesting area fluctuates a lot from year to year (Arndt, 2022). However, one of Albania's strengths is in terms of the area of certified organic collection in the wild: about 650,000 ha, which places Albania in third place in Europe after Finland and Romania (Commission, 2021). The main export markets are the USA, Germany, Austria and Switzerland (Commission, 2021). Any company that aims to start or expand its business in specific products or market segments need to analyze consumers and what are those factors that influence the consumer behavior. The situation shows that there is a need to study the consumer behavior, especially the consumer's attitude towards buying organic food products and their purchase intention. Considering potentials for development, the Albanian government introduced a subsidy scheme for organic agriculture in 2008, as such providing incentives for farmers to venture into growing organic food. Favorable factors are capital and the knowledge and the experience of those returnees from migration. In general, Albania with its variety of microclimates due to its different altitudes makes possible the production of a wide variety of crops. The organic sector in Albania has good prospects if the terms "bio" or "organic" are really protected and organic producers and processors have access to financing. The majority of the research studies that are currently available on consumers' preferences for organic products are based on data from the USA or Western Europe. More studies on consumer behavior in developing countries have been conducted more recently, but they may not be applicable to the Balkans due to highly different cultural and economic situations (e.g., Roitner- Schobesberger et al., 2008; Chen & Lobo, 2012; Bruschi et al., 2015). Due to its potential competitiveness and demand, the Balkans is quickly emerging as a significant part of the production of organic products (Radi & Canavari, 2014).

Classifications of organic products

According to law, organic food comes from ecological farming, which aims to grow high-quality food while also protecting the environment. According to Allen and Alba-la (2007), organic food is defined as "food produced without using the conventional inputs of modern, industrial agriculture: pesticides, synthetic fertilizers, sewage sludge, genetically modified organisms (GMOs), irradiation, or food additives." The organic farming sector in Albania is a new industry and has many limitations including the lack of information on consumer preferences for organic food. Since 2016, Albania has its own law on organic food products (No. 106 / 2016) which is based on EU Regulation 834 / 2007 (Rural, 2022). It defines the general rules for the production and processing of organic agricultural food products and is supplemented by a series of further implementing rules. The organic sector in Albania must be differentiated into two main categories: non-certified organic

products, and certified organic products. A large part of the rural area's population, especially in villages, has access to these organic products at reasonable prices. One of the most important credence attributes frequently used for market analysis of vegetables has been the 'organic' label, which is perceived to provide benefits such as food safety, human health and more sustainable agricultural practices (Haghiri *et al.*, 2009; Thøgersen, 2009).

Consumer preferences for organic food

Consumer behavior is a very complex process. The key to a successful marketing is to understand consumer needs. Marketers can build successful marketing campaigns for their products by recognizing these consumer needs and the buying process. Marketers involved in sales of organic food have to segment their market in order to maximize the market share. Moreover consumers are willing to "pay for the privilege of buying organic". In consumer research, where consumer behavior is studied, in addition to demographic and socio-economic factors that influence consumer behavior, it is also necessary to study consumer attitudes, interests, opinions, knowledge, intentions and motivations (Solomon 2006). The findings of other studies paint the same picture of the same factors driving consumer demand for organic food.The growing demand for organic food products in different parts of the world from the beginning of the 2000s is driven by the growing awareness of consumers about the quality and safety of organic food products and this trend will always increase (Vindigni et al. 2002). However, data show that the level of consumption of organic food products is still low compared to non-organic food (Gupta and Odgen 2009). The literature shows that consumer preference for organic food is primarily driven by environmental concerns, health awareness or concerns, and locality/origin (Katt and Meixner 2020). Although there may be differences in the order of preferences in the specific cultural and demographic factors, the main reasons, in order of priority, are health, product quality, and concern for the environment and environmental degradation. A person's economic situation affects the choice of products. A consequence of this has been the gradual segmentation of the food and beverage market, similar to what has been observed in other developing countries. Some studies (Apaolaza et al. 2018; Haas et al. 2013) have argued that the main factor that motivates consumers to buy organic food products is health concerns. Thus, the theoretical model of this study assumes that health concerns, the country of origin of organic food and environmental concerns affect consumers' attitudes towards organic food. Furthermore, numerous reason (Hashmi, Huong Wee, 2014; Rizal & Koe, 2010; Chen & Chai, 2012) discovered that consumers' health consciousness is a powerful motivator for them to acquire organic food products. One of the key elements that influence a buyer to buy a particular product is subjective norms especially in a nation with a high level of social interacts. Ajzen (1991) stated that people as social beings are easily influenced by their surroundings, in particular by the members of their family, close friends, and colleagues. Therefore, when the consumer is making decisions about their behaviour, they take into consideration the opinions of these people and imagine how they would act under similar circumstances.

Figure 1: Factors that impact consumer behaviour on purchasing organic products

Conclusions

Our study suggests other possibilities for future research that may be directly or indirectly related to distribution, marketing, consumption, etc. based on the literature review. A marketer must be aware of the variables affecting the demand for organic food. The most significant reasons on consuming organic products is health concern, knowledge & awareness, subjective norms, and price.As far as we are aware, there are no research studies on Albanian consumers' preferences regarding organic food products. The study can direct and aid those in charge of agricultural policy in promoting the switch to organic farming, which would be advantageous to both the environment and human welfare. Our research will be useful to managers as they create their promotion plans on organic products. Furthermore, by addressing the primary drivers of organic food consumption, the research offers clear direction for industry professionals who must create effective marketing strategies.

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THE INFLUENCE OF GENDER, AGE, AND EDUCATIONAL LEVEL ON ONLINE CONSUMER RESPONSE TO DIGITAL MARKETING

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Abstract

This conference paper presents a comprehensive literature review investigating the multifaceted relationship between gender, age, educational level, and online consumer responses to digital marketing strategies. In the digital era, understanding how these demographic factors influence consumer behavior is pivotal for marketers aiming to create effective and tailored online campaigns.

The review begins by examining the evolving landscape of digital marketing, highlighting the profound impact it has had on the way businesses interact with consumers. As the Internet continues to shape consumer behavior, it becomes essential to comprehend the nuances associated with various demographic groups.

Gender differences in online consumer behavior are explored, with an emphasis on the varying preferences, motivations, and purchasing patterns exhibited by men and women. The paper also delves into the influence of age, recognizing the distinct online behaviors of different age segments. Furthermore, the review elucidates how educational level can significantly affect online consumer response, shedding light on the relationship between education and digital literacy.

Key findings from the literature indicate that gender, age, and educational level collectively shape online consumer preferences, trust, and decision-making processes. These factors impact ad engagement, brand loyalty, and conversion rates. Marketers must consider these insights when designing digital marketing campaigns to effectively target specific demographics.

Keywords: digital marketing, online consumer behavior, gender, age, educational level, demographic factors

Introduction

In comparison to other Balkan countries, the efficacy and prevalence of online marketing in our country remain low. However, digital marketing remains an important trend for marketing development globally and has the ability to grow even further. Complex digital marketing strategies provide endless prospects for market expansion, market share increase, brand recognition, and brand strengthening. Identifying critical variables like the online consumer profile, optimal segmentation criteria, and proper targeting continue to be issues for businesses in our country. The effectiveness and ubiquity of online marketing in our country remain low. Furthermore, as firms grasp the need of building a strong online presence, the usage of e-commerce and digital marketing methods in Albania is gradually expanding. This transition is being driven by shifting customer preferences, particularly among younger populations who favor online purchasing and digital engagement with brands. Businesses in Albania must adapt and invest in digital marketing to remain competitive in an increasingly international economy as the digital landscape evolves.

Additionally, both national and international statistics show that there is a slight difference in internet access based on gender categories, especially in the main categories that each group usually chooses to purchase. According to the survey conducted by INSTAT in 2021, men have higher internet access, and the main categories they choose to buy are technology and electrical appliances, while women appear to be more inclined towards purchasing food products, clothing, or personal care products for family use. These gender-based variations in internet access and consumer preferences underscore the importance of tailoring digital marketing strategies to effectively reach and engage different demographic groups. Businesses need to be mindful of these distinctions to better serve their target audiences and maximize their online marketing efforts.

Studies consistently reveal that individuals with higher educational attainment tend to exhibit greater digital literacy, making them more discerning and informed online consumers. Businesses should consider this factor when designing digital marketing campaigns, as it influences not only the type of products or services consumers are interested in but also the depth of information they seek before making online purchases.

Material and Methods

A comprehensive literature review technique is used in this study to analyze the complicated interplay of gender, age, educational level, and online customer responses to digital marketing strategies. We conducted thorough searches in respected academic databases and publications, with an emphasis on studies published in the last decade. Relevance, credibility, and currency were among the selection criteria. Selected literature was topically grouped, with a focus on the important variables of gender, age, and education's influence on online consumer behavior. To successfully synthesize data, we used tables and matrices. Each source was evaluated critically to ensure the inclusion of high-quality research by evaluating methodology, data collecting, and constraints. The research revealed patterns and trends on the effects of gender, age, and education on online customer replies, which informed our analysis. Furthermore, in order to increase the rigor of our systematic literature review, we adhered to established protocols for performing such studies, assuring transparency and replicability in our process. A full understanding of the intricate links between gender, age, educational level, and online customer responses in the context of digital marketing tactics is provided by the synthesis of information from many sources.

Results and Discussion

Consumer behavior is always an important issue in marketing research. Without consumer, there is business cannot be done and no profit can be made. Therefore, many marketers and researchers try to figure out the factors which influence consumers to buy products or services. Consumer behavior is always defined as selecting, using and disposing of products or services of individuals or organizations.

The present attitude which influences future intentions of online purchasing is different in gender as well. Females are less likely than males to change their future intentions (Hernandez, Jimenez & Martin, 2010). However, according to Garbarino and Strahilevitz (2004), females more easily change their perceptions than males because of friend's recommendation and suggestion. On the other hand, males showed higher intention to online purchasing after they purchased online (Hernandez, Jimenez & Martin, 2010).

Gender difference does not only influence online motivation. It also influences the types of products that males and females prefer to purchase online. According to the survey conducted by INSTAT in 2021, men have higher internet access, and the main categories they choose to buy are technology and electrical appliances, while women appear to be more inclined towards purchasing food products, clothing, or personal care products for family use.

Several studies conducted have revealed the basic factors that determine what a buyer is likely to purchase. Age and generation have been cited to have a great impact on the consumer's buying decisions (Murray, 2002). There has been a contention on whether it is the age or generation that has the bigger influence on the buyer decision. Therefore, this research paper seeks to make use of available literature to establish whether consumer behavior is more a function of a person's age or generation.

In regard to the above analysis, it can be established that the generation factor has a profound influence on buyer behavior. However, there are limitations that are mainly brought about by the issue of generation boundary. It is difficult to establish a boundary and even harder to try to describe the buying behaviors of those at the boundary (Torocsik, 2003). Education plays a role in how consumers perceive the products, which could be indirectly related to the web experience they have; the less they feel uncertain about product attributes, benefits, and quality.

In today's digital landscape, it is crucial for marketers and businesses to study online consumer behavior in respect to age, gender, and education. It makes it possible to customize marketing plans to suit various demographic groups, boosting the potency of internet advertising. Digital marketing initiatives can become more focused and effective by comprehending how these aspects affect consumer decisions, trust, and engagement online. Additionally, it aids companies in adjusting to changing consumer tastes and levels of digital literacy, ensuring that they maintain competitiveness in a dynamic online market.

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SUSTAINABLE TOURISM AND LEGISLATIOn

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Abstract

The relevance of the subject is conditioned upon the significance of the tourism sector for the economy of the Republic of Albania, which necessitates a proper consideration of the legal mechanisms designed to ensure the development of the tourism industry in the Albanian region. The purpose of the research is to analyse the state of implementation of the concept of sustainable tourism development in the Albanian legislation regulating the tourism industry. The following research methods were used in the research: logical and legal method, formal and dogmatic method, qualitative analysis method, correlation analysis method, and systematic approach. The publication highlights the main approaches to understanding the concept of sustainable tourism development both from the standpoint of international organisations (in particular, the World Tourism Organisation) and from the standpoint of theory. The research reflects a comprehensive analysis of the Law of the Republic of Albania "On Tourism" with a focus on the concept of sustainable tourism development in this regulation. Particular attention in the publication is devoted to the understanding of the concept of sustainable tourism provided for in the Law of the Republic of Albania "On Tourism", and to the identification of its characteristic features. The conducted research allowed for establishing the correlation between the normative provisions of the Albanian legislation in the field of tourism and the system of key features of sustainable tourism developed in the theory of tourism development science. The author describes the impact of the COVID-19 pandemic on the tourism industry of the Republic of Albania and the set of measures proposed at the level of individual tourism development programmes designed to overcome the adverse effects of the pandemic. The study allowed for developing recommendations for amendments to the Law of the Republic of Albania "On Tourism" at the level of detailing the concept of sustainable tourism for each type of tourism sector, which indicates the practical significance of the work.

A REVIEW OF HOFSTEDE'S INDIVIDUALISM AND COLLECTIVISM IN BUSINESS ENGLISH EDUCATION

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Abstract

This paper presents a critical examination of Hofstede's Cultural Dimensions Model within the context of Business English learning. Hofstede's cultural dimensions are indispensable instruments for comprehending the impact of cultural differences on various aspects of societies. Notably, Hofstede's theoretical framework has been widely used in the fields of international business and intercultural communication. Moreover, as culture profoundly influences the development of language, Hofstede's model provides a structured framework for students, educators, and organizations to enhance their understanding of cross-cultural communication. While numerous theories have been suggested to overcome these obstacles posed by cultural differences, including Hall's cultural dimension, GLOBE Study etc., Hofstede's Cultural Dimension Theory is considered to be the most robust and comprehensive theoretical framework for understanding these complexities. This paper provides a review of the dichotomy between students' and teachers' beliefs through the lenses of 'collectivist' and 'individualist' societies which might affect their interactions. Specifically, it aims to portray how societies like Albania which are increasingly being remodeled into an individualistic one through geopolitical forces, albeit in a more hybrid style, are affecting the learning and teaching process of English in classes. The end result is that, probably due to its geographical position and other ethno cultural factors, Albania offers a mixed learning experience of Business English with both characteristics of individualism and collectivism.

Keyword: individualism, collectivism, culture

Introduction

Due to globalization, the use of the English language in business has become an indispensable tool for overcoming trade obstacles and facilitating international business. Most global businesses worldwide encounter setbacks due to intercultural disparities between countries. These cultural differences can have a significant impact on various aspects of business operations, from hiring employees to marketing and selling products, negotiating contracts, and more. Today, working globally requires knowing your counterparts and being able to communicate your ideas in a manner most likely to be comprehended as intended. This, in turn, means having the ability to understand your own culture and being aware of expectations in different situations. Therefore, proficiency in Business English is a necessary language skill for international business. Hofstede's cultural dimensions' theory focuses on the relationship between culture and individuals. The main aim of this study is to give a contribution by combining Hofstede's' Cultural Dimensions Theory with Business English teaching. In this research, we will focus on the second cultural dimension: individualism and collectivism. According to Hofstede (2010), "Collectivist societies are where the interest of the group prevails over the interest of the individual" while 'individualist societies where the interest of the individual prevails over the interest of the group". English language teachers have the role of acquainting students with the cultural knowledge, customs and traditions of English-speaking countries. Technology, the internet, along with multimedia resources such as films, music and different television programs, online newspapers or magazines, allow students to analyses and observe cultural elements they rarely encounter in written texts.

Individualism and Collectivism in Classroom

Understanding the dynamics encompassing individualism and collectivism will help language teachers to understand student's beliefs, attitudes, behavior etc. This knowledge helps them to apply more effective teaching methods in the classroom. Developed countries and Western countries exhibit more individualistic traits while less developed and Eastern countries like Japan, China etc. exhibit collectivistic traits (Hofstede, 2001; Hofstede 2010; Hofstede 2011). The cultural orientation of a society, whether it leans towards individualism or collectivism, can influence the teaching and learning methods (Nelson, 2000; Alshahrani,2017; Alqarni,2022). Therefore, cultural orientation is important in dealing with cultural-related challenges that may arise in an educational setting, since culture can affect learners and classroom dynamics. In today's education, language teachers use a multifaceted approach in the classroom to encourage student's language skills. This is evident when we compare students from a collectivist society, who exhibit lower motivation to students from an individualistic society, who prefer to study in a student-centred approach. Collectivistic students are socialized to work together as a group (Rothstein-Fisch,C 2008). Albania has characteristics of both individualism and collectivism. During the communist period under Hoxha's dictatorship regime, Albania exhibited a strong collectivist society after the Post-Communist Transition Albania shifted towards a more individualistic society. In a collectivist society, teaching is only from one side from the teacher to the student. In Albania, especially in rural areas, the society reflects more collectivist values, therefore leading to a preference for a teacher-centred approach to education. In such an environment, students tend to be very reserved in expressing their opinions to their teachers. This teaching approach, embodied in the culture, has significantly influenced and shaped the behavior and educational development of the future generation, where decisions are made by others. However, after the fall of the communist regime, there was a tendency to shift away from the traditional teacher-centred model towards interactive teaching methods in the classroom. According to Nelson in individualist cultures students often speak up in class and frequently ask the teacher, class is divided into small groups, while in collectivist culture students speak up when called on by the teacher, rarely ask questions, and teachers tend not to use small group (Nelson, 2000).

By observing the behavior or characteristic of individuals, it is possible to discern whether they are part of an individualistic or collectivistic society. Our everyday behavior is the key in understanding our cultural values and norms. Teachers can introduce different classroom activities to stimulate discussions about different traits of individualism and collectivism. Students need to understand that the way we behave can reveal whether we are from an individualistic or collectivist culture. Based on "Cultural Matters: The Peace Corps Cross-Cultural Workbook (2011)", teachers can examine how telephone etiquette, decision-making, and awards can differ in these two cultural paradigms.

Telephone Etiquette: Individuals in an individualistic culture typically answer the phone by giving their names. In contrast, individuals within a collectivist culture often answer the phone by giving the name of their organization or group they work.

Awards: Employee-of-the-year awards are offered as a means of rewarding individual achievements. Meanwhile, in collectivist societies, awards often revolve around group achievements in order to encourage a sense of unity within the group. In a collectivist society the rewards are based on equality, while in an individualistic society, the rewards are based on equity.

Decision-Making: Decisions within individualistic societies tend to be autonomous, they believe in individual decision-making, while collectivist cultures typically follow a consensus-based approach.

These distinctive behavior and practices make us reflect on the contrast between individualist and collectivist societies. (Adapted from *"Cultural Matters" The Peace Corps Cross-Cultural Workbook (2011)*).

Understanding and addressing the characteristics of collectivist and individualistic classrooms is important for language teachers in order to apply a teaching method that is effective for all students. Knowing these cultural values can gradually build up students' confidence in speaking Business English. Such a transformation can develop students' abilities towards critical thinking, helping them to adapt to the changes in global education. This article can be a valuable resource for English language teachers who are looking to adapt their teaching methods by considering the cultural aspects of their students.

Conclusion

In conclusion, recognizing individualist and collectivist cultures is considered beneficial for language teachers. Acknowledging these cultural values and norms enables teachers to adapt their teaching methods to be more effective and to enhance students' learning experience. People's behaviour reflects whether we lean towards individualism or collectivism.

Moreover, the cultural orientation of a society can impact teaching and learning methods. In the modern educational time, where diversity is dominant, language teachers should apply multifaceted approaches to facilitate the student's learning processes. Students from collectivist societies may exhibit different learning styles and motivations from individualistic cultures. In Albania's context, with its historical shifts from a collectivist to a more individualistic society, it exemplifies how culture can shape educational models. By doing so, teachers can adapt the teaching methods that meet students' needs and develop students' critical thinking skills.

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A COMPETITIVE AND DESCRIPTIVE ANALYSIS OF ISO 9001-2015 CERTIFICATES IN BALKAN COUNTRIES

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Abstract.

The goal of the study is to provide a new approach for classifying Balkan nations according to their possession of ISO 9001:2015 certificates. Since it is required by law, business customs, licensing, export-import procedures, etc., ISO 9001:2015 is one of the main standards that business entities seek to be certified to and manage the certificate. However, when it comes to ranking, Balkan countries are ranked by alphabetical order and/or by the number of ISO certificates issued. To determine the level of the ISO 9001:1015 standard certificates index in Balkan countries until 2022 and to provide statistical insights into the Balkan economies, this paper uses competitive and descriptive analysis to examine the ISO 9001: 2015 certificates issued in Balkan countries, and ISO 9001:2015 standard certifications issued through the year 2022, weighting the number of business entities in each Balkan nation when issuing ISO 9001:2015 certificates. The main conclusion of the paper is that the proposed ISO 9001:2015 certificates index ranks Balkan countries based on a proper methodology on the issue of quality management and that this ranking can be used for other scientific and statistical issues, studies, and reports, keeping in mind that to gain a competitive advantage, economies should invest (aside from in the business climate, etc.) in ISOs.

Keywords: *Economic growth, ISO standards, ISO 9001:2015 certificates index, quality management.*

Introduction

Following a brief period of economic recovery following the COVID-19 pandemic, the economic effects of the Russia-Ukraine conflict, skyrocketing food, and energy costs as well as general inflation, Balkan economies, like governments outside the region, struggle to provide a suitable legislative, financial, social, cultural framework, and despite the difficult climate, several statistics show that the economies of the Western Balkans have outperformed even those of Europe.

Balkan countries, including those who are now EU members and those who are applying to join, are attempting to incorporate quality management ideas into the region's economy in general and business practices, in particular, to advance along the path of integration. International standards are designed for companies who are looking for ways to constantly outperform customers' expectations while raising the quality of their products and services. The answer for these companies is ISO 9001:2015 and other ISO standards, which cover numerous aspects of quality management and provide a manual for setting up and managing a management system. However, a different ranking approach that simply takes into account the quantity of ISO 9001:1015 certificates granted in Balkan nations is required.

The main objectives of this paper are to determine the level of the ISO 9001:1015 standard certificates index in Balkan countries until 2022 and to provide statistical insights into the ISO 9001 standard in Balkan economies, using competitive and descriptive analysis. The main purpose of the paper is to propose an ISO 9001:2015 certificates index to rank Balkan countries based on a proper methodology on the issue of quality management, and that this ranking can be used for other scientific and statistical issues, studies, and reports, keeping in mind that to gain a competitive advantage, economies should invest (aside from in the business climate, etc.) in ISO s.

Material and Methods

The Balkans, corresponding partially with the Balkan Peninsula, is a geographical area in southeastern Europe with various geographical and historical definitions (Gray & Sloan. 2014). The term by most definitions fully encompasses Albania, Bosnia and Herzegovina, Bulgaria, Greece, Kosovo, Montenegro, North Macedonia, European Turkey, and a large part of Croatia and Serbia. Sometimes the term also includes Romania and southern parts of Slovenia. Italy, although by some definitions having a small part of its territory on the Peninsula, is generally excluded.

The economies of the Balkans, particularly those in the Western Balkans, have had their resilience put to the test during the past three years, according to a 2023 World Bank report. Despite social spending pressures against record inflation, fiscal deficits have decreased in the majority of Balkan countries. The Balkans' prospects are still dim and the level of uncertainty is still high. The necessity to hasten the green transition has been made clear by the ongoing energy crises (World Bank. 2023).

International standards organization, ISO 9000 Family, and ISO 9001:2015

The International Organization for Standardization (ISO) is an international standard development organization (ISO. 2016) composed of representatives from the national standards organizations of member countries (ISO. 2019), founded on 23 February 1947, and (as of November 2022) it has published over 24,500 international standards covering almost all aspects of technology and manufacturing. In 1987, ISO published its first quality management standard. Standards in the ISO 9000 family have gone on to become some of the most well-known and best-selling standards. Part of this family is the ISO 9001:2015 standard, Quality Management Systems — Requirements, last reviewed and confirmed in 2021, and this version remains current. ISO 9001:2015 specifies requirements for a quality management system when an organization:

a) needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and

b) aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

Table 1. Main sectors of the Balkan economy ISO 9001:2015 certificates have been issued (ISO. 2022)

Main sectors ISO 9001:2015 certificates are issued		
No	**Sector**	**Number of certificates**
1	Food processing	1250
2	Rubber and plastic products	1684
3	Basic metal and fabricated metal products	3187
4	Machinery and equipment	1535
5	Electrical and optical equipment	1920
6	construction	4262
7	Wholesale and retail trade	
8	Wholesale & retail trade, repairs of motor vehicles, motorcycles & personal & household goods	5580
9	Information technology	1247
10	Engineering services2574	2574
11	Other sectors	8000

Listing Balkan countries for ISO standards

There are several ways to list/rank Balkan countries about ISO 9001:2015 standard certificates issued.

1. Listing in alphabetic order, which doesn't show the real ranking of Balkan countries about ISO 9001:2015 certificates issued. For example, Albania is the first because of the letter A, while Romania which has the largest number of ISO 9001:2015 certificates issued is ranked 8th, etc.
2. Listing Balkan countries based on the number of ISO 9001:2015 certificates (2022), which doesn't give any other flavor to the Balkan countries' economy.
3. List of Balkan countries based on calculated ISO 9001:2015 index (2022), which gives a proper weighting on ranking countries about ISO 9001:2015 standard certifications.

Table 2. List of Balkan countries based on alphabetic order, Number of ISO 9001:2015 Certificates (2022), Number of business entities, ISO 9001:2015 index, and
Table 3. List of Balkan countries based on number of ISO 9001:2015 certificates (2022),
Table 4. ISO 9001: 2015 index (2022) Descriptive statistics and
Table 5. List of Balkan countries based on calculated ISO 9001:2015 index (2022).

No	Country	Number of ISO 9001:2015 Certificates	Number of Business Entities	ISO 9001:2015 Index
1	Albania	452	125222 (INSTAT. 2022)	0.003609589
2	Bosnia and Herzegovina	959	98000	0.009785714
3	Bulgaria	6765	338044	0.020012188
4	Croatia	2879	267634	0.010757228
5	Greece	6246	1365000 (Skene. 2017)	0.004575824
6	NR Macedonia	522	70424 (RELEASE. 2021)	0.007412246
7	Montenegro	160	39682	0.004032055
8	Romania	10621	247708 (EIB. 2023)	0.042877097
9	Serbia	3541	205139 (EU. 2019)	0.017261467
10	Slovenia	2178	153588 (Kuhelj. 2019)	0.014180795
11	Turkey	8243	3600000 (Dierks. 2023)	0.002289722

No	Country	Number of ISO 9001:2015 Certificates
1	Romania	10621
2	Turkey	8243
3	Bulgaria	6765
4	Greece	6246
5	Serbia	3541
6	Croatia	2879
7	Slovenia	2178
8	Bosnia and Herzegovina	959
9	NR Macedonia	522
10	Albania	452
11	Montenegro	160

ISO 9001:2015 Index	
Mean	0.012436
Standard Error	0.003515
Median	0.009786
Mode	#N/A
Standard Deviation	0.011656
Sample Variance	0.000136
Kurtosis	4.658965
Skewness	1.991027
Range	0.040587
Minimum	0.00229
Maximum	0.042877
Sum	0.136794
Count	11
Largest(1)	0.042877
Smallest(1)	0.00229
Confidence Level(95.0%)	0.007831

No	Country	ISO 9001:2015 Index
1	Romania (Maximum)	0.042877097
2	Bulgaria	0.020012188
3	Serbia	0.017261467
4	Slovenia	0.014180795
N/A	Mean	0.012436
5	Croatia	0.010757228
6	Bosnia and Herzegovina (Median)	0.009785714
7	NR Macedonia	0.007412246
8	Greece	0.004575824
9	Montenegro	0.004032055
10	Albania	0.003609589
11	Turkey (Minimum)	0.002289722

Based on the descriptive statistics, four countries are above the mean, Romania, Bulgaria, Serbia, and Slovenia, and below the mean are Croatia, Bosnia and Herzegovina, NR Macedonia, Greece, Montenegro, Albania, and Turkey, while below the media are NR Macedonia, Greece, Montenegro, Albania, and Turkey, giving in such a model of listing/ranking a better understanding of the criteria on how Balkan countries can be listed/ranked regarding ISO 9001:2015 certificates issued.

The methodology used in this paper includes elaborating ISO 2022 survey for ISO certificates issued worldwide, extracting data for Balkan countries, extracting data for several businesses in Balkan countries in 2022, and dividing the number of ISO 9001:2015 certificates by the number of businesses in Balkan countries to draw the ISO 9001:2015 certificates index, handling a comparative and descriptive analysis, after which, raking takes place.

Result and discussion

This research produced a main result on listing/ranking Balkan countries based on ISO 9001:2015 certificates index and provided insight into the countries which are listed higher, in medium and low levels based on this index, showing the level of quality management applications in these countries, since ISO 9001:2015 standard is related to quality management principles. This research produced a main finding/result related to listing/ranking Balkan countries on the ISO 9001:2015 certificates index, based on a theoretical and practical methodology, compared with previous alphabetical and the highest number of certificates issued. The main findings from the descriptive analysis are that four countries are above the mean, Romania, Bulgaria, Serbia, and Slovenia, and below the mean are Croatia, Bosnia and Herzegovina, NR Macedonia, Greece, Montenegro, Albania, and Turkey, while below the media are NR Macedonia, Greece, Montenegro, Albania, and Turkey, giving in such a model of listing/ranking a better understanding of the criteria on how Balkan countries can be listed/ranked regarding ISO 9001:2015 certificates issued. The statistically demonstrated list/rank shows the quality management application and competitive advantage of Balkan economies based on quality management principles since ISO 9001:2015 specifies requirements for a quality management system when an organization needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements. Using ISO 9001 helps ensure that customers get consistent, good quality products and services, which in turn brings many business benefits.

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ANALYSIS OF PERCEPTIONS AND RISK MANAGEMENT STRATEGIES OF HORTICULTURE FARMERS IN THE CONTEXT OF CLIMATE CHANGES

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Abstract

Agriculture in Albania has been greatly influenced by climate change. To cope with climate change, it is necessary to understand the consequences it brings to the agricultural sector. This paper aims to provide an in-depth understanding of the risks faced by farmers, focusing on climate change, including farmers'behavior and perceptions of risk, climate change and insurance. This research was based on a thorough literature review. The literature review summarizes facts related to the risks and consequences of the results of climate changes focusing on these aspects:Assessment of farmers' perception of climate change risks in agriculture; Assessment of farmers' willingness to pay for insurance; Assessment of farmers' awareness of climate changes and their attitude towards these changes; Identification of factors influencing risk perception and willingness to pay for insurance, as well as perceptions and attitudes towards climate change.

Keywords: Climate changes, Agriculture, Albania.

6. Introduction

Agriculture is a sector characterized by exposure to and confrontation with high levels of risk (Tangermann, 2011; Jankelova et al., 2017), especially from natural factors that are beyond the farmer's control. According to the IPCC (2007), "climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity". Recent research has identified prolonged droughts, more frequent temperature changes, and even floods, including frosts that occur above average levels over the past decade, which appear to be caused by climate change (Imami et al., 2021). Climate change has affected the severity of production risks for various sectors of agriculture, including damage to crops (flowers/fruits or plant parts) from hail, frost, wind or flooding, lower yields and quality due to extremely high temperatures (especially in cases of sprinkling scarcity), and various diseases that have emerged or intensified in recent times (Skreli and Imami, 2019). This research project aims to provide an in-depth understanding of the risks faced by Albanian farmers, with a focus on climate change, including farmers' behavior and perceptions of risk, climate change, and insurance.

7. Materials (or Subjects) and Methods

In the first phase, the study began with a review of published documents and literature (Imami et al., 2021), (Skreli and Imami, 2019).Documentary and literature review is a well-known method in research history, where the selection of a topic, source, evidence selection and management, authenticity basis, credibility and representation are considered (Dunne, Pettigrew, and Robinson, 2016). The aim is to identify the risks faced by Albanian farmers, with the main focus on climate change and insurance willingness. For this analysis, reports from INSTAT publications and articles from the Ministry of Agriculture and Rural Development were examined, as well as publications from Regional Agricultural Extension Agencies in Lushnje (which also covers the county where this work will be carried out).Technical reports: Over fifteen reports were reviewed, mainly produced by the Ministry of Tourism and Environment, the Institute of Environmental Policies, and GIZ.Scientific articles related to agriculture and rural development, farmers' risks.The second phase of this study is intended to be based on structured interviews, which will be a primary research method in this study.

8. Results and Discussion

This paper is a literature review.

A part of the literature consists of studies that show that the *age variable* is positively correlated with the dependent variable, which is the purchase of agricultural insurance. In other words, as age increases, the probability of willingness to pay for insurance premium also increases (Ajiboye et al., 2018; Fahad et al., 2018; Feng et al., 2013; Sherrick et al., 2004; Okoffo et al., 2016, etc.).

The literature indicates that the level of education of the farmer is a highly significant socio-demographic factor that influences the willingness to pay for agricultural insurance. According to Fahad et al. (2018), with an increase in the level of education, the probability of willingness to pay for crop insurance to manage farm risks in adverse situations increases.

Empirical studies conclude that socio-economic factors (i.e., income from farming) play a significant role in a farmer's willingness to pay for insurance (see, for example, Feng et al., 2013; Kouame and Komenan, 2012; Teshome and Bogale, 2015).

Furthermore, various empirical studies demonstrate that the larger the *farm size*, the higher the probability that a farmer will adopt an insurance scheme to protect production (or investment) from potential natural disasters (Fahad et al., 2018; Hassanpour et al., 2013; Kouame and Komenan, 2012; Usman and Dodo, 2014).

Boyd et al. (2011) and Porth et al. (2015) show that a farmer's trust in insurance companies is positively associated with the purchase of agricultural insurance. Therefore, the more farmers trust an insurance company or provider, the greater their willingness to pay for the insurance.

The findings of some previous studies related to this indicator reveal that having access to agricultural advisory services has a positive impact on a farmer's willingness to pay a specific insurance premium to cover potential losses from natural disasters (see Fahad et al., 2018; Falola et al., 2013; Sadati et al., 2010).

The expected results of this study involve the validation of the following hypotheses based on the survey results to be conducted in the field:

- Education positively influences farmers' willingness to pay for insurance – the higher the level of education, the higher the willingness to pay for insurance.
- Education positively influences farmers' awareness of climate change – the higher the level of education, the higher the expected awareness of farmers regarding climate change.
- The extent of damage from natural disasters has a statistically significant impact on the perception of the importance of insurance for covering natural disasters and the willingness to pay for insurance.
- Farm size influences farmers' willingness to pay for insurance – the larger the farm, the higher the willingness to pay for insurance.
- Age positively influences farmers' willingness to pay for insurance – as age increases, willingness to pay for insurance increases.
- Income from agriculture positively influences farmers' willingness to pay for insurance – the higher the income secured from agriculture, the higher the willingness to pay for insurance.
- Farmers' trust in insurance companies positively influences farmers' willingness to pay for insurance – the higher the trust, the higher the willingness to pay for insurance.
- Advisory services positively influence farmers' willingness to pay for insurance and farmers' awareness of climate change.
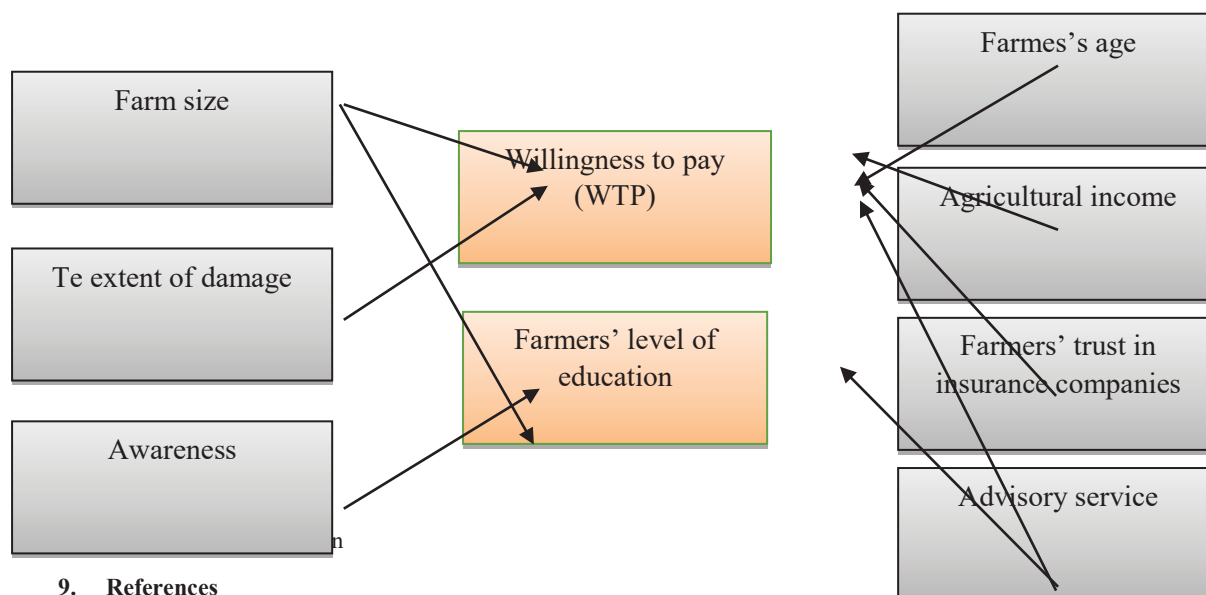
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ALBANIA'S DIGITAL TRANSFORMATION OF PUBLIC SERVICES DELIVERY

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Abstract. Albania has been undergoing a digital transformation in its public services delivery to enhance efficiency, transparency, and accessibility. The most important points of Albania's digital transformation in public services are E-government initiatives in order to provide citizens and businesses with easier access to government services online. Various government agencies have introduced online platforms and portals to offer a wide range of services, such as tax filing, business registration, and social services applications, which can be accessed and completed online. The main purpose of this study is to bring a general overview of the transformation of public services in the Albania, addressing the positive and negative impacts of this progress and development. Secondary data analysis is used as the main methodology, such as official government sources, academic papers, or reports from international organizations.

Key Words: *public sector, e-government, digital transformation, electronic services, online platforms*

Introduction

The digitization of services implies the substitution of digital processes for manual ones. On the other hand, digitization of services means replacing manual processes with digital ones to provide faster, easier, and better-quality services. Today, the Internet and the use of ICT have become a necessity and a very important aspect of the digitalization of public services in Albania. Since the 1960s, organizations in the public sector have used new technologies to manage online forms for data entry, storage, and retrieval of citizen data. This has changed the context in which citizens and public employees engage. For example, the digitization of public services has changed the location of public meetings from a public official's office to a technological device. Public organizations are embracing digital technologies to streamline public gatherings and interactions between the general public and public officials. From the perspective of public policy, digitalization facilitated the approach to innovation in administration and public services and brought services closer to the citizen. During the last 16 years (2005–2021), the use of information technology for the benefit of public service administration innovation has gained particular importance, supported by a framework of policies, plans, regulations, and new institutions. In this 16-year span (10.09.2005–17.09.2021), there has been a "straightforward policy" approach regarding the significance and utility of information technologies to digitize state databases and enable online administration services by using an inventive approach with the citizen as their beneficiary. Albania's digitalization has advanced at a relatively satisfactory rate, with the majority of businesses and employees using computers for work-related activities.

The Albanian government's intentions for online services and the development of digitalization, as a potent weapon for the transparent and effective supply of services to citizens and local companies, were highlighted by the National Agency of the Information Society. Additionally, a focus on the significance of maintaining a holistic strategy was made in order to overcome the divisions brought on by digitization and to care for the most vulnerable groups. The National Agency of the Information Society (AKSHI) has increased the number of electronic services offered online, with an impact on 1,781,700 users, including citizens, businesses, and administration workers.

The main purpose of this paper is to identify and describe the digital transformation of public services in our country, which has changed the understanding of the interaction between citizens and the government. Therefore, this paper explains the digitization efforts in Albania through SWOT analysis, highlighting the main achievements, challenges, and opportunities for further development.

In this article, secondary data analysis is used as the main methodology, specifically: official government sources (INSTAT and the National Agency of the Information Society), academic papers, or reports from international organizations that specialize in e-government development and digital transformation. SWOT analysis is done as a tool to clearly identify the topic being addressed.

Results and Discussion

This paper reflects on some areas of services that have been affected by e-government, where the movement and super-fast developments in the use of technology in the service of citizens require both a response at the infrastructural level, as well as in education, assistance for citizens in receiving and obtaining online services.

The research found that the level of trust and security of digital services for businesses is average. The interaction between the municipality and businesses that use digital services is not at the desired level. Institutions and municipalities must provide ongoing assistance and guidance to businesses regarding the safe use of digital services. The advantages offered by these services are multidimensional, but businesses must submit their requests in a single place and follow the trend of developed businesses to gradually transform e-services into m-services.

ADISA was established to raise the level of efficiency and transparency in the administration. Also, in Albania the governance reports show that, there are great needs for improvement in the fields of real estate registration and market guarantee. The registration system must continuously develop the technical-legal regulatory environment to ensure the safety of the property market. Digitization in tourism should ensure greater interaction with tourists to identify and address their needs. Combining e-services with educational ones is a must. Investments in digital infrastructure are needed to accelerate the effective use of ICT in teaching and learning.

Albania presents a promising landscape for digitization, characterized by its youthful population and a reasonably high level of education. However, the digitization journey comes with challenges, including the need for legal adjustments, improved institutional-business interactions, continuous staff training, enhanced digital security, and broader internet coverage, especially in rural areas. The e-Albania portal offers a range of electronic services, but the security and legal aspects of digitizing property information remain areas of concern. Research is essential to identify other influential factors in the adoption of digital services, highlighting the ongoing evolution and maturation of Albania's digital transformation efforts.

Figure 6 SWOT analyses

STRENGTHS	WEAKNESSES
-The young age of the population makes it simpler to receive training for new job fields using modern digital tools. -The level of technology navigation is raised by Albanian businesses' close ties to their international counterparts. -Government support. The Albanian governments have taken a constructive stance toward the digitalization of public services and tried to promote and use it more and more for public services as a result of the improvement in service quality and, concurrently, the public's favourable opinion of it.	-Population and labour force reduction: -Like many other nations, Albania's population is no longer increasing. -Being the sole consumer of digital goods necessitates spending an extensive amount of money on technology. -"Brain drains." Although less so than in previous years, Albania continues to lose competent professionals and talented individuals to western nations where the evaluation is better.
OPPORTUNITIES	THREATS
-Cheap labour force -The level of service transfer from nations with high labour costs to Albania is anticipated to increase with the introduction of more services using digital devices. -High level of language proficiency. Fortunately, Albania inherits a long tradition of effective foreign language instruction. -Lack of a saturated labour market. -Albania's labour market is not fully occupied. Still open are opportunities for fresh investments and employment. -European integration. Being a member of the EU would give Albania a competitive advantage when selling goods and services to other EU nations, promoting job growth and economic digitization at the same time.	-Increasing the average age of population. The average age of the population in Albania has increased as a result of social and demographic changes. -The "import" of unemployment. There is the possibility that many domestic products will be competed with by mainly Asian producers, who offer competitive prices for goods and services. This threatens the labour market in Albania. -Protectionist policies of EU countries. The possibility of drafting and implementing protectionist economic policies in the countries of the European Union threatens the companies that offer services from Albania to these countries.

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THE EVALUATION OF THE EFFECTS THAT DO NOT PASS FROM THE MARKET AND THE ANALYSIS OF THEIR DETERMINANTS - THE CASE OF THE TIRANA LAKE

Park

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The environment and natural resources are important assets that affect our quality of life and well- being. However, their valuation in an economic context is often challenging, especially when there is no clearly defined market price. The Tirana Lake Park is an environmental asset which, although it does not have a clear market price, has a significant impact on this city's life and urban environment. This research aims to analyze how the distance from Tirana Lake Park affects the prices of apartments in this city. For the realization of this research, 170 records were obtained from real estate offices in the city of Tirana. The model used is a hedonic regression model, where the dependent variable is the price of residential apartments and the independent variables are the variables that represent the attributes of these apartments. Based on the literature review, the attributes are grouped into locational, structural, environmental, and neighborhood attributes. The study results show that the distance from Tirana's Lake Park has a statistically significant impact on apartment prices, offering the "price" that apartment buyers place on this natural resource, as reflected in the housing price. The results of this research are useful for political decision-makers for a more appropriate cost-benefit assessment of projects that are directly or indirectly related to the parking of the artificial lake, as well as for their information in the field of urbanism and the environment in Tirana and beyond.

Keywords: Non-market valuation, hedonic prices, Tirana Lake Park, Albania

AGRICULTURAL LAND PROTECTION AND CONCRETING, A LOST BATTLE?

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ABSTRACT

The years 1991-2001 in Albania were characterized by mass movements of the people living mainly in the mountainous areas towards the capital and the areas around it, without excluding here as well other western lowland cities.

This immediate demographic movement had its negative consequences. Whole areas geographically, located in the hilly and mountainous areas of the country were depopulated, and the land agriculture in these areas remained barren.

Unlike these areas, the western lowlands, in which the largest fund is also found agricultural land, experienced a gradual but unstoppable invasion by migratory movements interior. Large areas of agricultural land were gradually occupied by new residents, who built there without any criteria, and concreted the entire surfaces on the outskirts of the urban areas which for 45 years served as the main agricultural fund, completely alienating their agricultural destination and transforming them into informal residential areas.

In 2006, the Parliament approved the law for the legalization of informal constructions, legislating thus ultimately the damage caused at the expense of agricultural land.

On the other hand, large areas of agricultural land are falling prey to large projects development. The lack of development planning of these areas and the ease with which you can change the destination of agricultural land is irresistibly reducing the fund of the agricultural land in Albania, thus damaging this national property with irreparable consequences.

The study methodology in this paper is complex and is based on the combination of techniques such as doctrinal research, comparative methods, descriptive methods, historical methods and legislation analysis.

Key words: protection of agricultural land, concreting, the law for the legalization of informal builings, mass movement of the population, lack of urban development planning

GREEN ACCOUNTING AND ENVIRONMENTAL SUSTAINABILITY - CASE OF ALBANIA AND KOSOVO

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Abstract

The United Nation Sustainable Development Goals (SDGs), and specifically SDG7 (affordable and clean energy) and SDG 13 (climate actions) are enhancing the embracing of strategies who promote the green growth in global level. Sustainable development policies, emphasizes the need for capacity building in the countries in global level towards addressing the negative effects of climate change. Albania and Kosovo have paid attention in adaptation and mitigation policies towards the meeting environmental goals. Traditional accounting consider the enterprise as a personal system neglecting the impact on environment and society. In this paper we analyze the role of green accounting as an important tool towards the transparency of the environmental activities and propose a road map on how Albania and Kosovo would adopt this tool.

Review of the literature and the policies implemented in our two countries, Albania and Kosovo, in relation to the sustainable reporting of economic entities will be the methodology for drawing the main conclusions. There also has been a focus group interview with the experts mainly from the academic level responsible for financial reporting and environmental issues. Both methods will address the achievement and limitations of green accounting development and implementation in Albania and Kosovo and help in preparing a regulatory framework on green accounting adaptation in financial reporting in both countries. In this paper, it is highlighted that there is a significant lack of cooperation between the institutions responsible for environmental problems at the national level. Moreover, there are no incentive policies for companies that would orient them in undertaking environmental investments.

Key words: green accounting, traditional accounting, sustainable reporting, regulatory framework

1. Introduction

High economic activity by various giant companies in various sectors has necessarily caused negative effects on the environment. In the past, this impact was less pronounced, but with the growth of the population, the various industries represented by these companies have also increased, and as a result, the damage to the environment has also increased, which is giving the environment a degrading direction.

Sustainable development is a concept that means meeting the needs of the present generation without compromising or hindering the meeting of similar needs of future generations (Environment). The concept includes three main points of view: social, economic and ecological. Today's companies to be successful and in compliance with legislation must consider these three aspects and implement social, economic and environmental goals. Issues related to environmental damage are no longer new issues. Until now, almost all countries have begun to pay great attention to the issue of environmental damage, for example water, land, air pollution and the existence of social inequalities in the environment. All the actors involved have started to contribute different ideas regarding the preservation of the environment. One of them is the emergence of the concept of environmental accounting (Tunti, Mutia, & Ga).

In the organization, accounting plays a vital role in business activities, because through it the collection, processing and analysis of data is done, which will serve the organization in making the right economic decisions. Traditional accounting includes little or no social costs of manufacturing and processing companies. The awareness of the involved parties about the importance of a healthy/clean environment and its preservation showed the green accounting which takes into consideration the social costs and it is thought that it will positively influence the mitigation of the said problem.

In the modern business world, environmental accounting, otherwise known as green accounting, represents an important subdivision of accounting that tries to take into account ecological costs in the calculation of operating profits of an enterprise. It similarly organizes information in an accounting structure, develops and clarifies environmental assets, environmental liabilities, environmental revenues and environmental costs, with the main goal of minimizing environmental damage (Yeasin, 2021).

According to Fraser & Glen, "*Green accounting is one of the contemporary concepts in accounting that supports the green movement in a company or organization by recognizing, quantifying, measuring and disclosing the contribution of the environment to the business process*" (Bell & Lehman, 1999).

The need for corporate reporting of its environmental and financial performance has some practical potential in providing a greater degree of visibility into its environmental activities and consequences and shedding light on what is often invisible to both governmental and societal groups. for those interested. It is possible that such reporting could spare or even reduce known adverse effects (M. & M.). Green accountants are responsible for identifying and tracking green costs by working with research, development and production managers when planning their budgets (Datta & Deb, 2012).

2. Material and methodology

This study is based on a review of the academic papers and policies implemented in EU countries. There has been also a focus group with the experts mainly from the academic level responsible for financial reporting and environmental issues. Both methods will address the achievement and limitations of green accounting development and implementation in Albania and Kosovo and help in preparing a regulatory framework on green accounting adaptation in financial reporting in both countries. The study aims to fill the gap from the theoretical perspective in green accounting literature considering the actual legislation and didactic materials in both countries. To gather information we used the string "Green accounting", "Environmental accounting", "Sustainability performance", "Implementation".

Green accounting (GA) helps management understand whether the organization is acting in compliance with environmental protection laws in order to fulfill its responsibilities towards the concept of sustainable development. The application of GA in the organization ensures:

- Fulfillment of regulatory requirements;
- Modifying the ways of doing work in such a way that no damage to the environment occurs;
- Promotion of a work culture and approach for a safe environment for its workers;
- Informing the shareholders about the amount and nature of the preventive measures to be taken by the management;
- Minimizing negative impacts on the environment;
- Ensuring the safe treatment and disposal of hazardous waste (Rewadikar, 2014);

3. Results and discussions

Sustainable development requires that all economic units, in addition to the economic aspects of the organization, also reflect their environmental impacts. This requires that every economic entity, in addition to traditional accounting, builds a green accounting system which will enable the identification and quantification of the use of natural resources. In addition, all the environmental costs such as environmental fines and taxes, green investments, waste treatment and all the cost related to enterprise externalities. This requires a well classified report that will be included in financial reporting of each enterprise.

3.1 Albania and Green Accounting

Albanian legislation related to the environment is in full cohesion with EU directives. Albania is part of Kyoto protocol and has committed itself to take part in the stabilization of the concentration of greenhouse gas emissions in the atmosphere. As a developing country Albania has no obligation towards reducing any quantity of greenhouse gas emissions. Government has taken activities in developing national institutional and legal framework in order to meet the requirements of climate change strategies. In the discussions held at the expert level, the lack of coordinated strategies between institutions where the main policies and investments that affect mitigation and adaptation towards climate change are prioritized was highlighted. On the other hand, companies in Albania have to apply the requests of the Law No 25/2018 "On accounting", article 18, on non-financial reporting highlighting the environmental sustainability practices that the companies have embraced. Guidelines for non-financial reporting has been developed from Accounting National Committee (KKK) providing the methodology on how the companies with the average number of more than 500employee, report the environmental, social and governance aspects of the company. Considering environment, company has to inform on actual and possible impact of activities in the environment, and how environmental issues would impact on unit development, performance and position in the market.

3.2 Kosovo and Green Accounting

Kosovo still does not have any policy intervention to systematically promote environmentally friendly practices. Kosovo, as a pre-membership country in the European Union, must meet the criteria in all areas to continue, that is, to become a member of the European Union. In this direction, it has a responsibility and must make efforts to take such initiatives so that its environmental policies are in harmony with international ones, which obviously attach great importance to the protection of the environment.

The creation of environmental institutions and policies led to the application of environmental laws and standards in order to achieve a balance between economic development and the use of natural resources. However, the shortcomings are in the lack of implementation of the law and not the literal understanding by the actors involved such as institutions, businesses, NGOs, individuals (farmers in our case). The correct understanding of environmental policies and their objectives will facilitate the implementation of the law, will raise the quality of the environment and thus also of local products, will help preserve but also increase biodiversity and will indirectly influence the increase of economic development.

Kosovo has signed the Sofia Declaration on the Green Agenda for the Western Balkans (GAWB) in November 2020, thus facing the strategy of the European Green Deal towards a modern economy through the development and implementation of clear measures designed to reduced greenhouse gas emissions, integrating climate action in all relevant sectoral policies (Ministry of Agriculture F. a., Strategy for Agriculture and Rural Development 2022-2028, 2021). The Ministry of Agriculture, Forestry and Rural Development, as one of the main institutions responsible for taking initiatives in this field, is faced with a lack of sufficient staff to carry out its tasks. The obstacle has also been encountered in the implementation of the Green Agenda, which is necessary for the regulation of the current situation. However, with a sufficient, qualified staff and sufficient financial resources, the problem in question can be addressed through the development of new policies with a focus on environmental protection.

The involvement of research institutes, universities and environmental NGOs for the preparation and implementation of awareness campaigns and trainings focused on environmental protection and mitigation and adaptation to climate change should be one of the primary objectives of all sectors with an impact on the environment.

3.3 Roadmap to Green Accounting framework in Albania and Kosovo

Conceptual framework details the characteristics of useful information and serves as a guide for standard compilers in the preparation of accounting standards, this is stated in international accounting issued by International Accounting Standard Board (IASB). The need of reporting the impact of climate risk on financial statements has increased the focus of regulators around the world on setting the rules on how to disclose the environment/social issues. IFRS Foundation established the International Sustainability Standard Board on 3 November 2021, following strong market demand for its establishment. ISSB

is developing standards on sustainability disclosure that will help companies in addressing the climate change issues. While reviewing the literature, we have seen different models of how the researchers propose to build a green accounting framework. We propose this plan of measures to be undertaken to reach a conceptual framework for the case of Albania and Kosovo:

First, raise awareness among economic entities about the necessity of including the concept of sustainability. This requires the unit to have information about the impact that its activity has on climate change, as well as what are the international and national strategies that bring the best environmental practices to be implemented.

Second, to improve the quality of sustainability disclosure. In Albania it is required to be addressed only from big companies, the others have to do it in a voluntary way. It is important related to performance sustainability to integrate financial, social and environmental accounting in one reporting package.

Last but not least, to determine the elements that will be included in Green Financial Statements. During the preparation of these statements, IAS-IFRS or even National Standards will be applied, but crucial accounts that are not found in the conventional accounting will also be included, such as:

1. natural resource assets, social and environmental investments, green investments will be added to the statement of financial position under the group of long-term assets;
2. in the liabilities section, contingent social and environmental liabilities will be added for companies that are a committee to the government and community rules;
3. social cost and environmental cost, including natural disaster cost, social assistance, waste treatment costs, recycling cost, pollution cost that will be classified as periodic or temporary and will be added to the financial performance statement;.

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CUSTOMER PERCEPTION OF E-BANKING SERVICE: IDENTIFICATION OF THE MAIN FACTORS FOR ITS USERS IN TIRANA

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Abstract

The transition from traditional business to electronic business is no longer seen as an option, but as a necessity. In this diploma topic, a study was carried out related to the identification of the main factors of e-banking for customers who use this banking service. For anyone who has always found going to the bank too tiring and not at all comfortable, e-banking is the solution. The study is mainly related to Albania and the approach that Albanian consumers have regarding this banking service. Primary data were used to achieve the objective. They were collected by structured questionnaire. During the survey process, 297 surveys were collected, of which 199 answered the filter question that they used e-banking, while the rest did not use this service. The procedures followed to achieve the objectives consist of all the steps: questionnaire design, data collection, descriptive analysis, factorial analysis, reliability analysis. The factors that determine the way the consumer perceives the e-banking service are numerous, but the results obtained suggest only five main factors that identify it, which are: Image and availability, Convenience, Extra bank services, Payments and commissions; The design. The results achieved are reliable as they respect the assumptions of the method implementation.

Key words: e-banking, costumers' perception, bank services, factor analysis

Introduction

Nowadays, when time and limits are more sensitive than ever in relation to the development of daily activities, each of us tends to escape this routine by being as practical as possible. Having the good will and sufficient financial culture, perhaps created by impressions formed during familiarization with banking offered mainly abroad, it will be easier to recognize and accept E-banking services. What is useful to us in the analysis of this topic is to understand how familiar Albanian consumers are with this service and how satisfied the users of this service are, by analyzing the influencing factors that E-banking has in general, dealt with later especially in Albania.

The growing development and progress being experienced in Information and Communication Technology has brought many changes in almost all aspects of life. The development of the banking sector has been affected more than any other group of financial providers. The increase in the use of telephone services and the use of the Internet as a new distribution channel for banking and international transactions has brought about the E-banking service, which is now replacing the traditional banking practice.

The purpose of the topic is to evaluate the customers' perception of the e-banking service, identifying the main factors for its users in Tirana. The aim is to identify the main factors of using the e-banking service. This evidence is based on the assessment of the perception of consumers (users) of this type of service offered by second level banks operating in Albania.

Method and procedures

Primary data was collected through a structured questionnaire. The variables are measured in Likert scale, 1=Strongly disagree to 5=Completely agree. Considering reasonable, in this research the bipolar scale (liquor scale) was used, which has five levels, where the lowest scale with the number 1 is known as "Not at all", while the highest degree with the number 5 is known as "Completely".

According to the review with the literature and the information collected about E-banking, the potential factors that can contribute to the clarification of the problem, that is related to E-banking, are: Convenience, Availability, Security, Speed, Payments and commissions, Privacy, Content, Image and bank management, Availability of various E-banking services, Design.

Results

The results show that the groups that have access to E-banking services are mainly students, 31% and 20% engaged in positions such as leaders or managers, 28% simple employees, 8% in government positions or employees in the administration and the rest others, i.e. 13%, have other commitments.

The results show that high and middle income groups seem to be users of E-banking and this does not seem unusual, since in most cases they are trend setters. In our case, 53% (the largest part) are individuals with incomes above 30,000 and below 80,000 ALL. Meanwhile, a relatively high figure was that of individuals (14%) with incomes above 80,000 and below 130,000 and 8% with incomes above 130,000 ALL.

Results for factor analysis. The first component consisting mainly of questions (expressions) that are part of the potential factors Image and management of banks and Availability of various E-banking services, it was decided that the common

name is Image and availability, since, basically, they were aimed at the image and availability of banks around the E-banking service.

The second component was called Convenience, as it is composed only of questions (expressions) originating from the potential factor Convenience. The third component is composed of questions (expressions) of several potential factors, but what ties them all together is the extra bank services that accompany e-banking. The fourth component was decided to be called Payments and commissions, since the factors composing it are all from the potential factor Payments and commissions. The last factor identified is composed of three expressions (questions) related to Design, and therefore this component is named Design.

This means that the main factors of the e-banking service offered by banks operating in Albania are: Image and availability; Convenience; Extra bank services; Payments and commissions; Design.

Table 1. Rotated Component Matrix[a,b]

	Loadings	Explained variance	Cronbach's Alpha
Imzh4	.807	25.146	0.957
Imzh6	.796		
Imzh3	.792		
Disp_e3	.764		
Disp_e5	.726		
Disp_e1	.718		
Disp_e2	.716		
Disp_e4	.706		
Imzh2	.681		
Imzh5	.663		
Kom6	.842	16.710	0.932
Kom5	.838		
Kom4	.792		
Kom3	.776		
Kom2	.742		
Kom7	.619		
Sig4	.689	12.549	0.847
Shpj2	.670		
Priv2	.638		
Prm4	.638		
Pag4	.605		
Pag5	.590		
Priv3	.543		
Pag1	.882	9.558	0.899
Pag3	.878		
Pag2	.874		
Dizj1	.817	8.585	0.895
Dizj3	.732		
Dizj2	.719		

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.
b. Only cases for which e-banking = 1 are used in the analysis phase.

Conclusion

This study has examined the factors influencing Albanian consumers' perception of e-banking. Key findings include: (a) E-banking is primarily adopted by students and managerial professionals, with a strong presence among high and middle-income groups. (b) Five major factors shape consumer perception: Image and Availability, Convenience, Extra Bank Services, Payments and Commissions, and Design.

These findings emphasize the multifaceted nature of e-banking perception and its relationship with convenience, design, and the overall image of banking institutions offering e-banking services. As technology continues to reshape the financial landscape, understanding these factors is crucial for financial institutions and policymakers.

E-banking has transitioned from an option to a necessity in the modern financial ecosystem. This study contributes valuable insights for both academia and industry, offering a foundation for future research in the digital banking sector. It provides a deeper understanding of consumer behavior and preferences in the context of digital financial services, offering guidance for optimizing e-banking offerings to meet customer needs and expectations in today's digital age.

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BUSINESS' PERCEPTION ON POLITICAL CONNECTIONS AND FIRM AGE

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Abstract

This study delves into this complex relationship within the context of Albania, a nation undergoing profound economic and political transitions. The focal point of our investigation is the variable of "political connections," meticulously constructed from a collection of pertinent items, with the composite variable derived from their average scores. Our analysis draws from a dataset comprising responses from 373 businesses operating in Albania. The Kruskal-Wallis H test is performed. This analysis reveals a compelling association between firm age and entrepreneurial perceptions of political connections. Notably, entrepreneurs' perceptions exhibit variances across distinct future business climate categories. The Jonckheere-Terpstra test underscored a nuanced aspect: as firms age, entrepreneurs tend to perceive a decline in political connections. In summary, this research contributes vital insights into the evolving perceptions of political connections among Albanian entrepreneurs, particularly as their firms mature. These findings bear significance for policymakers and business leaders, providing nuanced insights into the interplay between firm age and political connections.

Key words: political connection, firm age, non-parametric methods

Introduction

While numerous studies underscore the impact of the institutional environment on business activities, there remains a notable gap in understanding the intricate interplay between legal frameworks, tax administration, government policies, and their influence on the perceptions of entrepreneurs in the realm of business-political connections. To the best of our knowledge, there is a dearth of research exploring these relationships. This current study aims to delve into these associations within the framework of post-communist transition economies, specifically focusing on Albania. The insights derived from this research hold significant relevance for policymakers striving to enhance the regulatory landscape pertaining to legal frameworks, tax administration, and government policies in fostering constructive business-political connections.

Given the absence of secondary data that comprehensively covers the Albanian case regarding entrepreneurship indicators, evaluating its performance and benchmarking it against other countries remains a challenge [1]. This paper endeavors to bridge this knowledge gap by shedding light on the intricate relationship between formal institutions and the anticipated business-political climate within the context of a developing post-communist nation like Albania.

Literature review

Political connections is another informal institution that may affect business activity. Firms that have connections with politicians (local or national level) might perform better [2] and also they reflect lower risk as compared to those which do not have any political links [3]. Amore and Bennedsen [4] studied local political connections in a low-corruption environment such as Denmark, and their results indicate that doing business with the public sector is an important channel for transferring rent to connected firms by increasing their profitability. However, there are some scholars who found the opposite: firm performance is lowered by political connections [5].

In countries that institutions are not strong and in particular in post-socialist countries, firms tend to involve in local political activities [6], [7]. This involvement may lead to future benefits that politicians may offer to them. One of its forms is letting these firms operate without meeting all legal requirements leading to informal competition. According to Dethier et al. [8], informal sector competitor practices is perceived by entrepreneurs as a major constrain even in countries from Europe and Central Asia. This is in line with what scholars found for Albanian business environment: unfair competition is presented by entrepreneurs as a constrain [9]. Political connections are more present among older entrepreneurs due to their wider experience, social and possible connections with politicians [10]. On the other hand, political connections are affected by the prevailing country-level institutional and political environment, firm characteristics [11], and also by economic environment [5].

Reseearch strategy

Our interest variable is composed from a set of items. The average of these items was used to compose our variable. Thus, three items were used to compose political connections, which are: "Firms are involved in local political activities", "Relations between senior government figures and some elements of the private sector involve bribes or other contributions", and "Political patronage impacts on the operations of firms in the private sector."

Before composing it, the reliability of the scales was checked. Reliability means that a measure should reflect the construct that it is measuring. Cronbach's alpha resulted 0.675, which is minimally acceptable [12].

The Kruskal-Wallis H test is used to investigate differences on political connections across the levels of firm age. To test for trends, Jonckheere-Terpstra test is conducted.

Overall, 373 businesses in Albania were part of a survey. The analyses were computed by means of statistical package SPSS version 23.

Results

Table 1 serves as a comprehensive repository of results derived from both the Kruskal-Wallis and Jonckheere-Terpstra tests, meticulously examining the intricate interplay between firm age and the perceptions of political connections. Firm age is categorized as an ordinal variable with six categories: "Less than 1 year," "Less than 2 years," "Less than 3 years," "Less than 4 years," "Less than 5 years," and "More than 5 years."

Table 1. Results of the tests.

Kruskal-Wallis			Jonckheere-Terpstra			
H	df	Sig.	*J*	*z*	Sig.	*r*
12.370	5	.049	15116	-2.850	.004	.148

The results gleaned from the Kruskal-Wallis test unveil a compelling revelation – there exists a statistically significant association between firm age and perceptions of political connections (H(5, n = 373) = 12.37, p < 0.049). In essence, this implies that entrepreneurs' outlooks regarding political connections undergo notable variations across different categories denoting future business climates.

Intriguingly, this finding underscores the importance of considering the temporal dimension when assessing entrepreneurs' views of political connections. As firms mature, their perceptions may experience shifts that are vital to comprehend within the broader context of economic and political transitions. The Jonckheere-Terpstra test found a statistical significance ascending trend in the data. Thus, the score in the legal environment (J = 15116, z = –2.850, p < 0.004, r = –0.148) a descending trend across the categories of firm age.

Conclusion

The analysis unveiled an association between firm age and perceptions of political connections. This finding accentuates the divergence in business perceptions of political connections across different future business climate categories. Subsequently, It was revealed that, as firm age increases, entrepreneurs' perceptions of political connections tend to decline.

This research contributes valuable insights into the relationship between firm age and political connections, particularly within the context of Albania. These findings hold significance for policymakers and businesses alike, as they shed light on the evolving perceptions of political connections among entrepreneurs as their firms age. This nuanced understanding of the interplay between firm age and political connections can inform strategic decisions and policy measures aimed at fostering a conducive business environment in the ever-changing landscape of Albanian business.

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A LITERATURE REVIEW ON FACTORS DETERMINING FARMERS' WILLINGNESS TO UNDERTAKE SOIL ANALYSIS

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Abstract

Increasing agricultural productivity requires technical and professional tools to help farmers achieve their goals. Soil fertility and health are determinants for increasing agricultural productivity. Soil degradation is prominent in developing countries and maintaining good soil fertility is important to boost agricultural production in this countries. Soil analysis was first introduced to ascertain the conditions of the soils and to improve its nutrient components, and would have an effect on farmers' profits as a result of soil fertility improvement or cost reduction from precision in fertilizer application. This paper tries to bring a literature review with aim to understand the importance of soil analysis and the factors that influence farmers' willingness to undertake them. The educational level of farmers, contact with agricultural extension services or any other institution, access to credit, type of household are some factors that influence farmers' decision to better assess the importance of soils analyses in their farm activity. Increasing the level of farmers' knowledge about the impact of soil analysis will affect the improvement of their decision-making. Soil analysis and technology adaptation are the product of the interaction of external group factors (government subsidies, training and participation in groups, land transfer) and individual farmer factors such as age, education, family and business characteristics.

Keywords: farm, farmers, factors, soil, soil analysis

1. Introduction

The activity and management of farms is closely related to farm production, which is influenced by a healthy soil. Soil has a certain structure which cannot be changed, but its quality can be improved through management. Good soil management means recognizing and managing the nutrient level and soil pH and this is accomplished through soil analysis. Soil quality assessment should be a regular process and part of the management practice by farmers, because fertility and soil health are determinants of increased agricultural productivity. The purpose of this paper is to identify the factors that determine farmers' willingness to undertake soil analysis.

2. The importance of soil analysis

Soil analysis refers to an agricultural technology based on soil testing and field fertilizer trials to determine the amount, period of use and working method of elements such as nitrogen, phosphorus, potassium, micronutrients and organic matter based on the demand pattern of plants for elements, the ability of the soil to supply fertilizer and the effect of fertilizer application [2, 9]. Conducting soil analysis is a cost-effective tool to identify soils where nutrients such as nitrogen, phosphorus and potassium (NPP) are deficient, and need to be corrected to achieve optimal crop yields [15].

[8], stated that soil analysis is the only necessary and available tool for determining the amount of soil nutrients. In order to improve soil quality and further increase the efficiency of fertilizer use, as well as to improve the ecological environment, soil analysis is gradually being promoted and accepted [13, 14].

3. Factors that determine farmers' willingness to undertake soil analysis

Many researchers have undertaken research on soil testing, fertilizer application and agricultural technology adoption behaviour about the factors that influenced farmers' decision-making mechanisms. Farm characteristics, farm size and location [4], as well as soil characteristics influenced by management, crop intensity and soil conservation, will influence the adoption of new techniques [10]. [5], concluded that farmers who rely on government funding, once this support is discontinued, do not continue to undertake good management practices.

[3], showed that farmers who perform soil analysis and have followed the advice of the soil testing service provider display a higher rating for these services. Also the type of farm activity, is also a determinant of farmers' predisposition to soil testing services. Farmer income and the structure of this income has an impact on farmer willingness to pay for agricultural services [12, 1, 7]. [6], does not find a link between income and farmers' willingness to receive agricultural services but they state that farmers do not fully declare them, and they suggest that farm size positively affects farmers' willingness to pay more for soil testing services.

[13], has presented four types of factors that influence the undertaking of soil analysis, which are: 1) land transfer, awareness of soil analysis and use of technologies, government subsidies; 2) perceived ease of use of new analyses and technologies and their perceived usefulness; 3) technical training, access to information, and the ratio of agricultural income to total household income; 4) the level of education and the scale of agriculture.

4. Conclusions

Agricultural production is closely related to soil quality. Good soil management means knowing and managing soil nutrients. This is achieved through soil analysis, which represents a tool for farmers to reach maximum production and profit. The purpose of the paper was to present the importance of soil analysis and the factors that influence farmers' willingness to undertake them. Soil testing was first introduced to determine soil conditions and to see how to improve its composition and fertility. It is important to emphasize that the decision to recognize soil quality is not only a decision that affects farm management, but is also an environmental issue on the priorities of sustainable agriculture. Studies have shown that farmers who perform soil analysis and have followed the advice of the soil testing service provider display a higher rating for these services. The type of farm activity, is also a determinant of farmers' predisposition to soil testing services. Farmer income and the structure of this income has an impact on farmer willingness to pay for agricultural services.

5. Literature

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CHALLENGES AND FINANCIAL ANALYSIS OF "SIGAL UGA" AS A LEADING COMPANY IN THE ALBANIAN MARKET INSURANCE.

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Abstract

The development of insurance market is closely related to the economic development of the country. Lack of awareness about the importance of the insurance scheme, small and decrease population, low level of urbanization, underdeveloped digital and legal infrastructure as well as low level of education are some of the biggest challenges that affect the progress of the insurance market in Albania. For the development of the insurance market, technical assistance, the independence of the supervisory, the adjustment of best international practices adapted according to national reality, the cooperation of insurance companies with other financial institutions and the promotion of competitiveness are necessary. The development of the insurance market also requires external and political support. Despite the fact that the insurance sector in Albania is less developed compared to other countries in the region, it has grown over the last few years. Sigal Uniqa Group Austria is one of the international insurance groups that dominates the Albanian market and is a leader in the life and non-life market. Based on the situation of this company in the insurance market, this paper aims to carry out the financial analysis of Sigal UGA based on the financial statements published by this company and the Financial Supervision Authority. The overall evaluation of the financial statements, ascertaining the possible problems of this company, is one of the main objectives of this paper. Based on different analytical indicators, this studie aims to calculate and analyze different reports related to profitability, solvency, capacity, etc. At the end of the analysis, it is intended to give conclusions and recommendations aimed at improving the analytical indicators of Sigal UGA.

Keywords: analytical indicators, solvency, financial performance, premiums

1. Introduction

The objective of economic entities is profit maximization (Basu, et al., 2022). In order to obtain information on the performance of an economic entity, it is necessary to analyze its financial statements (Munteanu, et al., 2016). This paper will focus on the analysis of the financial statements of the company Sigal UGA in order to understand more about the reports and financial performance of this company. According to (Olayinka, 2022), the analysis of financial statements serves as a tool for evaluating the performance of companies and helps investors in making decisions. There are different indicators that can be used to help investors assess the financial stability of an organization (Van Beurden & Gössling, 2008), among which we can mention solvency, liquidity, financial performance, etc.

The main objectives of the paper are:

    a. Processing of financial information for the purpose of carrying out the financial analysis of the company Sigal U.G.A.

    b. To sum up the economic and financial performance of Sigal U.G.A

In order to achieve the objectives of this work, the financial statements of the Sigal U.G.A company for the years 2021, 2022 and the financial statements of the first quarter of 2023 will be taken into consideration.

2. Methode and procedures

For analyzing the financial statements of Sigal company, methods, reports and different indicators were evaluated. This indicators are constantly used in the analysis of different financial statements. By comparing the rezults of those indicators, we will be able to understand the dynamics of changes of the balance sheet from year to year. Comparing the results of the balance sheet will show whether the change in the performance of Sigal U.G.A. is positive or negative. The information obtained from the financial statements will be used to analyze the financial performance of the Sigal U.G.A. company.

3. Solvency

The solvency of the Sigal UGA company is calculated as the difference between the basic capital and the additional capital with the elements deducted in the calculation of the capital (trade accounts receivable, other loans, prepayments and calculated income, inventory, intangible assets, buildings without ownership certificates, guarantees of the green card, investments in participation). The capital of Sigal in 31.12.2022 was 1,644,902,481 ALL. The required level of solvency was 1,103,118,167 ALL. As result of the improvement of the financial result of the Sigal company for the year 2022, the solvency of the Sigal company exceeds the required level of solvency with a value of 541,784,314.

For the first quarter of 2023, the solvency of the Sigal company, as a result of the positive financial result, continued to exceed the required level of solvency. While the capital of the Sigal company was worth 1,804,103,092 ALL, the required level of solvency was 1,129,813,827 ALL. Therefore, we can say that the solvency of the Sigal company is at satisfactory levels.

3.1 Assets Covering Technical Provision

The high level of liquid assets that the Sigal company has on its balance sheet has influenced the increase of Assets Covering Technical Provisions by 6.63% from 2021 to 2022. This indicator was improved by 2% during the first quarter of 2023. It is worth noting that for several years the company Sigal has had a quantity of assets covering technical provisions above the required legal level. The liquidity of the Sigal company is also at satisfactory levels.

3.2 Balance Sheet

In 2022, compared to the previous year, the assets of Sigal company have increased by 4.4%. On 31.12.2022, the assets with the largest weight were bank deposits which include about 50% of total assets, claims provisions includes 6% of total assets and trade receivables includes 4% of total assets.

The passive of the Sigal company include owner's equity, technical provisions and other liabilities. On 31.12.2022, the owner's equity of Sigal company included 42% of total passive, technical provisions included 52% of total passive, while other liabilities included about 7% of the company's passive.

3.3 Financial performance

From the financial statement of the Sigal company, we note that the net financial result in 31.12.2022 is 466.8 million ALL, 25% higher than in 2021.

Net earned premiums in 2022 increased by 4.2 billion ALL, +12% compared to the previous year.

Net expenses for the incurred damages have decreased by 4.8% in 2022 compared to the previous year.

Gross written premiums increased by 13.71% from 2021 to 2022, while gross premiums paid decreased by 8%. The ratio of gross claims paid/gross written premiums was 35% from 41% on 31.12.2021. This ratio has decreased as a result of the increase in gross written premiums as well as the decrease in claims paid. The performance of this indicator was influenced by voluntary products.

Net operating expenses of the activity calculated as the sum of insurance expenses, the change in deferred insurance expenses (+/-), administrative expenses and other operating expenses have increased by 272,320,013 ALL from 2021 to 2022. Also, the company had an improvement in the technical result by 85.19%. On the other hand, net investments showed a slight decrease by 0.46%. This situation has come as a result of the decrease in income from investments in 2022.

The increase in gross written premiums and the decrease in gross paid damages has impact the company's profit in 2022 which was 25% higher than previous year profit. The financial result continued to be positive and had an increase even in the first quarter of 2023 compared to the same period of the previous year.

Conclusions

The solvency of the company in 31.12.2022 has exceeded the required level of solvency by 541,784,315 ALL compared to the end of 2021. In 31.03.2023 the solvency of the company has continued to increase compared to the required level of solvency by 674 million ALL.

The increase of assets of Sigal company has been higher than the increase of technical provisions. Due to this fact, in 2022, assets covering technical provision had increased compared to 2021. The indicator of the assets covering the technical provisions has also improved in the first quarter of 2023. It is worth noting that the Sigal company must take measures to increase of compensation payments that this indicator has decreased. Even though the operating expenses of the company have reduced, this indicator should continue to decrease.

From the company's balance sheet, we notice that there is no investment in bonds. This means that the Sigal company does not have a high exposure to the risk of interest rates. On the other hand, the company is exposed to the risk of interest rates since the majority of its deposits are in euro.

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FACTORS INFLUENCING ACCESS TO AGRICULTURAL MARKET INFORMATION

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Abstract

Access to agricultural market information is essential to improve farmers' positioning and reduce their risk of market speculation. In Albania since 1998, several AMIS have been implemented which have subsequently failed to function when support for donor assistance projects has been exhausted. Despite repeated failures, there is no comprehensive, survey-based study to assess demand and preferences for agricultural information (price, information on production methods, weather forecast, disease risk, etc.). The purpose of this paper is to provide a review of the literature on the methods used to assess the willingness to pay for weather information system and price information system as a reflection of farmer's willingness to participate in or adopt voluntary data sharing systems. The literature illustrates the main perspectives used to study the functionability of AMIS namely from the users' perspective, management perspective, funding perspective, infrastructure perspective and data perspectives. The results of the literature serve as a solid base for the research activity and a source for policymakers, researchers and other stakeholders interested to design information systems which enable farmers to cope with climate change hazards and market fluctuations.

Keywords: Willingness to pay, agriculture information, weather forecast information, Albania

1. Introduction

Agricultural Market Information Systems were established in most developing countries and some emerging economies after the 1980s, and even later (Noleppa and Zhllima, 2021). The latest development has been the arise of nontraditional (not related only to price information) of the second generation AMIS (expansion of 'm-service and opportunities to use crowdsourcing enabled not only the provision of pricing information, but also other trade and production information), limiting the risk of farmers and other market operators (Amer et al., 2018; Baumüller, 2017). Despite the increasing use of information and communication technology (ICT), there is a great deal of concern in developing countries about farmers' access and their role in keeping AMIS in place (Islam and Gronlund, 2010). There are very few studies on failures to achieve financial sustainability at AMIS (Vaidya et al, 2013; Mohan et al, 2019). Especially in those countries where AMIS is established and supported by donors, after the transfer to public institutions, the state has failed to effectively maintain AMIS and provide reliable information, and as a result the lack of a user-based system has led to the closure or malfunction of AMIS (Noleppa and Zhllima, 2021). Few studies have explored the main reasons related to institutional failures or cognitive factors of farmers and market actors prohibiting the use of AMIS (Munz et al, 2020) and on users' preferences for AMIS (Kenkel and Norris, 1997; Parker et al. 1996; Cohen and Zilberman, 1997). There are two dimensions of failure namely. Interest and demand by farmers (users) and ii. Political support and administrative setting. Such systems, frequently fall into the vicious trap because low access and poor reliability to AMIS, reduces farmers' affordability, leading to further system collapse. Given these problems, there is a need to assess farmers' ability to directly fund or support information systems, as in the case of crowdsourcing (Amer et al., 2018; FAO, 2017). This research aims to fill the gap by providing a review of the literature on the main perspectives for creating a demand for AMIS. Considering these perspectives AMIS should comply with users' perspective, management perspective, funding perspective, infrastructure perspective and data perspectives. The results are structured in order to contribute to further research activity carried in this field of research in Albania and as a thematic source for policymakers interested to design information systems which enable farmers to cope with climate change hazards and market fluctuations.

2. Literature review

There are several studies that assess the challenges that farmers have to access and use agricultural market information which may include poor infrastructural links, high costs to access information, low level of trust in information sources and information quality, low informational knowledge and insufficient support from government agencies and agricultural advisory (Amer et al., 2018). In addition, there is very limited research to explore the main reasons related to the institutional failures of AMIS or the cognitive factors of farmers and market actors that prevent the use of AMIS (FAO, 2015) and on the preferences of users towards AMIS. Very few studies explore their willingness to pay for information service (Kenkel and Norris, 1997; Parker et al, 1996; Cohen and Zilberman, 1997, Zhllima et al, 2023).

There are several categorization of factors influencing agriculture information systems demand. Some literature review categorizes factors influencing demand in five dimension

1. Users' Perspective

The literature reports a lack of assessment and clarity in AMIS requirement specifications, in particular to identifying the primary stakeholders and their needs within a certain socio-economic, technological and behavioral contexts (Shreshtha 2003, Islam and Grönlund 2007, Weber 2005). Insufficient awareness of the value of the services (CTA 2007, FAO 2008) and reluctance towards a user-oriented approach (Shreshtha 2003) apparently contribute to low or even no sense of ownership

(Traoré 2004) for the AMIS. Farmers seem to be more interested in time specific and reliable maximum farm-gate, off-lorry and retail prices of the nearest and the main neighboring markets (Foodnet 2006). Here, timely dissemination is defined by the availability of information just before or during the time of business transactions (Mabota and Arlindo 2003). There is also a complementary relation between access to information and access to extension services. Those who are benefitted with price information services would be interested in other information as well such as weather forecasts, advices for crop production, and uses of appropriate seeds and fertilizers (Mabota and Arlindo 2003). It has been observed that payment for the services by the poor rural people is a critical issue for the sustainability of AMIS (Agredia 2007). From a user's perspective, delivery methods need to be low cost (Manda 2009) as the farmers are often reluctant to pay for the services since they do not see far ahead regarding the value of their investment.

2. Management Perspective

The management of AMIS by the government tends to turn it into a centralized and structured system. The implementation of AMIS with the intervention of the government goes through a slow and not very motivating process, bringing misunderstood of the end users. AMIS need to be decentralized in the areas where there are regional price differences (Awasthi 2007). Lack of information and communication management polices at the national or project level (CTA 2007) and absence of a steering committee in order to manage the processes and monitor the service quality (FAO 2008) are critical failure factors. These deficiencies bring many undesirable consequences, such as inefficient coordination and non-participation among the various agencies (Shreshtha 2003), weak content management at the local level (FAO 2008, Wichern and Hausner 1999), and reluctance to carry out periodic impact evaluations (Tollens 2006, Awasthi 2007). In the administration there is a lack of practice, this brings problems in the stability of the data . So most of the services you have do not pay attention to reliability, which is essential to user.

3. Funding Perspective

Most AMIS are created by donors. In correspondence of reason allocation of funds is done by assessment of relevance for mission or policy, economic and social impacts, urgency, scope of operations, modalities, time lengths and degree of short and long-run prospects of the projects. (Islam and Gronlund 2010).Having a realistic financial and business model and efficient financial management are the most important aspects of a project's financial sustainability. (Islam and Gronlund 2010) Therefore, there is a need for a realistic economic model for network extension and continuity of a quality service that would ultimately help to strengthen the socio-economic activities of the rural community (CIAT 2005).

4. Infrastructure Perspective

AMIS infrastructure is defined as the tools required for ensuring uninterrupted connectivity between the content providers and recipients. Most of the AMIS are web based services, which means that internet connectivity will be present and with high bandwidth in rural zones. In such cases in large audience, in large amount of data this type of AMIS must fail. AMIS platform should be multiple channel technologies, which means market information should be shared among rural zones in different channels, via internet, radio, print, email and SMS. Due to telecommunication growth a Multi-Channel Service Platform (MCSP; web, WAP, SMS, voice) AMIS should be efficient and usable.

5. Data Perspectives

Data collectors and data providers are important in terms of data perspectives. Data collectors may be local, regional or official, data providers are farmers, traders, retailers. Accuracy of data collection and reliable reporting are critical factors for the success of AMIS (Shreshtha 2003). Dissemination of information should be on time. This process depend on acquisition, transmission process, and used technology. Later information may be unnecessary for farmers and other actors. We are focused on data collection most for CIS In Albania, based on the literature, data collection should be focused on climate services. In Albania, there is no climatic system or services that collect, translate, transfer and use climatic information. Data should be collected in real time for seasonal, daily and historical weather. The farmer is expected to combine the data related to the weather with other agricultural options for the most effective farming.

Based on the review of the literature and conditions in Albania, Albanian farmers are constantly interested in information related to weather conditions. Providing climate service information is one of the main ways in which farmers are supported in their decision-making in agriculture.

4. Conclusions

This research aims to fill the gap by providing evidence in the case of transition countries that have experienced repeated failures of AMIS, such as Albania, a country where donors led all efforts to support AMIS (FAO in 1994), GIZ in 2002, USAID / AAC in 2008 and most recently the GIZ SRD project in 2020 and the JICA FiAS project in 2019. In addition, an agricultural price data collection system is carried out by the Ministry of Agriculture and Rural Development, which is currently inaccessible to farmers (Zhllima, et al, 2022). Thus, de facto, there is no AMIS accessible, functional and comprehensive for farmers currently in Albania (Noleppa and Zhllima, 2020). The challenges before the development of Albanian agriculture and even EU integration and meeting the objectives are the creation of viable and sustainable frameworks to understand the need and acceptance of users to support these systems but also wider systems such as Systems of Agricultural Knowledge and Information (EC, 2020; Noleppa and Zhllima, 2021). Most farmers are expected to show a clear need for market information (mainly prices). Access to information will vary according to the farmer's characteristics, his access to social networks and the characteristics of the value chain and production area. Access to accurate information is not expected in the areas outside the Administrative Units, and this is even more pronounced outside the municipalities.

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CUSTOMERS' TRUST ON BUYING FOOD PRODUCTS IN SUPERMARKETS – THE CASE OF ALBANIAN CONSUMERS

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Abstract

In Albania, supermarkets have become part of the distribution chain of food products quite late compared to other countries in the region. The first network of supermarkets dates back to 2007 (Euromax) and since then other networks have been opened. From that time until today, purchases of food products in supermarkets have continuously expanded, but the share they occupy in relation to other food retail units is not at the levels that the most developed countries have today. This study investigates consumer' trust in buying food products in supermarket chains in the country. Through the evaluation of a series of social attributes, transparency and quality ones, it results that consumers in Tirana choose to buy food products in supermarket chains mostly for reasons of trust in the quality of the products these retail units sell and further for the transparency that these food retails units demonstrate to consumers.

Key words: *trust in supermarkets, food retail market,*

THE NEW PARADIGM TO TACKLE EDUCATION IN AGRICULTURAL SCIENCES

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ABSTRACT

Taking into account the potential of agriculture and related disciplines for the economy of Albania and the perspective of joining the EU in the near future, a new knowledge paradigm is needed to tackle the new skills' challenges in the labor market over the next decades. Albanian agriculture has to face *new learning challenges* introduced by the digital revolution and the introduction and development of artificial intelligence. The possession of soft skills, combined with hard skills, represents the fundamental "*hybrid*" set of competencies needed in the labor market to allow Albanian agriculture sector to align to EU standards. The role of vocational education and training (VET) is examined in the light of a recently accomplished project on the development of agricultural skills in agriculture in Albania, taking into account existing weaknesses and gaps.

Keywords: *Agriculture*, *VET*, *Paradigm*, *Value-Chains*, *Soft Skills*.

Introduction.

In the EU year of skills, Albania is tackling the prospect of skills' development and professional training for young generations in a traditional sector such as agriculture, while being at the crossroads of an economic and social transition, pending accession to EU full member status (Ciapetti, 2023). The profile of skills in Agriculture in Albania has seen a dramatic decrease of skilled work over the last decade. According to our analysis of INSTAT's labor force surveys, skilled agricultural workers still represent the largest share of the workforce in Albania. However, the share of this labour component in the overall Albanian workforce fell from 43% in 2012 to 23% in 2019. Agriculture qualifications are a mirror of the dramatic socio-economic shift occurring in Albania in the framework of a major rural to urban reconfiguration. The question is whether Albania development can forgo to tackle the issue of qualifications and skills in a sector still weighing 20% of its GDP and employing more than third of its workforce.

The international perspective opens up further considerations of how the scenario of labor and skills policies for the next decade must also contemplate an international strategy for the training of technical skills that allow a transnational *value chain perspective* of productions in neighbouring geographical areas (such as the Western Balkans). This is a geo-economy of skills encompassed by the geopolitical vision of education expressed by the European Commission in the Strategy for a "European Education Area" by 2025[18].

It is recognized that an action aimed at developing skills cannot exist without investing in the skills of those called to teach and train. Development economics has no doubts that teachers are the cornerstone of the skills' enhancement process. At least this is the conclusion reached, for example, by Nobel Prize winner Esther Duflo (Duflo, 2010) by examining various education programs in various developing countries, underlining the importance of the pedagogical dimension and teaching calibrated to the level of the students. A confirmation of this perspective is easily found in Albania tackling a dramatic problem of school dropout: a large part of official development assistance is directed to vocational and education training (VET) and to programs focusing on the growth of teachers' skills and on the renewal of teaching materials and methodologies.

Background

A recently accomplished VET project coordinated by Italian Cooperation and Region Emilia-Romagna provides a case study for our paper. The program "vet through innovation" and the technical assistance "PEMA" project were responsible for designing the foundations of the VET multifunctional center at the campus of upper secondary Rakip Kryeziu school in Fier. The project designed an intervention logic to support a complex system of skills of all Albanian agricultural schools, as well as assistance to the "historic" Rakip Kryeziu school in Fier eventually leading to the design and development, in collaboration with AKAFPK, of a new post-secondary Albanian qualification (AQF5 referenced to EQF5) and framework curriculum for "quality manager of agricultural processes".

Results and Discussion

During the project lifespan (2020-2023) Albanian legislation has strengthened the legislative framework regulating VET (National Law 15/2017) and has introduced some steps towards increasing school financial autonomy, like a reform for the management of commercial activities on the school premises (Instructions No. 23 of 2.8.2023), clearly steering VET towards a "dual" collaborative type of training in partnership with the business world. Our main research result points to a major consideration: the complex requirement of skills to face the social, economic and climate challenges of the next decades should be integrated into the curricula of Vocational High Schools, in order to provide opportunities for students/trainees in due course before further education achievements or entry into the labour market. This, of course, starts with giving teachers the tools they need to be able to incorporate these skills into the classroom. The teacher is the key (Moser & McKim, 2020; Weeks, Lawver, Sorensen, & Warnick, 2020). In an OECD report (OECD, 2022), emphasis is placed on the preparation of Teachers and Trainers

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[18] https://eur-lex.europa.eu/EN/legal-content/summary/a-european-education-area-by-2025.html.

in VET, as they are the "backbone" of the education system. Their importance was highlighted during the Covid-19 pandemic, when the commitment and creativity of teachers and instructors ensured the continuity of teaching and learning. Unser a "collaborative training and learning paradigm", a special attention should be paid to the employment of new Teachers/Instructors, where the school will have to have a proactive role, and possibly the employed persons have an organic connection with the School, the locality, the region, the territory.

A major undertaking to be accomplished, judging from our project experience, is the translation of soft skills into Learning Outcomes (Competence), and the challenge of Schools to be competent in providing and assessing them. Specifically, the set of new competencies to tackle complexity include transversal non-disciplinary competence which can be described, based on a recent Italian legislative effort in this direction, as follows:

- be able to handle and solve technical business problems;
- to know the principles and areas of professional activity and the relevant regulations and ethics;
- to possess basic cognitive tools for continuous updating of one's knowledge, also with ICT tools;
- to have appropriate skills and tools to cooperate in the management and communication of information;
- to know how to work in a team, to operate with a defined degree of autonomy and to integrate immediately into the work environment.

Possession of the above-mentioned skills is a precondition to benefit from and be included in various learning and knowledge exchange initiatives, such as the Erasmus+ program, where VET schools can benefit from various mobility for students and teachers. Including soft skills in new *learning units* should give VET teachers and schools the capacity to enter a dialogue with families to better orient the future of youth and with the business sector to build collaborative programs aiming at increasing skills for quality and safety assurance in agricultural production. This training component could easily be encompassed in existing VET framework curricula putting emphasis on soft skills in the practice-oriented part of the curriculum. Besides the fact that most of the teachers of the Vocational Schools, especially in the "Agriculture" Department, possess the appropriate technical-scientific knowledge and skills, their competencies and skills' development is more necessary to be at the right level to learn and teach the skills required by technological revolution (International Academy Tenerife, 2021; Juhasz & Horváth-Csikós, 2021). This obviously requires even more special attention from institutions related to professional education such as the National Agency for Employment and Skills (AKPA) and the National Agency for Education, Vocational Training and Qualifications (AKAFPC) - since only through a coordinated strategy and the undertaking of a national action would make possible a new paradigm in the education of young people, but also in lifelong learning. A step towards a consolidation of *sectoral committees* to coordinate national VET initiatives is probably needed also in agriculture besides action already started in other fields like ICT.

Last but not least, a better and innovative model of School management is required, with the support of school board members from the private sector, which in the "Rakip Kryeziu" School example has been achieved for representatives from the private sector to be part of the board of school. The formalization of cooperation with local and regional enterprises set by the example of the "Rakip Kryeziu" School will have to be followed by the creation of voluntary "clusters" or "VET networks" in other schools. A more specific legislative initiative in terms of VET directives, possibly in the framework of a national *sectoral committee* devoted to agriculture knowledge would undoubtedly help address many of the issues addressed above for assuring a future to agriculture skills'enhancement, with a focus on soft skills, and their inclusion in teaching.

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INSIGHTS INTO STATUS, PROGRESS AND STANDARDIZATION OF EARTH SCIENCE TERMINOLOGY

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Abstract

The primary aim of this research is to provide insights into the complex realm of earth science terminology within the Albanian language. Earth science terminology represents a distinct domain characterized by its unique vocabulary. This study focuses on the terminology that has emerged due to the expansion of scientific research and exploration within the field. To achieve this goal, we will be conducting a manual extraction of terms from terminological dictionaries. We will also be performing an in-depth analysis of these terms categorizing them based on their attributes and usage. An additional aspect of our investigation is the examination of synonymy, a phenomenon where one concept is associated with multiple synonyms. Addressing synonymy is crucial for enhancing communication clarity and underscores the significance of terminology standardization. Standardization is a central theme in our analysis which will be dealt with in an adequate manner. This standardization process is indispensable for facilitating the dissemination of scientific knowledge and effective communication. Furthermore, our research delves into the intricate relationship between synonymy, standardization, and the promotion of the Albanian language within the context of earth sciences. This study highlights the dynamic nature of language and underscores the imperative nature of terminology standardization for effective communication in the ever-evolving field of earth sciences.

Key words: term, terminology, vocabulary, borrowing, standardization, synonymy.

Introduction

Before delving into the study of earth science terminology, it would be appropriate to provide a definition of *earth sciences*. An encyclopaediafrom the 1990s defined"earth science(s) as a field that deals with various aspects of the physical constitution of the earth, such as geology, geophysics, oceanography, meteorology, etc." (Brown,1993)

The study of terminology within a language is carried out through the examination of terminologies specific to particular areas of knowledge, where each area comprises a set of terms that correspond to the concepts within that field of knowledge (Pllana *al*,2021).

An issuewhich has received a fair amount of attention is *standardization of terminology*. Standardized terminology means terms that are "approved" over other terms (Warburton, 2014, p. 42). Whereas Cabre (1992) argues that standardization of terms is a complex process that entails a number of operations: the unification of concepts and concept systems, the definition of terms, and the elimination of synonymy.

Issues of synonymy have long been the centrepiece of a multitude of research papers, with most of researchers arguing that standardization is a muchsought-after process since (a) it reduces the possibility of various interpretations; (b) allows for a smooth and a relatively easy utilization of technical and scientific literature (Caka, Susuri, 2009, pp. 42-45) and (c) avoids the use of synonymy.

Methods and procedures

The manual extraction of terms in the field of earth sciences involved a thorough process of reviewing both dictionaries and meticulously sifting through numerous terms to identify the most relevant ones. These selected terms were subsequently subjected to comprehensive analysis, where they were organized into different categories based on linguistic, semantic, and terminological attributes. To aid in this categorization process, we drew upon the diverse theoretical frameworks and methodologies employed by esteemed terminologists within the field.

Discussion

Based upon the analysis of the pool of terms we were able to group the synonyms as follows below.

(1) Albanian terms that have organically superseded their borrowed English counterparts, while coexisting with their English equivalents.

Alb."depërtim": Eng. "penetrim/*penetration*" Alb. "përshtatje": Eng. "adaptim/*adaptation*"

Alb. "gërryerje":Eng. "abrazion/*abrasion*". Alb. "ndajthithje": Eng. "absorbim/*absorption*".

Alb. "humnerë": Eng. "abis/*abyss*" Alb. "grumbullim": Eng. "akumulim/ *accumulation*"

(2) Foreign terms that have seamlessly integrated into the Albanian language through a process of albanianization.

Alb "daik": Eng. "dike"; Alb "doger-i": Eng. "dogger";

Alb "disten-i": Eng. "disthene"; Alb "intruzion": Eng. "intrusion";

Alb. "Fukoid-i": Eng. "fucoid";   Alb "grykë-ë": Eng. "estuary";

(3) Everyday Albanian words that have been elevated to the status of specialized terms through terminologization. Under this grouping we could distinguish several categories of common words which have been elevated to the status of terms.

3.1. words denoting parts of a building/furniture elevated to the status of terms in earth sciences.

"*çati* shtëpie" – çati gjeologjike (Eng. geological *roof*);   *dritare* e shtëpisë" -dritare karst (Eng. karst *window*);

"*dysheme*s htëpie"- dysheme abrazioni (Eng. abrasion *floor*);   "*shtyllë* shtëpie" – shtyllë ranore (Eng. *pillar*);

"*shtrat*i përroit" – shtrat (Eng. stream *bed*);

3.2. words denoting parts of the body elevated to the status of terms in earth sciences

"*klivazh* njeriu" – klivazh lokale (Eng. local *cleavage*);   "*trup* njeriu" – trup rrasor (Eng. tabular *body*).

"*ballë*/ballore" – ballë delte (Eng. delta *front*);   "*grykë* njeriu" – grykë vullkani (Eng. volcano *mouth*);

3.3. words instruments/ devices used for various purposes and intents elevated to status of terms.

"*kurthpërkafshë*" – kurthimbyllur (Eng. closed *trap*);

"*lug/korritëpërkafshë*" – lug oqeanik (Eng. oceanic *trough*)

(4) Typical Albanian terms that have naturally evolved from the language itself. Instead of borrowing terms from the "donor" language, Albanian utilizes words from its own stock of words to name concepts in the field of earth sciences.

"hedhje": Eng. "fault";   "pykëzim": Eng. "wedging";

"hulli": Eng. "trough";   "bëz": Eng. "dune";

"hapje": Eng. "fault";   "shtërrësim": Eng. "disintegration";

(5) Terms created by appending suffixes like "-ian" , -"ion", "-an" to the borrowed foreign words.

konkrec<u>ion</u>;   kimerixh<u>ian</u>;

akuitan<u>ian</u>;   cenomen<u>ian</u>;

mesin<u>ian</u>;

Synonymy and standardization

It should be pointed out that synonymy has long been frowned upon by terminologists in the field. The number of synonyms in English is significantly more extensive and prevalent than its Albanian counterparts. Wüster has argued that in the realm of terminology there is a considerable amount of synonymy that cannot be eradicated (Trojar, 2017).

Eng. steepness; tilting, inclination; *alb. *pjerrësi*   Eng. colour; tint; *alb. *nuancë*

Eng. floor; base; sole; pavement; *alb. *bazament*   Eng. sludge; slime; mud; *alb. *murgë*

Eng. vein; seam; *alb. *dell*   Eng. marine whirl; marine vortex; *alb. *shtjellë detare*

Eng. summit; peak; *alb. *kulm*

The abundance of synonyms within the domain of earth sciences in the English language can be rationalized by considering the historical role of English as the language of exploration, extraction and invention. Palmer (1997) argues that English exhibits a substantial number of synonyms due to its historical incorporation of words from various other languages

In the Albanian language, we can identify two major categories of synonyms. Within the first category, the group of synonymous terms can be linked back to the indigenous Albanian vocabulary.

- Alb. gjarpërimlumi; bërrylak;

- Alb. çarje, thyerje;

Within the second category, it is straightforward to recognize sets of synonyms where one of the terms originates from the native Albanian vocabulary, while the other is borrowed from the English language.

- Alb. shpërhapje, *dispersion*, *difusion* (Eng. *dispersal, diffusion*);

- Alb. mospajtim, *diskordancë* (Eng. *discordance*);

- Alb. gërryerje, *abrasion, erozion* (Eng. "*abrasion, erosion*).

The analysis of the two categories of synonyms in the Albanian language brings to the forefront issues that have long been central concerns for both linguists and experts: standardization and the promotion of the Albanian language. These two processes are closely intertwined because the efforts of terminologists and specialists helped avoid borrowed terms. As a result, the standardization of terminology emerges asa task that should be shouldered by specialists and should have practical applications in various contexts, including spoken language, university texts, media, and more.A great many termsthat have gone through *albanianization*have become productive morphemes, giving rise to numerous new terms, such as: *njëanshëm-njëanshmëri*; *binjak-binjakëzim*; *form-formim-formacion* etc.

Conclusions

In summary, the study of earth science terminology revealed insights into language evolution and standardization in the field. Earth sciences encompasses diverse disciplines related to the Earth's structure, waters, and atmosphere, with evolving definitions.Analysis revealed term categories, including native, borrowed, everyday words turned specialized, and those with specific suffixes. Synonymy, a challenge, is more significant in English due to its history of global scientific communication.Standardization addressed ambiguity and synonyms, crucial for clear communication in science and beyond.

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ASSESSING THE EFFICIENCY OF GOVERNMENT EXPENDITURE IN ALBANIA

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Abstract

Assessing public spending efficiency is a crucial aspect of responsible governance and economic management. It involves the systematic assessment of how taxpayer funds are allocated, utilized, and ultimately contribute to achieving desired outcomes. This process serves several vital purposes in maintaining a healthy and productive society. Assessing public spending efficiency also plays a pivotal role in achieving long-term fiscal sustainability. It is not only a responsible and ethical practice, but it is also essential for the effective functioning of a government and the overall prosperity of a nation. In the last years, public debate in Albania is focused on the efficiency of various concessions and public-private partnerships in the health sector, waste management, urban renaissance, etc.. There are numerous studies aiming to assess public spending efficiency using a variety of methodologies, depending on the research questions and the variables chosen to measure the efficiency. In our research we used partial least squares structural equal modeling (PLS-SEM) with six variables that potentially predicted government spending. Compare to previous study, we have recalculated the standardized partial linear regression coefficients (β weights) representing the slopes between government spending and each of the six factors. After running the PLS-SEM on SmartPLS v. 3 software we were able to identify which variable better predicts government spending. This implies that government spending is more efficient in influencing and predicting some components of economic development.

Keywords: *public expenditures*, *efficiency*, *sustainable development*, *public sector performance*

Introduction

Effective management of the public financial system is crucial for fostering economic development, as it enables the government to oversee and regulate public economic endeavours. This, in turn, leads to a situation where the private sector, particularly in developing and transitioning economies, depends on public initiatives and ventures that draw funding from the public budget [4]. Assuming a pivotal role in policy-making determinations, governments shoulder a substantial duty in steering nations towards economic advancement and augmenting societal well-being [3]. Given that a substantial portion of the GDP is earmarked for public expenditure, enhancing the efficiency of such outlays assumes paramount importance in safeguarding the sustainability of public finances [6]. Discerning the extent to which governments can elevate their performance while maintaining current spending levels, solely by augmenting spending efficiency, stands to assist fiscal policymakers in attaining enduring fiscal prudence [8]. The primary purpose of this paper was to investigate the relative efficiency of Albania's public spending.

Various concessions and public-private partnerships (PPP) in the sectors like energy, infrastructure, health and waste management have fired the debate on the efficiency of government spending. From a total of 230 contracts, only 14 have budgetary funding. The cumulative weight of the investments amounts to about 30% of the 2022 GDP, but the values of the existing projects and those in the process continue to be drawn up outside the budget process. About 87 percent of the contracts consist in unsolicited proposals and applications.

The International Monetary Fund (IMF) has raised a red flag on the high risk represented by the concessionary contracts for the Albanian economy and fiscal stability in particular. The framework for coordinating and managing PPPs continues to suffer from important weaknesses and the extent of related fiscal risks remains unclear. Many Public-Private Partnership (PPP) contracts for infrastructure investments have been ill-designed which can hinder the efficiency of public investments and become a cause to create large liabilities, which can damage debt sustainability. Albanian government should strengthen public investment management (PIM) and upgrade the capacity of the Ministry of Finance to undertake financial analysis of new PPP contracts and their direct or contingent impact on fiscal for the lifetime of the project.

Assessing public spending have received considerable research and public interest in the last decade [2],[7],[5]. Efficiency is a crucial aspect of responsible governance and economic management because the increase in public spending in developed countries has not necessarily led to an equivalent increase in social welfare and economic growth [11]. It involves the systematic assessment of how taxpayer funds are allocated, utilized, and ultimately contribute to achieving desired outcomes. This process serves several vital purposes in maintaining a healthy and productive society. First and foremost, assessing public spending efficiency ensures accountability and transparency in government operations. It allows citizens to have confidence that their hard-earned money is being used judiciously and effectively. Without proper evaluation, there is a risk of wasteful or inefficient allocation of resources, which can lead to a loss of public trust and confidence in the government. Furthermore, evaluating spending efficiency enables policymakers to make informed decisions about resource allocation.

Assessing public spending efficiency also plays a pivotal role in achieving long-term fiscal sustainability. It is not only a responsible and ethical practice, but it is also essential for the effective functioning of a government and the overall prosperity of a nation. In an era of increasing fiscal pressures and constrained resources, it is imperative for governments to ensure that funds are directed towards initiatives that generate lasting benefits for society. By eliminating or re-evaluating programs that do not yield satisfactory outcomes, governments can reallocate resources towards investments that promote sustainable economic growth, job creation, and social well-being.

Material and Methods

Measuring the efficiency of the public sector, especially in terms of service delivery, is a sensitive empirical matter and the available literature on this, especially regarding aggregated and international data, is quite limited [1]. There are numerous studies aiming to assess public spending efficiency for different sectors (i.e. education, health, etc.) using a variety of methodologies, depending on the research questions and the variables chosen to measure the efficiency. Most authors tend to use the share of total expenditures of general government in GDP as a measure of the size of the public sector. They look for indicators of public sector performance, which allows for international comparisons, tentatively ranking countries among themselves and also as a possible cross-country output measure of public spending [2]. It is important to note that there have been limited studies conducted to assess public spending efficiency at an aggregate level.

The majority of studies examining the efficiency of (public) spending rely on non-parametric methods like the Free Disposable Hull (FDH) or Data Envelopment Analysis (DEA) but also parametric approaches like Stochastic Frontier Analysis (SFA). Inputs are typically quantified in monetary terms [10]. In our research we used partial least squares structural equal modeling (PLS-SEM) with six variables that potentially predicted government spending (GS): economic growth (EG), economic complexity (EC), government effectiveness, (GE) human development (HD), unemployment rate (UR), and national debt (ND). GS refers to general government total expenditure and was measured as a percentage of GDP. EG refers to gross domestic product (GDP) based on purchasing-power-parity (PPP) share and expressed as a percentage. ND refers to total government debt and is measured as a percentage of GDP. EC is the knowledge intensity of an economy by considering the knowledge intensity of the products it exports and it ranges from about −2.8 (weak) to about 2.6 (strong). GE is the capacity of the government to effectively formulate and implement sound policies, and the level of respect of citizens and the state for the institutions that govern economic and social interactions among them. It ranges from about −2.5 (weak) to about 2.5 (strong). HD refers to achievements in key dimensions of human development: a long and healthy life, being knowledgeable, and have a decent standard of living. It ranges from about 0.2 (weak) to about 0.9 (strong). UR refers to total proportion of unemployed people and is expressed as a percentage of total labour force. The source of data were INSTAT, IMF, Observatory of Economic Complexity, World Bank and United Nations Development Program. Compared to previous study [4], we have recalculated the standardized partial linear regression coefficients (β weights) representing the slopes between government spending and each of the six factors. The six β weights measure the relative effect of each of the six factors on government spending when the effects of the other five variables are held statistically constant, as follows:

$$GS = \beta 0 + \beta 1EG + \beta 2EC + \beta 3GE + \beta 4HD + \beta 5UR + \beta 6ND$$

The data were standardized to run the tests and have the ability to compare results to prepare the data for analysis. Standardized data ensure that the relative strength and direction of each β weight could be directly compared across a potential range of −1 through 0 to +1. The closer the β weight is to ± 1, then the larger the effect.

Results and Discussions

After running the PLS-SEM on SmartPLS v. 3 software we were able to identify which variable better predicts government spending [9]. This implies that government spending is more efficient in influencing and predicting some components of economic development. Five factors are statistically significant ($p<.05$) predictors of government spending. The strongest predictor of government spending is economic complexity ($\beta^2 = 0.387$), followed in order of magnitude by human development ($\beta^4 = 0.312$) and unemployment rate ($\beta^5 = 0.289$). Government effectiveness ($\beta^3 = 0.237$) and economic growth ($\beta = 0.213$) are weaker predictors of government spending. The β coefficient for national debt is not significantly different from zero ($p > .05$). This model's high level of practical significance is indicated by the effect size ($R^2 = 0.714$), reflecting that 71.4% of the variance in government spending is explained by the linear combination of the six weighted factors.

Conclusions

Regardless of the existing economic system, the role of government is important for directing and maintaining a country's sustainable development, and one of the issues governments encounter is how to translate their spending into economic and sustainable development. The model presented can offer decision makers in Albania an idea of which factors are more connected to public spending and how the spending plan can be adjusted and direct it to the most significant dimensions. Therefore, evaluating the influence of budget allocation efficiency on the attainment of these objectives is crucial for gauging the effectiveness of Albania's budgeting system, the outcomes of public programs, and the efficacy of fiscal policies.

The presented model could be employed by the Albanian Government to assess potential strategies for fostering sustained economic growth and implementing top-tier public policies, ultimately optimizing the outcomes of such expenditures. It concentrates more on long-term financial planning to best utilize the government income. What sets this model apart from others is its consideration of the pivotal facets of development, emphasizing the attainment of enduring economic objectives like unemployment management and economic diversification. Furthermore, refining the existing model and assigning varying weights to each component based on Albania's specific development needs and strategic goals is regarded as an optimal approach to leverage the findings of this study. Therefore, examining the influence of budget allocation efficiency on the achievement of these objectives is instrumental in evaluating the efficacy of Albania's budgeting system, the outcomes of public programs, and the effectiveness of fiscal policies.

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IS THE STUDY PROGRAMME IMPACTING STUDENTS' PREFERENCES: USING EXPECTATION DISCONFIRMATION THEORY ON HONEY

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Abstract

This research aims to determine the impact of taste and type of honey on the liking scores of students following two study programs of the Faculty of Biotechnology and Food through the Disconfirmation of Expectation Theory (DET). The design applied is 2x6x3. Ninety students enrolled, respectively forty-four, in Food Science and Nutrition (FSN, group one) and students of Agrifood Technology (TA, group two) forty-six participated in a taste experiment. Six types of honey are evaluated 1. Filtered monofloral honey, 2.Monofloral honey with chunks, 3.Unfiltered monofloral honey, 4. Polyfloral, 5. Polyfloral crystallised 6—industrial honey in three information conditions, blind evaluation (taste), labelled test (type of honey), and the provision of complete information- type and taste information simultaneously. Students assessed the taste of honey by giving a blind liking score measured through the Likert scale (1=not like at all, 5=like it very much. In the labelled conditions, students evaluated the type of honey. In full information, they assessed at the same time taste and type. The results show significant differences among the liking score of the two groups of students in the three information conditions. In the blind test, TA students give a higher liking score to monofloral honey with chunks than FSN students (mean 4.5 vs 4.1), f (values)=3.175, p (value_=0.078); the same tendency is also observed in poly floral honey type.

In contrast, the industrial honey-type scoring is higher among the students enrolled in FSN. A possible explanation is related to the information students in FSN have about healthy foods. The taste experience with a sweet product like honey may unconsciously influence the liking score compared to TA students. In the type test, the same results are obtained with monofloral honey with chunks; the students of TA show a higher liking score compared to FSN ((mean=4.48 vs 4, (f (value)=6.515, pvalue=0,012). In contrast, in the case of unfiltered monofloral honey, poly floral and crystallised poly floral, the FSN students gave a higher liking score. In full information condition, the FSN students show higher liking scores for poly floral, poly floral crystallised and industrial compared to TA students. These results show that the two groups of students process the information differently. The DET approach helps understand in small samples how information on the same products is processed differently due to the student's education programme.

Keywords: taste, type, honey, disconfirmation expectation theory, information interpretation, liking scores

ANALYSIS OF THE ECONOMIC AND CULTURAL VALUE OF BEEKEEPING ACTIVITIES IN ALBANIA

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ABSTRACT

A developed apiculture is profitable for the whole nation, since it increases productivity and makes a positive contribution towards a more sustainable agricultural economy. This presentation aims to analyze the economic value of products and services provided by managed pollinators (*Apis mellifera*) in Albania. The data were collected through surveys and interviews with 69 beekeepers from different district in Albania, and included three agronomists from the Albania Technology Transfer Centers. A structured questionnaire was also used, and a cost benefit analysis was carried out. The results showed that the average annual benefits that can be generated by a beehive, if all the potential of the services and products that a beehive offers were used, would be around 6600 euros. These results indicate that the services and productivity provided by a beehive have considerable economic value and financial return. However, only 2.89% of beekeepers were able to receive the full potential of benefits offered by their beekeeping production. We envision that the results from this study can be used to incentivize and encourage beekeepers and local communities to develop a framework that encourages research and community involvement.

Keywords: cost benefit analysis, managed pollinator, Albania, beehive services, beehive product

Introduction

Pollinators in general and the western honey bee *Apis mellifera* L. 1758 in particular, provide multiple benefits to humans. The contribution of managed pollinators towards the pollination of plants and the products they produce in hives has a significant global economic impact (Pan *et al*., 2018; Potts S. G *et al*., 2017; Breeze *et al*., 2016; Reilly *et al*., 2020). This study, conducted in Albania for the first time, aims to analyze the economic value of the products and services provided by managed pollinators (*Apis mellifera*) in Albania. Research that explores the benefits of beekeeping could help beekeepers in mitigating potential future losses (Kuliçi *et al*., 2023), leading to a safer, more sustainable and productive beekeeping industry. Our ultimate goal is to encourage beekeepers and local communities to develop a framework that encourages research and community involvement which in turn will benefit beekeeping management.

Material and Methods

Surveys, interviews and questionnaires were used to collect data for the study. The survey was carried out during the period of February 2022 - September 2023. Ninety-two people were interviewed and given a structured questionnaire. Sixty-nine of the participants were beekeepers, eighteen were farmers, two were beekeeping researchers and three were agricultural extension specialists (agronomists) from the Albanian Technology Transfer Center. The analysis conducted is based on descriptive statistics, and includes a cost-benefit analysis.

Results and Discussion

This study included experienced beekeepers, 92.75% of which had more than 10 years' experience. The benefits generated by a single bee operation were assessed as: a) an individual value or through indirect service, and b) through the monetary value of the products produced.

a) The results showed that an average annual value of 5,600 euros can be generated by using a beehive to provide pollination services for 1/2 ha of cherry trees. The practice of renting beehives to carry out the process of oriented pollination is developed in the USA and other developed countries (Morse R.A & Calderone N.W, 2000; Sumner D.A & Boriss H, 2006). However, beekeepers and farmers in Albania seem to lack information on the effectiveness and income generated by this practce, as only 2.89% of beekeepers rent out their hives for pollination services. Another possible source of income for beekeepers is the subsidy of 9.45 euros per hive from the Ministry of Agriculture and Rural Development. However, 39% of beekeepers did not even apply for the subsidy. The next possible source of revenue is inhalation therapy. Only 4.35% of beekeepers use beehives for the purpose of inhalation therapy. This therapy has been introduced in our country in recent years. It requires a minimal investment, a study of its application protocol, but also a suitable terrain and a possible reason as to why few beekeepers carry this out. Beekeepers can also earn revenue by selling bees. The selling price of a hive varies according to the season, the age and race of the queen and the overall strength and health of the hive. We estimate that the average annual value that can be generated by a beehive, if all of the above-mentioned services that a beehive offers are used, would be 5,973 euros.

b) Financial gain can also result from the products that a beehive produces. All beekeepers in Albania use bees to harvest honey. Beekeepers prefer not to move their bees in search of monocultures to produce monofloral honey. They therefore produce larger quantities of polyfloral honey (10 kilos per hive), with an average selling price of 18.9 euros per kilo. Royal jelly is another value-added beekeeping product. However, it is only produced by 26% of beekeepers, with an average production of 70 grams per hive and an average selling price of 5.67 euros per gram. Most beekeepers consider this a difficult and time consuming task that is potentially harmful to the health of their bees, and for these reasons the practice is not widespread among. Pollen, harvested by 42% of beekeepers, is another value-added product of beekeeping. The income generated by the collection of pollen is 9.45 euro per hive. In most cases, beekeepers who collect royal jelly and pollen also collect propolis, which is harvested and sold by 23.2% of beekeepers, generating an income of 6.05 euros per hive. The next important product produced by bees is wax. Most of beekeepers produce and sell pure wax only for the production of new frames. Honey vinegar production is another income-generating activity that is not widespread among beekeepers. Only 7.25% of beekeepers are involved in honey vinegar production, which provides an income of 11.81 euro per hive. This is due to lack of market demand and lack of information on how to produce it. Another possible product that beekeepers can learn to produce is mead. There is currently no data on mead production, but we recommend beekeepers learn and produce it as it could be a high value product. The above results show that the average annual value that a beehive can generate, if all its products were harvested and used, would be 616 euro.

This study indicates that the services and productivity provided by a beehive have considerable economic value. If the full potential of beehive services and products were used, the average annual benefit that could be generated by a beehive in Albania would be around 6,600 Euro.

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THE VAT REDUCTION OF BASKET FOODS IN THE CONDITIONS OF INFLATION, AS AN INSTRUMENT OF FISCAL POLICY IN ALBANIA.

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Abstract

In this study, we will analyze the annual income of individuals or families in Albania and how much they spend for food basket products.

Consumption is the largest component of GDP for each country and represents private consumer spending on consumer goods, thus constituting the most weighty element of aggregate demand.

The VAT rate for food basket goods in Albania is 20%, a rate among the hightest compared to other countries in the region or the EU.

In the conditions of a post-Covid 19 crisis or an economic crisis with increasing inflation, a reduction of the VAT rate for the food basket products to the level of the rate of some EU countries, would bring a reduction in prices of these products and on the other hand, it would lead to an increase in consumer savings and a greater fulfillment of their consumption needs. An increase in inflation "erodes" consumer incomes.

According to the Keynesian hypothesis of "Absolute Income", consumption and saving are a function of income and have a positive relationship between them. So, we will analyze this impact in Albania.

Keywords: Food basket goods, consumption, VAT rate, inflation, saving, incomes

JEL classification: L66, D16, E12, E21, E31, D14, P36.

PUBLIC DEBT IN THE REPUBLIC OF KOSOVO, FINANCING AND THEIR IMPACT ON ECONOMIC DEVELOPMENT

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Abstract
Citizens of the Republic of Kosovo pay their taxes so that the state as an institution that originates from this society with its mechanisms, including but not excluding the budget as an instrument that reflects public finances, such as income (income) and output (expenses), to make life easier for citizens, always creating a safe environment, offering quality services in education, health, infrastructure and real economic development. The main factor that has influenced the increase in public debt is the increase in capital investments in order to stimulate the economy within the country. At the end of 2022, the State Debt reached the value of 1,753.20 million euros, which compared to the previous year marked an increase of about 4.8%. The objective of the paper is to analyze the movements of public debts over the years, the purpose of using and allocating financial means of public debt in strategic sectors of the economy such as; road infrastructure, investments in the field of agriculture and the environment, energy and in support of small and medium businesses, always in compliance with the legal regulations in the entry of the government into public debts. The methodology used in this study is the analysis and comparison of public debt over the years, the structure of budgeting in strategic sectors of the economy, review of legal regulations, literature, annual government reports on public debt, etc.
Key words: Kosovo, Public Debt, Public Debt Financing, Public Debt Financing Sources, Internal and External Debt.

I. Public debt / legal basis

Public debt or government debt refers to the obligations a government has to pay a specified amount at a specified future date to bondholders issued by the government or other government-related institutions. State debt can be realized in the form of internal and external debt. Internal debt means state debt issued or contracted by a creditor within the country[19], while international debt[20] means state debt issued or contracted through an international agreement and/or financial agreement with a creditor based abroad. The legislation in force on Public Debts determines that, in no case, the amount of unpaid principal of the general debt should not exceed forty percent (40%) of the Gross Domestic Product (GDP). The Government of Kosovo (MFPT) is the only entity authorized to access the State Debt, mainly for these purposes; For the financing of projects and investments which are considered to be a state goal presented in strategic government documents[21].

II. Sources of public debt financing

The portfolio of general state/public debt at the end of 2022 consists of domestic debt and international debt, as well as two state guarantees[22]. At the end of 2022, the State Debt reached the value of 1,753.20 million euros, which compared to the previous year marked an increase of about 4.8%. The increase is as a result of disbursements in the amount of 111.01 million euros during 2022 (of which 50.6 million euros are budget support) as well as the New Issuance of Securities within the Domestic Debt in the amount of 5.85 million euros. Over the last two years, the Debt/GDP indicator has been declining, from 21.92% at the end of 2021 to 19.91% at the end of 2022. The Ministry of Finance, Labor and Transfers (MFPT) for the year 2022 has fully respected the legal limit [23]for obtaining public debts, where in this year the total debt in relation to BPV was 19.91%.

Table 1: Domestic and international debt (in million €)

Description	The year 2022	The year 2021	Year 2020
International Debt	641.20	576.75	525.80
Domestic Debt	1,112.00	1,106.14	961.90
General Debt	**1,753.20**	**1,682.89**	**1,487.69**
GUARANTEES State	29.61	30.63	31.65
General Debt (% of GDP)[24]	**19.91**	**21.92**	**22.44**
BPV from KAS[25]	8,954.87	7,816.58	6,771.60

The data in the table show that most of the debts in the total debt are: 63% from domestic borrowing, while 37% are from international borrowing. The government currently has state guarantees in the amount of 29.61 million euros[26].

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[19] It is subject to the laws of the Republic of Kosovo;

[20] Subject to the laws of a legal jurisdiction other than that of the Republic of Kosovo;

[21] Law on State Debt and State Guarantees no. 08/L-099, Article 23.

[22] State guarantees represent potential liabilities and they become actual debts only in cases where the public entity fails to pay the guaranteed contractual obligations;

[23] Law on State Debt and State Guarantees no. 08/L-099, article 45, it is determined that in no case the amount of unpaid principal of the general debt should not exceed forty percent (40%) of the BPV.

[24]International Debt changes over the years also as a result of exchange rate changes.

[25]The GDP values for 2018-2022 were taken from the official website of the Statistics Agency of Kosovo.

[26] The current guarantee for Urban Traffic - Pristina is worth €5.61 million and the Guarantee for the Second Credit Line for the Deposit Insurance Fund in Kosovo is €24 million.

The Republic of Kosovo has started issuing securities since January 2012 and represents the main catalyst in financing the budget deficit. At the end of 2022, the internal debt is 1,112.00 million euros, compared to the previous year, it has increased by 5.85 million euros, as a result of the issuance of securities. Also, during 2022, 217.75 million euros were issued for the refinancing of maturities of securities issued in previous years.

Table 2: Domestic Debt in the last three years (in million €)

Domestic debt (net)	The year 2022	The year 2021	Year 2020
New Emissions	5.85	144.25	169.95
Domestic Debt Stock	**1,112.00**	**1,106.14**	**961.90**
State guarantees	29.61	30.63	31.65
Domestic Debt (% of GDP)	12.42%	15.07%	14.20%

As can be seen in the table, the domestic debt has a slight upward trend in recent years. The guarantee issued during 2016 in the amount of 10.00 million euros, through which it guarantees the local public enterprise Trafiku Urban for the loan borrowed from the EBRD. By the end of 2022, the borrower has returned the loan amount in the amount of 4.39 million euros. At the end of 2016, the Republic of Kosovo issued another state guarantee in the amount of 24.00 million euros, which was made available to the Kosovo Deposit Insurance Fund for the second credit line offered by EBRD.

At the end of 2022, the external debt has increased by 11.18% compared to the previous year, this is because the amount of repayment/service of the external debt during 2022 was 48.26 million euros, while the amount of withdrawals was 111.01 million euros. Throughout 2022, withdrawals in the highest amounts have been realized by the EU, ANZh, BZhKE and EBRD. External debt at the end of 2022 amounted to 641.20 million euros, which represents about 36.57% of the total State Debt or 7.16% of GDP.

Table 3: International debt in the last three years (in million €)

Description	The year 2022	The year 2021	Year 2020
International Debt	**641.20**	**576.75**	**525.80**
Central Govt	564.19	532.30	479.50
Subordinated Debt	47.01	44.44	46.29
International Debt (% of GDP)	**7.46%**	**7.86%**	**7.76%**
BPV from KAS	8,954.87	7,816.58	6,771.60

The main international creditors are: the World Bank (ANZH) with a 34% participation, the International Bank for Reconstruction and Development (IBRD) with a 16% participation and the European Union (EU) with a 16% participation of the international debt. Budgetary organizations for projects financed by international debt have withdrawn funds from loans until the end of 2022 in the amount of 111.01 million euros. Withdrawals from direct loans were 97.66 million euros, while public companies have withdrawn funds from sub-loaned loans from the Ministry of Finance, Labor and Transfers in the amount of 13.35 million euros.

III.   **Conclusions**

Based on the general debt data it is observed that we have a trend of increasing public debt (borrowing), where in 2009 the total debt was 6.12% of GDP, while in 2022 it is 19.91 %. Despite the fact that according to the law on public debts, the limit allowed for public debts is 40% of GDP, the level of 19.91% of the General Stock of Debt, represents the tendency of the increase of the percentage, taking into account the fact that 278.30 million euros are funds that are not disbursed / withdrawn according to agreements reached with international financial institutions even though they were available to withdraw. With the trend of increasing public debts, special attention should be paid to external debt, avoiding exposure to currency risk and variable interest rates. On the other hand, the trend of increasing domestic debts, especially the increase in the use of bonds and the reduction of treasury bills, affects the increase in interest rates (cost of debt). Delayed implementation of capital projects or putting them into operation with the aim of realizing benefit /profit that directly create the preconditions for economic development or economic stimulation and the creation of favorable conditions for the return of borrowed funds. Therefore, the institutions that manage the public debt must create adequate mechanisms under strict supervision so that the public debt is within the prescribed legal parameters on the one hand, and on the other hand, the borrowed financial resources are allocated to the planned projects within the time limits so that with these projects to be completed on time and broken down into economic benefits from those investment projects and not this additional cost for the country's economy.

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EVALUATION OF THE PERFORMANCE OF THE POULTRY FARMING SECTOR IN ALBANIA

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Abstract

The poultry farming sector in Albania plays an important role in the livestock development of the country. In this sector, numerous investments have been made towards intensive breeding of poultry, which have led to a continuous increase in production possibilities. In this paper, the performance of the poultry farming sector for the 2004-2022 period, in Albania, has been evaluated, using the non-parametric Data Envelopment Analysis (DEA) method. The total number of poultry as well as the number of eggs and the amount of poultry meat produced were used as performance indicators. The results show that this sector has reached optimal levels of its performance in 2004, 2021 and 2022, while in all the other years these levels have not been achieved. The analysis of the progress of this sector over the years is a valuable tool for highlighting the problems encountered over time and a good way of predicting and improving work in the future.

Keywords: poultry farming sector, performance, Data Envelopment Analysis (DEA)

Introduction

The poultry farming sector in Albania has experienced a rapid development after the year 2000. In this period, intensive poultry breeding farms were developed in our country, which led to an increase in the production of eggs and poultry meat. Poultry breeding is widespread throughout our country, this being also supported by popular tradition. The counties that stand out the most for poultry breeding and that have high performance in the production of eggs and poultry meat are Durrës, followed by Tirana and Berat [5]. The production in this sector includes the one obtained from agricultural economic units, poultry farms and especially from agro-industry [9]. The production of eggs from the poultry farming sector is sufficient to meet the needs of the local population, as well as to be exported abroad.

Materials and Methods

The performance of the poultry farming sector in our country has been evaluated for the 2004-2022 period using the DEA method, through the input-oriented CCR (Charnes, Cooper, Rhodes, 1978) model (CCR-I) in its multiplier form (under CRS assumption) (as in [2]). In the CCR-I model, the goal is to minimize inputs while producing at least the given output levels [3]. According to the CCR-I model, the relative technical efficiency of a Decision Making Unit (DMU) is determined as follows:

$$max\ z = \sum_{r=1}^{s} \mu_r y_{r0}$$

Subject to

$$\sum_{r=1}^{s} \mu_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0 \quad per\ j = 1\ to\ n$$

$$\sum_{i=1}^{m} v_i x_{i0} = 1$$

$$\mu_r, v_i \geq 0 \quad \forall i, r$$

Where: y_{rj} represents the output value r ($r = 1,\ldots,s$) of unit j, x_{ij} represents the value of input i ($i = 1,\ldots,m$) of unit j, μ_r is a non-negative weight assigned to output r, v_i is a non-negative weight assigned to input i, s is the number of outputs, m is the number of inputs.

In this paper, the efficiency of the poultry farming sector in our country is evaluated for 19 years (2004-2022) and as DMU in the model, the time period that is the year will be taken. So, the efficiency of the poultry farming sector in relation to itself over time is evaluated. The model will show in which years the poultry farming sector has been efficient and in which years the sector has not been efficient. As performance indicators, the total number of poultry (000 heads), the total number of eggs produced per year (000 eggs) and the amount of poultry meat produced per year (in tons), published by the Institute of Statistics of Albania (INSTAT) [4] are taken and are presented in figures 1, 2 and 3 below.

Figure 1. The number of poultry during the 2004-2022 period in Albania

Source: Developed by the authors based on INSTAT data

Figure 2. Production of poultry meat for the 2004-2022 period in Albania

Source: Developed by the authors based on INSTAT data
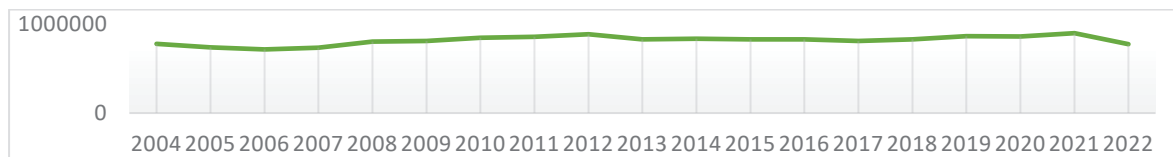
Figure 3. Production of eggs for the 2004-2022 period in Albania

Source: Developed by the authors based on INSTAT data

Results and Discussions

After the processing of the above data by Solver in Excel, through the DEA model, the results of relative technical efficiencies of the poultry farming sector in our country are obtained for each year. The results are reflected in table 1.

Table 1. Efficiency results of the poultry farming sector

for the 2004-2022 period in Albania

No	Year	Efficiency	No	Year	Efficiency	No	Year	Efficiency
1.	Year 2004	1.000	8.	Year 2011	0.771	14.	Year 2017	0.883
2.	Year 2005	0.929	9.	Year 2012	0.775	15.	Year 2018	0.840
3.	Year 2006	0.941	10.	Year 2013	0.780	16.	Year 2019	0.895
4.	Year 2007	0.855	11.	Year 2014	0.738	17.	Year 2020	0.927
5.	Year 2008	0.828	12.	Year 2015	0.813	18.	Year 2021	1.000
6.	Year 2009	0.819	13.	Year 2016	0.846	19.	Year 2022	1.000
7.	Year 2010	0.838		Source: Developed by the authors				

From table 1, it can be seen that in the years 2004, 2021 and 2022, the poultry farming sector has the best performance of the 19 years studied. In these three years we have a result of relative technical efficiency equal to 1, therefore they has been technically efficient. In other years, the poultry farming sector does not result in optimal levels of performance. In these years, the poultry farming sector has not been technically efficient, as the efficiency results are less than one. The years with the lowest result of relative technical efficiency are 2011, 2012, 2013 and 2014, as seen in figure 4 below.
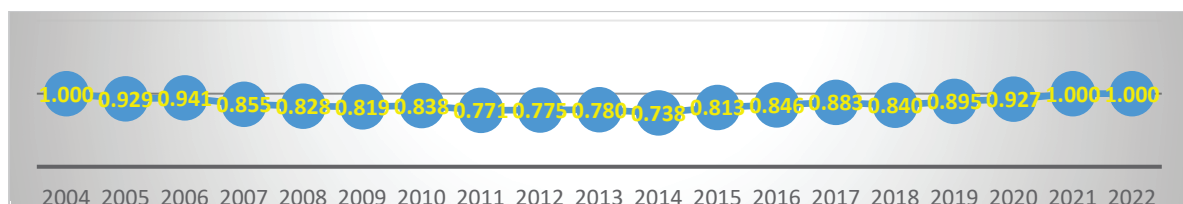
Figure 4. Efficiency results of the poultry farming sector for the 2004-2022 period in Albania

Source: Developed by the authors

From the graph above, we notice that the performance of the poultry farming sector from 2004, where the level of efficiency is 1, has continued to decline until 2014, where it has reached its lowest level of efficiency (0.738). Then, in this sector, an

increase in efficiency is observed year by year, until in 2021 and 2022, when the efficiency of this system reaches the maximum value of 1. To maintain maximum efficiency levels, the problems that have caused a decrease in the level of efficiency during the period under study should be taken into account and well managed. The opportunity to improve the efficiency is provided by the DEA method through the reference set for each inefficient unit, which is obtained from the sensitivity report. For example, if we refer to unit 4 (inefficient year 2007), there is a reference set composed of units 1 and 18 (efficient years 2004 and 2021) as in table 2.

Table 2. Reference set for unit 4 (year 2007)

No	Year	Efficiency	Reference Set	Weight
4.	Viti 2007	0.855	Viti 2004; Viti 2021	0.4432; 0.4338

Source: Developed by the authors

According to the reference set, a linear combination of the inputs and outputs of unit 1 (year 2004) and unit 18 (year 2021) with the respective weights 0.4432 and 0.4338, gives an assumed unit with a result greater than or equal to that of unit four (year 2007), which uses less input than this unit, as shown in the table 3 below.

Table 3. Composite values for unit 4 (year 2007)

No	Year	No. of eggs	Poultry meat	No. of poultry
4.	2007	735705	13455	7135.4
Composite values		**735705**	**13455**	**6100.8**

Source: Developed by the authors

According to the DEA method, in 2007, to produce 735705000 eggs and 13455000 tons of poultry meat, about 6100800 poultry should have been used in production and not 7135400 poultry that were actually used. So, according to the DEA method, the inefficient unit (year 2007) must work as efficiently as the assumed unit formed by the linear combination of efficient units. These results help predict and coordinate future work in this sector.

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THE FISCAL EVASION AND THE CHALLENGES OF FISCAL POLICY IN ALBANIA

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Abstract

Many developing countries such as Albania have high levels of fiscal evasion and tax avoidance. For this reason, there is a need to identify fiscal policy challenges, factors that determine taxpayers' behavior, as well as the factors affecting structural improvement and fiscal administration, in order to improve the performance of tax administration.

The objective of this study is to analyze the fiscal policy issues that increase the fiscal evasion, and to give relevant recommendations regarding the improvement of fiscal legal framework and awareness of taxpayers to comply with their tax obligation. The methodology is based in a descriptive and econometric analysis, using primary and secondary data. Primary and secondary data are obtained from questionnaires conducted with large taxpayers and from national and international institutions respectively. The level of income declared for tax proposes is analyzed depending on several factors. The factors are the level of taxes, level of social and health insurance, penalties from tax audit, number of audits, and the ability of the tax inspector.

The results show that the level of declaration of income, by companies, for tax proposes is in a negative relationship with the level of taxes, in a positive relationship with the level of fines from the tax control; In addition, companies suggest that for the reduction of fiscal evasion is important: a stable fiscal legal framework, fair and equitable; the reduction of the fiscal burden; increasing the trust in the tax system and administration; increasing professional skills of the tax inspector and the tax control should be a support for business to implement the rule of law; and the business should be closely involved in the drafting of the fiscal policy.

Keywords: Fiscal legal framework, tax evasion, behavior of taxpayer, tax control, tax administration

I.   Introduction

All modern societies face the challenge of limiting tax evasion and the losses this phenomenon causes to government revenues, and the time has come for policy makers to employ strategies that stimulate voluntary tax compliance with minimum cost to the tax system (Paleka and Vitezic, 2023). In the fiscal field, criminal offenses were provided for the first time in the Albanian criminal legislation after the 90s, by means of Law No. 7669, dated 16.11.1993, to be included later in the Criminal Code of 1995.In total, for the group of criminal offenses studied (criminal offenses in the field of taxation) during the years 2015-2020, 535 completed cases and 582 convicted perpetrators were recorded.

The number of cases and perpetrators for this group of criminal offenses shows a continuous increase from year to year. The most widespread type of criminal offense and the most volume of cases and perpetrators is the one provided for in Article 181, non-payment of taxes and duties.

Table 1. Number of cases and convicts in years.

Years	Cases	Convicted
2015	125	68
2016	73	53
2017	85	99
2018	82	112
2019	84	129
2020	86	121
Total	**535**	**582**

Source: General Directorate of Police

Fiscal evasion and influencing factors

The term "tax evasion" includes the deliberate concealment or avoidance of tax obligations through non-submission of documents or non-declaration of data. The level of fiscal evasion in Albania compared to a decade ago has improved (WB, 2021). The levels of fiscal evasion mainly include non-payment of taxes and duties, but also unpaid insurance. Two major problems found in the tax system are (I) non-declaration in the financial system and (II) manipulation of asset values in the balance sheet.

The purpose and objectives of the work

The purpose of the paper is to make a modest contribution in terms of improving fiscal policies and increasing the level of awareness of taxpayers. Taking into account that businesses are faced every day with a tax legislation that changes often, it is necessary to identify the factors influencing the level of income declaration.

The final goal of the study is to analyze fiscal policy problems that negatively influence the success of businesses and therefore the level of tax obligations.

The main objective of this study is to create a framework to study the problems of the fiscal policy that our country is following. The focus will be on the issues of value added tax, profit tax, income tax, social and health insurance contributions.

Other objective of the paper is to create a theoretical basis for the description of the tax system in Albania and the influencing factors in fiscal evasion.

II. Methodology

The paper consists of a combination of primary and secondary research. Secondary data were obtained from the Ministry of Finance, World Bank, International Monetary Found. Also, the method is based in other studies and and scientific articles (Becker, 1968; Molefsky, 1982; Ameur and Tkiouat, 2010). The primary research is based on a questionnaire constructed mainly with Likert scale and open questions. Descriptive analysis, multivariable regression and case study were used to analyze the data. The study includes mostly large business companies. Data analysis was performed with the Eviews 10 program. For the realization of the study, a questionnaire addressed to taxpayers was carried out to identify the influencing factors in the percentage of the declaration of tax effects and fiscal policy problems.

The econoRegarding the reviewed model:

The dependent variable taken in the study is the percentage of income declaration by taxpayers and is expressed as a percentage (of the total 100% of realized income).

The independent variables taken into consideration are: tax rate (profit tax, personal income tax, value added tax and social security and health contributions), number of audits, penalties imposed by the tax audit, trust in the government, size of businesses, legal status and ability to pay of businesses. Most of the variables are statements expressed on a Likert scale from 1- strongly agree to 5- I do not agree at all.

The data were collected through questionnaires distributed to several types of businesses in Albania, mainly VIP businesses and large businesses. From the distributed questionnaires, about 150 businesses have been cooperative and very willing to complete the questionnaire.

The econometric model that presents the level of income declaration for tax effects is as follows:

$$Y = \alpha_0 + \alpha_1 * x1 + \alpha_2 * x2 + \alpha_3 * x3 + \alpha_4 * x4 + \varepsilon$$

Y: declaration of Income for tax effects

x_1: tax rate

x_2: fines from tax control

x_3: business solvency

x_4: control inspector skills

The hypotheses raised in relation to this model are as follows:

H1: There is a negative relationship between the level of the tax rate and the level of declaration of business income for tax effect.

H2: There is a positive relationship between the level of fines from the tax audit and the level of declaration of business income for tax effects.

H3: There is a positive relationship between the skills of the inspector and the level of declaration of business income for tax effects.

H4: There is a positive relationship between business solvency and the level of business income declaration for tax effects.

III. Results and Discussion

The analysis of the regression results presents the following results in relation to the hypotheses.

Hypotheses	Affirmed/Rejected
H1: There is a negative relationship between the level of tax rate and the level of declaration.	VERIFIED
H2: There is a positive relationship between the level of fines and the level of disclosure.	VERIFIED

H3: There is a positive relationship between the skills of the inspector and the level of declaration.	VERIFIED
H4: There is a positive relationship between business solvency and disclosure level.	VERIFIED

The descriptive analysis of the questionnaires results as follows:

The main opinions of taxpayers are given below:

- Regarding the legal basis of value added Tax (VAT), it turns out that the interviewees on average agree that the legal basis is stable; the prepayment of VAT burdens the financial situation of the business on average; the tax rate of VAT is high; setting a different tax rate for different categories of products and services is more acceptable to taxpayers.

- The legal basis of Income Tax is partially stable; the applied rate of Profit Tax for business is considered moderately high; the profit tax rate should be differentiated based on different industries; considering profit tax installments as debt to the state is not acceptable; the determination of profit tax installments for new businesses is arbitrary; withholding tax (15%) on rental payments is not acceptable.

- The legal basis of Social and Health Insurance contributions is stable; the rate of Social Security contributions is moderately reasonable; occasional changes to the minimum wage have a significant impact on businesses.

- The tax inspector's professional skills are moderately sufficient; tax control procedures are partially respected according to the law in force; the penalties in case of non-compliance with the legislation are high.

- In relation to the fiscal policy, the business is on average able to pay the tax obligations on time, but the businesses with limited liability find it more difficult to pay the obligations on time; in general, there is an opinion that the fiscal policy in Albania is partially fair; the level of trust in the government for the reversibility of tax payments and taxes in the form of public goods and services for the community is low; the fiscal policy of the last year has negatively affected business efficiency. From the taxpayers surveyed, it is found that the average percentage of income declaration for tax effects is 65%.

IV.   Conclusions and recommendations

From the control of all the variables taken in the study if they had any impact, it resulted that the control techniques and the number of controls have an impact on the percentage of the declaration for tax effects. As the number of controls increases, the percentage of income declaration decreases. With the improvement of tax control techniques, the percentage of income declaration increases. Fiscal legislation is considered unstable, and the tax burden is considered high.

Among the main recommendations of the study can be mentioned: the VAT rate should be differentiated; for foods and products (services) a lower rate should be set while for other products a higher rate should be set; the VAT prepayment scheme should be reviewed as it burdens the taxpayers; the duration of the refund procedures should be reviewed once again; in the case of bad debt, the VAT recognition procedure by the tax authorities should be carried out more quickly and the procedure should be limited to the tax administration only; to be reviewed the reference wages for freelancers because they create difficulties for businesses.

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COOPERATION OF PUBLIC-PRIVATE SECTORS FOR THE CARE OF RURAL DEVELOPMENT.

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Abstract

All rural areas provide income mainly from two economic activities, agriculture and livestock. In many cases these activities are family, and in special cases they are a group of families. In the agricultural sector, production is always at risk from weather conditions and in extreme natural disasters, where the production is almost zero, or it has negative economic balances and total business bankruptcy. In the livestock sector, production is always at risk from epidemic diseases, floods and droughts. In extreme cases, business bankruptcy is quite possible. These are exactly the problems that agribusinesses face. Without efficient management, financial support, and collaboration between actors, the rural economic development remains stationary and possibly regressive. The Albanian reality shows that in times of natural disasters, farmers often turn to banks for loans to recover their business. Banks consider these loans as high-risk loans and are reluctant to lend to farmers. A part of farmers, turn to financial institutions that lend to agribusiness, but there they find loans at a very high cost. There are practices where farmers have taken loans for a second time to repay the previous loan. In this study, we will deal with the state-farmer, and private-farmer cooperation, proposing ideas for cooperation based on statistical data and probability, to protect agribusinesses from bankruptcy as a result of natural disasters and enable the creation of surplus value. In our research, we kept statistics to compare the results of the achievement and approximate the results achieved with those predicted. Finally, we show them statistically and lay out the conclusions.

Key words. Cooperation, Loans, Insurance, Natural disasters, Statistical Approach

THE POTENTIAL OF AGRO-CORRIDORS AS PART OF ECONOMIC CORRIDORS: LITERATURE REVIEW AND THE CASE OF ALBANIA

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Abstract

This article represents a literature review on the importance of economic corridors to facilitate and improve interconnection, physical mobility and the functioning of agro-industrial markets, generating effects of economies of scale in agriculture and other related sectors. It sheds light on the broad typology of connecting corridors within and between countries and concludes that the main and more important corridors are transport ones. The analysis of transport corridors in Albania and at regional level, shows that the potentials of agriculture can be better exploited, expanded and developed through the construction of a map of agro-corridors. The article concludes by addressing the elements that can be included in this map. It also shows that there exist opportunities to expand the current transport corridors making them more dynamic for agribusiness.

Key words: *Economic corridors, Agro-corridors in Albania, Connectivity, mobility, Potentials and Opportunities for Development.*

A LITERATURE REVIEW FOR SMART TOURISM PROSPECTS

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Abstract

The development of information and communication technology has been one of the most significant transformations in the twenty-first century. Technological advances in recent years have had a significant influence not only on society, industry, and people in everyday circumstances, but also on cities and, in particular, tourism. While technology continues to improve, the tourist industry has evolved to be one of the most prominent in the world.

These facts have given birth to the "Smart Tourism" idea which may be described as a step forward from traditional tourism. Information technology plays an crucial role in the tourism industry. The term "smart" has grown in popularity to characterize technological, economic and social developments propelled by smart technologies and based on sensors, large-scale and capacity-based data, information, and new methods of interfacing people and machines.

The mobile revolution, and especially, the role of smartphones provides numerous chances for inhabitants and visitors to construct experiences for a place that is distinct from the past. The implementation of the smart city concept in intermediate tourist towns on their way to become smart destinations necessitates an unavoidable commitment to their environment as well as increasing the quality of civic life and the economics of cities via more sustainable and technologically sophisticated aspects..

With the advent of smart tourism, the impact of information technology on tourism has gained attention, and this phenomenon of digital transformations has spread to all industries. As a result, smart tourism technology has emerged as the most crucial component of the tourist business. In this article, we have identified the most often used methodologies and core ideas in the Smart Tourism sector and present them in depth, along with the papers that focus on them, after carefully evaluating a large number of publications. The goal of this research is to look at how smart tourism technology and memorable tourism experiences influence visitor satisfaction and destination loyalty.

Key Words: Smart tourism, Smart cities, Smart Destination Strategy, Social Media, Information and communication technology and Big Data.

INFLATION TARGETING IN ALBANIA

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Abstract

The impact that monetary policies and frameworks might have on the aggregates is also strongly related to the everyday consumption and investments. Of course a lower and stable inflation rate would imply price stability, which, in a chain reaction affects the cost of borrowing and the consumption itself. Understanding these connections, but most importantly the crises experiences has led to the creation of several policies and regulations that would allow the central banks to avoid possible further disequilibrium. In order to achieve these goals Central Banks have to make sure that they are following the most suitable monetary policy. One of the most commonly used ones is inflation targeting. The primary goal of this research is to study the prior conditions that are needed for the implementation of inflation targeting as a monetary policy framework of inflation targeting in emerging economies such as Albania and understanding better the macroeconomic impact that this framework has on these countries. The history has shown that not all of the policies work for all the countries and that there are special preconditions that should be strictly met for a monetary policy to be effectively applied. Nevertheless, a lot of literature supports the claim that inflation targeting was mainly a very good story to tell from several emerging economies.

Keywords: *inflation targeting, monetary policies, emerging economies, macroeconomic.*

1.Introduction

Inflation targeting application is different from country to county but commonly these countries all apply the same four elements: 1. Aim to achieve price stability; 2. Set a numerical target ;3.Defines the horizon of the time needed to reach this target; 4. Constantly evaluates if the goal is achieved and adjusting accordingly the short-term interest rate, which is the main monetary policy instrument. (Mishkin Frederic, 2000)

During the last two and a half decades, inflation targeting has been the monetary policy framework choice of many countries. What mainly characterized this framework is the fact that it started to become popular not only because of the practice that it implies but also because it substituted other failing monetary policy frameworks. Rose, A.K. (2014) in his study emphasize that none of the countries which have adopted inflation targeting have abounded this framework during the financial crises. Inflation targeting is flexible in terms of shock response but also is consistent with the regime. Inflation Targeting apart from focusing in the price stability has additional benefits such as:
1. Medium term target inflation announced to the public
 2. Sets the price stability as the primary goal of the monetary policy
3. Monetary aggregates do not play an important role in the formation of the scope of this framework
 4. Communications with the public increase highly the transparency of this framework
 5. Central banks become more accountable for reaching the inflation target. (Mishkin, 2000)
These elements all imply the characteristics that an economy adopting inflation targeting as a monetary policy framework should have. But how are these countries classified and how would we define which of them is for real an inflation targeter? Because for some of the economies that state that they have an inflation target, there are evidences that actually they are still under the exchange rate regime or even monetary policy. Aiming for the price stability is not the only criteria that makes a country an inflation targeter, (Dokle, 2013).

Carare & Stone (2003) bring a much-clarified classification of countries which target inflation. Fully fledged inflation targeter together with the implicit price stability anchor and inflation targeting lite are the three main categories that are briefly explained in Carare & Stone (2003) paper.(Alina Carare & Mark Stone, 2003).

4. Inflation Targeting in Albania

If being compared to other countries which were in transition, Albania has performed much better in terms of stabilization of macroeconomic indicators, it managed to decline inflation rate from over 237% to 6% in 1996 and maintain it with very few fluctuations around the target of 3% for the following years, excluding here 1997 when the pyramidal schemes collapsed. This performance was an outcome of the restrictive monetary policy implemented by Bank of Albania. Adopting Monetary targeting regime as a monetary policy made Albania one of the few countries which implemented this regime. This regime in specific monitors M3 as an intermediate target and in this way it controls the money supply in the economy. What simulated mostly the usage of this monetary policy was the IMF technical assistance program which apart from monetary targeting targeted other indicators such as international reserve, total funding of the budget deficit and net internal means. Throughout the years in order to maintain stability and control the monetary supply, Bank of Albania used different instruments and tools both direct and indirect ones. Firstly, central bank settled a ceiling on the level of the credits provided by commercial banks which worked as a primary tool for the control of the monetary supply. A couple of years later, in 1995, central bank used the deposits rate of SOB's as an indirect instrument for controlling the monetary supply. Another attempt to influence interest rate after the removal of credit celling in 2000 was done through the open market operations, Repos.

Even after taking into consideration all the positive results from the application of this monetary targeting policy regime, Bank of Albania had its own doubts related with the future application of it. As per Estrella & Mishkin, (1997) paper, such monetary targeting regime in times of price stability should not be a reliable regime for emerging economies. The reason behind it is related with the information that could be obtained from the monetary aggregates once inflation is maintained under the borders of the target. According to their results with stability of inflation rate, the velocity shock noises increase causing so the monetary aggregates to be less reliable. This could easily be demonstrated by the difference of planned and actual monetary aggregates and planned, and actual inflation rate expressed in % change. The divergence of M3 (broad money) has been an issue known and analyzed by the central bank, which together with other factors such as supply shocks exchange rate movements and the pressure that they forced on inflation rate encouraged central bank to consider other monetary policies. Without fully applying the IT, Albania has been classified by Alina Carare & Mark Stone, (2003)as an inflation targeting lite country.

The process of starting to adopt IT as a monetary policy regime started in early 2004 and was officially finalized on 2009, when the government announced Inflation Targeting as the official monetary policy regime. There are three main reasons behind this movement. Firstly, the unresponsive monetary aggregate to velocity shocks in an environment characterized by price stability, was quit a good signal for the Bank of Albania to change the monetary policy regime from the existing one to Inflation Target regime. Secondly, the government would recognize the importance that all of the macroeconomic factors have in the successfully implementing this new, complex regime. Lastly previously used monetary target regime, was inspired by IMF technical assistance program and implementing a new monetary policy regime would independently encourage Bank of Albania to maintain stability through inflation targeting as a nominal anchor. As many economists and researchers argue being used as a monetary policy the Inflation Targeting does not surely translate to stability and growth. There are other preconditions that should be met for this monetary policy to be successful. In other Inflation targeting in Emerging Economies 21 words the effectiveness of the Inflation Targeting should not only be measured by the approach that it has but also by including the function of those other factors such as the relationship between the central bank and the government, the autonomy and transparency of the central bank, the technical infrastructure in terms of analysis and forecasting, together with the stability of the financial environment Carl walsh,(2007)

With all these factors combined together, is inflation targeting effective in the economic growth of the country? Based on previous studied, unfortunately there is not a conclusive argument related to this question as different scholars, economists and researches have been showing through their studies different outcomes. One of the greatest economist, M. Friedman argued through his research that "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output". In order to understand better this statement, which now is being known as the Friedman Theory, inflation should be accept as a phenomena caused by the expansion monetary policies. According to Friedman, there was no time in history that inflation and increase in money supply did not grow side by side. He argues that in the long run the monetary growth does increase inflation as well but not the output.

Studies made by F. S. Mishkin,(1990),Frederic Mishkin & Adam Posen, (1997), Walsh, Carl E., (2010) show empirical results that countries which have adopted inflation targeting as a monetary regime perform much better in the macroeconomic indicators point of view. Other studies like Barro, (1995) and Judson & Owen, (1999) argue that the relation between inflation rate and economic growth is strongly negative.

5. Conclusions

- Inflation targeting has been the monetary policy framework choice of many countries.
- Thera are some prior conditions that are needed for the implementation of inflation targeting as a monetary policy framework.
- Adopting inflation targeting as a monetary policy framework, central banks should be fully independent from the fiscal policy and the politics of the country.
- So if a central bank wants to achieve its goal of price stability, it should make sure that actually the public would be expecting similar inflation in the future.
- It is essential for the central banks to be fully independent from the government.
- The main condition for inflation targeting implementation would be the presence of only one important goal, the price stability.
- Empirical results show that countries which have adopted inflation targeting as a monetary regime perform much better in the macroeconomic indicators point of view.

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DIGITALIZATION AND THE TRANSFORMATION OF FINANCIAL SERVICES MODEL IN ALBANIA.

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ABSTRACT

Digitalization, as a concept of transforming the existing business models serves as a catalyst to economic growth and enables the banks to curb their costs and generate additional revenue, by increasing customer satisfaction.

The pandemic of the 2020-2022 life model, set the ground for the opening of new and strengthening of existing Fintech services in Albania, focused on small payment services.

The Bank of Albania and the Albanian Government have supported the e-services sector by legally warranting the open banking concept. The new law "On payment services", was approved in 2020, and enables banking accounts to execute payments by financial institutions other than banks.

 The data review indicates a positive perception of digital services and an increase in the use of digital services offered by banks and fintech in all sectors of the economy, including the rural sector.

Keywords: *digitalization, bank, fintech, home banking*

Introduction

The advent of digitalization in the last decade has opened many avenues for improving our lives. As of 2022, there were 9 licensed companies in the electronic payments and electronic money market in Albania. Are they a threat to the current banking system or can they serve as a benchmark for banks to step up their game? The banking system may not be the main culprit, but surely bears a big weight in the fact that Albania is still a cash-dominated society. People are reluctant to spend moments of their day in the slow-moving bank lines to perform basic services. Fintechs are here to challenge that, and Albania makes no exception. But what are the strategies in play here? Is there going to be direct competition or more of a synergistic effect is to be observed? In this work, we tend to advocate for the latter.

Methodology

In this work, we have made extensive use of the annual Bank of Albania Report (2023) and associated supportive documents and QKB extract historical data, in order to assess the share of the electronic payments market between operators.

Data were processed and visualized in a graphical form for ease of interpretation.

Graph1 Home banking transactions 2015 – 2022   *Graph2* Web accessed accounts vs. total 2015 - 2022
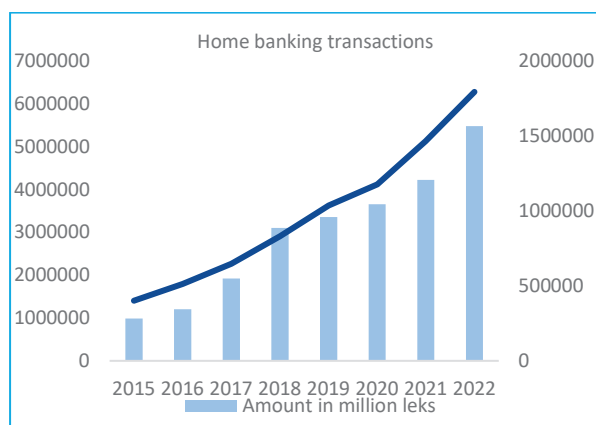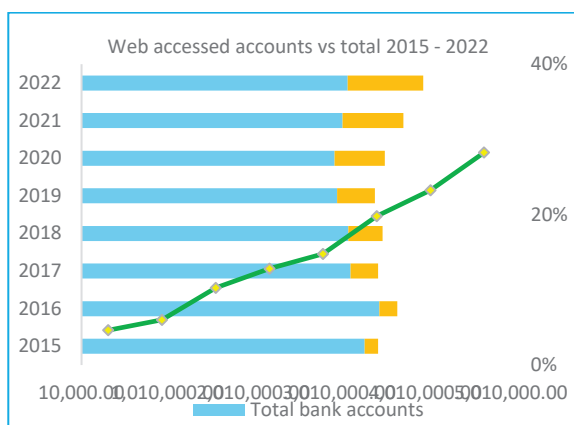
Source: Bank of Albania, (2023), Graphics by author

We observe that the number of transactions follows a steeper curve after the year 2020, in line with COVID-19 socio-cultural behavioural change and the Law "On payment services" of the year 2020

This chart supports the growth of home banking transactions, as based on data from the Bank of Albania, by the end of 2022, about 28% of accounts were web-accessed - more than double those in 2018.

Graph3 Market share e-money 2022
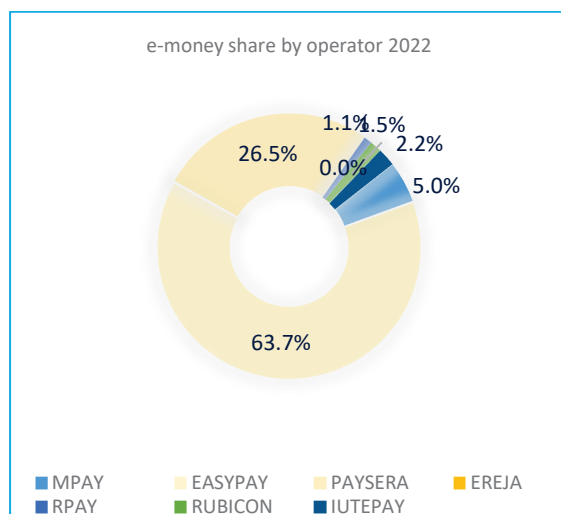
Graph4 Electronic payments 2017 - 2022
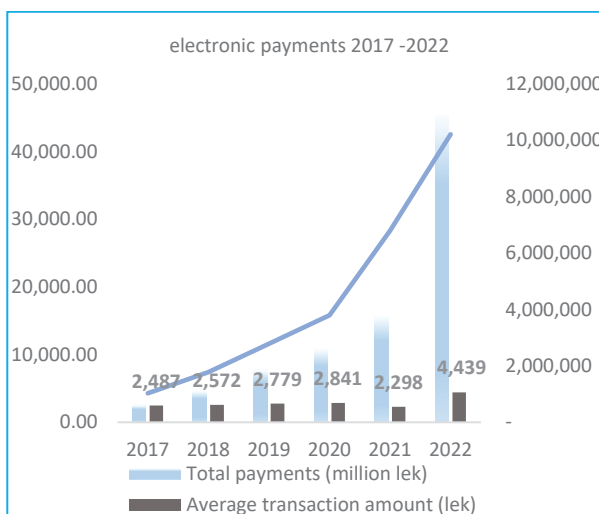
Source: QKB (2023), Data manipulation & graphics by author

We analyzed the market share of 8 key players in the electronic payments market, for the year 2022. While obvious that Easypay, as a pioneer of this segment since 2006, still dominates the payments, it must be stressed that 70% of the companies registered their first financial year in 2022. We should expect the position of Easypay to be challenged in quantity and quality over the next reporting period.

Graph 4 illustrates the double-digit growth of the electronic payment market, but also sheds light on the improved trust that consumers are placing in electronic payments - both in quantity and the amount per transaction. It appears that the legislative framework, post-2020, has played a pivotal role in boosting trust in these types of payments, as the amount per transaction has doubled in just over a year. As analogies can be drawn from neighbouring economies, this should not come as a surprise for a country that has over 80% internet penetration (2021)

Despite these numbers, it must be acknowledged, as indicated in the Bank of Albania Report, that although electronic payments account for about 30% of the payments that go through the banking system, the payments executed through the e-money operators, account for a mere 0.8% of the overall payments in Albania.

Graph5 Home banking vs. electronic payments from e-operators 2022
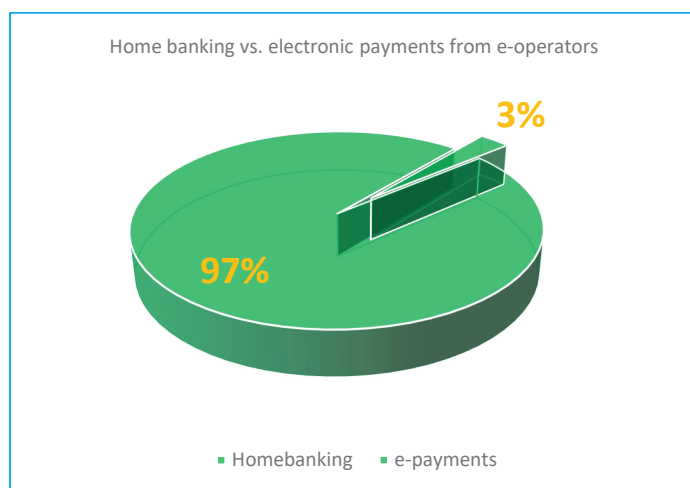
Source: Bank of Albania, (2023), Graphics by author

Results and Discussion

The data indicates that COVID-19, along with the law "On payments" has steered bconsumer behaviour towards web-based accounts, home banking, and electronic payments via fintech apps, though the Albanian economy still is heavily reliant on cash payments.

As such, we do not see electronic payment operators/fintech startups posing a real challenge to the banking system itself; we predict a more collaborative approach, wherein banks tap into the fintech proprietary technology, and enhanced security

features, thus creating a favourable business environment, allowing fintechs to grow and diversity and banks to offer better and faster services focused on customer experience.

The bank has the responsibility of shaping customer behaviour by any means at their disposal; be that awareness campaigns, easy-to-use apps developed in collaboration with fintech, or a dedicated customer support line, in order to enhance customer experience. This multifaceted strategy should be able to attract customer interest and save millions of EUR in annual fees borne by Albanian customers. But there's a steep road ahead.

Rural areas of high density would highly benefit from this synergy, where current access to banking services is very limited. This would ease their access to the array of banking and fintech services, and as a positive side effect of technology penetration, we should be able to observe a moderate shrinking of the informal economy, meaning more money would be siphoned into the economy for better services and wealth distribution.

On a final note, a well-thought regulatory framework should be in place, to guarantee data integrity and privacy, in order to avoid a boomerang effect.

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SOCIO- AND PSYCHOLINGUISTIC PERSPECTIVES OF MULTILINGUAL ADVERTISING AND PRELIMINARY THEORETICAL IMPLICATIONS OF ALBANIAN CONSUMERS' ASSOCIATIONS WITH MULTILINGUAL PACKAGING

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Abstract

There has been a salient academic interest on the impact of foreign languages in advertising that has included varied fields such as linguistics, marketing, multilingualism, sociolinguistics, psycholinguistics, international advertising, and consumer research. This interest of foreign languages in advertising has been largely researched through the lenses of socio- and psycholinguistic perspectives. The former looks at the psychological and neurological factors that enable humans to process a foreign language and the mental representation involved in comprehending the marketing messages whereas the latter delves into how society influences the usage of language and its connotations related to its country of origin. This paper offers a distilled clustered view of the main theories that underpin FLs in advertising. It also provides preliminary theoretical implications of Albanian consumers' associations with multilingual advertising based on a quasi-experimental study with 78 Albanian students where they were asked to select the associations that different FLs evoked in them. We conclude that research on the complex role of language on consumer behavior can be greatly advanced through the distilled linguistic views present in the article and cautiously offer promising preliminary results for further research in multilingual product packaging in Albania.

Keyword: advertising, country-of-origin, foreign-language display, association.

Introduction

Foreign languages (FLs) in advertising have come a long way and include now in its mainstream studies varied fields such as linguistics, marketing, multilingualism, sociolinguistics, psycholinguistics, international advertising, and consumer research (Hornikx & Van Meurs, 2020). This interest of FLs in advertising has been largely researched through the lenses of socio- and psycholinguistic perspectives (see also Alcántara-Pilaret al. 2015; Hornikx and van Meurs 2015; Hornikx et al. 2023). The former looks at the psychological and neurological factors that enable humans to process a foreign language and the mental representation involved in comprehending the marketing messages (Alcántara-Pilar 2017, Hornikx et al., 2023, Luna and Peracchio 2002). The Sociolinguistic approach delves into how society influences the usage of language and its connotations related to its country of origin (Hornikx and van Meurs 2020; Jaffe and Nebenzahl, 2001; Luna and Peracchio 2005). Through the lenses of socio- and psycholinguistic perspectives and taking cue from Hornikx et al. (2023), FLs in advertising in grouped into two main clusters: 1) FLs as symbols and 2) FLs as mental processes. These clusters are of relevance as they enable further empirical research of FLs into the mediums of product advertising such as TV ads, print ads, product packaging etc. These clusters aim to give an insight into the competences and mechanisms of FLs in advertising and how they affect consumer behavior.

Aims: This article has two aims: 1) to present a synthesized summary of the theories related to socio- and psycholinguistic perspectives relevant for the empirical research of FLs on consumer behavior; 2) and to provide preliminary theoretical implications of Albanian consumers' associations with multilingual advertising based on a quasi-experimental study with 78 Albanian students where they were asked to select the associations that different FLs evoked in them and the reasons behind the employment of multilingual product packaging by local food operators.

Materials and Methods: In our search for linguistic theories relevant for the study on foreign

Languages (FLs) in advertising, we retrieved relevant literature through the electronic database 'Taylor & Francis Online' which provides access to journals spanning Marketing, Linguistics, Psychology, Social Sciences etc. It also houses the 'Journal of International Consumer Marketing' which has contributed with seminal research on FLs in advertising and product packaging. Furthermore, a pre-test was conducted where 78 Albanian students were asked to select from a list of associations that different FLs evoked in them and the reasons behind the employment of multilingual product packaging by local food operators. In total, 13 adjectives and 5 foreign languages were used (*table 1*).

Category	English	French	German	Italian	Albanian	Greek
Exotic	7	7	0	8	13	12
Melodic	11	12	6	**24**	16	12
Luxurious	8	19	12	4	14	1
Passionate	4	**25**	0	20	7	1
Technical	13	2	14	3	9	7
Modern	**27**	7	6	6	6	4
Reliable	19	4	9	7	12	4
Elegant	6	21	0	18	5	3
Prestigious	8	11	11	6	6	4

Simple	12	0	0	6	**22**	4
Complex	2	13	**25**	1	9	9
Boring	1	4	10	2	6	**22**
Beautiful	11	9	6	18	21	6
Total	**129**	**134**	**99**	**123**	**146**	**89**
Mean X̄	**9.92**	**10.3**	**7.61**	**9.46**	**11.23**	**6.84**
SD	**6.78**	**7.6**	**7.19**	**7.69**	**5.73**	**5.8**

Table 1. Number of associations for language and category, n=78

Results and discussion: Based on the concise linguistic theories presented herewith, we believe that research on foreign languages in advertising and packaging on consumer behavior can be greatly advanced through direct and conceptual replication of the seminal studies mentioned in our article, taking cue also from the clusters of linguistic theories that shed light on the complex role of language on consumer behavior. Furthermore, our preliminary results showed that English is mostly associated with modernity, French with passion, Italian with melody etc. This is line with the literature which has empirically proven that FL association is prevalent in advertising and acts as an implicit country-of-origin effect (Haarmann, 1984, 1989; Kelly-Holmes, 2005; Piller, 2001; Hornikx et al. 2007). These are preliminary results and their transfer to consumer-food packaged (CPF) still has to be empirically tested across varying consumer demographics and product types. Nonetheless, the preliminary results offer a promising avenue for further research on foreign language associations that may influence packaging perceptions and choice.

Author Contributions: E. Shehu conceived the topic, synthesized the literature review and and conducted the pre-test with regard to foreign language associations. Eda Luga & Enxhi Shehu wrote the paper, including the tables and figures and added valuable suggestions to the article.

Conflicts of Interest

The authors declare that they do not have any conflict of interest.

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4ᵀᴴ INTERNATIONAL CONFERENCE ON AGRICULTURE AND LIFE SCIENCES "ICOALS"

Title: Innovating education for Rural and Sustainable Tourism

Authors: Prof. Dr Klodiana Gorica, Prof. Asoc. Dr. Ermelinda Kordha, Joana Agaci (Master Shkencor Student)

Aim of this research is to highlight the importance of education in addressing the skills gap and fostering sustainable tourism practices.

It particularly emphasizes the increasing demand for green and digital skills while addressing the multifaceted challenges and opportunities brought about by the tourism industry's growth. Among these challenges are skills shortages and a gap of research and innovation, which pose obstacles to both sustainable sector development and overall economic progress.

In response to these challenges and to enforce the sector's sustainability, there's a clear imperative to integrate green and digital competencies into educational curricula. Our research also highlights several areas requiring further exploration, including the current state of education systems, specific employer needs, and the precise skill sets demanded by the tourism sector, with a particular focus on green and digital skills.

Key words: Education, Sustainability, Green Skills, Digital Skills, Tourism

CIRCULAR ECONOMY AND INDUSTRY 4.0 INTEGRATION IN MANUFACTURING SECTOR: AN OPEN INNOVATION PERSPECTIVE FOR STAKEHOLDER'S COLLABORATION.

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Developing economies are characterized by fragmented incentives towards any systemic or structural change. In those contexts, different actors show preliminary attempts toward systemic shifts like Circular economy, one of which are SMEs. Recognizing the fact that those firms may not possess adequate resources and proper infrastructure to develop those practices alone open innovation approach is advocated. Open innovation involves different functional process which rely on the collaboration of stakeholders, for this reason this study aims to analyze how different forms of collaboration can contribute in proper implementation of CE and industry 4.0 in manufacturing sector through open innovation processes. Focusing on manufacturing sector, this research aims to evaluate how those firms "internalize the innovation" coming from external ideas and know-how, and; expand their market to turn this innovation into higher profits considering the sensitivity towards the environmental issues. Considering three Albanian cases this study comprehensively tackle how multi-faceted collaboration can deeply amplify innovative ideas and decomposes/simply the complex challenges of sustainable development. Moreover, it brings insides how SMEs can be engaged in open innovation practices.

Key words: circular economy, industry 4.0, open innovation, sustainable development

SESSION

"Environmental Sciences and Natural Resources Sustainable Management of Forest Resources"

SOLUTION APPROACHES FOR IMPLEMENTING THE RECAST OF EU'S WASTEWATER TREATMENT DIRECTIVE IN ALBANIA

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Abstract:
The European Green Deal, as a core initiative of the European Commission, aims at transforming the European Union (EU) into a modern, resource-efficient and competitive economy. Consequently, all subordinate European directives must be brought align. This also applies for the European wastewater treatment directive, where the current version shows deficits in terms of remaining pollution from urban sources (small agglomerations, combined sewer overflows, etc.), climate protection (greenhouse gas emissions, energy efficiency, renewable technologies), and governance (stakeholder participation, transparency, monitoring, data and information management digitalization. etc.). For Albania as a candidate country for EU membership an early consideration of European regulative requirements is advisable as this will facilitate later implementation and adaptation measures. Evidently, this also holds true for the Albanian (waste-)water sector, which currently faces great challenges. To meet future EU demands, strategic data and information management, integrated perspectives in planning and operation, stakeholder education and collaboration as well as public participation are only some of the key areas requiring improvement and further development. This conference contribution will give an overview on the specific core challenges in regard to the recast of EU's wastewater treatment directive by also referring to the Albanian context. It shall provide a basis and orientation for the upcoming discussions on how to best introduce related approaches and demands in the Albanian wastewater sector making it fit for a European future.

Key Words:
Water pollution control, governance, stakeholder management, data management, digital water, renewable energy.

ANALYSIS OF HEAVY METALS IN THE SOIL, IN THE REHOVA MINE AREA.

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Abstract

Copper mining at Rehova village, that is out of production since 1990, is located at Korca District and covers an area of approximately one km2 including the mine site, the former enrichment factory and the dumpsites. The plant has been working for about 11 years, during which time it has processed 678,930 tons of ore and produced about 47,000 tons of copper concentrate with about 17.5% Cu. The minerals at the dumpsite consist mainly of Cu, Fe and CuFeS2 from the enrichment processing which consisting of selective flotation of the ore, used to produce copper concentrate with about 17.5% Cu and 10.8% moisture. The amount of tailings at the dumpsite is estimated at 500,000 tons while the total of volume of contamination is approximately 35,000 m3. The present study aimed to assess the levels of heavy metals Pb, Cd, Cr, Cu, Zn and Ni in the soils contaminated by industrial activities at this area. The soil samples were collected from three sampling sites (natural soil, dumpsites and sediments) and 3 samples of plants that dominate the area. The soil samples within study area were collected from the layers (0-30 cm and 30-60 cm) as well as (0-30cm) leaving in 10m, 100m, 1000m and up to 10 km from first sample. The samples were digested by the mixture of HNO3 and H2O2, and the concentration of metals were measured by a Varian model SpectraA-200 Atomic Absorption Spectromete.

Key Words: Rehova, hotspot, heavy metal, Atomic Absorption Spectrometer, dumpsite.

Introduction.

The Rehova copper enrichment plant was designed and built with machinery and equipment mainly produced in the country where, according to the technological scheme, the enrichment of copper ores is carried out by the method of selective flotation of copper ore. Copper concentrate with about 18% Cu and 10-12% moisture was obtained there, which was sent to Laç metallurgical plants. The tailings that remain after the separation the copper ore have been deposited in the dam erected for this purpose near the factory which has worked for about 11 years, during which time it has processed 1,117,728 tons of ore producing 678,930 tons of ore and about 47,000 tons of copper concentrate 17.5 % Cu.

Contamination of soils with heavy metals may pose risks and hazards to humans and the ecosystem [1]. Due to their very material composition, the large amount of material deposited in them as well as their very fine granulometry, the roofs constitute a very large potential risk for the surrounding environment. Solid and liquid substances with the composition of heavy metal ions are discharged from the dams, which constantly dissolve and pollute streams and rivers.

Heavy metal contamination has adverse effects on the agro- ecosystems, such as loss of high quality farmland and pollution of soil and groundwater, enhanced demand for clean water, contamination of urban areas and increased public health problems, low grazing quality and reduced crop yields and livestock production [2]. Recent studies by several investigators have shown that atmospheric fallout from smelters can contribute significantly to soil contamination with heavy metals [3]. Metal deposition patterns, though depending to a considerable extent on climatic conditions (i.e. wind and rainfall distribution) [4], generally decline exponentially with distance from the smelter. Consequently, metal concentrations in soils near the smelter may be elevated significantly and may pose a significant health hazard. The total soil metal concentration can be used to estimate the degree of soil exposure to heavy metal contamination, but they are not generally [5].

This is a difficult problem to prevent, but one that must be studied in depth to know the influence that these ions have on the lives of living things that live in terrestrial and aquatic environments polluted by them. The purpose of this study is to evaluate the pollution of the surrounding area with heavy metals and to propose a methodology for the rehabilitation of that area.

Material and Methods.

Sampling site: The copper mine of Rehova site is located at Korça District, direction Korça – Erseka national road, some 20 kilometers from Korça city in southern directions (Figure 1). The facilities were established near the Rehova village, a hilly-mountain area with soft slopes, which are followed by higher mountain peaks in western and eastern directions. The Rehove mine site covers an area of approx. 1 km2, including mine area, the remaining of a former enrichment factory and dumpsites of mine waste near tributary of river Osumi..
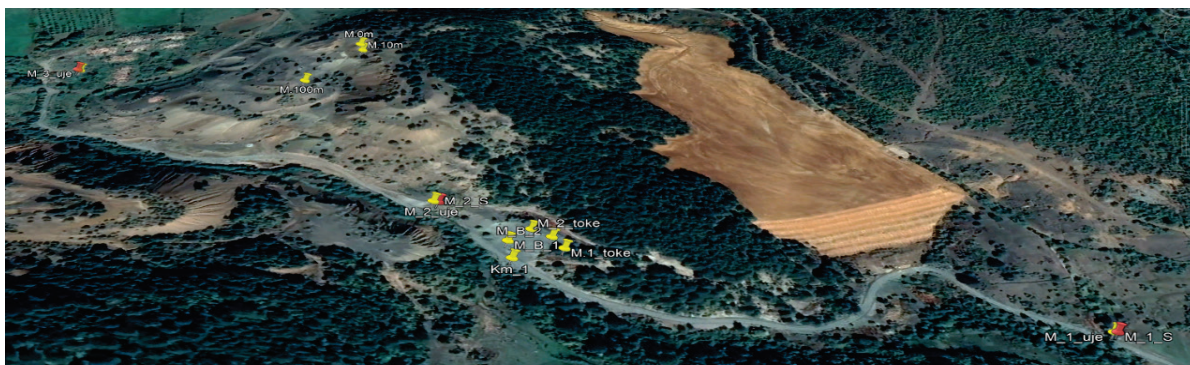
Figure 1. Located area of Rehova copper mine

Soil sampling, preparation and analyses: In July 2023, 16 surface soil samples (0-30 cm) were collected from the different locations according to the distance (0m, 10m, 100m and 1, 2, 3, 4, 5, 6, 7, 8, 9, 10km) from the first sample (figure 2). Subsamples of each soil were air-dried and ground to pass through a 2-mm stainless-steel sieve and are analyzed with METHOD 3051A [6]. The main characteristics of these soils are given in Table 1. The water content (w %), is calculated as the ratio of the weight of water to the weight of the solids in a given mass of soil and organic C by elementary analysis. Total contents of heavy metals were determined by the mineralization of soil samples in the solution of aqua regia (HCl and HNO3) in the ratio (3:1). The metal concentrations in the extracts were measured by Atomic Absorption Spectroscopy.
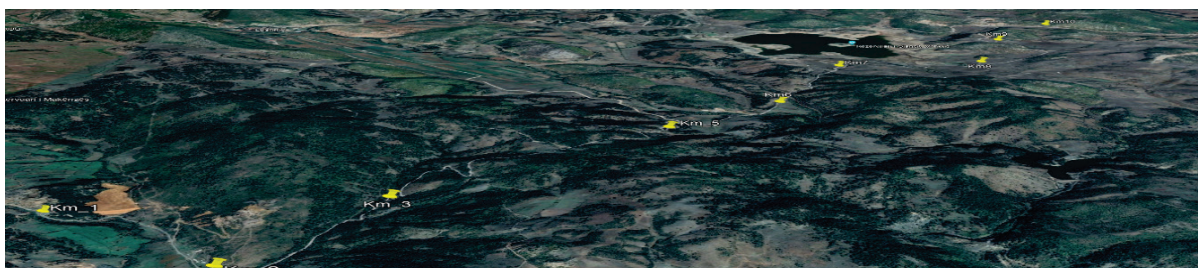
Figure 2. Samples locations

Table 1. Chemical-physicals characteristics of the studied samples

No. Soil Sample	W% %	Organic C mg/kg	N- tot mg/kg	P-tot mg/kg	K-tot mg/kg	Ca mg/kg	Mg g/kg
1	2.91	0.28	213.87	241.33	171.63	0.566	145.987
2	3.34	1.77	829.06	271.14	357.74	0.580	127.855
3	5.45	2.12	498.81	241.33	445.46	4.139	37.942
4	5.77	1.30	350.36	271.14	394.27	7.454	38.632
5	4.07	1.24	283.55	666.11	206.87	1.475	101.443
6	3.14	11.49	768.09	801.04	329.41	2.362	71.718
7	4.22	1.91	551.85	498.66	703.65	6.184	33.312
8	3.20	1.60	855.34	579.44	509.14	2.814	116.401
9	6.29	1.58	668.60	2585.66	515.71	0.437	33.317
10	15.60	1.28	1435.97	369.10	446.38	2.892	117.084
11	6.81	4.61	2122.69	498.59	180.43	6.255	129.686
12	3.86	1.10	742.04	382.41	648.13	3.254	132.194
13	6.62	2.25	1355.95	426.00	1914.34	6.037	86.645
14	7.46	3.10	1783.93	740.78	2068.81	8.745	87.306
15	11.49	0.66	650.74	974.88	1434	5.759	103.446
16	4.92	1.66	1169.54	501.04	4960.33	4.475	573.308
Mean	**5.946805**	**2.3715432**	**892.5252**	**628.0406**	**955.3942**	**3.96425**	**121.0173**

Results and Discussion.

The chemical-physical characteristics of the studied samples varied greatly between them (table 1). The total contents of heavy metals of the studied samples are presented in Table 2. We compared the total content of heavy metals in the soil samples with international and German threshold values. The mean contents of Cd, Cr, Cu, and Ni were above the permissible limits of the 86/278/EEC Directive (CEC 1986, BBodSchV (1999) and Average Earth Crust*. The mean contents of Pb were within values of international and German threshold values and the mean contents of Zn were above of permissible limits of Average Earth Crust*.

Table 2. Mean, international thresholds values, average earth crust (mg/kg) of heavy metals.

No. Soil Sample	Cd mg/kg	Cr mg/kg	Cu mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg
1	7.545	120.415	947.73	84.02	7.502	99.593
2	6.876	91.439	1319.85	54.87	6.725	111.355
3	3.864	34.615	60.87	87.22	3.363	39.399
4	4.400	52.058	77.48	99.70	3.708	41.436
5	5.527	74.840	750.03	1.95	5.308	0.000
6	5.021	51.193	135.15	75.55	4.931	125.261
7	3.258	67.562	148.14	73.12	3.615	78.730
8	6.356	249.199	1571	492.80	10.957	336.407
9	4.774	329.547	75.7	388.27	9.426	69.074
10	6.425	1634.191	56.6	1732.54	4.390	76.981
11	5.160	932.096	47.05	1147.71	8.698	72.123
12	4.715	875.991	39.88	974.06	8.141	61.445
13	4.956	328.835	145.9	630.72	6.445	73.955
14	4.327	774.169	62.22	778.59	6.508	76.686
15	4.327	486.301	53.38	1252.56	2.961	71.823
16	3.048	82.468	76.98	111.03	5.073	77.297
Mean	**5.036204**	**386.55753**	**347.9975**	**499.0434**	**6.109406**	**88.22278**
86/278EECDirective[1]	3	150.000	140	75	300	300.000
BBodSchV[2]	1	60.000	40	50	70	150.000
Average Earth Crust*	0.98	85.000	25	44	17	71.000

[1]CEC (1986); [2]BBodSchV (1999); *Rudnick and Gao (2005) [7,8,9]

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PLANTS TO REDUCE HEAVY METALS FROM INDUSTRIAL WASTEWATER

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The wastewater of industrial processes is considered as an important source of heavy metal pollution. If discharged without treatment, these effluents may cause harm to human health and the environment. Many plants are known for their potential to absorb heavy metals from air and soil, but so far very few plants have been used for the removal of heavy metals from wastewater. This study will be focused on the treatment of industrial wastewater, specifically the removal of heavy metals from the wastewater discharged from industries using natural processes. Plants will be used in different forms and conditions, in order to achieve the best possible results. The achievement of the effectiveness in reducing heavy metals in industrial wastewater through plants will be a sustainable natural solution that will contribute to the advanced treatment of wastewater in particular and generally to the reduction of negative impacts on the environment.

Key words: *industrial wastewater, heavy metals, plants*

BACKGROUND HEAVY METAL LEVELS IN SOILS DERIVED FROM METAL-RICH PARENT MATERIALS IN ALBANIAN REGIONS

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Abstract: This study has established fundamental background values for total heavy metals (aqua regia extractable) in soils originating from metal-rich parent materials, with the intention of providing pivotal benchmarks for soil quality standards. Our database comprises data from 27 soil samples collected in metal-rich regions across Albania, sourced meticulously from scientific papers and study reports. Background concentrations for Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn), and Cobalt (Co) were defined as antilog of the median values and are expressed in milligrams per kilogram (mg kg^{-1}) as follows: 2.83 (Cd), 438.86 (Cr), 44.00 (Cu), 1160.61 (Ni), 74.00 (Pb), 94.35 (Zn), and 112.62 (Co). Serpentine soils are recognized for their elevated levels of total heavy metals, including Ni, Cr, and Co. In assessing soil contamination, we meticulously compared the measured heavy metal levels to these newly defined background values. Notably, our analysis revealed that 6 soil samples exhibited heightened Cd levels, 15 soil samples displayed increased Cr levels, 8 soil samples demonstrated elevated Cu levels, 12 soil samples showcased heightened Ni levels, 10 soil samples had increased Pb levels, 9 soil samples presented with elevated Zn levels, and 9 soil samples exhibited higher Co levels, collectively indicating contamination resulting from anthropogenic sources. These newly established background values serve as critical markers for precise soil quality assessment and underscore the urgency of implementing targeted remediation efforts to alleviate heavy metal contamination in these environmentally sensitive regions.

Keywords: Background values, heavy metals, soil quality, contamination, metal-rich soils.

MAGNETIC-BIOCHAR-CLAY COMPOSITE AS AN EFFICIENT ADSORBENT FOR POLLUTANTS IN WATERS

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Abstract

Availability of clean water free from toxic substances and the general degradation of surface water quality in Albania are issues of serious concern especially as the country aims to join the European Union (EU). Toxic metals and organic contaminants are notorious, and recent Ishmi river monitoring data show that the "3Cs" (Cd(II), Cr(VI), and Cu(II)), ibuprofen and naproxen are predominant. Thus, the elimination of these contaminants from effluents is of high importance. In this study low-cost adsorbents which include dried biomass of grape cluster stalk (GC), feldspar clay (FLC), magnetic nanoparticles (MNP), magnetic-biochar (MB) and biochar-clay (BC) were combined in different ratios to prepare the composite magnetic-biochar-clay (MBC). The adsorbents were characterized and employed in sorption experiments. Sorption data showed that MBC composite exhibited over 370, 201 and 122 % removal efficiency for Cd(II), Cr(VI), and Cu(II), respectively, compared to the GC biochar, while FLC showed no significant sorption. The removal of Cr(VI) was enhanced when the sorption was performed with all three metal ions in the same solution, suggesting a co-operative sorption effect. The Pb(II) ions exhibited higher removal efficiency on MBC over GC biochar and FLC. Another study using these adsorbents for the removal of the pesticide terbuthylazine (model organic compound), showed that the BC exhibited an efficiency of 67% compared to MBC (60%), but a major shortcoming of the BC is that it has no magnetic property and is difficult to remove from solution after the sorption process. Thus, in addition to easy separation from water after the sorption process, the MBC adsorbent has the potential to effectively adsorb Cd(II), Cu(II), Cr(VI), Pb(II) and terbuthylazine from contaminated water.

Key words: *emerging contaminants; adsorption; water treatment; low-cost adsorbents; feldspar; grape cluster stalk*

Introduction

The quality of surface water in Albania has become a matter of increasing concern, particularly as the country strives to align with European Union standards (Water Framework Directive, Marine Strategy Directive) [1], [2]. Surface waters, especially when impacted from urban life as in the case of Tirana and surrounding areas (more than one million population) are a sink for various contaminants [3], [4]. Toxic metals, pesticides, and pharmaceuticals have been reported in low- to middle- income countries with poor water treatment infrastructure [5] and represent a threat to biota and the general environment due to their toxicity and persistence [6], [7], [8]. Most current treatment methods are expensive, cumbersome, and not suitable, especially for low- to middle- income countries [8], [9]. Thus, there is a need for designing and implementation of low-cost composites to remove these contaminants.

Materials and Methods

Adsorbent preparation

Low-cost adsorbents including dried biomass of grape cluster stalk (GC) and feldspar clay (FLC) were cleaned, washed and dried, while the magnetic nanoparticles (MNP) were prepared by co-precipitation of Fe(II) and Fe(III) [9], [10], [11]. The magnetic-biochar (MB), biochar-clay (BC), and magnetic-biochar-clay (MBC) were prepared by charring pure or varying ratios of the pristine materials [10]. The GC and/or FLC and MNP were mixed in NaOH solution for 2.5 h, centrifuged for separation of the adsorbents, dried overnight at 80 °C, and calcined under limited air for 2 h at 500 °C by gradual increase of ≈15 °C/min. The calcined adsorbents were sieved through a 1 mm sieve size, washed several times with Milli-Q until neutrality, dried at 40 °C over night, and preserved for further use.

Adsorption experiments

Stock solutions (1000 mg/L) for Cd(II), Cr(VI), and Cu(II), and 500 mg/L Pb(II) and terbuthylazine (TBA) were used to prepare working solutions in Milli-Q water for the sorption experiments. Adsorbent mass of 20 mg in 30 mL solution volume for the "3Cs" and 15 mL for Pb(II) and TBA were employed. The mixture was agitated at 200 rpm for 24 h at room temperature (20 °C). Concentrations of 2 mg/L (TBA) and 5 mg/L ("3Cs") were employed. Samples were filtered with 0.45 PTFE filters and measured on ICP-OES (metals) and HPLC-UV (TBA).

Results and Discussions

Characterization data showed that the composite exhibited marked improvements from the pristine individual adsorbents such as high porosity and better structure (Fig. 1 a-f). Sorption results showed enhanced removal efficiency on MBC 1:2:1 and MBC 1:3:1 of over 370, 201 and 122 % for Cd(II), Cr(VI), and Cu(II), respectively, in comparison to the BC (Fig. 2 a), while FLC

had no sorption for Cd(II) and Cr(VI), but slightly for Cu(II) (Fig. 2 c). The adsorption of Cr(VI) was enhanced when adsorption was performed with all 3 "Cs" ions in the same solution (Fig. 2 b and Fig. 2 c). Both GC and MNP exhibited the highest efficiencies for Cr(VI) and Cu(II) (Fig. 2 b) but reuse, bleeding, and high cost hinder the application of these adsorbents. For the TBA sorption, BC (1:1, 2:1 and 3:1) composite show slightly higher adsorption (67%) compared to MBC 1:2:1 and MBC 1:3:1 (60%) (Fig. 2 d). The Pb(II) was adsorbed in higher amounts on MBC 1:2:1, BC 1:1 and GC biochar with 75, 74 and 73% respectively, while FLC 42% removal efficiency (Fig. 2 e). Given the magnetic properties of MBC, their use and reuse is simple and cost efficient (Fig. 2 f).
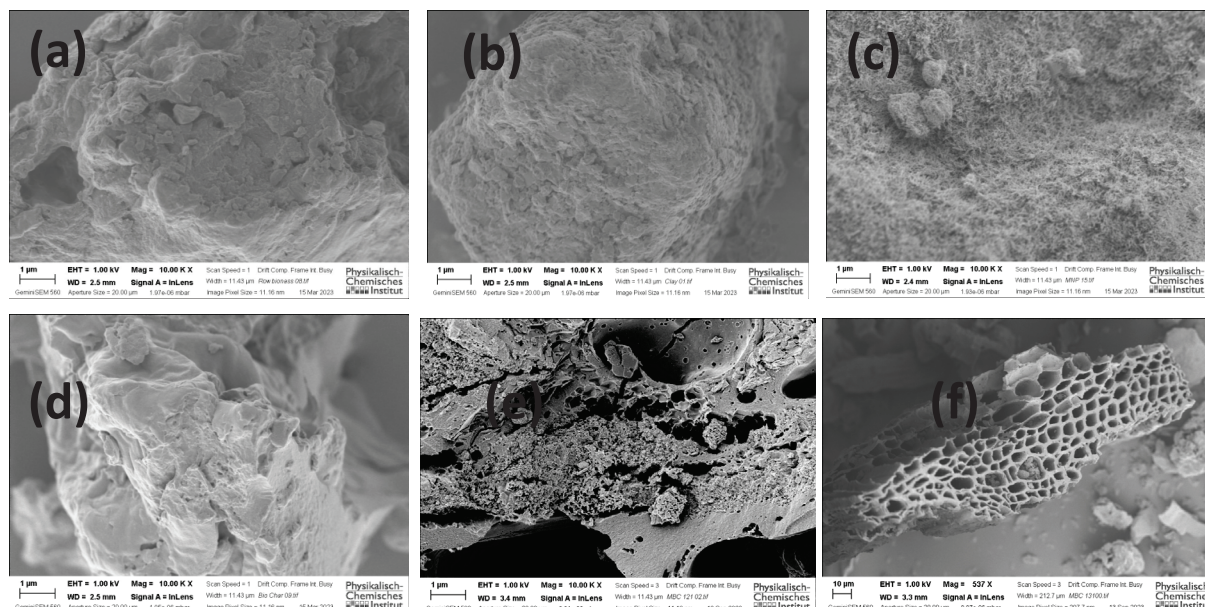
Figure 1. Scaning electron microscope images (SEM) of the (a) GC; (b) FLC; (c) MNP; (d) Biochar; (e) MBC 1:2:1 and (f) MBC 1:3:1.
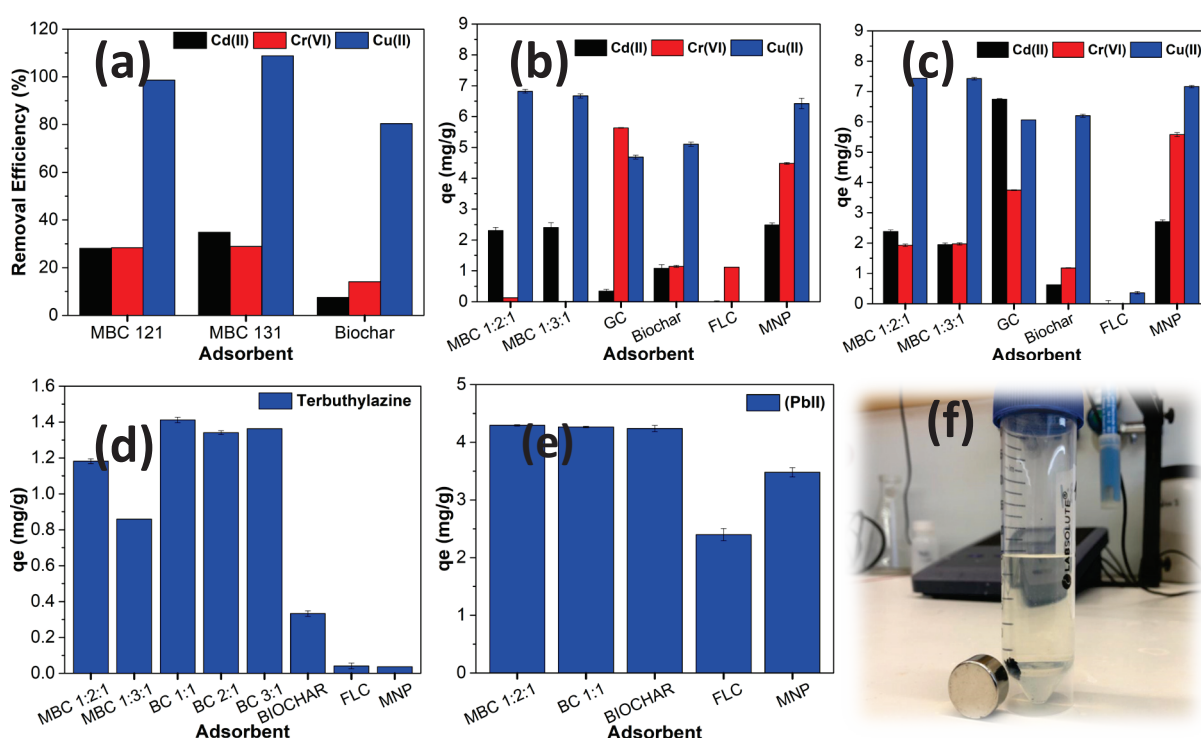
Figure 2. (a) Removal efficiency for Cd(II), Cr(VI) and Cu(II) on MBC 1:2:1, MBC 1:3:1 and GC biochar; (b) adsorption of Cd(II), Cr(VI) and Cu(II) in separate solutions (one cation/vial); (c) adsorption of Cd(II), Cr(VI) and Cu(II) when all cations were combined in solution; (d) adsorption of terbuthylazine; (e) adsorption of Pb(II) and (f) demonstration of magnetic separation of MBC adsorbents from solution after adsorption.

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ADSORPTION OF HEAVY METAL BY CLAYS IN AGRICULTURAL SERPENTINE SOILS

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Abstract

Albanian natural clays have the ability to adsorb heavy metals and decrease their availability in the soil and the possibility of take up and accumulate in agricultural plants. The aim of this study was to evaluate the adsorption ability of natural soil components such as clays to improve the agricultural serpentine soils. We use the clay extracted by soils collected in Prrenjas area (Domosdova field) and from Durres area (Rubjeke). Adsorption experiments carried out using metal solutions of Ni, extracted from serpentine soils from Tropoja region in Albania. We analyzed the concentrations of heavy metals before and after interaction with clay. The concentration of metals determined by the method of atomic absorption. We measured total and available metals (DTPA TEA CaCl$_2$, and Mehlich 1). Clay separation from other fractions did by sedimentation techniques to divide partices with size <2 µm. We evaluated effect of contact time on adsorption of metals ions; effect of pH on adsorption of metal ions; impact of the amount of adsorbent on adsorption of metal ions.

Result told us that clays from Durres and Prrenjas are the appropriate clay mineral for the removal of Ni. We evaluation the nature and the degree of Nickel in the agricultural serpentine soil. Assessment of various pH and contact times will give us information about adsorption behavior of clay. Based on the first results, the application of clays to reduce the mobility and availability of nickel is promising.

Key words: heavy metal, clay, extraction, adsorption; serpentine soil

Introduction

Soil and Water pollution are the most important environmental issues causing serious problems to humans and all living creatures.

Heavy metals and metalloids can accumulate in soil, with potentially toxic effects to human health and ecosystems, threatening the sustainable use and management of soil resources.

The concern of soils and waters contaminated with heavy metals coming from commercial fertilizers and / or irrigation with wastewater, mining and industrial activities is even greater when grown with food plants.

Clay minerals have attracted much attention for metal stabilization due to their high specific area, liming (pH-increasing) effect, excellent ion exchange capacity and abundant surface hydroxyl groups [2],[5],[6] strong mechanical stability, stable chemical properties, lower cost and environmentally friendly.

Adsorbents, mainly clay minerals, are readily available, inexpensive materials and offer a cost-effective alternative to conventional treatment [5] [6] . Bentonite is used as an adsorbent for removal of metal ions because of its high exchange capacity, larger surface area and adsorptive capacity for different organic and inorganic ions[3]. The present study deals with the use of clay material as an adsorbent for the removal of Ni(II), from solutions, as an alternative to existing commercial adsorbents. The effect of various parameters affecting adsorption behavior as contact time, initial metal ion concentration, amount of adsorbent and pH of solution have been investigated and data on adsorption isotherms have been presented.

2. Material and Methods

Will be selected for study, the Bentonite of the Prrenjas area, Fusha e Domosdoves [3],[4],[7],[1] and clay fraction dominated by smectite (65%) collected from Rubjekë (Durrës) (19°30'39" East and 410 11'51" North)

Will be analyze the concentrations of heavy metals before and after interaction with clay. The concentration of metals will determined by the *method of atomic absorption.*

Will be analyze the concentrations of heavy metals before and after interaction with clay. The concentration of metals will determined by the method of atomic absorption.

Clay separation from other fractions will do by sedimentation techniques to divide silicate minerals with size <2 µm.

We will measure total and available metals (DTPA TEA CaCl2, Sr(NO3)2, waterextraction).

Batch Technique of Determination of Adsorption Equilibrium

1.Effect of contact time on adsorption of metals ions

- The amount of adsorbent will be 2g/l (0.1g/50ml)

- pH = 5.8
- the temperature during the experiment will held 30oC
- contact time from 10 to 240 minutes.
- Concentration of ions in solution up to 12 mg/l.

2. Effect of pH on adsorption of metal ions.

- the amount of adsorbent will be kept 2g/l (0.1g/50ml solution)
- temperature during 30oC
- contact time 120 minutes for metals,
- pH of solvents was changed by 1-10 being adjusted with NaOH and HNO3.
- The concentration of ions in the solution up to 12 mg/l.

Result and discussion

This study will clarify

- the dependence of the percentage of heavy metals like Ni, Cr, Zn and Fe that can be adsorbed and thus removed in significant amounts using cheapest clay material (adsorbent) from aqueous solutions
- the dependence of the percentage of metal ions adsorbed by pH
- the dependence of the percentage of metal ions adsorbed by the amount of clay.

Table 1. Concentration of Nicket total and available in serpentine and contaminated soils

Soil	Ni total	Ni available
Sampling stations	mg/kg	mg/l
Tropoje (serpentine)	1750	25.77
Elbasan (contaminated)	388	0.191
Prrenjas(serpentine)	2138	1.67

Total and available Nickel in soil

The concentration of Nickel total is high in serpentine soils of Prrenjas and Tropoje but it is lower in Elbasan where soil is contaminated by industrial activities. The available fraction of Nickel is higher in soil of Tropoja and it is lower in serpentine soil of Prenjas that is an clayl soil. The nickel available is lower in soil of Elbasan, a contaminated soil beeing in accordance with the findings of previous study [7], [1].

Absorption of Nickel ions from Durres clay at pH 5.8

$$q_e = (C_0 - C_e) \times V/m$$

q_e is the amount of adsorbed ions per unit of clay mass;

C_0 is the initial concentration of the ion in the solution (mg/l);

C_e is the concentration of ion equilibrium in solvent (mg/l);

V is the volume of the solution;

m is the mass of clay (g).

Table 2. Results obtained from the analysis of Ni ions (AA) before and after the adsorption process by clay of Durres and Prrenjas for different contact times and pH 5.8

clay	Time (min)	C_0(mg/l)	C_e(mg/l)	q=C_0-C_e(mg/l)	q_e(mg/g)	%Ni adsorber
Durres	30	9.3	8.6	0.5	0.25	5.37
Durres	60	9.3	8.6	0.7	0.35	7.5
Prrenjas	60	25	20.1	4.9	2.45	19.6
Prrenjas	90	25	19.2	5.8	2.9	23.2

Fig 1. The dependence of % Ni adsorbed as a function of contact time for Durres and Prrenjas will be presented in the figure:
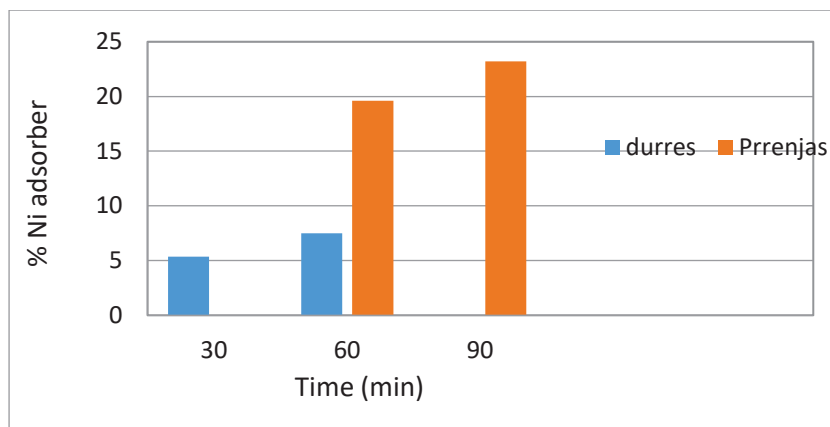
7.5% of available nickel is adsorbed by the clay of Durres and 23.2 % of Ni is adsorbed by the clay of Prrenjas

Conclusions

Result told us that clays from Durres and Prrenjas are the appropriate clay mineral for the removal of Ni. Assessment of various pH and contact times will give us information about adsorption behavior of clays that we are tested.

We valuation of the nature and the degree of Nickel in the soil from serpentine and ex industrial region of Elbasan.

Based on the first results, the application of clays to reduce the mobility and availability of nickel is promising.

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LONG-TERM OBSERVATIONS AND YIELDS IN A TILLAGE EXPERIMENT IN EASTERN AUSTRIA

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Abstract

A long-term field experiments testing the factors soil tillage (conventional tillage using a mouldboard plough, no-till, deep conservation tillage, shall conservation tillage) and two crop rotations was established in 1996 at the experimental station of the University of Natural Resources and Life Sciences Vienna in Raasdorf, east of Vienna. Long-term results show that no-till is a promising soil tillage method for the Pannonian area. With no-till fuel consumption and working time from the end of the last harvest to the establishment of the new crop can be reduced to about an eight. Means of long-term winter wheat did not differ with no-till tending to perform better under dry conditions (due to less unproductive soil water loss through evaporation) but performing not as good under wetter conditions. No soil disturbance in no till resulted in a higher accumulation of nitrogen, phosphorus and potassium in the uppermost soil layer over the years. In no-till, soil biological activity is increased as the higher abundance of earthworms show.

Keywords: Tillage, crop rotation, yield, nutrient stratification

EXPLORING THE NOTION OF "LANDSCAPE" IN ALBANIA: LEARNING FROM DIFFERENT APPROACHES IN LANDSCAPE DESIGN EDUCATION

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Abstract

Although the word landscape is widely used in the Albanian language today, its origin traces back to Latin roots, making its integration into our everyday vocabulary a relatively recent phenomenon. It is unclear when or how this word entered the Albanian language for the first time. However, in the period between the two world wars, the word landscape became present in the written Albanian language due to a wave of Albanian youth pursuing higher education in Italy and France. A pivotal moment for landscape architecture in Albania occurred in 1937 when the Italian landscape architect Pietro Porcinai designed the royal palace's park in Tirana. Porcinai can be considered the first landscape architect in Albania. Regrettably, this progress was impeded in the post-World War II era, as the communist regime disengaged educational ties with the Western world. Albania's first university-level landscape architecture programs only took root after 2010, affording us a unique vantage point to learn from more established nations. This paper embarks on a concise journey through the experience of landscape architecture education in Albania and conducts an in-depth exploration of four distinct clusters of nations: those with Latin, English, Germanic, and Far Eastern linguistic traditions. Through a thorough comparative analysis, we derive valuable insights and formulate practical recommendations to identify the best-suited education model for Albania. Our study aims to illuminate the path ahead for landscape architecture education in our country, capitalizing on the lessons learned from our global counterparts.

Keywords: languages, history, traditions, models, education

Introduction

Although there are descriptions of landscapes in ancient paintings, the concept of landscape is reported to have been first used in the 4th and 5th centuries, initially in the Far East as an art of painting and later in Northwestern Europe and Britain. It was meant to refer to a system of spaces transformed by humans into usable land areas, such as delimited plots but not necessarily enclosed by fences or walls (5). So, the first use of the word landscape had the meaning of a delimited territory that was transformed to a certain degree by man for the purposes of use as a residence or economic activity.

The present-day form of the word with its scenic connotation first appeared in the 15th century when the term "landschap" was introduced by Danish painters to refer to paintings of terrestrial nature or pastoral scenes. Afterward, during the 16th century, it spread throughout Western Europe. This meaning of the word "Landscape" was first encountered in Britain in 1598 (5). Thus arose the second use of the word landscape to discuss a new painting genre. Although, the term landscape in the original Latin languages is more related to the subject and genre of painting than to the meaning of spatial planning.

In the 18th and 19th centuries, the word *landscape* gradually changed in meaning. At this time, we have a shift from the painting of a view to the view itself. Painters began to go out into the field more and more and discover beautiful scenes based on the criteria of landscape beauty defined by critics and artists. This change also transformed the design of gardens and parks as designers abandoned perfect geometric shapes by shifting to naturalistic forms so that gardens and parks resembled the pastoral landscape. As a consequence, landscape gardening was born. The 18th and 19th centuries mark the period when painting became closer to landscape design.

In the 20th century, several developments in science and society altered this relationship again. Therefore, landscape design and painting took different paths in the second half of the 20th century. Knowledge about ecology and environmental conservation became part of the professional background of landscape architects. As an emerging consciousness, the protection and management of the landscape began to be seen as more important than the design of picturesque parks. As a result, landscape architects no longer turn to painters for inspiration, while painters seem to have lost some interest in producing conventional landscapes (6). The educational system through landscape-oriented disciplines is determinant in these shifts. During this time, plenty of new landscape architecture departments were established globally. They adopted diverse approaches toward "landscape" looking from various perspectives and enabling a better exploration of landscape potentials to inspire solutions against emerging societal challenges.

While the global scale picture of the evolution of the "landscape" notion is more transparent, it is still unclear at local levels of developing countries like Albania when and how it was introduced. Furthermore, the international background in landscape architecture education is vital to better understand, promote, and improve the newly established programs in developing countries. This study aims to bring insights from Albania by revealing when and how the "landscape" notion locally emerged. Furthermore, we discuss the basis, potentials, and challenges of Albania's newest and only landscape architecture program.

Material and methods

The primary materials of this study are publications and documents of the 19th and first half of the 20th century regarding the use of the word landscape in the Albanian language. For this purpose, several searches are done in the National Library of Albania, Milan University and Polytechnic University of Milan Libraries. Also, the internet archives (https://archive.org/) and the Marubi archive in Shkoder, Albania, have been other sources of information.

The experiences of different countries in Landscape architecture education are studied through the publications of professional organizations like American Society of Landscape Architects[1] (ASLA), Landscape Institute[2] (LI), International Federation of Landscape Architects[3] (IFLA), European Council of Landscape Architecture Schools[4] (ECLAS) etc.

Results and Discussion

The word landscape in the Albanian language and landscape architecture education in Albania

The word landscape seems like a not highly complex word that refers to something we think that we understand, but if we stop a little and do a simple analysis, we can find that this word carries distinct aspects for each of us. Although it is widely used in the Albanian language, it is relatively new and derived from Latin languages. It is not very clear when and how this word entered our language for the first time, but based on our research, the following hypotheses are constructed:

1.   In the 19th century and the early 20th century, a process of recognition and rediscovery of the Balkans by some European countries can be observed (7). It can be appreciated that Edward Lear, through his landscape paintings, laid the foundations for what can be called the artistic journey of Europeans in Albania. This was when landscape painting experienced a revival in Europe, and landscape painters were more oriented toward recognizing and depicting natural beauty and everyday life. English travelers, to communicate in the territories of the Ottoman Empire, generally used the French, Italian, or Latin language because English was much less known (2).

2.   It is known that especially the Northwestern part of Albania has continuously had Venice's presence and cultural influence. According to Indro Montanelli in his publication "Albania una e mille" (4), the influence of the Italian language in early 20th-century Albania was significant. In 1856, the "Marubi" Photo Studio was established in Shkodër by the Italian painter, sculptor, and architect Pietro Marubi. Closely connected to the Marubi family was the photographer and painter Kolë Idromeno (1860-1939). Kolë Idromeno is considered the first landscape painter in Albania. In 1875, he studied at the Academy of Fine Arts in Venice, and upon his return to Albania, he became one of the promoters of the art of landscape painting[5].

3.   During the 19th century, the word "peizazh" (landscape) was borrowed from French into the Turkish language as well. Therefore, another possibility for its introduction into the Albanian language should be considered through scholars in schools and universities of the Ottoman Empire in the latter half of the 19th century and the early 20th century.

4.   Nevertheless, in the period between the two World Wars, the word "peizazh" (landscape) was present in the written Albanian language, mainly because a considerable number of young people pursued higher education in Italy and France. Thus, this word entered our language primarily as a term in both art and geography.

5.   In 1937, the Italian landscape architect Pietro Porcinai proposed a landscape design for the Royal Palace in Tirana (3). Pietro Porcinai can be considered the first landscape architect in Albania, and this project marks an essential event for landscape architecture in our country. Unfortunately, this significant event did not continue in the years after World War II, as the communist regime severed educational ties with the Western world, and the specialists in gardens and parks trained in Eastern schools were referred to as horticultural or greenery engineers.

Indeed, the word landscape in the Albanian language remained primarily a term used by painters, geographers, and writers for quite some time. However, in the 1980s and 1990s, with the introduction of ecology into universities, it also became a term in environmental sciences. Perhaps the strong influence of environmental sciences during this period, especially at the Agricultural University of Tirana, led to the subject of gardens and parks in the horticulture department being mistakenly called "Architecture of Environment" for a period of time. Only in 2010 did it receive its correct name, "Landscape Architecture" (8; 10).

Especially after the approval of the European Landscape Convention and the expansion of university studies in landscape architecture at the Agricultural University of Tirana, landscape has become increasingly an area of academic interest for a wide range of disciplines (8). This has been further enhanced by adopting the law for Albania's accession to the European Landscape Convention in 2016 and the growing public awareness about the importance of the environment in general and public spaces in particular.

Exploration of four distinct clusters of Landscape architecture education

Being relatively late in landscape architecture education, Albania has the advantage of learning from other countries' experiences. Studying such experiences worldwide, four distinct clusters are created, and some valuable features are underlined.

Italy and France have a significant history of garden design but a difficult way moving from garden design via horticultural engineering to landscape architecture. The importance of landscape architecture practices is not very clear. People, authorities, architects, and urban planners usually believe it is engaged in "garden design" and beatification—no departments of Landscape architecture (though some translate "paysagiste concepteur" as Landscape architect). Despite internationally accepted educational standards in Italy, the dominance of the "architetto integrale" continues. In Albania, the impact of the idea of landscape architecture as garden design and beatification is present.

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[2] https://www.landscapeinstitute.org/
[3] https://www.ifla.org/
[4] https://www.eclas.org/
[5] Marubi Archive, Shkoder, Albania

Norway and Germany have the oldest Landscape architecture programs in Europe. In both countries, the programs started in Agricultural schools. There were debates about it. Especially in Germany, professionals working in garden design faced the superiority of the architects' academic/administrative titles. Today, the profession and education have a strong position and enjoy great respect in academia and society. Different schools try to optimize the unique qualities of each school and increase collaboration among architecture, landscape architecture, urbanism, environment, and design.

In the *USA and Great Britain,* Landscape architecture programs have both rural and urban roots. The first landscape architecture program at Harvard Architecture School not only reflected the nation's increasing urbanization but also went hand in hand with the foundation of ASLA in 1899. Education in landscape architecture is strongly linked with the professional standards and regulations set by the private sector. Professional associations have played a vital role in developing landscape architecture curricula and standards since the beginning (9). The profession and education have a strong position and enjoy great respect in academia and society.

China and Japan are among the countries with the oldest tradition and history of landscape design (1). A deep respect for nature is a characteristic feature of landscape architecture education in these countries. Landscape design is not done by one single and independent discipline, but frequently, it is carried out collectively by professionals who combine art, science, and literature.

Conclusions

In conclusion, we can say that the development of landscape architecture discipline in Albania is still in its infancy. Thus, Albania can learn from the experiences of other countries and consolidate the new undergraduate and graduate landscape architecture programs. Some of the lessons that could illuminate the path ahead for landscape architecture education in Albania are:

(i) Reinforce the Department of Horticulture and Landscape Architecture at the Agricultural University of Tirana; (ii) support landscape architecture programs through both natural sciences and design disciplines; (iii) improve the credibility of the program within the whole educational system; (iv) promote a strong position and great respect for landscape architects in academia and in society; (v) adopt international standards of landscape architecture education; (vi) promote the role of landscape architects and provide space for their more significant contribution to the developments of the 21st century; (vii) establish professional associations and assist them in identifying what the profession aims to reach at the national and international level.

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PUMPKINSEED (*LEPOMIS GIBBOSUS*, LINNAEUS1758) PRELIMINARY BIOLOGICAL CHARACTERISATION IN AN ALBANIAN LAKE (DEGA LAKE, BELSH, DUMRE, ELBASAN)

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1. Introduction

Generally, non-native species (NNS) have moved, survived, and reproduced in a variety of settings, exerting pressure on native wildlife. Such species are known to have negative environmental, economic, and societal consequences, such as changes in native species populations, disease transmission, and severe irreversible changes in the natural environment [1]. As a result, worldwide treaties, efforts, rules, and conservation methods have been formed to prevent their spread and to remove and manage established populations in a timely manner, therefore maintaining biodiversity [2].

The North America fish species, commonly known as pumpkinseed (*Lepomis gibbosus*), represents a small-bodied, warm-water fish that has been introduced firstly in Europe as an ornamental fish in the 19th century from North America [3].

In the Balkans, pumkinseed fish, it was accidentally (with a high level of uncertainty) introduced into some trans-boundary river systems in central North Macedonia and northern Greece, as well as into Lake Kastoria, Prespa (north-west Greece), River Alfios (Peloponnesus) and Lake Tavropos (central Greece), while in Albania, it was introduced in 1994 [4]. This inhabitants of both lentic and lotic environments reported to be found in several Albanian aquatic ecosystems, which are represented by Drini basin, Prespa lakes, Mati river, Ishmi river, Erzeni river, Shkumbini river, Semani river and Vjosa river [4, 5].

The aim of the study is not only to add another country to the long list of European countries, where pumpkinseed has shown the highest establishment success, but also to start evaluating the growth and abundance, which can be important for the interactions with local fish species.

2. Material and Methods

The presented scientific work was conducted in one of the lakes of the Dumre region (mainly known as Belshi lakes), which is represented by the Dega lake. It is located in the territory, which belong to the Municipality of Belsh, inside the Elbasan County of the Republic of Albania, as it is shown in the Figure 1 A. In the Figure 1 are also shown photos of species individuals fished in the lake (Figure 1 B).

The weight and total length (TL) was determined for every individual fished by using fixed fishing net once a month, while it was registered the abundance of the other fished species.

A regression analyses was performed by using the Excel program of Office Package, where it was also possible to calculate a and b coefficients, respectively. It was also conducted the T-test for equal and/or unequal variances in the comparisons between average TL and weight values, respectively.
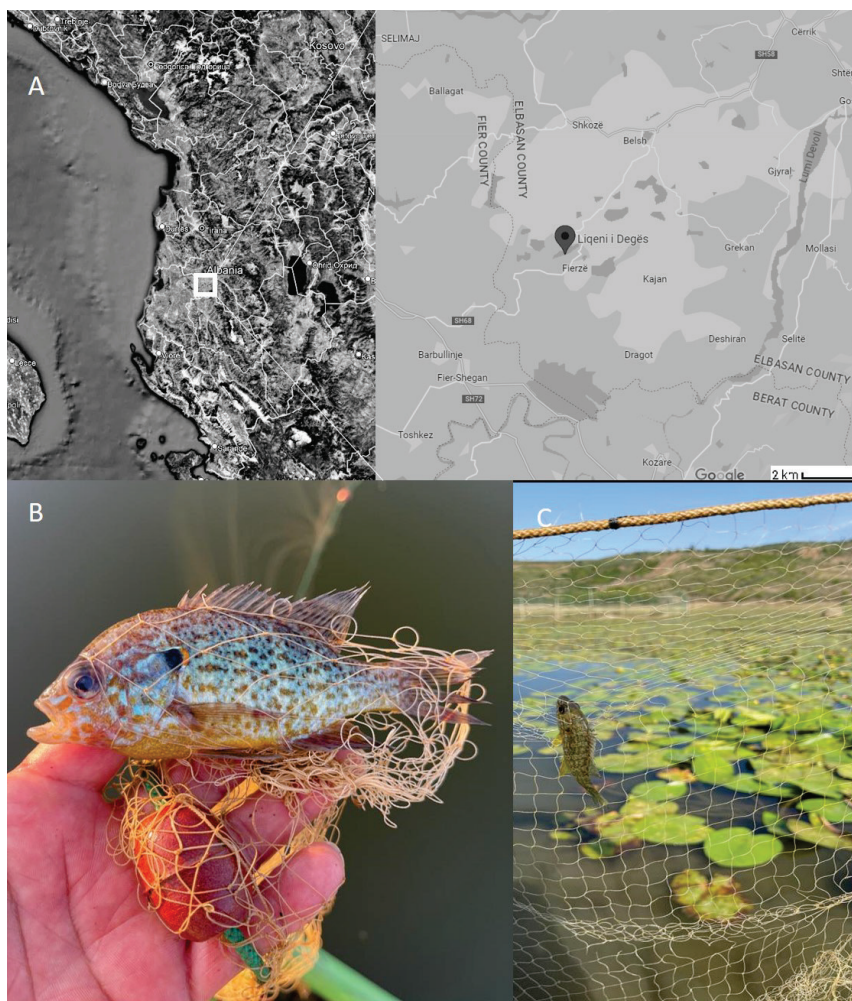
Figure 1. Geographical location of the area of study, represented by Dega lake in the Municipality of Belsh (A) and photos of the species (B) fished in this lake.

3. Results and Discussion

Pumpkinseed favors shallow pools with minimal water movement and plenty of flora, and it dwells in temperatures ranging from 4 °C to 30 °C [6]. It thrives and reproduces in a wide range of habitats [7], and its presence may have a significant influence on the biodiversity of the ecosystems where it settles [8]. Pumpkinseed breeding season begins as the water temperature rises, which is normally approximately 20 °C, however the duration and particular time may vary depending on the location [9]. Males can reproduce with many females in succession. Following spawning, the male guards the eggs in the nest and then defends the juveniles until they absorb their yolk sac [10]. The species normally achieves sexual maturity at the age of 1-2 years [10].

In terms of feeding preferences, the pumpkinseed prefers worms, crustaceans, and insects. It also eats small fish, fish eggs, and other vertebrates [11]. There are significant differences between North American and European populations of pumpkinseed [12].

A regression analyses was conducted in order to show the relations between length and weight of the measured pumpkinseed individuals (Figure 5). As it shown in the graphic, the weight increased exponentially with the increase of the total length of the fish. The estimated a and b coefficients were 0.045 and 2.467, respectively. The b coefficient resulted to be lower than 3, which indicate that the fish growth is negatively allometric. It indicates also that the large specimens have changed body shape, i.e., become more elongated, or the small specimens were in better nutritional condition at the time of sampling [12].

The chart shows the equation $y = 0.0449x^{2.4671}$ and $R^2 = 0.9465$, with axes labeled "Weight" (y-axis) and "TL" (x-axis).
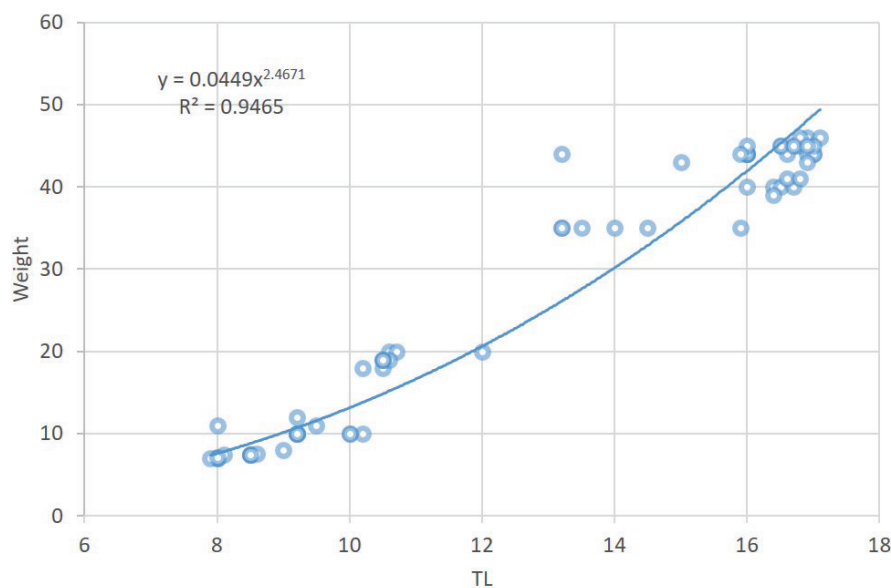
Figure 5. Graphical presentation of pumpkinseed length-weight relationship.

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ANALYSIS OF VARIATIONS AND TRENDS OF CLIMATE CHANGE IN TIRANA IN ORDER TO ADAPT AND INCREASE THE RESILIENCE OF AGRICULTURAL SYSTEMS TO CLIMATE CHANGE

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Abstract

Climate is among the main determining factors for agricultural production, as it determines the level of productivity and its sustainability. The functioning of agricultural systems in particular depends on two main climatic gradients, which are the temperature trend and the amount of rainfall. Their fluctuations in recent years, also influenced by the pressure of climate change, are visible. These fluctuations lead to extreme climate events such as high summer temperatures in the form of heat waves; pronounced lack of precipitation for long periods of time, recorded as pluviometric deficit, accompanied by the phenomenon of drought; short and intense rains accompanied by floods, especially in autumn and spring; sudden frosts in early autumn and late spring, which pose a risk to agriculture, with significant agronomic, but also social-economic effects. Analysis of climate variability, especially thermal and pluviometric limits, can be done through climate indicators recorded at meteorological stations (specifically at the Agricultural University of Tirana Meteorological Station) and processing with contemporary methodologies. For our Meteorological Station, it turns out that there is an increasing trend in mean maximum temperatures, there is no increase in mean minimum temperatures and an increasing trend in mean temperatures influenced by the increase in mean maximum temperature, while it is clearly evident that the rainfall has a downward trend, with an obvious seasonal change in its distribution. The area of Tirana, which was taken into the study, is an area with a developed agriculture and diversity of cultivations. Analysis of climate variability and climate change phenomena in this area will contribute to the implementation of strategies and adaptation measures of agricultural systems, in order to increase the resilience and sustainability of agricultural production.

Keywords: temperature, rainfall, climate change, climatic zone, agriculture

1. Introduction

Agricultural activity is closely related and dependent on the climatic performance of the areas where this activity is carried out. Analyzing climate variations over time in these areas and documenting climate change is important as it creates opportunities to adapt agricultural systems and increase their degree of resilience. According to predictive scenarios [4], Albania is likely to warm up more and in the forecasts for the annual summer temperature change it can reach up to 5.3°C (4.6 - 6.0°C) by 2100, while there will be lower increases for winter temperatures and higher increases for spring. As for rainfall, the scenarios predict a possible decrease in seasonal rainfall compared to 1990 which is likely to decrease by up to -8.5% (47.4 mm up to -56.0), by 2050; and by up to -18.1% (94,9 mm up to - 89.7) within the year 2100. While the number of extreme rainfall events is expected to increase and the decrease of rainfall levels in general, will increase the number of consecutive days without rainfall (drought) which is likely to be greater in the northern part by 23 days and up to 15 days further south by 2100 compared to the baseline period 1960-1990 [8]. Agriculture can be considered as one of the causes of climate change, since it occupies the second place with 24% of emissions at the global level [4], but it constitutes the economic sector that suffers more from the effects of climate change than any other sector. Even in Albania, GHG emissions from the agricultural sector have increased by 4.7% between 2009 and 2019, and emissions from this sector are expected to increase further [9]. The area that will feel their negative effects the most is the Western Lowlands area, which is also the most agricultural and productive area in Albania. Lowland areas are characterized by a stable mean temperature of 14°C–16°C. Maximum temperatures can reach up to 21.8°C in lowland and coastal zones. The north, west and southwest regions in Albania experience the highest amounts of rainfall. Annual average rainfall is 1,430 mm; however, the spatial and seasonal distribution varies, with the majority of rainfall occurring during the winter months [1]. The implementation of climate change adaptation strategies in agriculture would first require analyzing the behavior in the short-term versus the long-term behavior of agricultural systems [6, 7] and secondly, the analysis of climate data at local levels to identify climate variations, especially for the two main climate indicators: temperature and rainfall, in order to recommend adaptive measures. In this study, the climatic variability of the area of Tirana is analyzed, referring to the main climatic indicators and their variations over time (temperatures and rainfall), measured and recorded at the Meteorological Station of the Agricultural University of Tirana, in order to highlight climatic fluctuations and the tendency of climate changes to take adaptive measures and increase the resilience of agricultural systems in the area of the Western Central Lowlands of Albania.

1. Material and methods

The study refers to the area of Tirana for the analysis of climate variability and the verification of climate change trends through the collection and processing of historical series of climate data and their digitization. The climatic data series were obtained from measurements and recordings made at the Meteorological Station of the Agricultural University of Tirana (41°21'43.57" N, 19°46'13.63" E) for a period of 14 years (2009-2022). The data includes the main climate parameters such as daily temperature levels (maximum, minimum and mean) and rainfall amounts. The statistical processing of the collected

information, in order to highlight the climate variability and climate trends in the area of Tirana (area of the Western Central Lowlands) was done by means of climate indicators. Their use also makes it possible to highlight climate trends in relation to climate change. For the analysis of climate variability and the determination of trends, based on the two main climate parameters, the following indicators by [2] were used:

- FD - Total number of frost days (days with absolute minimum temperature <0°C).
- ETR - Intra-annual extreme temperature range: difference between the highest temperature observation of any given calendar year (Th) and the lowest temperature reading of the same calendar year (Tl).
- GSL - Growing season length: period between when $T_{day} > 5°C$ for >5 d and $T_{day} < 5°C$ for >5 d.
- Tn90 - Percent of time $T_{min} > $ 90th percentile of daily minimum temperature.
- R10 - No. of days with precipitation ≥ 10 mm d^{-1}.
- CDD - Maximum number of consecutive dry days ($R_{day} < 1$ mm).
- R5D - Maximum 5 days precipitation total.
- SDII - Simple daily intensity index: annual total/number of $R_{day} \geq 1$ mm d^{-1}

The analysis of the variability and tendency of the indicators (intensity), which were used in the study and which also determine the climatic fluctuations, was done by means of the linear regression test [5].

2. Results and Discussion

Analysis of the variation of the thermal regime

In order to determine the trend and fluctuations of the mean maximum temperature, the graphic analysis of the data and the determination of trends by means of the linear regression test was made [5].

Mean maximum temperature

$y = 0.034x - 45.219$
$R^2 = 0.1648$
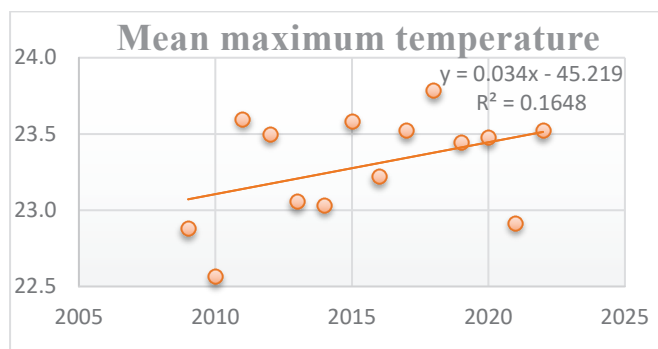
Graph 1. Determining trends in the mean maximum temperature

It results that in the area of Tirana there are fluctuations in the values of the mean maximum temperature around its mean values but with an increasing trend in recent years, which is given by the regression equation and the correlation coefficient (r=0.41) and which argues the fact that the mean maximum temperature has a noticeable upward trend in recent years in relation to the reference year (2009). This trend also coincides with the data provided by the predictive climate scenarios for the Mediterranean basin [3].

Mean minimum temperature

$y = 0.0959x - 181.63$
$R^2 = 0.4848$
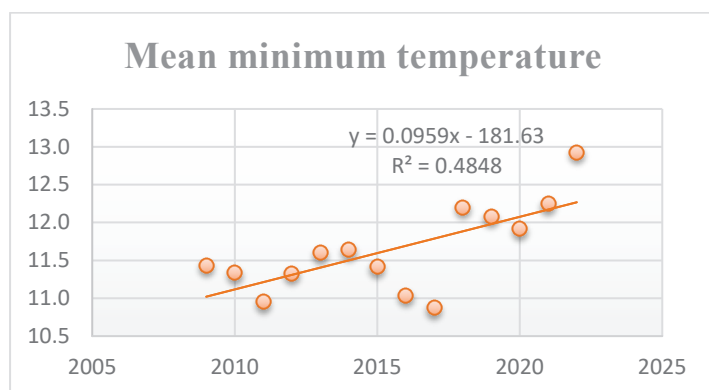
Graph 2. Determining trends in the mean minimum temperature

From the graphical analysis and the linear regression equation and correlation coefficients (r=0.70), it result that the minimum temperature in this area has a trend around its normal values, without any clear tendency expressed for its increase, in difference from the maximum temperature.
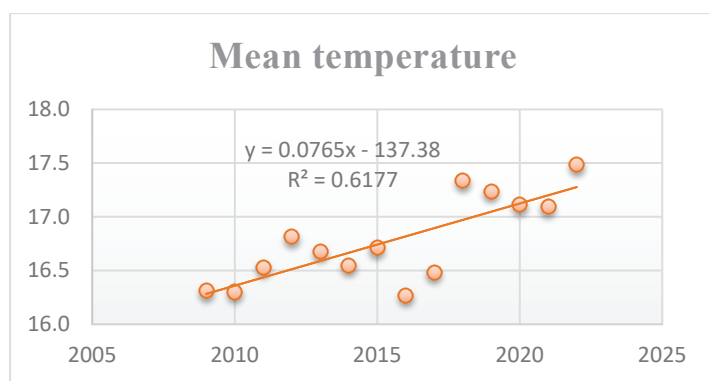
Graph 3. Determination of mean temperature trends

On the basis of the values of the linear regression equation and the correlation coefficients (r=0.79), it results that the mean temperature presents an obvious increasing trend. The variations and trends of the thermal climate regime was also confirmed from the analysis done by means of indicators of [2].

Table no.1. Values of thermal indicators considered for the period 2009-2022

	2009	2010	2011	2012	2013	2014	2015
FD	12	16	11	28	5	4	15
ETR	42	43.1	41.3	46.4	41	41.2	45.1
GSL	342	356	355	360	360	360	347
Tn90	54%	59%	53%	58%	57%	53%	55%

	2016	2017	2018	2019	2020	2021	2022
FD	10	19	9	14	9	11	6
ETR	43.6	49.7	37.5	45.3	40	44.3	42.5
GSL	361	348	360	344	352	360	360
Tn90	55%	55%	58%	57%	53%	55%	57%

The values of the indicator "Fd" result that in recent years it has a downward trend. From the values of the indicator "ETR" result that there are fluctuations in the temperature amplitude, which creates stress conditions in the plants. The values of the indicator "GSL" show that there is a tendency for the extension of the plant growth period, given that the period of the year with higher temperatures has been extended, especially during the autumn season. From the values of the indicator "Tn90" it turns out that this indicator has also slightly decreased, as a result of the slightly increasing trend of the minimum temperature level. The conclusion drawn in relation to the thermal progress in this area also coincides with the data of the predictive scenarios of climate change, where it turns out that Albania will be warmer [8].

Analysis of the variations of the rainfall regime

In order to determine the progress and fluctuations of the pluviometric regime in the area of Tirana, the graphic analysis of the data and the determination of trends by means of the linear regression test was done [5].
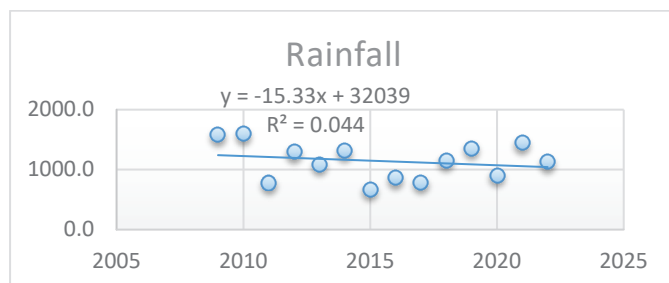
Graph 4. Determining the trends of rainfall for the period 2009-2022

The results of the analysis obtained through the regression equation test show that there is a downward trend in recent years, i.e. a decrease in the annual amount of the sum of rainfall. Analyzing the data using indicators of [2], results in the following values.

Table no. 2. The values of pluviometric indicators analyzed for the period 2009-2022

	2009	2010	2011	2012	2013	2014	2015
R10	60	48	25	45	35	45	16
CDD	30	33	50	50	31	19	80
R5D	116.7	148.9	69	130.2	114.3	131	145.8
SDII	13.8	12.7	10.4	15.5	10.9	11.8	11.2

	2016	2017	2018	2019	2020	2021	2022
R10	26	23	39	41	30	43	32
CDD	105	79	16	35	18	38	36
R5D	141.6	251.4	87.7	1718	109.9	193.5	216.7
SDII	13.1	14.9	10.1	15.8	14.6	20.4	17.2

The values of the indicator "R10" indicates that the rains have become shorter and more intense. The values of the indicator "CDD" have a slight increasing trend in recent years. From the values of the indicator "R5D" turns out that there is an increasing trend in the amount of millimeters of rain in 5 days, and the intensity of rainfall. The values of the indicator "SDII" have an increasing trend in its values, which proves that the rainfall has become more intense in recent years.

3. Conclusions

From the study it turns out that there is an increasing trend in mean maximum temperatures, there is no increase in mean minimum temperatures and there is an increasing trend in mean temperatures. The rainfall regime has a downward trend, have a marked seasonal change in their distribution and have become more intense in recent years. The results of this analysis also coincide with data evidenced by other studies from international institutions [8].

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ACCUMULATION OF NITRATES IN GROUNDWATER

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ABSTRACT

Nitrogen is an important nutrient for the aquatic life cycle but it can create significant problems when reaching excessive concentrations. The most important effects of N excess in surface water consist in harmful algal blooms, low oxygen, and contaminated drinking water. The most common form of N found in the aquatic environment are Nitrates. The Western Lowland of Albania is one of the areas that is highly affected from this problem due to the large amount of fertilizers needed for agricultural production and animal husbandry, in the groundwater an subsequently in the surface waters. This boost in the agriculture sector is coupled with an increase in the application of fertilizers and subsequently with an increased nitrogen emission from the agricultural areas. The purpose of this study is to quantitatively determine the leaching of nitrates as a result of agricultural activity into groundwater bodies. This study was carried out by setting up an experiment with 36 pots, where the forms of nitrate movement in the soil were analysed as a function of their source type and leaching intensity. Soil samples were taken at a depth of 0-30 cm in soils with a light, medium and heavy textural class, in the Lushnje region. The samples were taken in greenhouses soils that have been continuously cultivated with vegetables for short, medium and long periods of time. The samples were analyzed for nitrate levels in groundwater using field laboratory equipment. The results show a correlation between the nitrate content in the soil solution and the organic matter content in the soil. Ammonium nitrate and urea have produced almost the same levels of NO_3^- ions in the soil, indicating a rapid transformation of urea. Furthermore, the rate of organic matter mineralization can be an important source for the nitrate content in the soil solution.

Key words: Soil, textural class, pots, nitrates transformation.

1. Introduction

Nitrogen is an important nutrient for the aquatic life cycle but it can create significant problems when reaching excessive concentrations. The most important effects of N excess in surface water consist in harmful algal blooms, low oxygen, and contaminated drinking water. [7] [5] **(Wendland et al. 1994, Kunkel et al. 2004)**
Nitrogen (N) in the form of nitrate is a common pollutant in both surface and groundwaters. Nitrate-N can readily leach down beyond the root zone in agricultural soils and reach the ground and surface waters. At levels exceeding the permissible limits, nitrate-N makes the ground water unfit for drinking purposes. [1] (Bartley et al 2003)
Widespread pollution of water bodies by nitrate-N due agricultural intensification in the twentieth century in industrialized countries in North America and Western and Central Europe has been of major concern since early 1970s. [8] (Zadeh 2018)
Albania has seen in the last decades an intensification in agricultural landuse. This boost in the agriculture sector is coupled with an increase in the application of fertilizers and subsequently with an increased nitrogen emission from the agricultural areas. To tackle the problem the European council approved a holistic legislative framework (Council Directive of 12 December 1991) concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC) by aiming at the reduction of pollution caused by nitrates used in agriculture, and by defining certain steps for EU countries to take. **[4]**
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31991L0676&qid=1694523432877
Although the concern that increased application of mineral fertilizers is polluting both surface waters and aquifers is substantiated by observed correlations relating expanded use of fertilizers and nitrate leaching [3] [2] [Howarth et al 1996, **Donoso** et al 1999**], the direct impact of the application of fertilizers on the nitrate content of waters is difficult to ascribe precisely. Nitrate concentrations in groundwater may vary widely from place to place even with uniform farm management practices [6] [**Liu et al 2005**].**
The purpose of this study is to quantitatively determine the leaching of nitrates as a result of agricultural activity into groundwater bodies.

2. Materials and Methods

Soils from three different sites in the western region of Albania are used. In each sites, soil samples were collected inside of greenhouses under intensive vegetable cultivation. For each area, soil samples were taken at a depth of 0-30 cm. Each sample is representative of 15 sub-samples which are mixed with each other. We select three greenhouse soils with different textural classes. Soil samples were collected: One site in Qerret village – Sandy Loam Soil; One site in Këmishtaj village – Loam Soil and one site in Karbunara village – Silty Clay Soil.

The soil samples were then taken to the accredited laboratory of the Department of Environment and Natural Resources (LAME), where the samples underwent a laboratory processing process. The soil samples were air-dried, were sieves to pass a 2 mm sieve, and were used for analysing of physical and chemical properties as: pH - H_2O *(1:5 soil – water ratio)*; Organic matter *(Potassium dichromate method);* Total Nitrogen (*Kjeldahl method*); Available Phosphorus. *(Mehlich–3 Method)*; Soil Texture *(Hydrometer method).*

Some data on physical and chemical properties of the soil selected for this study are presented in **Table 1**.

Table 1. Physical chemical properties of selected soils.

Code	pH-H$_2$O	Organic Matter %	Total N	P available	Sand	Silt	Clay	Textural Class
			mg/kg		%			
Qerret	8.31	0.803	913.3	6.27	63.08	24.61	12.31	Sandy loam
Këmishtaj	7.86	2.67	2239.8	130.81	33.69	49.74	16.58	Loam
Karbunarë	8.91	1.286	1362.0	42.87	11.79	42.01	46.2	Silty clay

The data presented in **Table 1** show that the soils obtained in this study have a high variability in their physical and chemical properties.

This study was carried out by setting up an experiment with 36 pots, where the forms of nitrate movement in the soil were analysed as a function of their source type and leaching intensity. Distilled water was added to the pots and the soil was kept at Field Capacity. The experiment was conducted in 9 different variations with 4 replication each. For each soil texture (Light, Medium, Heavy), in one series, doses of Ammonium Nitrate (V1; V3; V5) were applied, while in the other series of soils (V2; V4; V6), doses of Urea were applied.

In the **V0_Vl variant - Sandy Loam Soil; V0_Vm variant - Loam Soil; V0_Vh variant -** Silty Clay Soil (Control Group), no doses of chemical fertilizer (Ammonium Nitrate or Urea) were applied, but distilled water was added instead. Distilled water was added to the pots and the leaching process was carried out in 2 replications. The samples were analysed for nitrate levels in groundwater using field laboratory equipment.

3. Results and Discussion.

The data on the amount of nitrates leached from the experimental variants are presented in **Table 2**.

Table 2: The nitrate ions (NO3-) content after soil leaching.

	Nitrate NO$_3^-$ (mg/l)								
	Sandy loam			Loam			Silty clay		
	V0	NH$_4$NO$_3$	CO(NH$_2$)$_2$	V0	NH$_4$NO$_3$	CO(NH$_2$)$_2$	V0	NH$_4$NO$_3$	CO(NH$_2$)$_2$
1st Leaching	4.05	3.45	3.05	15.88	66.80	67.90	21.75	81.50	83.50
2nd Leaching	4.03	40.75	39.75	42.0	81.25	82.25	23.65	60.75	54.75
1st +2nd Leach.	8.08	44.2	42.8	57.88	148.05	150.15	45.4	142.25	138.25

Sources of nitrates that leach and join the groundwater come from:

1. The process of ammonification and nitrification of organic nitrogen compounds in the soil.

$$R\text{-}NH_2 \Leftrightarrow R\text{-}OH + NH_4^+ \Leftrightarrow NO_2^- + 4H^+ \Leftrightarrow NO3\text{-}$$

2. Dissociation and transformation of Ammonium Nitrate and Urea added to the soil.

$$NH_4NO_3 \rightarrow 2NH_4^+ + NO_3^-$$

$$CO(NH_2)_2 + 2H_2O + H^+ \rightarrow 2NH_4^+ + HCO_3^- \text{ (Urea transformation)}$$

$$NH_4^+ \Leftrightarrow NO_2^- + 4H^+ \Leftrightarrow NO_3^- \text{ (Nitrification)}$$
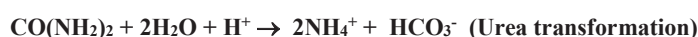
1. **Nitrates from organic matter of soils**

The data of the experiment clearly show that nitrates originating from nitrogen compounds in the soil (V0) are present in the groundwater that we have measured and in quantities that are closely related to the Total N content in the soil. (Figure 1)
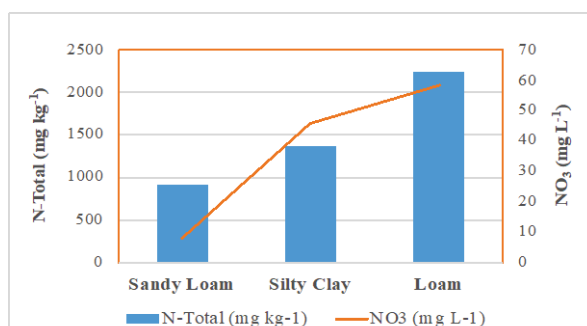
Figure 1. Nitrates sourced from soil organic matter

From the data presented in table 2, 8.08 mg NO$_3^-$ per liter were leached from Sandy Loam soil, 45.4 mg NO$_3^-$ per liter were leached from Silty Clay soil, and 57.88 mg NO$_3^-$ per liter were leached from Loam soil.

1. Nitrates sourced from Ammonium Nitrate and Urea added to the soil.

If we were to refer to the amount of leached nitrates originating from chemical fertilizers added to the soil, then from the total amount of leached nitrates we must subtract the nitrates sourced from organic compounds that we analyzed above. We have presented these results in Figure
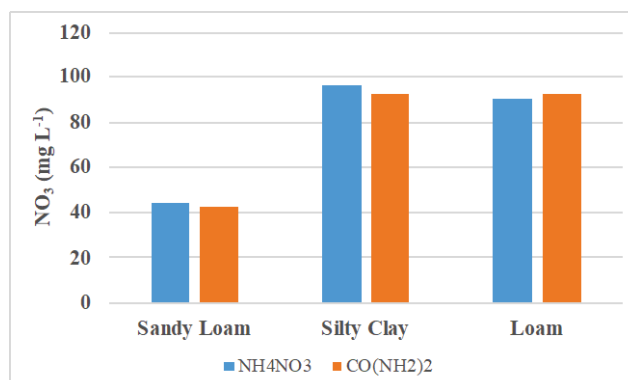
Figure 2. Nitrates sourced from chemical fertilizers

The results for Silty Clay and Loam soils clearly express the potential they have to leach Nitrates coming from chemical fertilizers. In both of these soils, the amount of leached nitrates is almost equal. While in sandy loam soil we need more data to clarify the lower amount of leached nitrates. Perhaps one reason could be the immobilization activity in the soil, which is related to the low presence of organic matter in the soil. This remains to be verified.

4. Conclusions

At the conclusion of this study, we reach some important conclusions:
Datas constitute important preliminary information for assessing nitrate behaviour in the studied soils.

1. The results show a correlation between the nitrate content in the soil solution and the organic matter content in the soil.
2. Ammonium nitrate and urea have produced almost the same levels of NO^{-3} ions in the soil, indicating a rapid transformation of urea.
3. Furthermore, the rate of organic matter mineralization can be an important source for the nitrate content in the soil solution.

These preliminary data are an important source of information for furthering the study

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PHOSPHORUS FIXATION CAPACITY IN SOME GREENHOUSE SOILS IN ALBANIA

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ABSTRACT

Although a lot of studies are conducted in Albania, little is known about the soil's capacity of P-fixation. Most of studies has been to know the level of available forms of phosphorus in agricultural soils. The objective of this study is to assess the capacity of some greenhouse soils for P-fixation. Capacity of soils for P-fixation is an important indicator affecting the status of soil P and its availability to crops. Phosphorus fixation characteristics were studied in 3 selected soil samples collected in greenhouses soils from Lushnja region of Albania. Soils have total P (extracted by HNO_3 69% + H_2O_2 33% in a ratio 4:1) in range from 668.43 mg P kg^{-1} soil to 2968.12 mg P kg^{-1} soil and available P extracted by Mehlich III in range from 6.27 mg P kg^{-1} soil to 130.81 mg P kg^{-1} soil. To determine P fixation 2 gr of each soil sample were weighed into 50 mL plastic bottles and equilibrated for 24 h at room temperature after adding 25, 50, 100, 200 and 500 mg P kg^{-1} soil. A known volume of standard P solution prepared in $CaCl_2$ 0.01M solution was added to each bottle to make the final soil – solution ratio of 1:10. Another set of soil sample was similarly treated with $CaCl_2$ 0.01M solution. After equilibration soil samples were analyzed for P by using the method of Murphy and Riley (1962). The P fixation was calculated as follows: P fixed = added P – P remaining in solution after equilibrium. Results shown a P fixation capacity of studies soils in range from 54% to 99% of added phosphorus.

Key words: Soil, phosphorus capacity, fixation, clay content, soil pH

1. INTRODUCTION

Although a lot of studies are conducted in Albania, little is known about the soil's capacity of P-fixation. Most of studies has been to know the level of available forms of phosphorus in agricultural soils.

The challenge for agriculture over the coming decades will be to meet the world increasing demand for food in a sustainable way. Declining soil fertility and mismanagement of plant nutrients have made this task more difficult [3]. Phosphorous is an essential macronutrient or plant growth and it is generally added to soil as a fertilizer and, thereby, increases the physiological efficiency of crops. However, excessive application of P fertilizers (e.g., calcium superphosphate and calcium-magnesia) can cause P accumulation in the soil [2] and can lead to P losses from leaching of the surface water and subsequent eutrophication of water bodies '[5] Phosphorous is non-renewable resource, and with continuously unsustainable consumption, it is predicted that P fertilizers will soon become limited and more expensive [8]

When phosphate fertilizer is applied to soil and dissolved by the soil water, various reactions occur between phosphate and soil constituents which remove P from the solution phase and render it less variable. This phenomenon is called P fixation or sorption (the two terms are frequently used interchangeably). [6] Adsorption and desorption reactions are considered as key aspects of the chemical behavior of P in soil. Adsorption describes the removal of phosphate ions from solution to soil components [1] desorption describes the reverse process, of removal of bound soil P to the solution. [4] The adsorption by oxides of iron and aluminum, and amorphous materials in soils affects the fate of applied P and availability of P to plants. [7] Among the soil properties affecting P sorption capacity are texture, organic matter, soil pH, Aluminum saturation, CEC and $CaCO_3$ content.

The objective of this study is to evaluate the capacity of some greenhouse soils for P fixation, as well as relationship between P fixation and doses of added - P. The capacity of soil for P fixing is an important indicator that help as to know the status of P in soil and its availability by crops.

For the study that we are presenting, diversity in the content of phosphorus in the soil is the most important indicator because we suppose that a part of it can come from the high doses of Phosphorous fertilizers used in greenhouses.

This is the main reason for choosing greenhouses with large differences in their cultivation time.

2. MATERIALS AND METHODS

2.1. Soil samples

Soils from three different sites from the Lushnja region of Albania are used. Soil samples was collected: one sample from one-year old greenhouse location in Qerret village (Soil A), one sample from teen years old greenhouse location in Karbunara

village (Soil B) and one sample from twenty-year-old greenhouse location in Kemishtaj village (Soil C). All the samples are collected at 0-30 cm soil depth.

2.2. Analysis of soil samples

The soil samples were air-dried, were sieves to pass a 2 mm sieve, and were used for analyzing of physical and chemical properties in the laboratory of the Faculty of Agriculture and Environmental, Agricultural University of Tirana. Soil texture (determinate by Hydrometer method); pH-H_2O (measured in 1:5 soil – water ratio); EC (measured in 1:5 soil – water ratio); Organic Matter (determinate by Walkley Black methods); Total Nitrogen (determinate by Kjeldahl method), Total Phosphorus. (extracted by HNO_3 69% + H_2O_2 33% in a ratio 4:1); Available Phosphorus (extracted by Mehlich 3 method).

2.3 Determination of phosphorus adsorption capacity of selected soil samples.

Two g samples of each soil were weighed into 50 ml centrifuge tubes with two replications. A range of P solutions (0, 2.5, 5, 10, 20 and 50 mg P/L) was prepared by KH_2PO_4 in 0.01 M $CaCl_2.2H_2O$ solutions and 20 mL aliquots of solutions were added to the centrifuge tubes to give 0, 25, 50, 100, 200 and 500 mg of added P kg of soil. The samples were than shaken for 24 h at room temperature (24 C) at 144 rpm. After 24 h shaking, the tubes were centrifuged for 15 min., and filtered through Whatman No. 24 filter paper. The filtrate was analyzed for available P following the methods of Murphy and Riley (1962) The amount of P adsorbed per kg of soil was calculated from the difference in the P added to the soils and the P present in the solution. The P in the control (no P) treatment solution was considered. The adsorbed P was calculated as mg kg mg kg^{-1} soil.

3. RESULTS AND DISCUISION

3.1. Physic – chemical properties of soil

Some data on physical and chemical properties of the soil selected for this study are presented in table 1.

Table 1. Physical chemical properties of selected soils

	pH	EC $\square$S/cm	Organic Matter %	Total Nitrogen mg kg^{-1}	Total Phosphorus mg kg^{-1}	Mehlich III - Phosphorus mg kg^{-1}	Clay %	Silt %	Sand %
Soil A	8.31	431	0.803	913.29	668.43	6.27	12.31	24.61	63.08
Soil B	8.91	937	1.286	1362.01	1367.55	42.87	46.2	42	11.79
Soil C	7.86	839	2.67	2239.77	2968.12	130.81	16.58	49.74	33.69

As can be seen in the data of analysis, the soils taken in the study are characterized by a great diversity in all the indicators that express their physical and chemical properties. So, Soil A is a sandy loam soil with low content of salt concentration, Organic Matter, Total – N and Mehlich III – P. On the other side Soil C is a loam soil with average content of Organic Matter, and high content of salt concentration, Total – N, Total – P and Mehlich III – P. Soil B is a silty clay soil, with high salt concentration low content of Organic Matter, average content of Total – N and high content of Total – P and Mehlich III – P.

3.2. Phosphorus remaining in solutions after treatment of soil samples with added P.

The amount of phosphorus not adsorbed by the soil, remaining in solution after the equilibrium period is shown in table 2.

Table 2. The amount of P added in the equilibrium solutions of soils treated with varying amounts of P

Added P (mg kg^{-1} soil)	P added in the Equilibrium Solution (mg kg^{-1})		
	Soil A	Soil B	Soil C
25	2.09	0.22	10.07
50	9.54	7.31	20.35
100	24.87	18.29	42.87
200	70.79	89.52	97.28
500	201.17	228.09	224.65

Changes in the amount of P in the equilibrium solution with added P were examined statistically for each soil. The regression analysis showed that there is a linear relationship between the amount of P added to the solution and the amount of P remaining in the solution at the time of equilibrium in all studies soils (table 3).

Table 3. Regression equations and R^2 values relating added P and P remaining in the equilibrium solution for the results show in table 2

Soil	Regression equation	R^2 Value
Soil A	y = 0.4252x - 12.72	0.9983
Soil B	y = 0.4937x - 17.71	0.9923
Soil C	y= 0.4545x - 0.492	0.9981

3.3 Phosphorus adsorbed to soil after treatment with added P

The Adsorbed – P in selected soils with different amount of added P is shown in table 4.

Table 4. The amount of Adsorbed – P to soil after treatment with Added – P in solution

Added P (mg kg^{-1} soil)	Adsorbed P (mg kg^{-1} soil)		
	Soil A	Soil B	Soil C
25	22.91	24.78	14.93
50	40.46	42.69	29.65
100	75.13	81.71	57.13
200	129.21	110.48	102.72
500	298.83	271.91	275.35
Average	113. 31	106.31	95.96

The amount of phosphorus adsorbed in the studied soils seems to be related to the phosphorus content in the studied soils.

Thus, the amount of adsorbed - P is 131.31 mg kg^{-1} soil in Soil A, 106.31 mg kg^{-1} soil in Soil B and 95.96 mg kg^{-1} soil in Soil C, so adsorption capacity decreases from Soil A to Soil B and Soil C.

If we refer to the Total - P and Available – P presented in Table 1, their content increases from Soil A to soil B and to soil C.

These data show us that the soils with lower phosphorus content have the highest capacity to fix the added – P.

To know relationships between the amount of added – P to the soil and adsorbed – P we built the regression curves between the added – P and adsorbed – P. The results are presented in Table 5 and Figure 1.

Table 5. Regression equations and R^2 values relating added P and P adsorbed P for the results shown in table 4

Soil	Regression equation	R2 Value
Soil A	Y = 0.5748X + 12.72	0.999
Soil B	Y = 0.4937X + 17.71	0.992
Soil C	Y = 0.4545X + 0.495	0.998
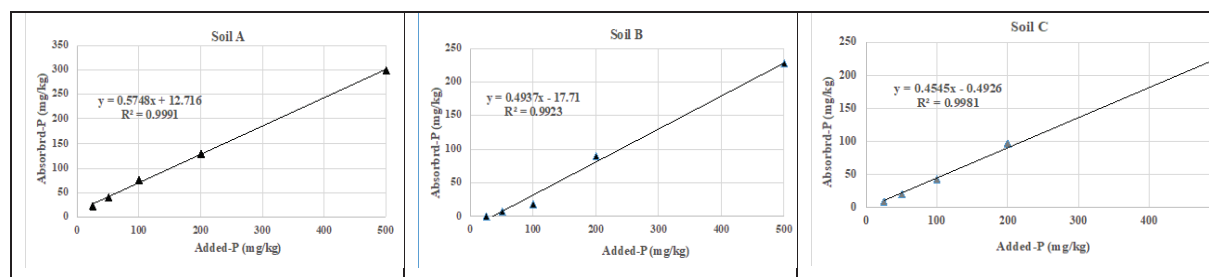
Figure 1. The relationships between Adsorbed – P and Added – P in selected soils.

Changes in the amount of P adsorbed with added P were examined for each soil. The regression analysis showed that there is a linear relationship between the amount of P added to the solution and the amount of P adsorbed from soil at the time of equilibrium in all studies soils

3.4. The relationships between Added – P and percentage of Adsorbed – P in selected soils.

The percentage of the added P adsorbed to the soil is shown in table 6.

Table 6. Adsorbed P as a percentage of the added P in solution

Added P (mg kg^{-1} soil)	Adsorbed – P as % of Added – P in solution		
	Soil A	Soil B	Soil C
25	91.6	99.2	59.7
50	80.9	85.4	59.3
100	75.1	81.7	57.1
200	64.6	55.2	54.4
500	59.8	54.3	55.1
Average	74.4	75.16	57.12

The percentage adsorption is higher in low concentration of Added – P compare with high concentration of Added – P for Soil A and Soil B but not for Soil C.

To know relationships between the amount of added – P to the soil and the percentage of adsorption – P we built the regression curves between the added – P and the percentage of adsorbed – P. The results are presented in Table 7 and Figure 2.

Table 7. Regression equations and R^2 values relating added P and percentage of Adsorbed – P for the results shown in table 6

Soil	Regression equation	R2 Value
Soil A	Y = -10.75ln(x) + 124.4	0.972
Soil B	Y = -16.04ln(x) + 149.7	0.905
Soil C	Y = -1.882ln(x) + 65.9	0.843
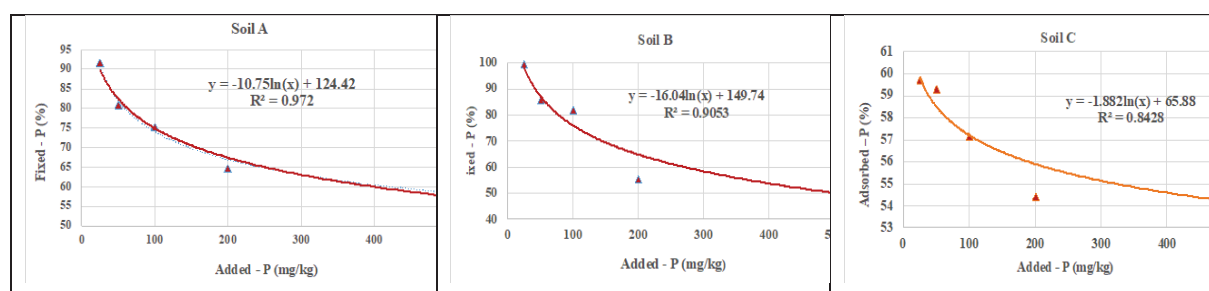
Figure 2. The relationships between Added – P and percentage of Adsorbed – P in selected soils.

Our data fit better with the logarithmic equation. The trend of the decrease in the rate of adsorption with the increase in the dose of phosphorus added to the soil is an important indicator to determine the practices of fertilizing with phosphorus fertilizers.

For Soil A and Soil B, in added – P up to 100 mg kg^{-1} soil, more than 75% of it is adsorbed by the soil and only 25% can remain in solution as available P. In Soil C, which has a very high content of Total - P and Mehlich III - P, the absorption power of the soil is much lower compared to the other studied soils. In this case, the utilization coefficient of the added phosphorus can fluctuate between 40 and 45%.

4. CONUSIONS

- P fixation capacity of studies soils in range from 54% to 99% of added phosphorus.
- Changes in the amount of P adsorbed related to added P were examined for each soil. Adsorbed P content in the soil was with liner relationship related to amount of added P.
- The ratio of Added - P with Adsorbed – P, expressed in percentage, fit better with the logarithmic equation.
- This model shows that with the increase in the amount of Added - P, the percentage of Adsorbed - P decreases.
- Soils with a long history of cultivation with high doses of phosphorus fertilizers have a lower potential to fix phosphorus.
- The evaluation of the adsorption capacities of the soil for phosphorus is a very important instrument to manage phosphorus fertilization.

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THE IMPORTANCE AND EFFECTIVENESS OF INTRODUCING FISH PASSES IN NEWLY DEVELOPED HYDRO POWER PLANTS: THE ASHTA HPP CASE

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All fish need to move both upstream and downstream of rivers in order to feed, breed, and find shelter, or even escape from floods, heat waves, droughts, pollution incidents or predators. However, manmade barriers like weirs and dams block the free movement of fish upstream and downstream rivers.

The fish-passes are used for decades in the developed countries as a technique to restore the river connectivity and fish migration in heavily modified riverways. The first fish pass in Albania was introduced during the construction of the Ashta Hydropower Plant in the Drini River. The fish pass is operational since more than 10 years allowing the ecological connectivity between the Spathari Reservoir upstream and the lower parts of the Drin River.

Monitoring surveys were conducted both prior to the construction of the Ashta HPP as well as several years later to evaluate the effectiveness of the fish-pass. The sampling sites included areas upstream and downstream the Ashta HPP as well as in the fish pass.

The paper reviews the structure and the functionality of fish pass, its affection by the physical conditions and by human activities and provides the results from long-term monitoring of species composition that utilize it. The paper indicates some advantages and disadvantages of different methods used to monitor the fish pass and concludes with some recommendation to improve the effectiveness of fish-passes in future HPP developments in Albania.

Keywords: Fish pass, Ashta Hydropower Plant, Drin River

BRIEF OVERVIEW OF TRENDS ON ADRIATIC SEA FISHERIES LANDING IN RELATION TO CLIMATE CHANGE

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Abstract

The Adriatic Sea plays a crucial role within the Mediterranean ecosystem, serving as a habitat for a diverse array of marine species. However, this region is currently facing a growing pressure due to the combined impacts of climate change and fishing practices. These factors are progressively disrupting the delicate balance of the ecosystem. Consequently, fluctuations in species abundance trends have displayed notable variability. Such variability can be attributed to a range of factors including the expanding human populations, increased demand for food, and the ongoing process of meridionalization. In this study, we conducted an analysis of the temporal dynamics of Adriatic marine communities in response to the warming of the sea spanning the years 1970 to 2020, using fisheries landing data of the Adriatic countries from the GFCM database. The outcomes of this analysis highlight the pressing and immediate need to address the threats confronting the Adriatic Sea and its associated fisheries. To ensure the preservation of both the ecological integrity and economic viability of this region, it is imperative to implement measures that protect its sustainability.

Key words: Adriatic ecosystem, Climate induced changes, Commercial fisheries, Sea warming.

Introduction

The Adriatic has a long history of human influence and several studies have explored past changes in marine species, fisheries, and environmental conditions, along with the impact of both environmental and anthropogenic pressures on the composition and the structure of its fish communities. These studies have noted significant shifts in the relative abundance of species, attributed to factors such as growing human population, increased demand for food and an ongoing process of meridionalization [1]–[4].

Recent research has consistently identified coherent changes in the Adriatic's ichthyofauna which appear to be particularly vulnerable to environmental perturbations, including but not limited to, long-term temperature changes, alterations in hydrological cycle and fluctuations in productivity and food supply. The rapid reorganization of marine species due to climate change is becoming increasingly evident, with a general trend of northward migration, as well as to deeper and colder areas [5]–[7].

The Adriatic Sea is recognized as a region of endemism, with one of the highest species richness levels. This characteristic makes it an ideal location for studies examining the impact of climatic conditions on marine populations [7]. There has been a notable shift in species composition and diversity in the Adriatic Sea due to the reduction of formerly abundant species and the introduction of new ones. This decline has been most significant among larger species, including marine mammals, birds, reptiles, and commercial fish and invertebrates. Conversely, the introduction of new species has predominantly involved smaller, lower trophic level organisms. Currently, the ecosystem exhibits a partially resilient structure characterized by a novel mix of species [2], [4], [8], [9].

In the present study we investigate the temporal fluctuations in landings of 27 taxa over a 50-year period in the Adriatic Sea and explore their correlation with sea surface temperature anomalies, serving as an indicator of climate change.

Materials and Methods

The annual catches, expressed as live weight equivalent of landings, have been routinely recorded since 1970, for the Adriatic Sea, by the General Fisheries Commission for the Mediterranean [10]. To define statistical sub-areas, the General Fisheries Commission for the Mediterranean (GCFM) designates the Adriatic Sea within area 2.1, encompassing only the northern and central basins. The southern Adriatic basin, the coast of south-eastern Italy and of Albania, is classified under the Ionian Sea (area 2.2). Following the approach of previous researchers studying the fishery dynamics in the Adriatic Sea [11], we included Albanian data originally classified as belonging to the Ionian Sea within the Adriatic data set in order to provide a comprehensive overview of Adriatic Sea fishery production. Unfortunately, this inclusion was not feasible for Southeast Italy. To assess temporal variations in community composition, we aggregated yearly data for each Adriatic country into annual cumulative datasets. Our analysis was limited to taxa for which data were available throughout the entire study duration. In total, we documented 27 taxa, including 11 taxa at the species level, 7 taxa at the genus level, 6 taxa at the family level, and 3 taxa encompassing multiple families.

Sea surface temperature (SST) was used as proxy of climate change. SST data for the Geographical Subareas (GSA) 17 and 18 were extracted from the NOAA ERSST v5 dataset (data.noaa.ersst. v5.html). The SST data, expressed in degrees Celsius, were averaged over the year to derive yearly estimates comparable with the community time series. Although this method may have led to the loss of specific details concerning extreme events in the Adriatic region, it enabled us to extract the main temperature trend over time [9]. To minimize the effect of the confounding factors on the data, we utilized anomaly data instead of absolute temperature [12]

Cross-correlation (r) analysis were used to explore the relationships between the landings and temperature anomalies. All statistical analyses were performed using the R statistical software ([13]).

Results and Discussion

a)   b)
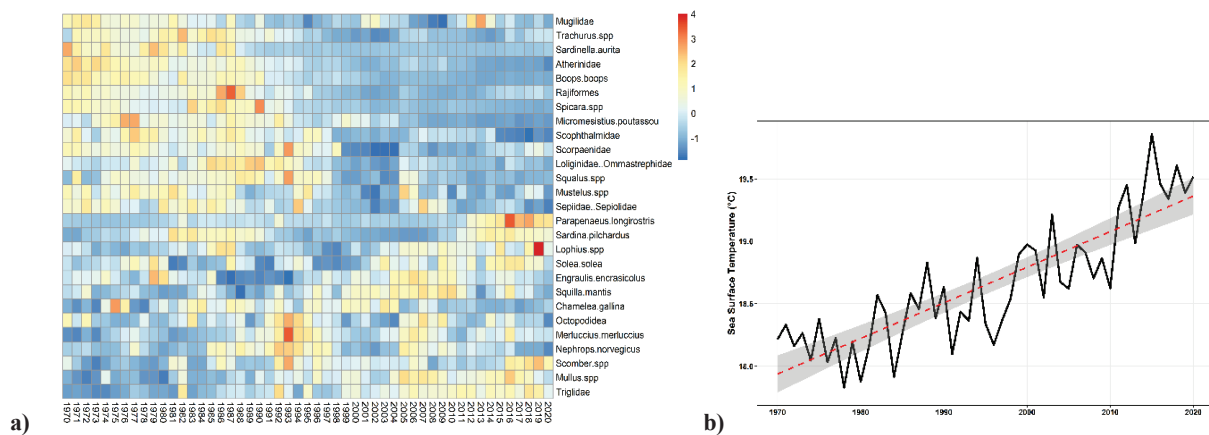
Figure 1. Evolution of the Composition of Fish Landings and Sea Surface Temperature in the Adriatic Sea: (a) Heatmap of Relative Landings Across 27 Categories from 1970-2020, (b) Time Series of Sea Surface Temperature

In order to investigate trends in fish landings in the Adriatic Sea for the study period 1970-2020, we analysed data obtained from the GFCM database to assess temporal variations in community composition. Our analysis was limited to taxa for which data were available throughout the entire study duration. The FAO landings data used in this study are known to include a certain degree of uncertainty. It has been argued that landings do not necessarily reflect the abundance of fisheries resources in the sea, even though they are affected by it. However, landings data are expected to provide a generally adequate picture of the trends of different exploited taxa if conditioned properly [14]. The composition of fishery landings in the Adriatic Sea has undergone significant changes over the period from 1970 to 2020, with all species manifesting different trends, encompassing both increases and decreases. (Figure 1a).

To gain a comprehensive understanding of marine community patterns, we conducted a Principal Component Analysis (PCA) to simplify our complex dataset into key components. The first two components, PC1 and PC2, collectively explain 51% of the data variability and represent primary trends among fish species. PC1, accounting for 37% of the variance, reveals a consistent trend with increased populations of mullets, mantis shrimp, gurnard, and deep-water rose shrimp, and decreased populations of bogue, skates, and rays. PC2, explaining 19% of the variance, displays temporal variations, ultimately returning to near-initial values in recent years. This component corresponds to shifts in population sizes of hake, Norway lobster, octopuses, and anchovy. In order to identify any significant changes in the composition of landings, we utilized hierarchical clustering. This method revealed two primary periods: 1970-1991 and 1992-2020. The relative abundance of species showed remarkable changes over the two period. The species dominating the first period exhibit a constant decrease in their abundances, while the species that dominate the second period have more stable landings or express an increasing trend through the study period.

In the dynamics of fish communities in the Adriatic Sea, it is imperative to consider the broader context of environmental factors. These factors, including sea surface temperature (SST), play a pivotal role in shaping the trends we have observed. Based on our analysis, the sea surface temperature showed a noticeable and statistically significant upward trend observed during the study period. The mean sea surface temperature in the Adriatic showed a constant increase, with an amplitude of change of about 2°C and an increasing rate of 0.03°C/year. (Figure 1b).

Pearson correlation analysis indicated that 19 out of 27 taxa are correlated with the SST anomalies, with 12 taxa negatively correlated and 7 positively correlated (p<0.05). The investigation at the group level demonstrates that crustaceans are the only group showing a positive correlation with the SST anomalies, while cephalopods and medium pelagics exhibit a negative correlation (p<0.05). No significant results were obtained for demersal fish, small pelagics, and bivalves.

Although several studies have investigated the multiple effects of climate change in the Adriatic Sea ecosystem, our study contributes to this body of knowledge by reporting a relationship between the interannual SST variability and fishery landings. Further investigation is needed into the processes that determine how temperature influences fish populations, in order to understand the interaction between climate change and fishing pressure in the development of fish communities from a comprehensive perspective.

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CAMERA TRAPPING MONITORING FOR MANAGING UNGULATE POPULATIONS IN CENTRAL ITALY'S BEECH FOREST.

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Abstract: In response to the rising ungulate population and its impact on agriculture and forest ecosystems, the adoption of reliable and cost-effective wildlife monitoring techniques is mandatory. To optimize forest management, we utilized photo-trapping to assess wild ungulate presence and abundance in a 560-hectare non-hunting beech forest in central Italy, managed for timber production. Using a 500 m × 500 m grid and stratified sampling, we installed 9 camera traps (CTs) on trees working in continuous. From 2019 to 2021, camera-trapping sessions were conducted in both early summer and autumn. Trapping rate (TR) was determined as the ratio of photographic events to the total survey effort (number of CTs * working hours/24 h) multiplied by 100. Density was estimated using the Random Encounter Model (REM). Descriptive and Kruskal-Wallis variance analyses were performed, considering species, season, years, and forest cover as variables. TR was different (p<0.000) between wild boar and roe deer (71.5±5.2 and19.9±1.9 respectively), as well as REM (20.1±2.7 vs 4.8±0.7 animals/100 ha respectively). Overall, for wild boar, apart from 2021 (p < 0.0001), there was no significant annual variation of the TR for the two species. Roe deer, a selective grazer, were more prevalent (p ≤ 0.0001) in summer (6.6 ± 1.2 animal/100 ha), while wild boars, consumers of acorns and beech nuts, were more abundant in autumn (25.0 ± 3.0 animal/100 ha). The monitoring method proved to be highly sensitive and easily replicable and show unexpected inverse seasonal variations determining phases of concentration in the periods of maximum sensitivity respect to each species.

Keywords: camera trapping; REM; roe deer; ungulate; wild boar

Introduction

The demographic growth of ungulates' populations is exacerbating the conflicts with human activities and with forest ecosystems [1]. It has been observed that ungulates, depending on their feeding behaviour, can influence forest regeneration, structure, and functioning [2-3]. Therefore, their abundance should be taken into serious consideration during the drafting of forest management plan. Moreover, wild ungulates abundance is susceptible to seasonal variations depending on species-specifics responses to weather factors, food availability, food preferences, human management choices and territorial planning [4-5]. Consequently, the careful selection of the counting period for each species becomes crucial for predict concentration and effectively prevent the consequent impact.

This study presents the findings from three years of wildlife surveys conducted through camera trapping as part of a project aimed at assessing the inter and intra annual variation of wild ungulates' abundance and the effect on forest (*Fagus sylvatica*) renovation in a hunting banned area. The specific targets of the present paper are:

- to develop a monitoring protocol that can be easily replicated in the forest environment to assess the relative abundance (Trapping Rate - TR) and estimate seasonal density (n° animals/100 ha) of wild ungulates;

- identify the periods of maximum occurrence for each ungulate species allowing to consider the peak of animal load.

Material and Methods

Study Area: a 560-ha of beech forest (*Fagus sylvatica*) managed for timber production. The area is situated along the eastern slope of Monte Amiata, an isolated volcanic relief located in the province of Siena (central Italy, approximately from 42°52'35.00'' to 42°54'09.00'' N and from 11°37'17.00'' to 11°38'27.00''E).

Data Recording: This forest was subdivided into three classes on the base of forest cover type and density depending principally on silvicultural interventions and thinning. Protective aged beech coppice, mature high beech forest with coverage < 60% and > 60% that amount for the twenty, the eighteen and sixty percent of the total forest cover respectively. A stratified sampling procedure was adopted to choose camera trap (CT) locations [6]. Using the QGIS software, a 1.5 x 1.5 km grid was drawn and overlaid onto the study area. Subsequently, the plot that best represented the three main classes was selected, and within it, CTs have been placed using the nodes of a 500 m x 500 m sampling grid as guides ensuring the 9 CTs proportionally allocated among the three forest classes. The CTs, active H24, were installed on tree trunks about 50 cm high. In addition, to determine the certain detection area, a triangle with a height of 5.4 meters and an angle of 1.13 radians was constructed using stakes and ropes [7] These parameters correspond to the radius and the field of view angle of the CT and were determined in the field.

Relative Abundance Index and Density Estimation: Trapping rate (TR) was determined as the ratio between the photographic events and the total survey effort (number of CTs * working hours/24 h) multiplied by 100 [8]. We used the following REM equation [8-9] to estimate roe deer and wild boar density. As expected for social species, D was corrected for the average group size.

Imagines have been carefully analyzed to determine the independence of each event. For each event we recorded time, species, number of individuals, average daily range (ADR) and average resting time (ART) in the certain detection zone.

Statistical Analysis: Four species per-season subsets have been used to assess the relative abundance (TR) and estimate density (D): summer roe deer (SRD); autumn roe deer (ARD); summer wild boar (SWB); autumn wild boar (AWB). Descriptive

analysis and the Kruskal-Wallis test nonparametric have been performed, considering species, season, years, and forest cover as variables in the analysis. For each statistic, significance was set at $p < 0.05$.
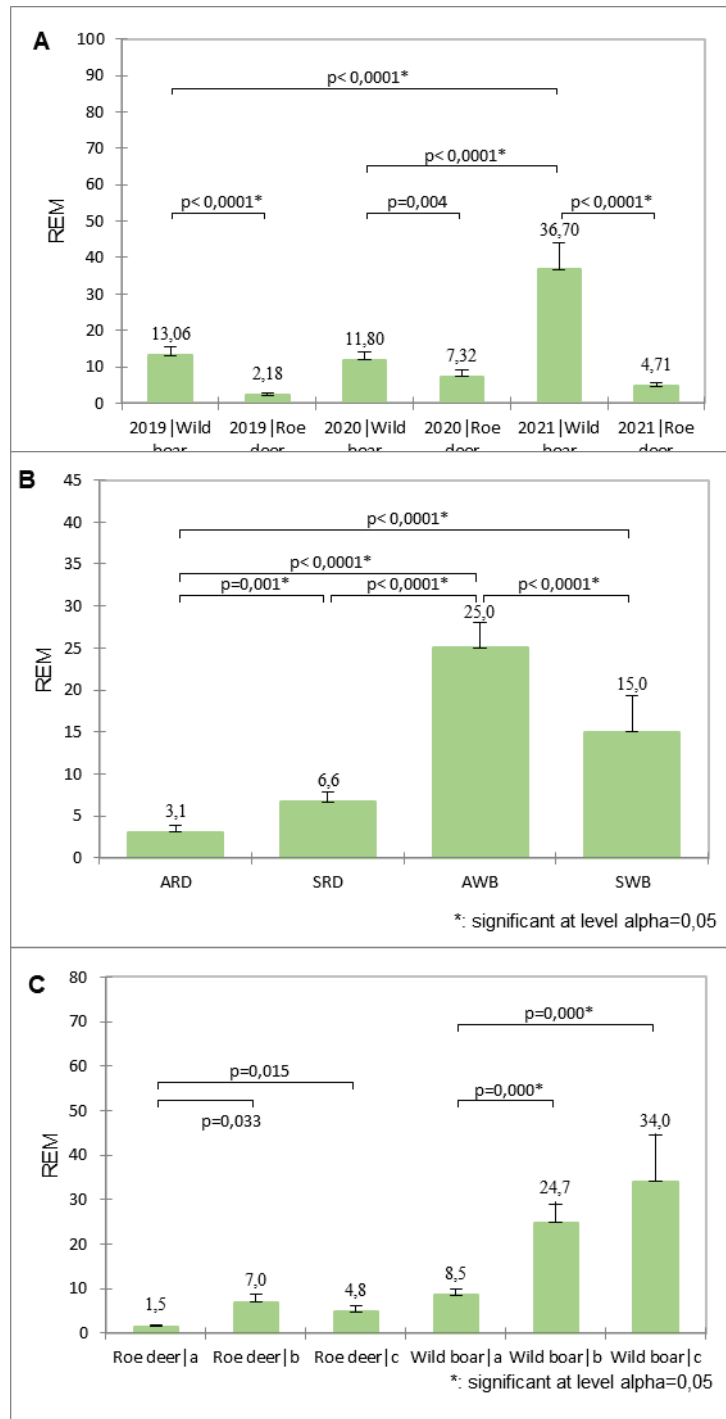
Figure 1. A) Effect of the year factor on the REM density of the two species (wild boar and roe deer); B) Inverse seasonal trend of the REM density of the two species; C) Effect of forest cover type on the trend of REM density for the species roe deer and wild boar.

Results and Discussion

In three years, during the summer sessions, 124 and 171 independent photographic events were recorded for roe deer and wild boar respectively, while in autumn they were 50 and 459, respectively.

Despite the significance (k=7.815, p<0.0001) of the year factor on the relative abundance (TR) of the two species, pairwise comparisons do not reveal significant interannual density variations for the roe deer. In contrast, the wild boar exhibited a significant increase in density in the year 2021, with a value three times higher than that recorded in the years 2019 and 2020 (Fig. 1 A).

Differently, significant abundance seasonal variations (p≤0.001) have been recorded by species, with inverse trends (Fig. 1 B). The roe deer increases its presence in the beech forests during the summer months (SRD), consistent with the described partial autumn migrations of roe deer [10] towards wintering favourable areas at lower altitudes. Conversely, the wild boar is significantly more abundant during the autumn (AWB) even in the presence of abundant snow cover and extreme thermal conditions, probably as result of the reserve effect inducing movements of hunted populations towards hunting banned areas, [11]. During the summer it shifts its distribution towards plain and hillside areas.

Furthermore, forest cover may influence the distribution of ungulates (Fig. 1 C). Indeed, the density values of both the species would seem to follow a stratification conditioned by the type of forest cover (K = 11.070; p = 0.004), showing higher values in the class **c**) protective aged beech coppice, intermediate in class **b**) mature high beech forest with coverage < 60% and lower values in class **a**) and mature high beech forest with coverage > 60%. Analysis of variance would confirm statistical significance.

According to our results, the food exploitation hypothesis [4], climate-limiting factors [10], and hunting disturbance [11] are all possible drivers of wild ungulates' home range shifting and temporal abundance variation at the local scale.

The average group size (AGS), the average daily range (ADR), trapping rate (TR) and REM density (D), are reported in Table 1 for each year and season per species subset.

Table 1. *Average group size (AGS), average daily range (ADR), Trapping Rate (TR) and REM density estimates for each season-species subset. Estimates were reported as mean ± SE.*

Subset[1]	Variables for REM estimation											
	AGS (n°)			ADR (km/day)			TR			D (animals/km²)		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
SRD	1.0±0.0	1.0±0.0	1.1±0.0	22.5±4.4	22.5±3.5	18.0±2.8	15,7±3,8	38,3±6,2	29,9±6,1	1.9±0.5	10.4±2.7	7.0±1.8
ARD	1.3±0.1	1.3±0.2	1.1±0.1	16.3±2.7	26.4±7.4	16.9±3.1	11,0±3,4	12,0±3,1	11,6±3,2	2.4±0.9	4.3±2.0	2.4±0.8
SWB	2.2±0.4	1.7±0.3	2.1±0.3	20.4±3.6	23.9±3.0.	25.2±5.8	14,3±3,9	36,3±3,9	68,1±12,3	3.0±0.9	11.4±3.9	30.6±12.7
AWB	2.1±0.2	2.0±0.2	2.1±0.2	25.9±3.0	28.9±2.8	22.7±1.6	91,8±13,6	66,5±11,6	154,9±19,9	22.2±4.5	12.2±2.3	42.8±7.9

Conclusion

In conclusion, wild boar counts should take place in autumn when its significant increase in abundance can reduce seed availability at the local scale while roe deer abundance should be investigated in summer when the selective grazing attitude of this species could impact on the beech forest renovation.

To confirm the hypothesis that hunting disturbance may be the primary factor determining the unexpected autumnal concentration of wild boars within the beech forest, the investigation should be extended beyond the current study area with a broad-scale approach including different types of woodlands in terms of both composition and management, as well as areas subject to direct hunting disturbance.

Regarding the estimation of REM density, the limited number of independent events recorded by the CTs result in wide confidence interval of the estimates, highlighting the need to increase the sampling effort both spatially and temporally. However, the monitoring method shows high informative potential, is replicable and cost-effective.

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VIRGIN FORESTS AS A KNOWLEDGE SOURCE FOR DEVELOPING A CLOSE-TO-NATURE SILVI-CULTURE. CONCLUSIONS FROM ALBANIAN BEECH (*F. sylvatica* L.) VIRGIN FORESTS.

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ABSTRACT

In Europe, the few remnants of virgin forest left have often been studied for reasons based on the following line of argument: Such studies increase our understanding of forest dynamics under a natural disturbance regime and are important basis for close-to-nature silviculture. Roughly 2 main types of unmanaged forest can be distinguished in Europe: so called primeval or virgin forests which have never been managed and strict forest reserves (SFR), which are left to develop freely. Structural characteristics are analyzed in Albanian beech virgin forests, unmanaged Middle-European forest reserves and managed stands. Sample areas comprise 4 to 14 ha and are situated in old-growth stands, which consist of beech (*F. sylvatica* L.). Patterns of stem distribution, basic growth and yield parameters and expan-sions of individual tree-crowns were measured. Results of inventories of forest structure and tree regeneration in 5 forests stands are presented and discussed. The examined virgin forests are characterized by a high volume of coarse living wood per ha and a high amount of stems above 7 cm DBH. The percentage of dead wood ranges from 4 % to 10 %. Gap area lies between 3.5 % and 6.5 % and average gap size between 60 and 74 m². On the basis of results from SFRs in Germany and Albanian virgin beech forests the following hypothesis are addressed: regeneration of unmana-ged beech forests is restricted to canopy gaps, is impeded significantly by several negative factors, e. g. disadvantageous soil conditions, competition of herbs and/or grasses or browsing, shows a broad-scaled spatial pattern. The results show that *single tree harvesting* is a near to nature silvicultural technique in beech forests.

Keywords: *virgin forests, forest reserves, forest dynamics, forest development cycle, forest regeneration, gaps*.

INTRODUCTION

In the nemoral zone of Europe true virgin forests amount to less than 0.1 % of the forested area (BÜCKING *et al*. 2000).

One of the early citations attributing a particular value to virgin forests for silviculture in managed forests can be found in a paper by RUBNER (1920), with the title "*Silvicultural conclusions from virgin forests*". The main agenda of the scientists mentioned above was strengthening the scientific basis of "*close-to-nature*" silviculture. The interest in virgin forests has often been justified by the following line of argument: These forests have not been subject to human impact, and studying them therefore offers us opportunities to advance our understanding of forest structure and dynamics (LEIBUNDGUT 1959). This is particularly interesting given the current trend towards a more close-to-nature silviculture, which largely relies on using natural processes to reach silvicultural goals (SCHÜTZ 1999). In recent years there has been an increased interest in virgin forests resulting in several compilations of the existing knowledge (KORPEL 1995). In most European countries, silviculture goals are directed towards natural multifunctional forest management. It can be achieved with a management system which does not include radical silviculture, but those which imitate the nature. This manner of management is known as "Close-to-nature-forestry" (Schütz, 1986) in the scientific circles. It involves some postulates: natural regeneration, selection and cutting of individual trees, autochthonous tree species.

Although detailed descriptions of virgin forests can be found in the European forest literature. Most of these studies were carried out on permanent inventory plots of 0.25-1 ha, which were usually laid out subjectively to represent different developmental phases (KORPEL 1995; LEIBUNDGUT 1959; MAYER *et al.* 1987). The inventories of the plots were often completed by detailed measurements of a stand profile along a transect and by mapping developmental phases on the whole area. In contrast to virgin forests dynamics in SFRs are still governed by past management for a considerable time span (MEYER 2005). Therefore they cannot be regarded as an "instant" substi-tute for missing virgin forests. In order to reduce input near to nature forestry aims at integrating natural processes into management concepts. Thus, the scientific interest in unmanaged forests is closely linked to its application in forest management. Regenerating forests is one of the most cost intensive measures in forestry. Therefore monitoring and analyzing patterns and processes of regeneration in unmanaged forests is of major interest for forestry research. The presented paper deals with regeneration in unmanaged beech (*Fagus sylvatica* L.) forests in Europe. On the basis of results from SFRs in L. Saxony, Germany and Albanian virgin beech forests the following hypothesis are addressed: Typically, regeneration of unmanaged beech forests: a) is restricted to canopy gaps, b) is impeded significantly by several negative factors, e. g. disadvantageous soil conditions, competition of herbs and/or grasses or browsing and c) shows a broad-scaled spatial pattern. In this paper, our preliminary results are presented and discussed.

MATERIALS AND METHODS

In terms of research methods in virgin forests, the earliest accounts were based on descriptions of the stand structures in extended areas. Sometimes, stem distributions of a few temporary plots are presented to illustrate the key findings (FRÖHLICH 1954). Today, such an approach would not be scientifically acceptable anymore. Forests are highly diverse in terms of species composition and stand structure. Accordingly, *Fagus sylvatica* virgin forests are often poor in other tree species (KORPEL 1995; MEYER *et al.* 2002). These facts were known to silviculturists, but could be confirmed in virgin forests, where stand structures often differ from those found in managed forests. The probability of regeneration above 2 m height at a certain plot serves as indicator of regeneration success. The SFRs represent oligotrophic beech forests situated in the Soling Mountains, Germany. Both SFRs are covered with almost pure beech stands. Underneath the even-aged over story (age: 155 & 167 years) regeneration has developed after gap-formation caused by windfalls and stem breakages. On 2 monitoring plots in each SFR (1.5 ha) DBH and tree positions of the stand ≥ 7 cm diameter were measured. Regeneration (trees <7cm DBH, without seedlings <1 year) was recorded per height-class on systematically distributed subplots. For the Albanian virgin forests data on sample areas of 3.6 to 5.0 ha with a full survey of DBH & positions of trees ≥7 cm DBH carried out in 1997 are available (TABAKU 1999). Rege-neration was sampled on a systematic grid network. The Albanian sample areas represent mesotrophic beech forests. The true probability of regeneration >2 m height in 3 basal area classes was compared to the expected probability of a random distribution.

Fig. 2. Schematic representation of the recordings

RESULTS AND DISCUSSION

Regeneration analysis

In the study plots, regeneration is well structured, where regeneration plants can be found at all height classes and more than half of the regeneration plants are below 50 cm. Just as in the old stands, beech predominates in the regeneration on all areas (in Puka virgin forest mixed tree species account 10-18% of the regeneration density).

Tab. 1: Density (N/ha) & height structure of the regeneration

Stands	Number of Sample circles	Sample circles without regeneration	N/ha	Height distribution (% of N)						
				< 0,2	0,2-0,5	0,5-1	1-2	2-3	3-4	> 4 m
Bleicherode	126	1	124.048	81,84	14,54	2,62	0,59	0,17	0,11	0,13
Heilige Hallen	177	3	15.887	62,44	10,90	7,47	6,34	4,11	2,23	6,51
Limker Strang	165	25	14.273	64,48	8,43	9,36	11,73	4,83	1,02	0,17
Dassel	117	0	114.744	67,49	23,71	5,54	2,91	0,32	0,03	0,00
Stauffenburg	105	1	32.581	54,94	28,45	7,94	4,66	2,73	1,29	0,00
Puka	60	4	24.200	45,95	21,31	17,17	8,65	3,60	1,87	1,45
Mirdita	90	4	29.844	57,40	28,61	9,29	2,57	1,41	0,00	0,71
Rajca	108	17	19.259	38,51	19,18	16,15	11,54	7,84	3,32	3,46

In stands, regeneration is well structured, where regeneration plants can be found in all height classes and more than half of the regeneration plants are below 50 cm. As in the old stands, beech dominates in the regeneration on all areas (only in Puka, white fir is mixed with 10-18% of the regeneration density).

Crown maps gap texture in the study areas

Crown maps based on the mean circle model were used as the basis for examining the gap texture. The determination of the area size of the gaps (Ø > 5 m) was determined with a Planimeter (to an accuracy of 5 m²). In addition, the lengths of the longest and the shortest perpendicular gap axis as well as the gap orientation were determined.
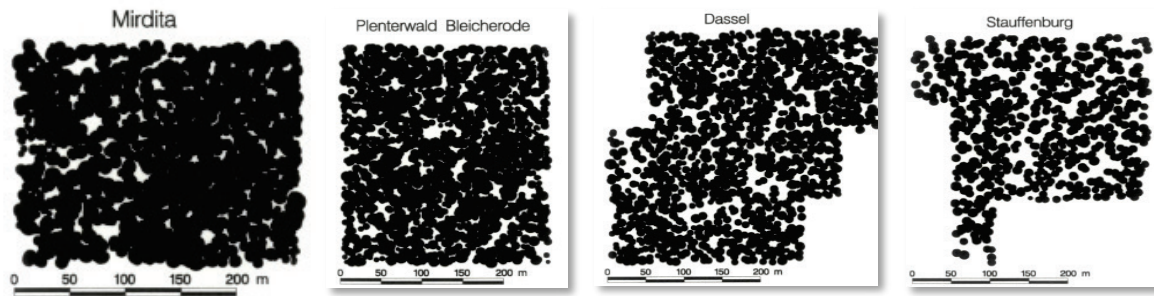
Fig. 3: *Crown maps of the study areas*

In the virgin forests regeneration mainly beech (Tabaku 1999) was found at each sample point. Regeneration >2 m height was recorded with a frequency of 67% (Munella) to 79% (Rajca). Hence, advance regeneration seems to be a typical feature of the examined beech virgin forests. At much lower levels of basal area in the examined SFRs frequency of regeneration was found to be 61% to 89% and of regeneration >2 m height 20% to 59%. 30 years of free development of SFRs have led to regeneration processes clearly restricted to gaps. The probability of regeneration >1,5 m height in gaps was recorded in the SFR "L.Strang" in 2004. The investigation of 60 canopy gaps revealed a probability of 77%.

There is no doubt that basic ecological principles apply equally to all kinds of ecosystems, including virgin forests. In virgin forests this relationship may be masked by maturity- and age-effects. Furthermore regeneration of shade-tolerant beech can stand low radiation and high competetion levels for quite some time. This is in line with the majority of investigations in broadleaved and mixed broadleaved-coniferous primeval forests in Europe, which reveal an overlap of development phases (KORPEL 1995). Thus the under-standing of gap dynamics (TABAKU & MEYER 1999, COATES 2002) may not be sufficient to fully understand virgin forest dynamics. In respect of the hypothesis following conclusions can be dawn:

1. There is strong evidence that regeneration in virgin beech forests is not stringently restricted to canopy gaps. Never-theless gaps are expected to enhance regeneration, or are a prerequisite for the advancement of regeneration.

2. Impeding of regeneration success can be assumed for the examined 2 oligotrophic beech SFRs. In contrast this seems not to play a relevant role in virgin beech forests due to overlapping of development phases, i.e. advance regeneration.

3. Typically, regeneration processes in virgin beech forests take place on a small scale. Distinct regeneration phases cover only small areas. This is in line with the "northern hardwood model" and the "mosaic-cycle concept" (REMMERT et al. 1991). In contrast in the examined SFRs regeneration develops only after gap formation. Separate patches of contrasting development status emerge autonomously from homogenous beech stands after cessation of management. Regarding forest management it is concluded that decelerated and selective harvesting of canopy trees over as long periods of time as possible provides the highest probability for successful natural regeneration.

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EXTREME ENVIRONMENTS AS SOURCES OF POTENTIALLY USEFUL MICROORGANISMS IN AGRICULTURE AND FOOD INDUSTRY

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The antropocentric term "extremophile" was introduced more than 30 years ago to describe any organism capable to live and grow under extreme conditions - i.e., particularly hostile to humans and to most of known microorganisms as far as in regard to temperature, pH, and salinity parameters. With the further development of studies on microbial ecology and taxonomy, more "extreme" environments were found and more extremophiles were described. Today many different extremophiles have been isolated from habitats characterized by hydrostatic pressure, aridity, radiations, elevated temperatures, extreme pH values, high salt concentrations and high solvent /metal concentrations, and it is well documented that these microorganisms are capable to thrive under extreme conditions better than any other organism living on Earth. Extremophiles have also been investigated as far as regard the search for life in other planets and even to evaluate the hypothesis that life on Earth came originally from space.

Extremophiles are interesting for basic and applied sciences. Particularly fascinating are their structural and physiological features allowing them to stand extremely selective environmental conditions. These properties are often due to specific biomolecules (DNA, lipids, enzymes, osmolites, etc.) that have been studied for years as novel sources for biotechnological applications. In some cases (DNA-polymerase, thermostable enzymes, bioconversions) attempts were positive and the final application was achieved in pharmaceutical and food industries as well as in agriculture, but certainly further exploitations are next to come.

Key words: Extreme environments, extremophiles, applications, hydrolytic enzymes, bioconversions

BEHAVIOR AFTER ONE YEAR OF OUTDOOR EXPOSURE OF HEAT-TREATED AYOUS WOOD.

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Abstract.

Wood is a renewable resource and an interesting building material for the growing bio-based economy. When it is used outdoor it is exposed to weathering and decay. The heat treatment of wood has proved to be an ecological modification system for outdoor use which is particularly useful for less durable wood, a non-biocidal alternative to the classical techniques of extending the natural durability of wood. The heat treatment causes a decrease in hygroscopicity which guarantees a lower sensitivity of the wood material towards environmental variations both of moisture and temperature. In this context, it is essential to examine the behavior of heat-treated wood over time, to understand the dynamics regarding its usability. The aim of this work was to verify the effects of the natural aging process on some physical properties of heat-treated Ayous (*Triplochiton scleroxylon* K. Schum) wood. This wood is increasingly attractive on the international market due to the rapid growth of the trees and the easy processing. The material used comes from forests certified for the sustainability of management that grow in Cameroon. The heat treatment was carried out at 215 °C for three hours with a slight initial vacuum. Planks, treated and untreated, were exposed outdoors for one year. Statistical analysis showed that the density of heat-treated aged wood remains significantly lower than untreated aged wood. Compared to environmental humidity, heat-treated wood reaches a consistently lower moisture content than untreated wood that indicates an appreciable dimensional stability of the material. Even after 12 months a lower ability to absorb moisture than untreated wood was retained. The anti-shrinkage efficiency (ASE) value supports this improvement. However, the ASE value was found to be below the 75% threshold, indicated as the minimum effective threshold. Colour affects the aesthetic of wooden products. The heat treatment induced darkening, measured by the chromatic coordinates' values and clearly visible even to the naked eye, on the natural light yellow colour of Ayous. The colour variation indicates chemical modifications, and lignin degradation contributes to the darkening of wood. The natural aging process causes a colour variation, both in the untreated wood and in the treated one. In the natural wood there was a darkening of the surface, and the plank surface acquired a colour tending to gray. The heat-treated wood, darkened by the treatment, instead highlighted a lightening. Natural aging of wooden surfaces leads to a slow deterioration of wooden surfaces, which cause unwanted changes. However, it is worth checking after longer exposure times.

Keywords: *natural aging; density; Anti-Shrinkage Efficiency (ASE); colour*

Introduction

The biological origin of woody materials makes them valuable in reducing the environmental impact of human activities. Wood is a renewable resource and an interesting building material for the growing bio-based economy. Outdoor it is exposed to weathering and decay. Heat treatment is a non-biocidal alternative to the classical techniques of extending the natural durability and service life, particularly useful for less durable wood [6]. High temperature treatment causes a decrease in hygroscopicity which ensures that the wood material is less sensitive to environmental changes in both moisture and temperature [2]. In this context, it is essential to verify the behavior of heat-treated wood over time. Previous studies evaluated the moisture behavior of heat-treated wood used for building facades, concluding that heat-treated wood performs better than untreated wood [1,9]. However, there is still little on heat-treated Ayous, a wood that is not very durable in its natural state. Ayous is a deciduous tree widely distributed in the tropical areas of Central West Africa, from Liberia to the Central African Republic; it is typical of secondary forests in subtropical areas mainly less than 500 m a.s.l., characterized by an average annual precipitation between one thousand and one hundred (1100) and eighteen hundred (1800) mm with seasonal distribution in two peaks where the average annual temperatures are around 20- 35 degrees centigrade; it is considered a pioneer tree species that colonizes abandoned agricultural lands and disturbed forest areas, where it is favorited for its rapid growth rate. In conditions of good fertility, trees can reach a height of up to 40-50 m [7]. This species is widely used in the origin area and its wood is increasingly attractive on the European and international market due to the rapid growth of the trees and the easy processing of wood. Heat-treated Ayous wood is widely used as a building material in North Europe, especially for the construction of building cladding and exterior flooring.

The aim of this work was to verify the effects of the natural aging process on some physical properties of heat-treated Ayous (*Triplochiton scleroxylon* K. Schum) wood in comparison to untreated.

Material and Methods

The material used in this experimental comes from natural forests certified for the sustainability of management and chain of custody, from Cameroon Department of Boumba et Ngoko. The Ayous planks were donated by Vasto Legno, which also provided for their heat treatment in an industrial plant. The heat treatment was industrially performed in an autoclave (Model

TVS 6000 WDE Maspell srl, Terni, Italy) at a treatment temperature of 215 °C for three hours with a slight initial vacuum. Planks, treated and untreated, were exposed outdoors for one year.

The samples were prepared according to the general requirements of the standard for physical and mechanical tests and preserved at laboratory conditions at 65% relative humidity and 20 °C. Statistical analysis was performed with StatisticaTM version 7.1 (TIBCO Software Inc., Palo Alto, CA, USA). Data distribution was checked for normality and homogeneity of variance using the Lilliefors and Levene tests, respectively. To check differences between treatments, t-test for independent samples was applied to assess possible differences among the data sets.

Results and Discussion

Density after heat treatment and weathering is shown in table 1. Heat treatment significantly affected density of Ayous wood ($p<0.001$). Statistical analysis showed that weathering did not affect density of natural wood ($p= 0.77$) (Figure 1 A) while density of heat-treated wood was significantly lower after one year of weathering ($p = 0.000002$) (Figure 1 B). Compared to environmental humidity, heat-treated wood reached a consistently lower moisture content than untreated wood that indicates an appreciable dimensional stability. Even after 12 months in outdoor conditions a lower ability to absorb moisture than untreated wood was retained (Figure 2). It has been possible to verify that heat-treated wood shows less shrinkage and swelling and reaches a lower humidity than untreated wood under the same environmental conditions (Figure 2). The anti-shrinkage efficiency (ASE) value supports this improvement. However, the ASE value was found to be below the 75% threshold, indicated as the minimum effective threshold.

Colour affects the aesthetic of wooden products. The heat treatment induced darkening, clearly visible even to the naked eye, here indicated by the chromatic coordinates' values [8]. The natural weathering process caused a colour variation, both in the untreated wood and in the heat treated one. In the natural wood there was a darkening of the surface as ΔE^* was found 25.50, and the plank surface acquired a colour tending to gray. The heat-treated wood, darkened by the heat treatment, instead highlighted a lightening and a ΔE^* 14.19. The colour variation indicates chemical modifications, and lignin degradation contributes to the darkening of wood.

The data presented highlight the influence of thermal modification on the reduction of wood hygroscopicity [5]. A lower ability to absorb moisture than untreated wood was retained even after a year of exposure in outdoor condition. Therefore, the dimensional stability of the heat-treated wood was also improved, making the material more suitable for outdoor use [3,4,6]. However, aging induced a decrease in performance both in heat treated and natural wood.

Exposure to the outside causes greater colour variations on natural wood surfaces than on heat treated wood.

These data made it possible to better understand the effect of aging on heat treated Ayous wood, a material that is still too little studied and is experiencing a growing interest in the European market.

Natural aging of wooden surfaces leads to a slow deterioration, which cause unwanted changes, even in heat treated wood, and checking after longer exposure times is needed.

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Table 1. Density of Ayous wood before and after heat-treatment and weathering.

Parameter	Sample number	Average value g cm^{-3}	Standard deviation g cm^{-3}
Density Natural unweathered	29	0.38	0.02
Density Natural weathered	159	0.38	0.04
Density heat-treated unweathered	30	0.32	0.02
Density heat-treated weathered	150	0.30	0.02
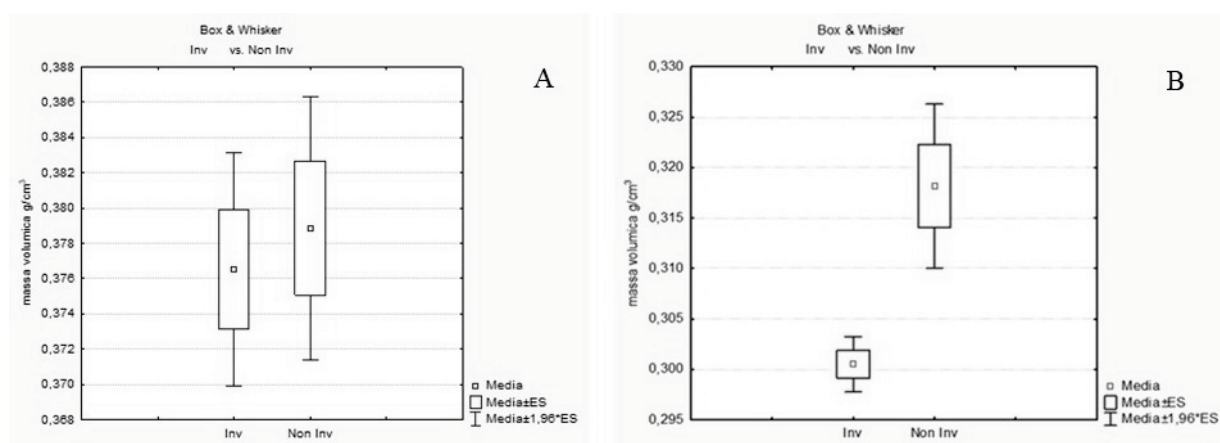
Figure 1. Density in natural (A) and heat-treated (B) Ayous wood, weathered (Inv) and unweathered (Non Inv).
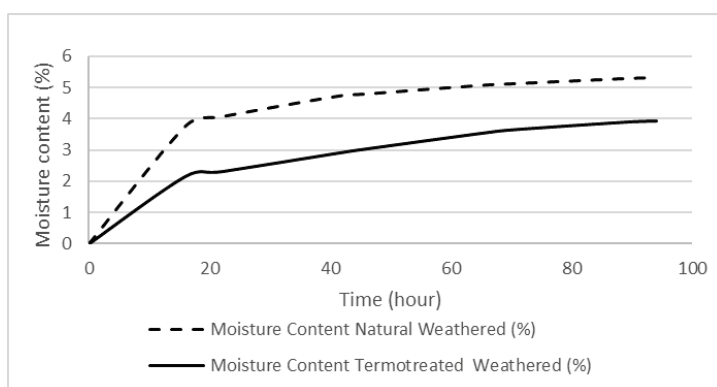
Figure 2. Moisture absorption dynamic in natural and heat treated wood, both weathered.

THE ALLOMETRIC EQUATIONS FOR EVALUATION OF STEM VOLUME AND ABOVEGROUND BIOMASS OF BLACK PINE (*PINUS NIGRA*. ARN) IN ALBANIA

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Abstract

The accurate estimation of tree volume and above-ground (AGB) biomass throuhg alometric equations and biomass expansion factors (BEF) play key roles in stand and country-level forest biomass and carbon stock estimation. However, specific allometric equations for volume and biomass estimation as well as BEFs are not available for natural forests of black pine (*Pinus nigra* Arn.) in Albania. The present study aimed (1) to develop allometric equations to estimate the standing volume and AGB of *P.nigra*, and (2) to estimate BEF applicable for estimating the AGB of natural black pine forests and carbon stocks. A total of 178 trees from 6 locations with DBH ranging from 6.0 to 53.0 cm were sampled for stem volume and biomass analyses after felling. We have tested several allometric equations based on diameter at breast height (DBH) and height (H) as independent variables. Our results based on measurements revealed that stem volume and biomass were gradually increased with increasing DBH, while a different trend was observed for height. The quadratic, power and linear models were the most accurate equations for volume and biomass estimation. BEF values ranging from 1.30 to 1.50 and these values can be used in the greenhouse gas inventory at the national level for Black Pine in Albania. However, biomass equations, which include DBH were more precise than equations that are solely based on H. These allometric equations are available to be used for the estimation of stem volume and natural black pine forest biomass and carbon stocks in Albania.

Keywords: *Pinus nigra*, allometric equations, volume, above-gound biomass, carbon stock.

1. Introduction

The lack of allometric equations to estimate standing volume was noted during the last National Forest Inventory (ANFI 2020). Therefore, there is a necessity to develop these equations based on predicted variables, such as diameter at breast height (DBH) and total height (H). The limitations of equations from other countries emphasize the need for location-specific studies, especially for main species in the country. The study presents the volume equations developed for *Pinus nigra* Arn. which is an important conifer species growing from north to south of Albania.

2. Material and methods

2.1 Study area

Data used in this study were collected from 7 locations comprising natural and artificial stands of *Austrian pine* mixed with other species (see Table 1).

Table 2. Characteristics of the sampling sites in the study

Nr	Location	Code	Geographic coordinates		Elevation (m)	Aspect
			North	East		
1	Germenj (Erseke)	GER	40° 14' 14"	20° 38' 40"	885	NE
2	Vithkuq (Korçë)	VITH	40° 30' 11"	20° 36' 17"	1260	NE
3	QafeMali (Fushe-Arrez)	QAM	42° 03 '36"	20° 00' 33"	554	SE
4	Gomsiqe (Puke)	GOM	42° 02' 29"	19° 51' 53"	792	NW
5	Librazhd	LIB	41° 18' 37"	20° 16' 49"	774	NE
6	Bishnice (Pogradec)	BISH	40° 55' 32"	20° 26' 06"	1282	SW
7	Skenderbegas (Gramsh)	SKE	40° 45' 46"	20° 15' 35"	746	SW

2.2. Methods for equation development

The circular sample plots allocated at uniform intervals of 200 m distance between each other were established in each location. The number of sample plots varied from 18 in GER site to 36 in VITH site. In each sample plot were measured DBH and H for each tree, and then were grouped in DBH classes. The sampled trees in each site were chosen to ensure a representative distribution by DBH classes. Before cutting the sampled trees, DBH were measured, while the H measured to the nearest 0.01m, after the tree felled. In total, 392 trees were felled and the destructive method was used. First, we sectioned the stem; (i) every

1 m (tree length up to 10 m) and measured diameters along the stem at 0.5 m, 1.5 m, 2.5 m, 3.5 m from the stump until the total length was reached or (ii) every 2 m (tree length over 10 m) and measured diameters along the stem at 1.0 m, 3.0 m, 5.0 m, 7.0 m and so on until the stem end. We calculated the volume of each section using the Huber formula (Avery and Burkhart 1994).

$$V_{log} = l \cdot g_{0.5}$$

where: V_{log} is log volume, $g_{0.5}$ = cross-sectional area over bark in m^2, obtained in the middle of each section, and L = length of each section in meter(m).

Total stem volume (V_{stem}) was calculated as the sum of the volume of each section (V_{cs}),tip (V_{non-m}) and stump (V_{stump}): V_{stem} = V_{cs} + V_{non-m} + V_{stump}

Collection of wood discs from the stems were performed from the base, middle and top of the stem and were sent to the laboratory for weighing and age determination. Prior to analysis, data of felled trees (DBH & H) were tested for normality and homogeneity using Kolmogorov-Smirnov test. We tested one linears and four non-linear models using DBH and H as independent variables. The adjusted coefficient of determination (R^{2}Adj), root mean square error (RMSE), and Akaike Information Criterion (AIC) were used as goodness-of-fit criteria to evaluate the developed volume equations. The performance of each volume equation was estimated by the following statistics: (i) the total relative error(TRE) and mean predictor error (MPE) (Dong et al. 2019). If the values of TRE were less than that value of MPE, then the developed volume model was considered reliable.

3. Results and Discussion

Table below depicts the main dendrometric variables of each forest stand in seven locations.

Nr	Characteristics	VITH	GER	GOM	QAM	BISH	LIB	SKE
1	Mean tree of basal area	21.2	17.7	17.3	16.8	20.9	18.5	26.8
2	Mean height (m)	13.6	14.6	7.4	13.5	11.0	9.6	10.7
3	Tree number per 1 ha	2200	1383	1450	2000	967	1183	1240
4	Mean tree volume (m^3)	0.21	0.20	0.08	0.04	0.22	0.14	0.42
5	Basal area (m^2/ha)	77.68	34.1	34.2	44.5	33.27	31.8	69.91
6	Mean volume (m^3/ha)	462.0	282.7	116.0	80.0	212.74	165.62	520.8

One way ANOVA indicated a siginficant difference among mean DBH of each location (F =15.873; p<0.05) and tree heights (F =3.868; p<0.05). LSD test showed a significant difference between mean DBH of SKE site with other locations and between QAM vs BISH and QAM vs LIB. In case of tree height, the LSD test showed a significant difference between GER and other locations.The Kolmogorov-Smirnov test indicated that DBH and tree height H data of 392 felled trees had non normal distribution. Several equations expressing the stem volume (Vol) as a function of DBH and tree height (H) were developed and the most accurate equations for volume preiction were those where TRE were less than MPE values.

Model	Location	R^{2}Adj	RMSE	AIC	TRE (%)	MPE(%)
Vol = - 0.2033 + 0.02403*D	GER	0.841	0.02	-23.64	0.01	0.04
Vol=0.071+0.00105*D + 0.000277*D^2 + 0.000009*D^3	GER	0.931	0.01	-35.51	26.7	28.1
V=0.071+0.00105* D + 0.000277* D^2 + 0.000009*D^3	GER	0.678	0.01	-10.78	60.45	68.54
Vol = - 0.0607 + 0.02349 H - 0.001700 H ^{2} + 0.000105*H	GER	0.975	0.01	-39.34	76.54	99.82
V = 0.000158 * D $^{2.38509}$	GER	0.897	0.0071	-14.52	85.45	99.34
Vol=-0.545+0.0417*D	LIB	0.893	0.07	-171.88	0.6	4.3
Vol=-0.0731+0.01593*H	LIB	0.77	0.111	-117.62	2.03	12.3
Vol=0.1313-0.02236*D+0.001246*D^2-0.000004*D^3	LIB	0.974	0.03	-269.29	19.4	65.4

$V= 0.3422-0.0114*H+0.0146*H^2- 0.00041*H^3$	LIB	0.837	0.09	-139.89	0.1	0.73
$Vol=0.0001142* (D)^{2.43522}$	LIB	0.968	0.03	-257.78	87.79	104.73
$Vol=0.0233*D-0.2381$	BISH	0.85	0.18	-29.72	0.56	2.55
$Vol=0.03089-0.008799 *D + 0.000783*D^2- 0.000001 *D^3$	BISH	0.99	0.03	-256.5	80.31	86.88
$Vol=0.07446*D-0.03553$	QAM	0.91	0	-69.41	0.48	15.2
$Vol=0.03607-0.01381 *D + 0.001714*D^2- 0.000038 *D^3$	QAM	0.98	0	-82.25	27.91	88.52
$Vol=0.1004-0.05948*H + 0.01099*H^2 - 0.000525*H^3$	QAM	0.6	0	-40.76	1.31	56.85
$Vol=0.000109*D^{2.46471}$	QAM	0.97	0.17	-3.75	0.25	7.55
$Vol=0.000045*D^{2.74173}$	SKE	0.77	0.19	-78.45	0.06	6.36

We recommend the use of models where tree volume is estimated from DBH, because it is easily and accurately measured in the field. The best-fit models to estimate total volume from DBH and tree height(H) adjusted well in the interval of diameters sampled (2.5–64.0 cm) and height (2.0-25.5 m). These models should be carefully used outside the specified DBH and tree height range.

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APPLICATION OF STRATEGIC MANAGEMENT IN ALBANIAN WOOD INDUSTRY

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ABSTRACT

In Albania, a number of studies have been done for many different business categories, but there is little or no evidence for strategic management in the wood industry. Over the years, the wood industry in Albania has undergone drastic changes. Company owners say that their business is constantly changing the shape and it is important for them to change the operational model in order to: 1) improve efficiency; 2) reduce complexity; 3) reduce costs; The research was conducted in the district of Tirana and Durres. The data was collected in the wood processing companies and 30 questionnaires were processed in this regard followed by statistical analysis. The study seeks to answer two basic questions: Do companies in the wood industry apply strategic management practices? What is the weight and correlation between the factors as product, customer, technology, innovation, environment, supplier in terms of ensuring a competitive advantage?

The study has showed: 1) In terms of the product, companies have considered as a strong factor the development of a new product; 2) Operational management is still in its infancy, but its importance is well appreciated; 3) Most critical areas in operations management are being practiced, except for inventory and innovation. Based on the theoretical framework and the collected data, we find that although the companies aim to be leaders in the market, they are followers of the customer and innovation as a competitive advantage is missing in this field; 4) In terms of technology, 70% of companies accept the purchase of new machines as a very strong factor. 5) The development of new ideas related to the product is also accompanied by obstacles where the financial sector and developments in the region are listed in this direction; 6) The improvement of customer service and quick response in product distribution are strongly correlated; 7) Companies did not achieve the level of synchronization that would be required in an ideal supply chain management; 8) Companies should work on gathering feedback from suppliers and customers and find ways to improve their systems.

Keyword: wood processing, strategic management, technology, innovation, supplier, assessment, challenges.

INTRODUCTION

Wood processing industries include a wide range of activities related to the processing and production of wood products. Nowadays, the wood processing industry faces several important challenges in the modern era where in our field of study it is worth mentioning: 1. Fluctuating wood prices; 2. Competition from alternative materials; 3. Lack of qualified workforce; 4. Market demand fluctuations; 5. Technology integration; 5. Supply chain disruptions; 6. Innovation and Design Trends;

The wood processing industry in Albania has taken a solid progress. This industry itself contains a history of change. Until the 1990s, the forms of management were controlled and directed by a centralized state system that determined the form of technology (in large schemes), the quantity of the products on the basis of a concentrated market demand. With the breakdown of the centralized system and the opening of private enterprises, the wood processing industry underwent its changes. Therefore, from large enterprise systems concentrated in few cities of Albania, this industry began its development with a wide geographical extent but fragile and grouped in the small business category. The overpassing of transition period in Albania, the strengthening of the economy, opening of new markets in Albania and abroad and the increase in market demand have also brought a development of the industry toward expansion of the product range, the involvement of modern technology and automated lines of production and increase of specialized workforce for specific technological processes.

Over the years, the wood industry in Albania has undergone drastic changes. Company owners say that their business is constantly changing the shape. As stated above, it is important for companies engaged in this industry to have a well defined operational management strategy. Ensuring competitive advantages by adding value from operational processes through the transformation of raw wood into final products is very important for companies in the wood processing industry. In Albania, a number of studies have been undertaken for various business categories with regard to the operational management strategy, but there is very little or no evidence for the wood industry. In this way, this study seeks to contribute by presenting the existing practices in the field of operational management and to present the need for their adoption in this direction.

RESEARCH METHOD

This is a study designed to identify the strategies that companies in the Albanian wood industry applies to operations management practices. The research was based on the development of questionnaires. The questionnaires were compiled to contain 6 sections as follows:

Part 1: General information

Part 2: Product, processes and product variety;

Part 3: Strategies

Part 4: Design and innovation

Part 5: Operational management practices

Part 6: Additional information

The questionnaires contained open and closed questions. A Likert scale five-point were used to identify the importance of product, technology and customer in development strategy of the companies. In this study, the target population was the wood processing and trading companies in Albania, registered by the National Business Center (NBC). The research was conducted in Tirana and Durres area. The questionnaires were distributed to several companies but 30 of them responded. The data were analysed using SPSS and hypothesis testing and statistical test were carried out.

RESULTS

In order to maintain a competitive position in the market, every company must have its own long-term strategy.

Based on the theoretical framework, the company's business strategy is built after managers have considered many factors and made some strategic decisions. This includes determining what the company's business is (its mission), market recognition analysis (environmental scanning) and identifying the company's strengths (core competencies). All three of these factors are critical for the development of the company's long-term plan or business strategy.

The mission is the purpose or reason for the existence of the companies. 90% of the respondents admitted that they have a mission. All the companies in the study have in their main goal the product, quality and the customer. In their formulations, we also distinguish their competitive advantages. "Adaptation of innovations in customer requirements in order to create a new product" expressed by "Erald" shpk shows the ability of company to change quickly and to fulfill customer requirements by giving this company the advantage of flexibility. "Ardeno" shpk in its strategy also shows the intention to make things as least expensive as possible; that is, ensuring the production of the product and the provision of services at a cost that enables the price set for them to be suitable for the market while enabling the company's profit by giving it the cost advantage.

Core competencies

As core competencies for the companies are considered products, technology and quality of their products. The companies are aiming to invest in products and machinieries in order to maintain competetive advantages in market.

The main direction (80%) is the production technology, followed to (70%) product development. These are considered as strong factors that also determine the development directions of the companies. A factor of 25%, is considered the market, determining that even environmental changes have an impact on the company's strategy.

In practice, the idea of product improvement is the norm since operations managers are constantly looking for new ideas. A small change in products can be enough to create a substantial difference in demand. As a result, companies feel the need to make frequent adjustments to their products. Besides the market, another pressure to change the type of products comes from internal demands. Many operational activities can adapt their existing product to reduce the cost of production or can design a new product. 100% of the companies admitted that they have a special sector for design of project and admitted that during the last 10 years they have developed new ideas regarding technological products and processes.

Based on the theoretical framework, two groups of questions were considered in the questionnaire as following:

- *New ideas in the direction of the product;*

- *New ideas in terms of production technology;*

In terms of the product, companies have considered the development of a new product as a strong factor. A very strong factor in the amount of 70% is considered the improvement of the existing product. Based on the close ties that the companies have with the customers, where 100% of the products are produced based on the customers' requests (we consider here the manufacturing companies), the improvement of the product is an indicator that shows the consideration of the suggestions of the customers and the market from the part of the companies taken in the study.

In terms of technology, 70% of respondents accepted as a very strong factor the improvement of existing technology. Another direction is the purchase of new machines such as CNC and the improvement of the internal transport system.

> *H1: There is a correlation between product and technology in development of new ideas and enhacement of the strategy of the company.*

The Spearman rank correlation coefficient was used to study the impact of the product category and production technology. This coefficient is used for the non-parametric analysis of the relationship between variables. The rank correlation coefficient assumes a value in the range $[-1; 1]$. The closer the value of this measure is to -1, the stronger the negative correlation between the examined features, while the closer it is to $+1$, the stronger the positive correlation. Values close to zero indicate a weak relationship between the variables.

Table 1: Spearman test for correlation of products and production technology variables

Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
4.53	0.68	1												
4.23	0.90	-0.323	1											
3.93	0.87	-0.171	-0.201	1										
4.4	0.68	0.345	0.125	0.047	1									
4.37	0.56	-0.534	0.444	-0.09	-0.221	1								
3.33	0.76	-0.156	0.439	0.035	0.27	0.027	1							
3.97	0.77	-0.229	0.363	-0.107	-0.04	0.192	0.139	1						
4.07	0.98	0.048	0.609	-0.197	0.271	0.143	0.247	0.141	1					
4.57	0.73	0.065	0.16	0.007	0.225	-0.275	0.396	-0.027	0.235	1				
4.53	0.51	-0.053	0.096	0.24	-0.04	0.016	0.239	-0.041	0.134	-0.193	1			
3.63	0.89	-0.008	0.111	-0.256	0.023	0.211	-0.017	0.032	0.464	-0.254	0.219	1		
4.1	1.00	0.071	-0.259	0.247	-0.113	-0.131	0.183	-0.267	-0.007	0.062	0.369	0.199	1	
4.27	0.64	-0.338	0.609	0.095	-0.016	0.2	0.379	0.371	0.191	0.183	-0.028	-0.186	-0.314	

Note: 1-8 related to product and 9-13 are related to production technology

An important factor is the the source of new ideas. In the questionnaire, some researched alternatives from the theoretical framework are collected. From the gathered data we conclude:

- 90% of the respondents accept the source of ideas from the owners as a very strong factor.

- Engineers are also proposing and encouraging the new idea. 100% of the companies employ more than 2 engineers and getting their opinion is considered by 80% as a very strong factor.

- The production staff is considered as a moderately strong factor (40%) while the environment is accepted by 80% of the respondents as a strong factor, showing the compatibility with the theoretical framework where the environment is considered as a factor that affects the development of companies.

• The development of new ideas related to the product is also accompanied by obstacles. The finance sector and the production staff are considered as hindering factors in the development of new ideas. Developments in the region are also considered obstacles. In terms of developments, we consider the changes in the legal framework for financial declarations in the state. The changes in the region have also brought an increase in the price of fuel and an increase in the prices of imported raw materials.

DISCUSSIONS:

The companies included in the study have a clear formulation of their mission and vision, which in itself is an important component in terms of fulfilling the company's objectives.

The formulation of the strategy at the business level is the attribute of the company's owners. The examples brought from site visits carried out in the premises of companies express the recognition by the staff of the goals and directions towards which the companies are aiming to be developed.

The Spearman test shows a correlation between the factors of product development and the improvement of production technology. Their positive correletation associated with fulfillment of customer requests shows a breakdown of the strategy at the operational level, but need to be emphasized that companies should develop more analyzes of risk and profit factors for the undertaken policies toward the development of new product ideas or investments in machinery.

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EFFECTS OF FEED SPEED AND WOOD SPECIES ON SURFACE ROUGHNESS

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Abstract

The aim of this study is to determine the surface roughness for four different wood species processed in planer machine with two different feed speeds. Samples of 70 x 20 x 500 mm are prepared for each wood species beech (*Fagus sylvatica* L), white oak (*Quercus petraea* Liebl), fir (*Abies alba* Mill.) and pine (*Pinus nigra* Arn.). The specimens were prepared by planing at 3 and 7 m/min feed rates, with 1.5 mm cutting depth. Surface roughness was measured from the tangential face of each sample according to ISO 3274 (1996) by using Mitutoyo SJ-201 device. Comparing the results of the surface roughness of all the four species planed with feed speed V1= 3 m/min, beech has the smallest values of surface roughness, while planning with feed speed V2 = 7 m/min the smallest values of surface roughness stand for fir.In both cases, white oak has the highest values of surface roughness. It is noticed that the surface roughness of all wood species increased with the increasing of feed speed during the planning. Data generated in this study can be used as a quality control tool for further wood processes such as sanding, finishing or gluing.

Keywords: feed speed, planning, surface roughness, beech, pine, fir

1. Introduction.

Wood surface roughness is a very important indicator that has a great impact on final quality of the wood products. Surface roughness also has an important effect on gluing, coatings, impregnation, strength of joints, control of blade sharpness, and decrease of waste. Parameter of wood surface roughness various according the wood anatomy, moisture content, density, porosity. [1 – 5]

Besides the above factors the surface quality of wood depends on other factors such as machining parameters: direction of cutting, geometry of the blade and its sharpness, thickness of the cut part, lack of precision of the sharpening tool, and technological parameters (speed of cutting, speed of movement, etc.) as well [5-7],[8-10]. High quality of wood surface is very difficult to be achieved. These difficulties are causedby wood defects and wood anisotropy (diversity of density, hardness, strength, modulus of elasticity). Many irregularities which occur on machined surface can be explained by result of its structure. Species with porous structure give worse surface quality than less porous structure species. [4].

Surface roughness commonly is defined by three parameters: Ra – arithmetic average of the absolute values of the roughness profile ordinates; Rz – arithmetic mean value of the single roughness depths of consecutive sampling lengths; Rmax – the largest single roughness depth with the evaluation length. Wood surface roughness can be measured by the means of contact and non-contact methods.

Roughness also depends on the direction of sawing – tangential or radial [1 - 2]. Research shows that radially sawn wood has a bit lower surface roughness than tangentially sawn wood. Also, different surface roughness is obtained in the late and early wood areas [5]. Early wood roughness is higher that late wood.

This paper will compare the surface roughness parameters during plane milling with two different feed speeds for four different wood species.

2. Material and Methods

Testing was conducted on samples of beech-wood, oak-wood, pine-wood and fir-wood processed in a plane machine. The knives dimensions were 300 x 30 x 3 mm. The used knife rake angle was 15º and the depth of cut was 1.5 mm. Dimensions of samples were 70 x 20 x 500 mm. Before planning, samples were kept in the conditioning room at 20ºC temperature and 65 ±5 % relative humidity. For each type of samples, the average density and humidity of wood were determined. Wood density is determined in accordance with ISO 13061-2 of 2014, and wood moisture is determined according to the ISO 13061-1 of 2014.

Two feeding rates, $V_1 = 3$ m/min and $V_2 = 7$ m/min, which differ considerably among them, were applied.

For each testing conditions a total of 20 samples were used. Measurements in ten different randomly selected surface spots at each sample were averaged. Surface roughness tests were conducted using a Mitutoyo Surface test SJ 201P, and carried out according to DIN 4768, 1990. The values of roughness were determined with a precision of ±0,01 μm.

Figure 1. Mitutoyo Surf test SJ 201

Descriptive statistics (mean, minimum, maximum, variance, standard deviation) was made for all analyzed variables. The differences between the obtained values of roughness parameter Ra for different feed speed were analyzed statistically. The error of type I (α) of 5 % was considered statistically significant.

3.Results and discussion

The arithmetical mean deviations of the profile (Ra) presents the average roughness value of each group of samples, 40 measurements in total for each group of samples.

The surface quality of samples of planed beech-wood, oak-wood, pine- wood and fir-wood were significantly different (Figure 2). **From the comparison of the average values of Ra µm, in figure 2, for the four wood species planed with the planing machine, the surface roughness of these samples with feed speed V1= 3 m/min turns out much better compared to the surface roughness parameter planed with feed speed V2= 7 m/min.**

The results clearly show that the physical and mechanical properties and anatomical structure of wood affect the surface roughness. Resistance to penetration blade cutting edge in the wood depends on the size, shape of cells, as well as thickness and strength of cell wall.
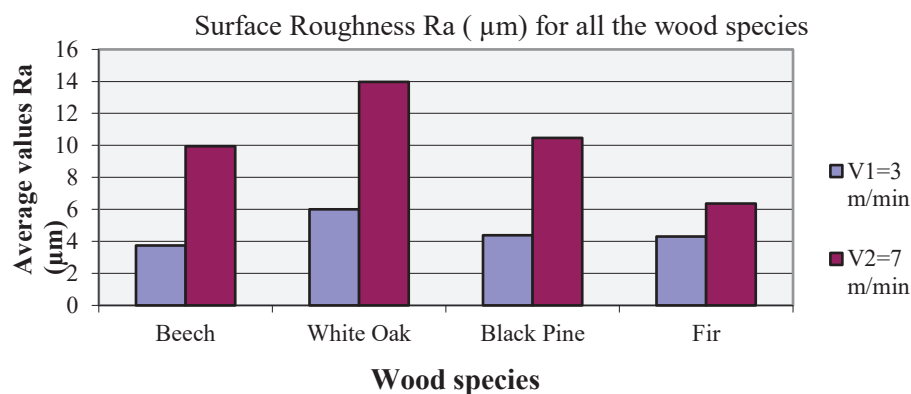
Figure 2. Average values of surface roughness for the four wood species

Out of the four materials planed with feed speed V1 = 3 m/min, the best surface quality (lowest surface roughness parameter) has beech material and the highest parameter of surface roughness comes from oak.

There is no big difference in surface roughness between fir and pine planed with V1= 3 m/min.

By processing all four materials with V2= 7 m/min, the surface roughness parameter increases significantly. This is explained by the fact that for higher feed speeds, the feed per knife is higher, which means the average chip thickness which is removed from the material, is bigger. Comparing these, we see that fir has the lowest surface roughness and the best surface quality, followed by beech, pine and oak.

In general, better results of the machining performance have been obtained with the decreasing feed speed.

The obtained results clearly show that the physical properties and structure of the wood affect the roughness of the surface. The differences in surface roughness mentioned above can be explained by the influence of the wood structure and its uniformity. Species with a thinner (smooth) structure, such as beech and fir, have less roughness compared to species with a thicker structure, such as oak and pine. Also, the uniformity of the structure or the size of the pore distribution, especially within the early annual growth zone, can cause a very variable wood surface. Porous woods with normal distribution of small pores tend to give a less rough surface than those with very large and open pores (oak).

In general, better results in the surface quality are achieved if the feeding speed is decreased. It is also reported from the literature that with the increased of the feeding speed, caused strong machining defects.[5], [6].

Therefore, it is recommended to mill at low feeding speed to produce a better surface quality.

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DEVELOPMENT OF AGROTOURISM IN ALBANIAN RIVIERA THROUGH ADAPTIVE REUSE AND FLEXIBLE DESIGN STRATEGY; CASE STUDY, DHËRMI

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Agrotourism as it is defined most broadly, involves any agriculturally based operation or activity that brings visitors to a farm or a village. Since the old settlements of Dhërmi village there is a strong relationship of the urban unit, the way that the buildings evolved with the natural site and the local agricultural fields, creating a unique Mediterranean typology. Unfortunately, during political and demographic changes, this village has lost most of the agricultural fields resulting in a lack of local production affecting the economy and the special coexistence of agriculture and urban units. The purpose of this research is to enhance the agrotourism through the strategy of adaptive reuse and flexible design of four main settlements on the historical center of the village. The involvement of the local community and the agricultural bust through and urban regeneration proposal of small village units. Four houses in the historical center are studied through their historical timeline, urban unit and different changes under different factors. Adaptive reuse is an effective strategy for similar typologies that need to reconnect the heritage with the current economic and environmental need. The four houses are rethought as guest house and local businesses enhancing agrotourism and local products through flexible design combined with urban study.

Key words: Agrotourism, Adaptive reuse, flexible interior design

1. Introduction

In Mediterranean countries the sun is desirable in winter, while in summer the sun should be prevented and cooling and ventilation are necessary. Houses are assembled in ensembles due to the nature in the Mediterranean climate. The accumulated settlements are protected and respond to climate through the creation of shade and protection from strong winds with green plantations, which surround the buildings expanding the agrarian field. The climatic characteristics of the Mediterranean allow staying outside the dwelling throughout the year; this affects the organization of the yard, veranda, terrace, and garden, as essential elements of the residential unit. The vernacular or traditional houses in the Mediterranean region use the upper floor in summer and the ground floor in winter with chimney. The kitchen is widely used in winter, while terraces and verandas or outdoor spaces serve to stay in the shade during the day or to sleep at night in summer. The use of local materials, mainly soil and stone, is one of the characteristics of vernacular architecture adapted to the regional climate. A good value of UV in building materials is the moderation of indoor temperature, "maintaining freshness in the morning and warming up at dinner." The vernacular architecture reflects the spirit of the local people and responds to local nature, culmination and history. It is identified by regional characteristics. In general, vernacular buildings do not meet the standards of comfort and lifestyle but can provide some advice on the strategy of mitigating the use of non-renewable energy (Nourissier.G,2002). Albania's southern coast has special landscape qualities that can boost economic development. The traditional villages of the region form a unique expression of popular/native architecture distinct from their safety and the use of area materials. The coastal villages area is located in the south-western part of the country between the city of Himara and Saranda. This name includes 11 settlements or urban structures starting with the village of Palasë, Ilias, Dhërmi, Vuno, Himara up, Pilur, Qeparo up, Borsh, Kudhës, Piqeras, Lukovë. These settlements date back to the 15th century. XIII, (Riza, Rural Constructions in Labëri, 1984) where some of them had fortification characteristics and the rest with agricultural and livestock characteristics. The beginnings of population gatherings in this area had caused mainly with an economic and protective function. The amount of agricultural land was quite small, which led to the creation of compact urban structures and grouped in the most unsuitable terrains for economic activity. This urban layout and structure are thought to have had a protective purpose against external factors. Constructions in these villages are generally with residential functions with few buildings of a social or administrative function. The apartment also contained economic functions such as animal care, agricultural products, and later commercial premises. (Riza.E 1984)In Dhërmi the highest density of constructions is along the national road, respectively in the center and the east. The random organization of the built environment is created through several social principles in the construction period. The direct positioning of the apartment towards the road, the proximity of the entrance to the road and the lack of a private yard are features of the urban area. However, most of the dwellings are dominated by rural features, a considerable distance from the entrance to the road, which is a private space and is located on its north side, as well as the presence of the courtyard on the south side, with a much larger area than that of the apartment itself. The courtyards were used for agricultural and livestock activities by the residents of the house. The breaking of the terrain and the need to use the yard space has been solved by terracing the surface. It should be noted that the terrace applied only on the surface of the yards and not on the surface of the buildings. The steep terrain does not seem to be a problem to build. Although most dwellings follow topographic lines in their placement, as it is the most economical solution, in some cases the violation of this principle is noticed.

Pic.1 Urban analysis

This coastal area, in the last decade of the last century, experienced the phenomenon of large-scale emigration, mainly to Greece, for economic reasons. Approximate estimates show that over 70% of the population has emigrated from this area. At the beginning of the new century, this phenomenon diminished, leading to a stabilization of immigration rates and the stability of the local population. Traces of construction on the map show that new facilities tend to be positioned near the national road, due to the accessibility and expansion of the village during the transition years. In the southern part of the village passes the main road which is lined with the upper village with only one road that leads to the largest and most important center of the village, there is also a path adapted vernacularly by the inhabitants of a village, the staircase which connects the square with the national road.

2. Methodology

The selected methodology is of a research, descriptive and analytical nature. This methodology relies on a detailed assessment of historical data, collected from selected bibliography, and their enrichment through observation. We will analyze concrete study examples similar to the urban situation in the village of Dhërmi, describing mainly the analytical part of the urban interaction they have and the creation of a strategy for the village under study.

3. Results and Discussion

Agrotourism is not a new term for these villages. Agrotuzmi is earlier in these villages than previously thought, it came as a result of the way of life of the inhabitants by creating activities in yards or squares and through exports mainly to Greece and Italy. To value with relevant significance are the socio-economic principles, which empower the community to optimise their local resources, contributing towards the development of effective strategies for sustainable development. This is possible to achieve by supporting local communities to be more self-sufficient, by sustaining local production, by optimising local materials and by choosing to work with communal efforts (M. Correia, L. Dipasquale, S. Mecca ,2014) Since ancient times these villages have been a key point for the economy of the region, having a large area planted.

Pic 2 Maps of the proposal urban nucleus   *Pic3. Map of the proposal of the common courtyard*
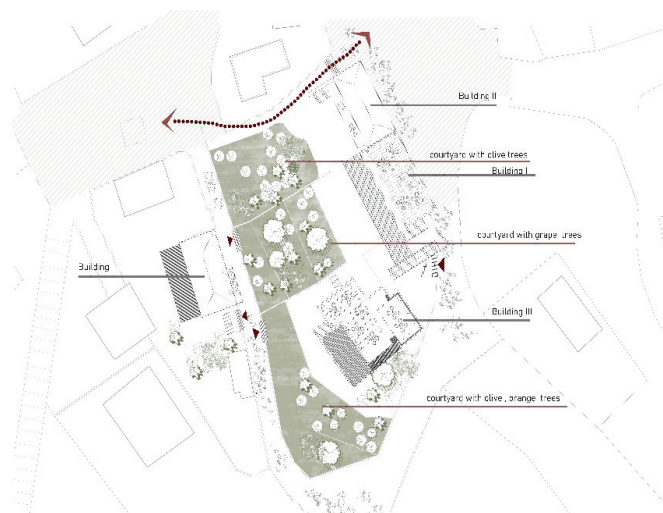
4. Conclusion

Since ancient times these villages have been a key point for the economy of the region, having a large area planted. Although in a more vernacular form of decades and centuries we have a typical form of agrotourism perhaps not in today's conditions and concept, the more vernacular one. What we see today in these villages is the continuation of this tradition and the need to improve it in architectural terms, but we cannot deny it as a tradition or as a way of life of these villages. After the period of communism, we have a big change in the architectural approach of these villages, you are also related to the problem of ownership in Albania. Since during the communist period there was no private property, but only state property, during the transition years we have a violation of property and a large number of agricultural lands which were used to build informally a large number of resorts. this greatly affected the economy of the villages as we have a decrease in production and a decline in the economy.

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ANALYSIS OF PLUVIOMETRIC DEFICIT AND DROUGHT PHENOMENON IN THE AREA OF TIRANA THROUGH CLIMATE INDICATORS

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Abstract

Drought is a natural phenomenon that brings harmful consequences to ecosystems and agroecosystems. It is part of the extreme climatic phenomena which is influenced by a set of complex and interconnected factors. Natural drought is caused by a reduction in precipitation or water deficit, relative to average meteorological conditions, for a period of time in a given area. Drought is a climatic phenomenon which is related to the modification of the rainfall regime and their absence for long periods of time, but also to the increase in temperature and other factors. It presents many aspects, but in the agronomic aspect it must be analyzed and evaluated carefully. Drought as a phenomenon brings consequences in the degradation of ecosystems, soil degradation and affects agricultural production. It appears at different times of the year, acts in different ways and affects agricultural plants at certain stages of their growth and development. Analyzing the drought phenomenon requires continuous daily records of rainfall and temperature and the use of various climate indicators, through which we can analyze and define more precisely the dry periods of the year, which are of particular interest in agricultural areas. The study takes into consideration the area of Tirana, an area with a pronounced agricultural character, referring to the measurements and recordings of climatic parameters at the Meteorological Station of the Agricultural University of Tirana. The study shows that there is a marked downward trend in rainfall and significant seasonal variability in their distribution. Analyzing the phenomenon of drought in this area will contribute to taking adaptive measures and increasing the resilience of agricultural systems.

Keywords: drought, rainfall, temperature, climatic indicators, agriculture

1. Introduction

Drought is a natural phenomenon that is caused by a lack of rainfall in a certain area. It affects the living world in terrestrial ecosystems, but also economic and social human activities, especially the agricultural activity [6, 5], reducing production and affecting the livelihood of communities in rural areas. A day is considered without rain when it falls less than a standard threshold of 1 mm; while dry days are those days when less than 10 mm of total precipitation falls and dry periods those when 10 consecutive dry days are recorded [14]. Drought is conceptualized in meterological terms when we have a lack of rainfall, in terms of hydrology, when we have deficits in bringing water to the ground and in agronomic terms when the lack of water in the soil causes problems in the life of plants [7, 18, 13]. Agronomic drought is influenced by meteorological and hydrological drought characteristics. It is related to the water needs of plants and depends on the type of plants and the stage of development they are in, from the physical properties of the soil and its water content. So, from the agricultural point of view, it is important to carefully assess the agronomic drought. Drought as a natural phenomenon is characterized by several aspects such as frequency (the number of drought periods of the year); duration (number of days for each dry period); quantity (the amount of rainfall during the dry period; or the amount of evapotranspiration during the dry period). Drought is caused by climate variability (normal drought) or climate change (abnormal drought) in a given area [4]. Climatic variations that can determine drought conditions in an area are natural variations in rainfall patterns [1], but also a set of other meteorological factors such as temperature [15], atmospheric demand [16] and heat waves [3]. In recent decades, changes in the rainfall cycle are a consequence of the increase in temperature and the effects of climate change [8]. Climate change is an important factor that has significantly modified the rainfall cycle, making droughts in some regions such as the Mediterranean longer and more intense, with even greater effects on ecological systems. The decrease in the level of rainfall will be greater in the Mediterranean basin, in which there will be a decrease in humidity and a greater dryness in the summer period, while in other latitudes there will be an increase in rainfall in the winter period [10]. Increasing temperatures and increasing the frequency and intensity of extreme meteorological events, with an overall decrease in precipitation, they risk having negative impacts on the agricultural sector, potentially reducing the production of many crops [8]. In the Mediterranean basin where Albania is also a part, droughts are a characteristic phenomenon, which is mainly determined by insufficient rainfall, but in the conditions of climate change they are likely to have a longer duration and be severe. They often lead to desertification phenomena, severely affecting agricultural activity. Each area has historically been characterized by normal drought, but analyzing the climate variability of an area, through the use of different indicators, can give us valuable information about how droughts in that area have changed relative to an average condition. This study is focused on the area of Tirana with the aim of assessing the "*normal*" drought, caused by climate variations but also "*abnormal*" drought conditions influenced by the trend of climate change.

2. Material and methods

The data used in the study refers to the area of Tirana and the historical data series recorded at the Meteorological Station of the Agricultural University of Tirana (41°21'43.57" N, 19°46'13.63" E) for a period of 14 years (2009 – 2022). Historical data series are daily records and include the parameters of rainfall amounts and average temperature, which were subjected to their homogenization before statistical processing. The analysis of the variability and trend of rainfall was done by means of the linear regression test [11]; the variability of rainfall related to climate change is done by means of the method proposed by [12], which analyzes the trend of precipitation in relation to the shape and scale of distribution to determine the days with precipitation for each year analyzed and dry periods of the year. Since drought is a very complex phenomenon, in order to

make a better assessment of its condition, some indicators should be used. Specifically, the Standardized Precipitation Index (SPI) was used in this study [9], that estimates deviations or deficits of precipitation for certain periods of time, based on meteorological drought assessment. This is an indicator known both in the international and the European field as one of the most efficient and most used indicators for monitoring dryness in an area [17]. The calculation of SPI is based on the historical series of rainfall for a given period. The SPI index is calculated by dividing the difference between precipitation and its average value, by the standard deviation at a certain time scale according to the following formula: $SPI = \frac{x - xi}{\sigma}$

The SPI index indicates the number of standard deviations by which an event (drought) deviates from normal conditions. Positive values of the SPI indicate higher than average rainfall, negative ones indicate lower than average rainfall. In the assessment of this indicator, the following value ranges are taken into consideration:

Table no.1. The range of values for the SPI indicator

SPI values	Legend
> + 2.00	extremely wet
+ 1.5 – + 1.99	very wet
+ 1.00 to + 1.49	moderately wet
- 0.99 to + 0.99	near normal
- 1.00 to - 1.49	moderately dry
- 1.50 to - 1.99	severely dry
- 2.00 and less	extremely dry

SPI is also defined as a function of the time scale. Therefore, the values of the SPI indicator are calculated in time scales of 3, 6, 12, 24 and 48 months. In agriculture, drought is assessed for short periods of time (3-6 months), while longer periods of time (12, 24 and 48 months) are used for groundwater. In this study, we will use a 3 month time period (June-July-August) and 12 months. For the assessment of the dry period of the year, the indicator of ombrothermal diagrams was also used [2].

3. Results and discussion

Statistical analysis of historical rainfall data series for the area of Tirana by means of the linear regression test and the values of the linear regression equation show that there is a downward trend in recent years in the annual amount of total rainfall.
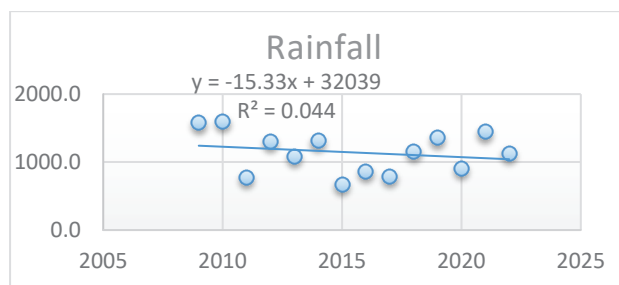
Graph 1. Determining the trends of rainfall for the period 2009-2022

Also, the results obtained from the calculation of the values of the SPI indicator for the historical period 2009 - 2022 indicate an increase in drought periods in terms of frequency, duration or quantity.

Table no.2. The values of the SPI indicator (3 months period)

2009	2010	2011	2012	2013	2014	2015
2.51	-0.01	-0.09	-0.90	-0.20	1.13	-1.07
2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
0.39	-0.94	0.91	0.33	-0.74	-0.79	-0.54

Table no.3. The of values for the SPI indicator (12 months period)

2009	2010	2011	2012	2013	2014	2015
1.44	1.50	-1.19	0.52	-0.18	0.55	-1.54
2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
-0.91	-1.16	0.05	0.71	-0.77	1.00	-0.03

Analyzing the dry periods of the year, by means of ombrothermal diagrams, shows that in the area of Tirana there is an extension of the dry periods of the year coupled with the decrease in the amount of rainfall, where there is an obvious seasonal change in their distribution and they have become more intense in recent years.
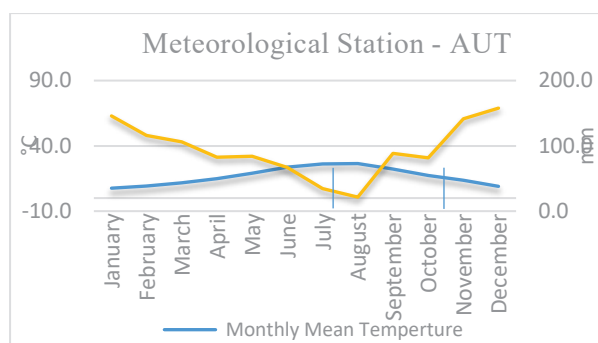
Graph 2. Determining the dry periods of the year in the area of Tirana

4. Conclusions

In order to evaluate the negative effects of the drought phenomenon in agriculture, the evaluation should be done in different time frames, mainly short-term. The results of the study, based on the values of the indicators used, indicate that there is an increase in the phenomenon of drought in the years 2011, 2015, 2017 and 2021 in the 12 month period, while in the 3 month period, only the year 2015 results with a more pronounced agronomic drought. The results show a negative trend in decreasing rainfall that is explained by the climatic variations during this period in this area, but also influenced by climate change. The study and monitoring of drought in areas with a pronounced agricultural character is important because, based on their results, we can adapt the typologies of interventions in order to mitigate the effect of drought on agricultural production.

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PRELIMINARY DATA OF MICROBIOLOGICAL ASSESSMENT ON DURRES SANDY BEACHES

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Microorganisms are naturally present in the environment, also on sand grains, either attached to them or in the water retained between the sand particles. They are an important component of beach sand - bacteria, fungi, parasites and viruses have all been isolated from beach sand, and some are potential pathogens. Bathers visit sandy beaches that provide important ecosystem services not only for their accommodation well-being, but also because contact with the bathing waters and recreational activities on these beaches have a positive impact on physical and mental health.

In this study, the presence of pathogenic microorganisms and fecal pollution (E. coli and Enterococci) was evaluated in the sandy beaches of Durres, which were monitored during the period May - August 2023 (once a month) in 21 sampling stations. 38% of the samples analyzed were positive for mold. In all analyzed samples, was found the presence of pathogenic microorganisms E. Coli (≤ 18 CFU ≤ 569 / gr sand) and Enterococci (≤ 22 CFU ≤ 611/gr sand). But referred the beach sand classification according the guidelines of WHO, 69% of the analyzed samples result above the recommended value for E.coli and 23% for Enterococci. From the preliminary results of the study, it was found that the values of Enterococci in the sand are higher than the values of E. coli.

Key words: sandy beaches, pollution, pathogenic microorganisms, well-being, ecosystem

Introduction

Beaches represent the unconsolidated sediment that lies at the junction between water (oceans, lakes and rivers) and land and are usually composed of sand, mud or pebbles. From a recreational viewpoint, sand beaches are sought after. Especially in higher latitudes, a significant percentage of time is spent on the beach itself rather than in the water. Microorganisms are a significant component of beach sand – bacteria, fungi, parasites and viruses have all been isolated from beach sand, and some are potential pathogens. Accordingly, concern has been expressed that beach sand or similar sediments may act as reservoirs or vectors of infection, as well as a source of water contamination [11, 14, 15].Beach quality monitoring and assessments based on microbiological, physical and chemical parameters are considered as a vital part of coastal management programs due to the increased recreational activities. The microbiological quality of beach sand, specially the sand – water interface is receiving more attention as high levels of fecal indicator bacteria have been detected during several studies [5, 9]. Following data published for Oak Creek, Arizona –USA, a fecal coliform count in sand was 2200 times higher than that of seawater [4]. Results revealed that re-suspension of sand due to recreational activities have affected the quality of seawater in a negative manner [4]. Based on research findings, sand is considered as a reservoir of infection in beaches [1, 10]. Generally, most of the recreational users of beaches, especially the children are in contact with beach sand more than seawater, but still the legislations or guidelines have not been set up to assess the quality of beach sand [1]. Recent studies have shown that microbiological infection is more prevalent in sand than in adjacent water and that the sand itself is a passive harbor for cumulative contamination [7, 8].

Table 1: Selected microorganisms in beach sand

Microorganism	Disease/role	Sources	Infectivity (low, medium, high)	Type of data available	References
Bacteria					
Escherichia coli	Fecal Indicator Organism	Animal and human feces	High (1–100 CFU)	Quantitative	[2, 13]
Intestinal enterococci	Fecal Indicator Organism	Animal and human feces	Not applicable	Quantitative	[2, 13]

Material and Methods

During the period May-August 2023, were monitored 21 sampling points on the beach of Durres and a total of 84 dry sand samples were analyzed.

Beach sand and water sampling and analysis

It consisted in following steps: (i) the sand area of the beach has been selected at areas that are mostly used, at a distance of about 10 meters from the shore (because the distance from the coast is very small on the beach of Durres); (ii) Containers for sand sampling are sterile bottles or single-use plastic bags; (iii) The amount of sample taken to be analyzed for microbiological parameters is 50 g [6]; (iv) Dilution of the sample was done with sterile distilled water (autoclave at 121°C for about 20 minutes), in the ratio 1:10. 5 g of sand is separated from the sample and then transferred to a beaker containing 45 ml of H20, the vessel is shaken for 5-10 min, allowed to settle and then filtered; (v) Filtering of the sample was done with the filter membrane method, in cellulose, with pores with a diameter of 0.45 μ; and aseptic transfer to Petri dish with selective terrain; (vi) Two microbiological indices were analyzed: Escherichia Coli (*E.coli*) – Method ISO 9308-3 and Intestinal Enterococci (IE) – Method ISO 7899-1, with Membrane Filters (MF), the filter membrane is aseptically transferred to selective ECD grounds and TTC agar. Plates are incubated at 37 and 44 °C for 2-3 days; (vii) The reading of the results was done at the macroscopic level, the assessment of the growth and color of the colonies and the biochemical tests. Colonies found are expressed in Colony Forming Units (UFC)/g of sand.

Beach sand classification under the Blue Flag award [6], was based on: (i) For enterococci, the guideline value of 60 CFU/g or MPN/g of sand is used as the compliance criterion for all sampling events and (ii) *E. coli* is used as an extra fecal indicator to connect with the European Bathing Water Directive parameter, using as compliance cut-off a reference value of 25 CFU/g [12].

Results and Discussions

In this study, was done the monitoring of the quality of the sand in the coastline of Durres. From all analyzed samples 38% of them were positive for mold. Also, was found the presence of pathogenic microorganisms *E. coli* (≤18 CFU ≤ 569 / 1gr sand) and Enterococci (≤22 CFU ≤ 611/ 1gr sand). In monitoring point D15, it was found the highest microbiological contamination, with high presence of *E.coli* microorganism 569 CFU/gr sand and Enterococci 611 CFU/gr sand in August (Figure1). This high pollution is a consequence of a surface water discharge channel.

But referred the beach sand classification according the Guidelines on Recreational Water, WHO 2021, 69% of the analyzed samples result above the recommended value for E. coli (Figure 1) and 23% for Enterococci (Figure 2).
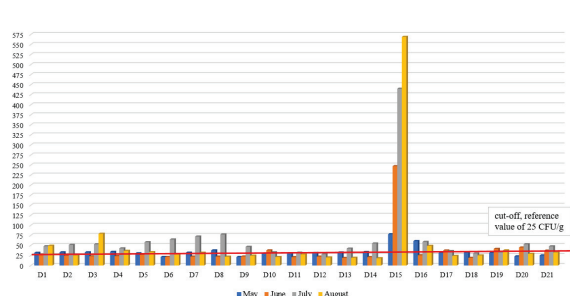
Figure 1 The presence of pathogenic microorganisms E. Coli   Figure 2 The presence of pathogenic microorganisms Enterococci
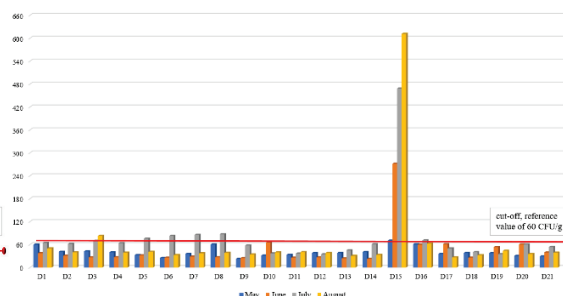
From the preliminary results of the study, it was found that the values of Enterococci in the sand are higher than the values of *E. coli*. Following gained results, as a preliminary conclusions and recommendations we might count: (i) when visiting the beach leave nothing behind but your footprints. You may even help clean up if you see an item of solid waste; (ii) Shower thoroughly when you get home, but also use the showers at the beach. Make sure you wash off sand from your skin and from the inside of your ears; (iii) If you have wounds, dress them properly with waterproof bandages before you go to the beach and avoid exposure to water; otherwise, the wound may get infected; (iv) Don't rub your eyes if you have sand in them; rinse with clean water instead. Rubbing may cause abrasions that might result in infections and (v) Do not take pets to the beach. Take them to non-bathing areas instead.

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AN OVERVIEW OF METHODOLOGY FOR SAMPLING AND ANALYSIS OF MICROPLASTIC POLLUTION IN ISHMI RIVER

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Abstract

In Albania, 198 tons of low-density and 111 tons of high-density plastic waste are produced every day. Plastic waste constitutes about 14% of the total waste in Albania. Plastic is by design durable and this longevity means that once it enters the lake and sea, it can remain there for hundreds of years. Over time it fragments and becomes micro- and nano plastic, which can enter living organisms and the food chain. Albania needs to improve the monitoring and information on the level of microplastic pollution in fresh and marine waters and to evaluate the main sources of plastic pollution in rivers and lakes. Ishmi river has a length of 74 km, passes through the area of Rinas, Fushë Kruja and flow into the Adriatic Sea through Cape Rodoni. This river is classified as the most polluted basin by the National Environmental Agency. The main amount of pollution in the Ishmi river comes from the plastic and primary microplastic waste. The origin of microplastics waste comes from domestic products, different local activity along the river basin and natural processes etc. This work presents an analytical approach of sampling and analysis of microplastic pollution using the specific steps of collection, chemical treatment, density separation and filtration of the sample. The objective of this study is to adopt different protocols to isolate microplastics from a large amount of organic matter present in a riverine system, without destroying microplastic structure. Plastic evaluation has been carried out using optic microscopy, FTIR and Raman Spectroscopy.

Key words: Microplastics, sampling, analytical methods, spectroscopy, river environment

1. Introduction

A significant amount of plastic waste is present into aquatic ecosystems due to extensive production and inadequate waste management practices [1]. In these environments, plastic wastes break down into tiny fragments, fibers, spheroids, granules, pellets, and flakes, measuring between 0.1 and 5000 μm, collectively referred to as microplastics (MPs)[2].

Plastics are heavily utilized across various industries, with packaging constituting the largest share at 40%, and a considerable 70% of all produced plastic ends up as waste, and only merely 9% of it is recycled[3][4].

The ecological implications of microplastics include their degradation, interactions and impacts on the environment, food chain, and human health [3][5]. However, the current research on microplastics in Albania lacks reliable data concerning their types and concentrations in both marine and freshwater environments [6]. This study intends to present sample preparation techniques for analyzing river waters for microplastics. Using this technique correctly is essential for ensuring accurate and reliable data by effective selection and isolation of microplastics and minimizing contaminants [7].

This study critically evaluates the existing methodologies used to assess microplastic pollution in the Ishmi river environment [8]. The focus of this paper is to present analytical methods, including an overview of non-selective sampling approaches, laboratory processing, and the applied methods for microplastic analysis. This paper also provides an overview of microplastics' size and types present in the Ishmi river, analyzed with image-J software. Finally, in this case was evaluated the presence of different kinds of microplastics using Fourier Transform Infra-Red (FTIR) and Raman spectroscopies, complemented by microscopic views.

2. Materials and Methods
2.1 Sample collection of river water and sediments

Collecting river water samples for microplastics pollution analysis requires careful planning to ensure accurate and representative results [9] Before selection of the sample stations is necessary to have information on Ishmi river, characteristics of the river, and potential sources of microplastics in the area.

Three stations have been chosen along the river that have potential for[10](e.g., urban, industrial, rural).
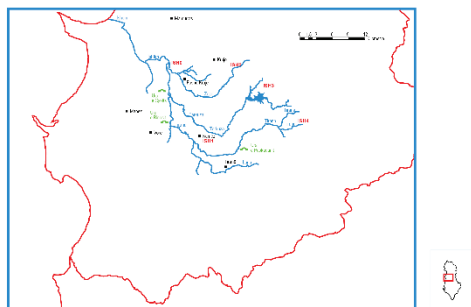
To ensure better results and to avoid contamination of samples during sampling process are used cotton clothes, laboratory gloves, sterilized glasses bottles. In each station are collected water samples in the coastal area and in the third station in river coasts and in center of the river. For collection of surface river water were used sterilized glasses bottles at about 10 cm depth[11]

A careful estimation of microplastic concentration in sediment samples may require collection in depth from 1 – 5 cm [12]. All samples were transported to the laboratory and stored at 4°C until processing analysis.

Figure 1. Map of samples stations

2.2 Microplastic Separation from samples

Microplastic separation is a critical step for accurate and reliable analysis, contributing to a deeper understanding of microplastic pollution in aquatic environments.

Samples may be subjected to separation [12] for three main reasons:

a)   Separation helps concentrate microplastics from a larger volume of water, making it easier to detect and analyze them accurately.
b)   Separation removes other organic and inorganic materials present in the sample.
c)   Concentrating microplastics through separation allows for a clearer view under a microscope, aiding in proper identification and classification of microplastics.

Microplastic particles can be separated from matrices with higher densities by flotation with saturated salt solutions of high density.

2.3 Water samples

To avoid the influence of organic matter in the water sample, 30% H_2O_2[13] was added into the glass bottle containing water sample, placed in a constant temperature oscillation box, and vibrated at the frequency of 100 r/min at 70 °C for 24h. After the supernatant was taken and mixed with NaCl and placed in a constant temperature magnetic plate for 24h.

To minimize the sample volume for more efficient results, all the sample content was thrown in a separatory funnel and left for 24 hours. After decantation of big particles and separation of densities only 1/5 of water column (surface part) were filtered by vacuum pump through 2,2 μm filter paper. Before analysis the filter papers were put in the oven and dried at 30 °C for 48 h.

2.4 Sediment samples

The sediment samples were dried in oven at 90°. The dried sample sieve in 500-75 μm for 30 minutes.[14] The obtained samples were diluted in NaCl saturated solution and let for 72h in magnetic plate for a perfect homogeneous. To minimize the sample volume the sample content was thrown in a separatory funnel and let for 24 hours. After decantation only 1/3 of water column (surface part) were treated with H_2O_2 30% at 60 °C in magnetic plate[15]. After 48h the solution was thrown in a separatory funnel and let for 72 h. After the second decantation the water column was filtered by vacuum pump through 2,2 μm filter paper and dried at 30 °C for 72 h.

3.   Results

3.1 Visual and chemical identification of Microplastics

Over the last decade FTIR-imaging has proved to be the best technique to analyze microplastics. Particles and fibers are rapidly recognized, counted, identified, and classified by sized on the wealth of spectral information.[16]

Firstly, the filter has been evaluated in optical microscope (Kozo XJPG304, Sony TCC-8.1version 7.3.1.7 40x100 zoom). The microplastic waste detected is pined with coordinates and then analyze by FTIR Spectrometer Nicolet 6700. The images provide very clear information of the presence of microplastic polymers such as polystyrene, polyethylene etc.
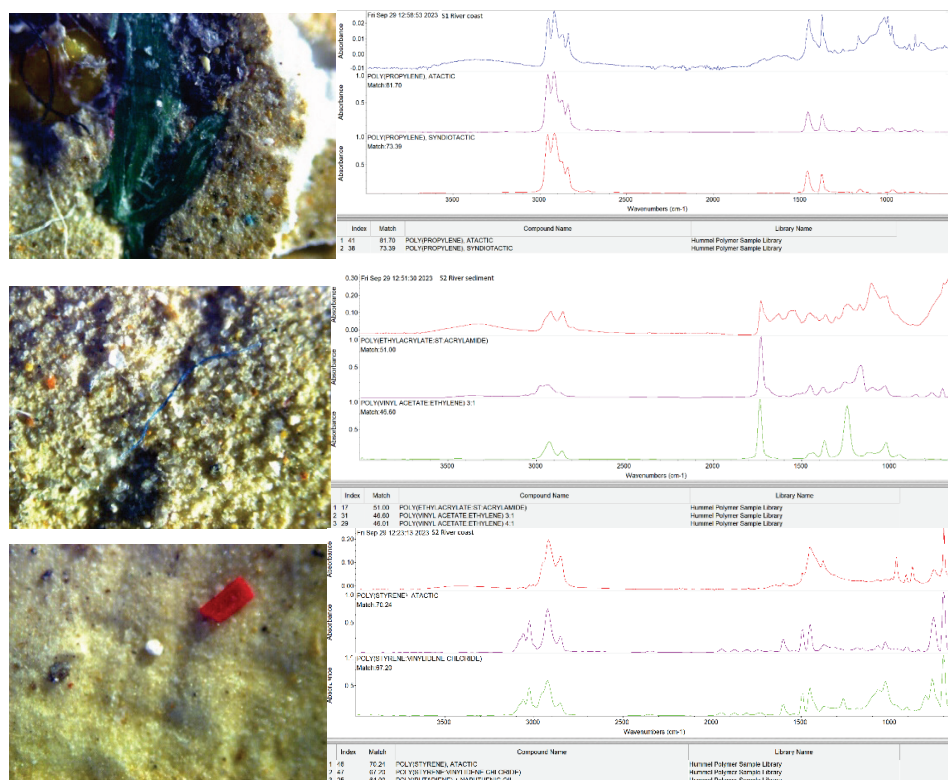
Figure 2: Examples of the FTIR spectra of the three microplastic particles found in the water and sediment samples, which were measured by micro-FTIR spectroscopy:

upper panel polypropylene, second panel polyethylene, third panel polystyrene

3.2 FTIR and Raman analysis
To evaluate different types of plastics in river waters we used Raman e FTIR spectroscopies to identify plastics in thew samples.
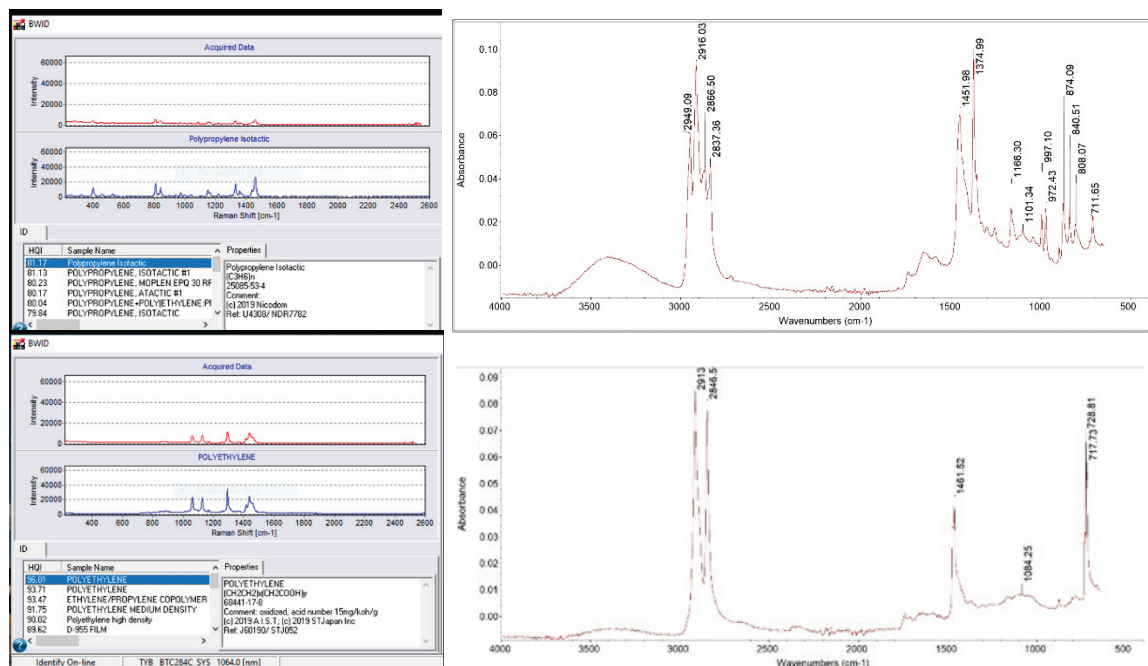
Figure 3. Raman Spectra and FTIR Spectra of microplastic's samples

As a result of the two spectroscopic techniques used, FTIR and Raman, which are complementary techniques to each other, it turns out that the result is the same regarding the polymers present in the sample.

4. Discussion

Due to the used techniques for extracting and purifying the samples, it was expected that the provided samples would mainly consist of tiny fragments, fibers, particles, and other low-density organic materials. Plastic fragments were particularly scarce, comprising only 20.8% of the particles analyzed, while plastic fibers accounted for 23%, and particles made up 22.9%. Our manual screening of bright-field microscopic images for areas with heterogeneous particle appearance revealed at moderate levels an overall abundance of microplastics in the samples. Intriguingly, a significant portion of particles turned out to be quartz particles, a finding unexpected as they were intended to be excluded during density separation. The presence of substantial quantities of sand grains in the samples raises questions and necessitates further investigation. To achieve this, careful attention should be given to the choice of high-density salt, favoring higher density options like NaI over NaCl. This strategic choice facilitates qualitative differentiation between microplastic waste and the remaining solution.

5. Conclusion

This case study underlines the critical need for spectroscopic techniques like FTIR and Raman in microplastics analysis. Specifically, FTIR spectroscopy and Raman spectroscopy emerged as a highly promising method for confirming the polymer origin of microplastic particles. The microscopic method used to evaluate the residues was successful as the microplastic residues (referred to in the literature) were clearly visible. The type of polymer residues was identified from the results obtained from the two spectroscopic techniques used, FTIR and Raman. From a detailed evaluation of the samples, it was found that the most widespread MP are in the form of fibers with a size of 100-200µm, while the fragments of the most evidenced waste are < 100µm². The polymers present in the samples are polypropylene, polyethylene, polystyrene etc. The FTIR technique provides information for a wider range of wavenumbers, including fingerprint areas and single bonds, while the Raman technique provides more information in the fingerprint area.

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ENVIRONMENTAL REPORTING IN ALBANIA: THE CASE OF A SELECTION OF LARGE BUSINESS ENTITIES

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Abstract

The environmental reporting has taken a huge interest in the past decades globally, and only the past few years in Albania from the public and the managers also. The stakeholders have become more aware of environmental issues and managers have recognized some profits. Regarding the attention, only a few organizations have implemented green practices in the form of ISO14001 or published stand-alone reports. Another issue on the matter is the lack of demands on the information issued, leading into a vague description on the organizations' activity, taking no responsibility or actions into preserving the environment. In our study we observe and manually analyze the reports issued and the web pages of the business entities, to find any trace of environmental reporting or information. The group of the study is composed by large organization that operate in Albania in different industries. The results show that only a few organizations show traces of environmental issues, mostly in the form of politics, fewer have implemented ISO14001 and most of them do not mention environment in any of their published reports or web pages. The absence of demanding standards or regulations, or even public awareness about the matter leaves managers/owners without the pressure needed to invest in being environmental-friendly.

Key words

Environmental accounting, stand-alone reports, CSR, ISO14001, environmental politics

Introduction

As the world is suffering from the climate change effects, in the business world the fault has been accepted since the Brutland Report in 1987. Although terms like sustainable development, integrated reporting or corporate social responsibility are being mentioned or even published, environmental reporting stands lightly green for the most part [6]. Before going all the way to the great future the "sustainable development" promises, we need to start slowly, by at least integrating environmental accounting.

Environmental accounting is the proces of recognising of the decreasement of natural goods and services in the proces of creating goods and services and analysing the profits created from the environment to the business entity and costs created by the entity to the environment [10]. Gray and Bebbington [8] argue about the importance of environmental accounting in two main arguments:

1- Accounting is important, it maintains the results, determines success or loss and it is an amazing mean of remote control, without which corporates could not exist.
2- One must understand the connection between the planet, organizations, and global capitalism. If the financial accounts are urging some specific behaviors and are deriving the market in some certain ways, then environmental accounts would urge healthier behaviors by markets and business entities. In our research we will be discussing the environmental reporting, as a mean of integrating the environmental accounting and taking responsibility.

The financial information stands behind financial decisions by managers/owners, also are a base for usage for the stakeholders. Apart from the increased interest from the stakeholders on the organization's accountability toward the environment, managers have also recognized the profits and opportunities that come from being environmental-friendly [3]. Profits meaning higher return on investment, developing new markets, improvement of business image, product differentiation, competitive advantage, and more on [4].

The environmental reporting operates according of two main mechanisms of publishing: voluntary reporting and reporting demanded by law and regulations [1]. The voluntary reporting has taken enourmes dimentions the past few years. Corporate Social Responsability (CSR) or even Integrated Reporting, get published as stand alone reports regulated by voluntary integrated standards and frameworks as CDSB[8], GRI[9], Kyoto Protocol or Carbon Disclosure Project. The voluntary of the proces and the lack of official and demanding standards raise concerns and doubt. Gray and Milne [9] argue that the practics of environmental reporting are so sporadic, incompleted, selective and for no doubt do not show the real effects on the environment. Ekundayo and Josiah [5] discuss that in order to meet with the environmental reporting requests, business entities have created the problem of "creative accoutning", picturing a positive image of the organisations operations, filled with imposible to compare or audit information.

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[8] Framework for reporting environmental and social information.
[9] Global reporting initiative

As for demanded reporting, on a study conducted by Biracaj , Jupe and Taka [2], there are not ascertained any laws or regulations requiring specific reporting or publishing information in Albania. Although the accounting standards and accounting law require more information on the notes, explaining hidden costs and other financial statement voices.

According to Gray [7] a reliable reporting must have at least the minimum of the information that follows: organisations politics declaration, identification of the main environmental effects, the people in charge, status and position of the environmental managing systems, level of certification (ISO 14001 or other), specified information for the goals and the performance on the main maters such as water, air, or other natural resources, ect.

The purpose of this study is to understand how Albanian large organisations report or give information about the environment. Furthermore if these business entities consider sharing this information to the public, in different channels as stand-alone reports or publishing in their web pages

Material and methods

We have selected of group of 100 business entities that operate in different industries in Albania, from the group of largest companies. Then we have retrieved the financial statements and reports published by them for the governmnet for the three past years. The selected companies are almost 50% production and construction, being the most influencing on the environment. Moreover we have searched for their web sites, being a demand for large entities by legistlation, and manually searched for environmental information issued. We focused on information on green politics, if there were environmental costs refered, environmental effects, if they were certified by ISO14001, ect.

Results and discussion

Studies of this range have been conducted in other countries, mostly on listed entities, although environmental information has been lacking in quantity and quality. In Albania, the stock market does not function properly, leading us into working with the fiskal authorities classification of large subjects.

The results show that environmental information issued by these companies in their notes to the financial statements is lacking at all from 95% of them. The other 5% of them publish in the form of a general description of environmental concern, the fact that they are certified by ISO14001 and only one had a non-financial report with specific paragraph about environment issues.

On the web page, being more accessible from the public, more companies published environmental information, trying to give a green image. Mostly the information stands into giving general politics or objectives about the environmental issues (10%) and the other (9%) on publishing the certificates. Only 3 of them have given more information, having special content section about corporate responsability.

The Albanian stakeholder lacks environmental awareness, besides on where to search for this information, "killing" one of the main drivers of directors into going green [4]. Furthermore, on our study we observe that there is a lack of understandment by the entities on the environmental issues and reporting, by equalizing social and evironmental responsability with charity or tree planting.

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PRELIMINARY DATA ON THE IDENTIFICATION OF FUNGI ANTAGONISTIC TO APPLE SCAB IN ALBANIAN APPLES POPULATION

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Apple scab, caused by the *Venturia inaequalis* fungi, is the major apple disease in Albania. Without proper control measures, this pathogen can lead to significant production losses in regions with wet and cold weather during the spring months. Another negative aspect is the reduction in production quality, which significantly affects competitiveness of Albanian apples on the market.

In this study, we collected samples from a well-known apple cultivation area in Albania, region of Korça. Isolations were made from different apple cultivars planted at the Agricultural Technology Transfer Center (QTTB). To gain a comprehensive understanding of the fungal species present in the sampled apple orchards, we utilized a combination of different techniques and approaches, including culturing techniques and molecular diagnostic tools. Through the ITS-sequencing, we successfully identified a number of fungal species, both pathogenic and potentially antagonistic.

The abundance of pathogenic species observed in this area is comparable to that in previous findings. Notably, some of the identified antagonistic fungi belonging to genera *Cladosporium, Epicoccum, Aureobasidium* have a potential ability to inhibit the sporulation of *V. inaequalis*. The number of antagonistic fungi obtained from this study provides a valuable dataset, holding promising implications for sustainable agricultural practices and effective disease management strategies for apple orchards in Albania.

Keywords: Apple scab, Antagonists, Biological control, Biopesticide, *Venturia inaequalis*

MIGRATION AND CLIMATE CHANGE, A SCOPING REVIEW

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Abstract. Climate change is becoming an increasingly present cause of a new global discourse, through the forced migration and displacement of many people. Environmental factors have always been key drivers of human movements, but nowadays, climate change and its impact on human life have become one of the most significant issues of the modern era. This paper contributes to understand the complex challenges and opportunities surrounding migration and climate change. It aims to present the main trends and drivers of migration in Albania and the forces that shape the migration flow encompassing adaptation and mitigation measures from climate change. If not managed properly, consequences of climate change, such as water shortages, crop and food reduction, rising sea levels and increasingly frequent natural disasters can create uneven pressure on agricultural systems, human capital and social services. The need for the urgent development of climate change adaption systems has become inevitable, thus the paper aims to identify the types of evidence in those broad topic areas such as migration and climate change. Following a comprehensive research across a range of databases, the authors analyze the phenomena of migration through gathering reliable data and provide knowledge and synthesis to assist policy makers to mitigate the consequences of global climate change.

Keywords: *climate change, migration, adaptation, mitigation measures*

GREEK WILDFIRE SMOKE OVER ALBANIA ON 23 AUGUST 2023, LIDAR OBSERVATIONS

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Introduction

Aerosols play an important role in human health, the environment, and climate. Depending on their chemical composition and optical properties, they can absorb or scatter light, causing cooling or warming effects. Biomass burning aerosol consists of black carbon (BC), which absorbs solar radiation, and organic carbon (OC), which scatters solar radiation [1]. Biomass burning is one of the major sources of atmospheric aerosols, mainly consisting of small smoke particles. These particles can easily penetrate the respiratory systems of humans, causing various health problems. Smoke has important local effects on the environment, affecting the Earth's albedo through the deposition of soot particles at the surface [1]. To better understand aerosol impacts on Earth's radiation budget and climate change, long-term measurements and atmospheric observations of optical and microphysical aerosol properties need to be performed [2]. Studies related to aerosol in Albania are based on in-situ measurements [3] or satellite measurements such as MODIS. In-situ measurements are performed mainly on PM mass concentration terms [4]. Related to optical properties, the refractive index of aerosol samples is studied, but all these studies involve cities like Vlore and Shkodra [5], [6]. Furthermore, there are no vertical long-term measurements for aerosol optical and microphysical properties or aerosol typing studies. This paper presents a study case from a lidar that was deployed in Tirana, Albania, during wildfire outbreaks in Greece.

Materials and Methods

Studies on the global distributions of aerosols and climate change need long-term data [2]. Long-term vertical atmospheric observations are being performed for the first time in Albania using a portable state-of-the-art Raman lidar (Polly_1v2) [7], [8]. The Leibniz Institute for Tropospheric Research has deployed this system in the library building at the Agricultural University of Tirana (41°21'N, 19°46'E) in frame of their collaboration.
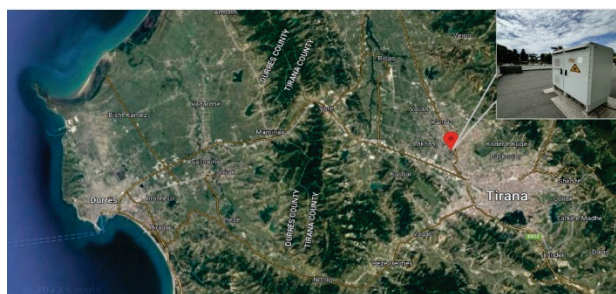
Figure 1. Polly1v2 on the rooftop platform at AUT (top right corner), Tirana, in November 2022.

The lidar has a Nd:YAG laser that emits pulses vertically into the atmosphere. A Newtonian telescope then collects the backscattered radiation that results from the interaction of the beam with air particles. This backscattered radiation, after being directed through mirrors and splitted by splitters, is detected by photomultiplier channels in five different channels (532 nm cross, 532 nm parallel, 607 nm and 532 nm total). Raman method is a well-validated technique for deriving intensive optical properties aerosol profiles from lidar data [9],[2]. Passing then from aerosol optical properties to microphysical ones and to retrieve mass concentrations the POLIPHON method is applied which consists of separating the backscatter profile on dust and nondust and then with depolarization values and conversion factors we get mass concentrations for dust and non-dust aerosols [10]. Lidar ratio and depolarization measurements are taken into account for aerosol typing [11]. In addittion, Aeronet values of AOD (aerosol optical depth) and AE (angstrom exponent) of Lecce Sunphotometer are taken into consideration for categorizing aerosols on coarse and fine modes.

Results and discussions

Between 00:00 and 03:38 UTC on August 23, 2023, a smoke layer was visible in the lower troposphere over Albania at altitudes under 4.5 km. The backward trajectory analysis and Modis images indicated that the aerosol layer was transported over the Mediterranean and contained products of Greek wildfires (Figure 2a).
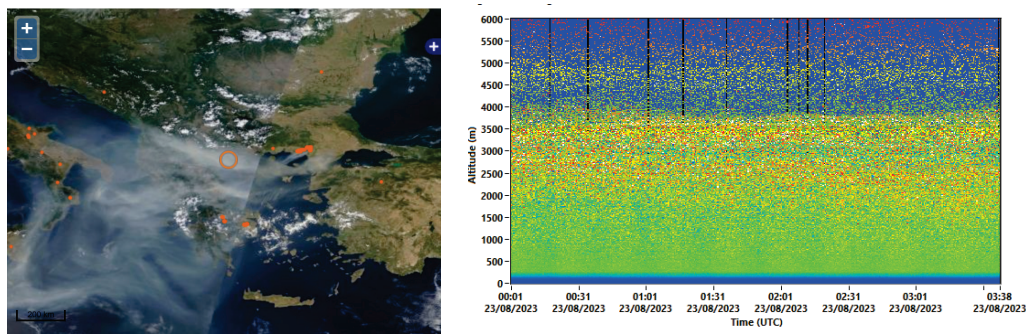
Figure 2: a) Modis images of the smoke plume from the Greek wildfires, August 23, 2023. b) Attenuated backscatter at 532 nm far range of Polly_1v2 for the period 00:00-03:38 UTC at Tirana.

The lidar attenuated backscatter coefficient at 352 nm is visualized for this time period up to 6 km in Figure 2b. Vertical profiles of aerosol optical properties (backscatter, extinction, depolarization, and lidar ratio,) are shown in Figs. 3a and 3b for the same period of time. There are distinguished three main layers. From ground up to 2 km and from 4 - 5 km low values of backscatter and extinction coefficients can be seen on the profiles. Particles at these layers resulted in particle depolarization of about 10-15% and a lidar ratio of about 60-90 sr, both of which indicated the presence of an aerosol mixture. The peak at profiles shows strong backscatter coefficient values of roughly 4 $Mm^{-1}sr^{-1}$ and 200 Mm^{-1} for extinction, which are attributable to the high aerosol load at the height of 3 to 4 km. This peak is accompanied with low depolarization value (<5%) and great lidar ratio (90±20 sr). Such values indicate that this aerosol is smoke, as determined by the particle linear depolarization and lidar ratio plot for 532 nm [11].
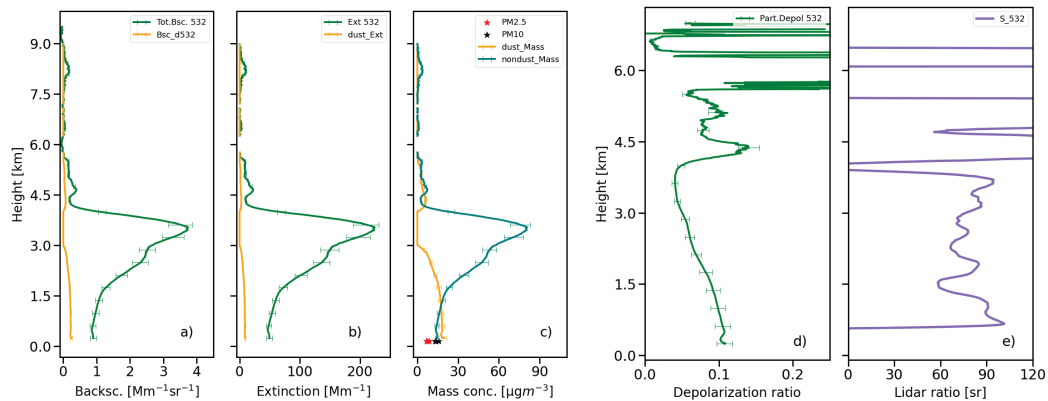
Figure 3: In this figure are presented plots of: a) backscatter coefficient at 532 nm wavelength (blue line for the total and yellow line for the dust); b) extinction coefficient at 532 nm, green line for total and yellow line for the dust; c) mass concentration for dust (yellow line) and non-dust (teal line); d) particle linear depolarization ratio at 532 nm; e) lidar ratio at 532 nm.

Aerosol mass concentrations (Figure 3c) as expected is characterized by a peak at 3 km height reaching values around 90 μg/m³. To compare ground values, data from a AirQino environmental monitor device located 200 m away from the lidar are used. PM2.5 and PM10 values measured from this device are shown, respectively with red and black stars at the mass profile. As can be noticed, there is a good agreement between these measurements. Light presence of dust, indicated by yellow line in the graphs, is also present.

AERONET (aerosol robotic network) is a network of sunphotometers which provides aerosol optical properties measurements products. For its proximity, measurements from the Thessaloniki sunphotometer are used to estimate the angstrom exponent (AE) and aerosol optical depth (AOD) of the aerosols over Albania. For this case average value of AE is 1.98 and for AOD_{530} is 1.74. Large angstrom exponent is characteristic of fine mode particles and the large AOD for hazy conditions.
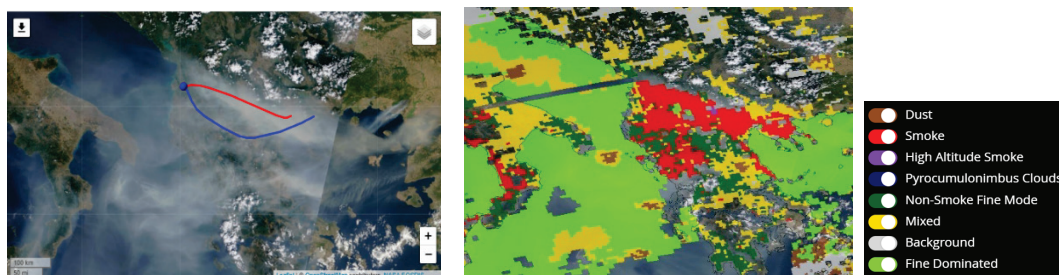
Figure 4: a) Backward trajectories for 500 m and 3500 m heights using Hysplit; b) NASA Worldview images for aerosol type.

HYSPLIT backward trajectories are used to identify the sources of the aerosols. The smoke comes from wildfires in Greece, as shown in figure 4a for 18 hours backward trajectories at 500 m and 3500 m height. Our lidar measurements correspond to these backward trajectories. The map in figure 4b is from NASA Suomi NPP/VIIRS and depicts the aerosol type, with red representing smoke and yellow representing mixed aerosols. The pollution and aerosol mixtures come from the North Europe.

Conclusions

Long term aerosol measurements of optical profiles for Albania are possible with a Raman lidar installed at AUT. High values measured of optical properties such as the backscatter and extinction coefficients for 23 August 2023 shows the high presence of aerosols over Albania up to 4.5 km height. For aerosol type, we used depolarization ratio and lidar ratio measurements, which revealed the occurrence of smoke up to 4.5 km height. Furthermore, Hysplit backward trajectories identified the source of these aerosols, which in this case is smoke from wildfires in Greece. Mass concentration profiles obtained using the Poliphon method yield a maximum value of 90 µg/m^3.

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STATISTICAL ANALYSIS OF FRUITS FOR VARIETAL IDENTIFICATION

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Through the analysis of the fruits, it is intended to find the distribution of frequencies and reliability limits for each variety, valid for varietal identification.

The method was applied with 400 fruits of each variety and the analysis of the sample variables was performed on the logic of variance and orthogonal regression respectively; $\bar{Y}$, Confid Int., Amplitude, Toler Inter, Extr Val Scale λ, Shape δ, Cv, Pred Int.

The results determined the profile of each variety, the squared deviation and the level of confidence, tolerance and amplitude of confidence and prediction.

These data are necessary for the control, comparison and testing of varieties through the analysis of the fruits in the centers of research and evaluation of genetic resources.

Keywords: Statistical; variety; Amplitude; Fruits; Frequencies

AGE REPORTS OF SMALL PELAGIC (SARDINA PILCHARDUS, ENGRAULIS ENCRASICOLUS)

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Abstract

The assessment of fish resources requires knowledge of the age structure of fish populations. Determining the age of fish by otolith is a fundamental tool for studying biological aspects such as growth, sexual maturity and longevity. Small pelagic fish are importance key for Adriatic fisheries. A significant decline in the number of small pelagic fish (sardine, anchovy) was observed in Albania after 1990 years. Methodology: Based on the methodology of the Adriamed Program, samples of sardine and mackerel were examined in the Aquaculture and Fishing Laboratory, Durres. These samples were taken from three fishing areas, in Durres, Vlore and Shengjin. The samples belong to the months of May and September 2022. Methodology: Zoological lengths of individuals (sardine, anchovy) according to length class with a difference of 0.5 cm. The sub-champion individuals weighed and the otolith removed. Maturation stages are defined in the 4-level system. The otoliths read in a stereomicroscope, determining the age of the fish. From the sampling, the following results were achieved: dominance of age 1+ and 2+, individuals 0+ and 3+ we meet less in champion. According to the study, the populations of sardine and anchovy are relatively new from the individuals that are represented. Final conclusions cannot be drawn only from three samples of small pelagic, but referring to other scientific articles from 2013 which showed that the average age was 1.44 years (sd = 0.658), and 90% were 1+ and 2+ years. The average length was 13.27 cm about 44% of sardines with a length of 12.5 - 14 cm. We noticed the same thing in our study, although with a reduced number of individuals.

Key words: otolith, small pelagic, sub champion, maturity stage, fish structure

Introduction

Reading otolith is similar to what happens to a significant number of fish species in determining their age. Small pelagic fish are of key importance for Adriatic fisheries. By comparing the results obtained from molecular and genetic techniques, with the information obtained from traditional techniques using otolithic morphometric, conclusions can be drawn on the age presence of the stock. This will enable assessment of the degree of correspondence between methodologies and will allow assessment of the spatial and temporal consistency of stocks. The results of the studies, especially the methodologies that support it, will be integrated into the implementation of Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 on the creation of a framework for community action in the field of the marine environment. Policy (Marine Strategy Framework Directive), which relates to one of the qualitative descriptors for determining good environmental status, in particular "Populations of all commercially exploited fish and mollusks are within safe biological limits, presenting a distribution of population by age and size. indicative of a good state of existence". The expected final results are geographical structuring at the geographical level (genetically distinct stocks), confirmed by analyzes of otolith structure and shape; and the appearance of reproductive isolation of stocks (link).If these results are confirmed, it will be important to analyze and interpret sardine stocks at the local/population level, instead of a single sardine stock in the Iberian Peninsula, as is currently the case.

Material and Methods

Monthly biological samples are collected at the main ports. These samples are taken from sardine and mackerel fish that are brought by fishermen to the port.

The sampling intensity is equal to monthly biological samples of anchovy and sardine.

- Frequency – length distribution

Annual length frequency distributions are obtained for each sample box by measuring fish based on 0.5 cm total length classes: prior to 1988 these measurements were based on 1 cm classes and the decision was made to improve accuracy. All sub-champion fish are weighed according to length group. This means looking at a distribution for each given port and given month and which have a stronger influence on the final estimate of the annual length frequency for all ports.

-Age reading

Age is estimated by reading the otolith, which are calcified bodies in the balance organ of the fish. After the otolith have been removed from the fish heads, their sections are taken. The sections show rings arranged concentrically around the center, the mechanism of whose formation has been linked to the interaction between fish metabolism and factors such as water

temperature, feeding intensity and reproductive stress. The age of a fish can be estimated by counting the rings.: this methodology was applied by the IRPEM (Institute of Marine Biology in Ancona) to the sardine. (Giannetti and Donato 2003).

Data processing

Using information about both height and age frequency distributions at different heights enables the annual age frequency distribution of the total population. Recruits are the new fish that enter the stock and represent a very important part as a feature for the study of fish population dynamics. In the IRPEM research, the recruitment index for one year is calculated for both anchovy and sardine. It is estimated as the percentage of recruits (9-10.9 cm anchovies or 13-14.9 cm sardines) in the total number of individuals caught. In both cases, most of the individuals in this height range are under one year of age. The order in which all these data are organized in the PC files is very important not only to avoid confusion, but also to obtain data collections as functions of different variables. For example, it is useful to distinguish the length of the anchovy frequencies in relation to the northern and southern ports.

Results and Discussion.

The results based on the data of the length, weight, sex and age of the sardine and anchovy fish. The age of the fish was determined by reading the otolith in a stereomicroscope and based on the results, the corresponding graphs were constructed, which we have presented below. As we see in the three championships, we have dominance of age 1+ and 2+, while 0+ and 3+ individuals are met with 2-3 individuals. Thus, we can say that the populations of sardine and mackerel are relatively new from the individuals that are represented. In fact, conclusions cannot be drawn only from three samples of small pelagic (sardine and anchovy), but referring to other scientific articles such as Evaluation of Anchovy (Engraulis encrasicolus) Population by Age and Length (KOLITARI J, DURO S) and Evaluation of sardine (Sardina pilchardus) population structure by length and age indicators (DURO S, KOLITARI J , MEDJA N) note referring to the previous study of 2013 which showed that the average age was 1.44 years (sd = 0.658), and 90% were 1+ and 2+ years old and the average length was13.27 cm. and about 44% of sardines with a length of 12.5 - 14 cm. We noticed the same thing in our study, although with a reduced number of individuals.
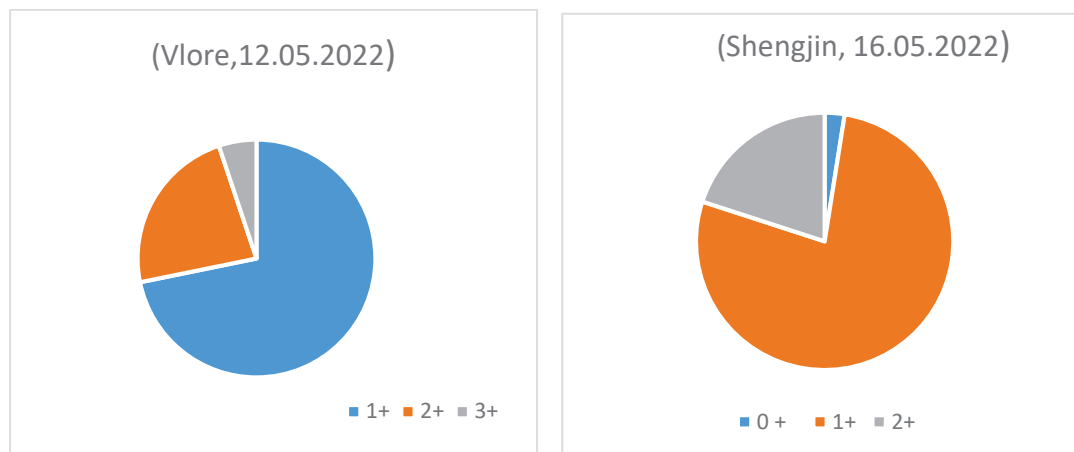
Graf.1. Age structure of Sardine

(Sardina Pilchardus)

Graf.2. Age structure of Anchovy (Engraulis

Encrasicolus)

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6.Evaluation of Anchovy (Engraulis encrasicolus) Population by Age and Length (Kolitari J , Duro S)

7.Evaluation of sardine (Sardina plichardus) population structure by length and age indicators (Duro S , Kolitari J , Medja N)

CHEMICAL MONITORING AND WATER QUALITY OF VJOSA RIVER, IN ALBANIA

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Abstract

Vjosa River is one of the most important water ecosystems in the southeastern part of Albania and the last wild river in Balkan and Europe. Therefore, the evaluation of its water quality is very important, mostly for the existence of biodiversity in this ecosystem. Chemical analysis of waters is also an important component of river monitoring. The measurement of physico-chemical parameters and nutrient levels can provide valuable information about the presence of pollutants in the water and can help to identify the sources of pollution. The aim of this study was to assess water quality of Vjosa River and to compare them with Water Framework Directive. The study was conducted during November 2021 up to October 2022. Five water sampling points were determined in the river and the samples were analyzed for nutrients forms as nitrogen and phosphorus. The values of ammonium ranged from 0.035 to 0.09mg/l. NO_2 from 0.008 to 0.083mg/l and NO_3 varied from 0.125mg/l to 0.32mg/l. The values of phosphates ranged from 0.01 to 0.08mg/l. Based on the obtained data Vjosa River can be considerate in the average values from high, up to good quality of waters, according to WFD. Vjosa River is the blue heart of Europe and also National park thus, we need to protect it and to contribute to continuous study about water ecosystem and its biodiversity.

Keywords: Vjosa River, ecosystem, chemical monitoring, nutrient levels

INTRODUCTION

The Vjosa River flows from northwestern Greece to southwestern Albania, spanning approximately 272 kilometres in total length. The Greek section of the river covers the first 80 kilometres while the Albanian section covers the remaining 192 kilometres. Notable tributaries include Voidomatis and Sarantaporos in Greece, and Drino and Shushicë in Albania. The river originates from the Pindu Mountains in Greece before crossing into Albania near Çarshovë, in the southeastern part of the country. It then flows northwestwards through the towns of Përmet, Këlcyrë, Tepelenë, Memaliaj, Selenicë and Novoselë before emptying into the Adriatic Sea, to the northwest of Vlorë. The Vjosa Wild River National Park is home to a multitude of rare wildlife species, encompassing more than 150 winged insect species, roughly 60 mollusk species, a minimum of 31 fish species, 31 reptile species, 257 bird species, around 70 mammal species, and over 350 plant species [7]. In total, the Vjosa River is regarded as the habitat of 1175 flora and fauna species. The park's surface waters are a significant economic asset to the nation. They have numerous traditional uses such as irrigation, fishing, tourism, and industry. However, aquatic habitats are highly vulnerable to the impact of both human activities and natural phenomena. Eutrophication, which is principally caused by the rise in anthropogenic nitrogen and phosphorus in aquatic ecosystems [2], represents a major issue. In this context, the Vjosa River is the most important ecosystem in Albania due to its water usage and biodiversity. Protecting this ecosystem and its resources is vital to ensure ongoing research. The objective of this study was to assess the water quality of the Vjosa River and compare it to the Water Framework Directive.

MATERIAL AND METHODS

Figure 1. Vjosa river and the sampling points
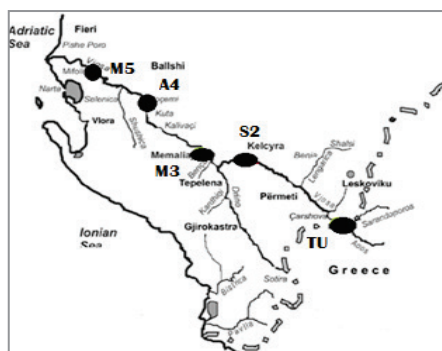
The study area and Water sampling

The Vjosa River was the focus of our study (figure 1). Five sampling points along the Vjosa River were determined and three expeditions from November 2021 to October 2022 were realized. The parameters like pH, temperature, and dissolved oxygen levels were measured on-site using portable apparatus. The chemical parameters of the samples underwent analysis, including NH_4^+, NO_2^-, NO_3^-, and PO_4^{3-}. The analyses were carried out in accordance with the ISO standard methods (**ISO 7150:1984; ISO 7890/1:1988; SSHEN 26777:1993; ISO 6878: 2004**) [3,4,5,6] and were compared against the **WFD [8]** standard.

The laboratory responsible was accredited and belonged to the Department of Environment and Natural Resources at the Agricultural University of Tirana.

RESULTS AND DISCUSSION

The mean values for each parameter, based on three expeditions, can be found in Table 1. According to the Water Framework Directive, the Vjosa River is of high quality in terms of pH and dissolved oxygen (DO), as well as in terms of parameters required for the protection of fish life. The amount of dissolved oxygen varied from 7.6 mg/l to 9.4 mg/l.

Table 1. Average values of nutrients at Vjosa River

Parameters	Tem, H2O	pH	DO	NH_4^+	NO_2^-	NO_3^-	PO_4^{3-}
Unit	^{O}C		mg/l	mg/l	mg/l	mg/l	mg/l
TU (TRI URAT)	13,9	8,215	9,4	0,09	0,083	0,125	0,08
S2 (SAJMOLA)	14	7,9	8,31	0,04	0,028	0,3	0,06
M3 (MEMALIAJ)	15,83	8,33	8,6	0,04	0,008	0,25	0,03
A4 (ANEVJOSE)	15,66	8,14	8,17	0,045	0,012	0,24	0,01
M5 (MIFOL)	16	8,085	7,6	0,035	0,036	0,32	0,02
Max	16	8,33	9,4	0,09	0,083	0,32	0,08
Min	13,9	7,9	7,6	0,035	0,008	0,125	0,01

Nutrients are essential for water ecosystem vitality. Overabundant nutrient levels can result in the proliferation of vegetation and algae blooms. Eutrophication risks in freshwater environments are commonly associated with phosphorus pollution, although there are indications that nitrogen compounds may also contribute **[1].** The ionic form of NH_4^+ is not harmful to fish. However, it can become toxic once converted to ammonia NH_3, especially in high pH conditions. The levels of ammonium in the Vjosa River were found to be of high quality according to the WFD. The NH_4^+ values fall within a range of 0.035 mg/l to 0.09 mg/l, whereas the NO_2 values range from 0.008 mg/l to 0.083 mg/l. The quality of Vjosa river's waters has been classified as high to moderate based on nitrite values. However, at Çarshove point, the situation is moderate due to the discharge of waters from Sarandoporos River. The quality of water in our country differs, and overall, it is of a high quality. The nitrates values varied from 0.12 mg/l to 0.32 mg/l, while the phosphates values ranged from 0.01mg/l to 0.08 mg/l. Based on these values, the quality of water for nitrates can be determined as first class of water quality according to WFD and phosphates are of first class mostly. The background values of PO_4 are considered 0.05 mg/l and 0.04 mg/l the amount for oligotrophic waters. The quality of water in the Vjosa River is generally high, although there are two sampling points where phosphate levels have increased beyond expected parameters. These levels, however, are under control.

CONCLUSION

In order to maintain healthy water ecosystems, it is essential to assess their quality. Therefore, the Vjosa River, one of the most significant water ecosystems in Albania, represents a situation of high quality. Based on all ionic forms of nitrogen and phosphorus, the situation is classified as the first class of WFD. The higher values of nitrites and a small amount of phosphates at the first sampling point in Çarshovë are due to the discharge from the Sarandoporos River. However, there is no need for concern as the water quality throughout our country is high. Therefore, the Vjosa River can be regarded as suitable for all purposes.

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ACCUMULATION OF HEAVY METALS IN VEGETABLE SPECIES PLANTED IN CONTAMINATED SOILS OF CENTRAL-EASTERN ALBANIA, ELBASAN-PRRENJAS REGION.

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Abstract

Anthropogenic factors affect all parts of ecosystems, causing changes in the structural component of plants. The object of this contribution is to investigate heavy metal accumulation in 10 vegetable species and to assess the human health risks of vegetable consumption. Ten vegetable types were cultivated on contaminated soils, farmland of the industrial area of metallurgical plant in Elbasan region in central Albania and serpentine soils in Prrenjas region. This ten vegetable species are contaminated with heavy metals (Cr, Ni, Fe, Mg, Ca, Co,Zn). Vegetables are important edible crops and are an essential part of the human diet. Different concentrations of heavy metals were found in edible parts of the different vegetables. The concentrations of heavy metals decreased in the sequence as leafy vegetables,root vegetables,legume vegetables. The ability of leafy vegetables to uptake and accumulate heavy metals was the highest. From the results obtained, it was found that the amount of total metals in the plants was at high levels, showing an accumulation ability of the different agricultural plants analyzed. The results of the mineralization analysis of the plant in the root, stem, leaf and fruit in terms suggests us that residents may face health risks from the consumption of these vegetables cultivated in serpentine and contaminated soils.

Keywords: heavy metal, mineralization analysis, phytoremediation, vegetable, accumulation

Introduction

Vegetable consumption is considered to be one ofthe major sources of heavy metal intake for humans, and elevated levels of heavy metal in edible partsof vegetables can affect human health. In this article we study ten vegetale types cultivated on contaminated soils [7], farmland of the industrial area of metallurgical plant in Elbasan region (41°0917191, 020° 043372) and serpentine soils in Prrenjas region which includes the field of Domosdova (41° 070517,20° 55.81779) and Rrajce Village (41.0785419, 20.5697909) [1]. In these regions, vegetables are exposed to heavy metals (Cr, Ni, Fe, Mg, Ca, Co,Zn) can be readily taken up by vegetable roots, and can be accumulated at high levels in the edible parts of vegetables. These vegetable consumption can cause adverse health effects [2]. For exemple Chronic (Cr) exposure can cause acutetoxicity to the liver and lungs, induce nephrotoxicity and osteotoxicity, and impair function of the immune system, also copper (Cu) surplus can cause acute stomach and intestine aches, and liver damage, and zinc (Zn) can reduce immune function and levels of high-density lipoproteins. From the results obtained from the mineralization analysis of the plant in the root, stem, leaf and fruit, total metals in plants of was at high levels more at serpentine soils in Prrenjas region [4].

Materials and methods

The study was conducted working according to a methodology divided into three phases: (i) Preparatory phase, preparatory work, formulation of the basic methodology for research; (ii) Fieldwork phase, data collection of vegetables species on Spring and summer; (iii) Laboratory work phase. The analyzes were carried out in the testing laboratory N.Sh Agrovet in the field of Kosovo data processing in the laboratory using the EPA 6010C Method, where we mineralized 10 plant samples, First, the plants are placed in a thermostat for 48 hours, at a temperature of 65 degrees Celsius, for mineralization, we take 0.3 grams of sample from each plant, place them in a Teflon container, add 6 ml of HNO3 and 2 ml of H2O2, they stay like this for one to two hours to the digestion and extraction of the metals that need to be read is done. They are put in the microwave, which by increasing the temperature helps in digestion [3], they are taken out of the microwave, they are expected to cool for one to two hours, and they are filtered in a 50ml flask, after filtration, the flask is filled with distilled water up to 50ml, and in finally the reading was done in ICP (Inductively Coupled Plasma).

Results and discussions

Heavy Metal Concentrations in Vegetable Edible Parts of the 10 species vegetables are presented in Table 1.

Table 1. The level of heavy metals in plants grown in serpentine and contaminated areas (mg/kg).

The parameter	Allium cepa (Onion) Elbasan	Solanum tuberscum (Potato) Elbasan	Lactuca sativa (Salad) Elbasan	Fragaria vesca (Strawberry) Elbasan	Lactuca sativa (Salad) Prrenjas	Avena sativa (Oat) Prrenjas	Allium cepa (Onion) Rrajce	Solanum lycopersicum (Tomato) Rrajce	Capsicum annuum (Pepper) Rrajce	Zea mays (Corn) Rrajce

Ca	13787.43	18745.19	7329.22	1265.59	96335.34	1917.13	4877.47	8874.79	4959.12	4275.46
Co	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.47
Cr	20.96	23.67	23.88	12.31	56.1	19.91	22.14	14.07	24.53	38.89
Fe	3658.18	5238.65	4494.09	2486.87	7047.69	2824.41	3963.89	2533.45	2890.15	7004.63
Mg	4105.79	4524.63	4165.38	3703.22	6995.09	2503.21	3482.27	3572.90	2508	6759.26
Mn	97.31	103.54	78.84	70.09	147.27	58.67	73.09	57.12	40.70	162.96
Ni	55.89	41.57	47.25	27.25	198.46	107.28	114.14	94.34	94.56	231.71
P	2750.50	1288.11	4054.96	1528.56	7068.72	1330.19	4684.01	3399.66	1451.65	2241.2
Zn	101.3	7.89	53.16	29.05	164.1	45.41	25.37	30.53	45.68	43.29

These results indicated that clear differences in heavy metal (Cr, Ni,Zn,) bioaccumulation existed among the 10 species of vegetables.

Table 2. Comparing the average results obtained by us with the range of heavy metal content in plants determined by Ross [5,6].

Metal level	Content interval (Total average)		Amount considered toxic
	Plant (mg/kg) Elbasan region Contaminated soils	Plant (mg/kg) Prrenjas region Serpentine soils	Plant (mg/kg)
Co	-	3	15-30
Cr	23	25	5,0-30
Ni	43	140	10-100
Zn	48	59	100-400

Comparing the average results obtained by us with the range of heavy metal content in plants determined by Ross **(tab. 2)**. In the plants of the region of Prrenjas and Elbasan, Co values are not detected. The Cr values in these plants are relatively high, typical for the serpentines of the Prrenjas region, also Cr values considered high and for the plants cultivatet in contaminated area of the Elbasan region. The values of Ni are many times higher than the allowed rates in the plants of the serpentine soils of the region of Prrenjas and are also considered toxic for the plant of Elbasan. The values of Zn in the plants Central-Eastern Albania are within the limits considered toxic [8].

Conclusion

At the end of this study we reached the conclusions: Ten species vegetables cultivated on serpentine soils of Prrenjas and Farmland of Elbasan are contaminated with heavy metals such as Zn,Cr,Ni. Also, from the results obtained, it was found that the amount of total metals in the plants was at high levels, showing an accumulation ability of the different agricultural plants analyzed (green salad, green onion, Tomato, Pepper, Potato, oat, corn). The presence of heavy metals is quite evident and the risk they present to the food chain is high. Is suggested the use of phytoremediation technologies for the remediation of the industrial area of metallurgical plant in Elbasan and also in serpentine area in Prrenjas region.

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BIODIVERSITY CONSERVATION ASSESSMENT IN THE NATURAL HABITAT PYLLI ME PISHA, WITHIN THE PROTECTED AREA OF THE DIVJAKË-KARAVASTA NATIONAL PARK

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Abstract:

Forests constitute the most important ecosystems for human and animal life on this planet. In today's forest management, Protected Areas play an important role for the long-term conservation of nature related to ecosystem services and natural values. Our study area belongs to the Divjakë-Karavasta National Park, Category II of Protected Areas, as an area of special importance that contributes to the preservation of biodiversity through the special habitats it offers. The natural pine forest habitat is located in the northern part of the park separating the northern part of the lagoon from the sea. This is mainly a forest where pine *Pinus halepensis* Mill. and *Pinus pinea* L. are the dominant species. Other forest species that are present include: *Fraxinus angustifolia* Vahl., *Quercus spp., Ulmus spp, Alnus glutinosa* (L) Gaertn*., Populus alba* L., etc. For the realization of the work in the field, we studied 30 test areas for the assessment of biodiversity of species. The assessment of biological diversity is determined through several ecological parameters such as: Dominant species of forest trees, their general characteristics, features of the trunk structure and the distribution of plant cover of the ground, dendrometric characteristics according to species, spatial distribution, structure, etc.

Keywords: biodiversity, conservation, ecological parameters, forest ecosystem,

1. Introduction

The term "biodiversity" refers to the variety of genes and ecosystems that occur in a given system (Redford and Mace, 2018). Human societies depend on biodiversity to obtain goods and to provide ecosystem products such as biomass production or recycling of nutrients and water (Díaz et al., 2006; Cardinale et al., 2012). Despite this right, the designation of protected areas continues to be global, prompting the discussion about the real effectiveness of protected areas to prevent the protection of species and natural habitats (Hirschnitz-Garbers and Stoll-Kleemann, 2011; Coetzee et al., 2014). There are several reasons why defining attainment areas may not be sufficient to achieve conservation goals. First, granting an area protected status does not necessarily lead to the protection of species and ecosystems in it, as conservation initiatives are not always effective or often fail to be implemented (Dudley et al., 2005; Anderies and Janssen, 2016). Second, the temporal scope of reserves often relies on management strategies that identify protected areas as static entities, rather than as part of landscape dynamics (Bengtsson et al., 2003). However, over time, nature's animals and human stresses injure the nature of species in natural areas by shaped more or less favorable environmental conditions for groups of different species (Bradshaw and Hannon, 2006; Cumming et al., 2015). Awareness that the biodiversity found in protected areas is already under concern is growing among conservation biologists, who are advocating for the creation of more resilient ecosystems to cope with global environmental threats (Berkes 2012; Kareiva and Marvier 2012; Cumming et al., 2015). Convention on Biological Diversity, target 11 Aichi calls for the conservation of "at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services," through effective and equitable management, ecological representatives and well-connected systems of protected areas and measures other effective conservation based on areas that are not recognized as protected areas but have been directly linked to areas conserved by indigenous peoples and local communities (Jonas et al., 2017). The aim of the study was the assessment of biodiversity conservation, through the botanical inventory as well as topographic, edaphic and anthropogenic data from about 30 concentric plots distributed throughout the forests inside and outside a protected area classified as IUCN category II (Divjakë-Karavasta National Park).

2. Material and methods

Our study is focused on the Divjakë-Karavasta National Park, the second category of Protected Areas, which lies in the coastal area of Albania, with a total area of 22398.08 ha VKM No. 59 dated 26.01.2022. First, we conducted a study of the current vegetation of the area in order to select the types of vegetation from which the data and field measurements will be collected. In order to see the changes in the structure of the forest vegetation over time, but also the changes related to the use of the forest, its benefits and functions, we have decided to study three types of forest vegetation: 1. Mediterranean Coniferous Pine vegetation type, 2. The type of alluvial vegetation, and 3. The type of forests that are managed as Coppice Forests. In this article we will refer to the data measured in the first area of study, which is the forest economy of Divjaka pine with the dominant species coniferous species such as soft pine *(Pinus pinea* L*.)* and wild pine *(Pinus halepensis* Mill) accompanied by species other notebooks typical of this area, with a total area of 1250 ha and which is part of the Central Area of the National Park. To continue with the work in the field, we first built a schematic network of test areas, the network of test areas 200 x 200 m, distributed over the entire surface of the Forest Economy, in such a way as to represent all the vegetation. So field data will be obtained through circular shaped test surfaces. Each test area will consist of 3 concentric circular areas with sizes of 25 m², 200 m², and 400 m². This form of organization of test plots aims to cover the variation of diameters in the forest. In total we have received 30 test surfaces.

3. Results and Discussion

Species presence indicators are often used to monitor the effectiveness of a particular forest management treatment in maintaining biodiversity. For this research, a set of tree species composition indices will be calculated to examine the heterogeneity in the composition of the studied plant communities. From the preliminary results of our research, we noticed that the wild pine species (*Pinus halepensis* Mill) has a wider distribution than the soft pine (*Pinus pinea* L.), classifying it as the dominant plant species. Pine forests are managed as tall forests with seed regeneration. What we have noticed from field research is that we have a lack of pine forest seedling installation. While other forest species which we ascertained from the botanical inventory in the field such as: *Myrtus communis* L., *Ulmus campestris* L., Carpinus orientalis Mill., *Juniperus macrocarpa* S.et Sm., *Fraxinus ornus* L., *Cornus mas* L., *Pistacia lentiscus* L., *Ruscus aculeatus* L., etc, have more regeneration presence. Also in relation to the presence of cleaning treatments in the habitat under study, we identified that it is very necessary to carry out forest clearing works from dense bushes, which prevent the germination of new seeds. An important indicator of biological diversity is also the health of forest trees. What we noticed during the field measurements in our plots was that most of the forest trees are dominated by the presence of the *Hedera helix* L. species. We recommend intervention with silvicultural forest services because from field observations we have found that the understory is mainly dominated by the species *Myrtus communis* L. and *Phillyrea spp*. Since our aim is to plan those intervention measures or activities in the forest that ensure its continuity, because in this way we say that it has been managed sustainably. Regarding the assessment of the state of regeneration of this habitat, i.e. the pine forest, in the study area, we noticed that old trees of the soft pine type *(Pinus pinea)* prevailed, and not new regeneration. In order to ensure in the future the management of this forest economy as a High Forest, with seed regeneration, it is very necessary to intervene with silvicultural measures.

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THE COEFFICIENT OF UTILIZATION OF WOODEN PANELS FOR FURNITURE PRODUCTION WITH CNC MACHINES

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Abstract

The main purpose of this work is to present the influence that the diameter of the cutting instrument has on the coefficient of utilization (*cou*) of wooden-based pannels during cutting with cnc routers. To complete this objective, is produced as sample a typical standard shelf with doors and the corresponding compartments. The toolpaths are calculated using Maestro CNC software, more specificly the nesting module. The toolpaths are calculated using cutting instruments with different diamenters (10, 12, 25 mm). As a cutting instrument, is used a milling cutter suitable for cutting melamine. A good cutting instrument for this purpose is considered a cutter with a diameter of ø=12 mm, with industrial diamond coating. This instrument is capable of cutting with high feed speed and clean edges without damage. Results show that the diameter does not have a big impact on *cou* during the furniture production but there are visible differences in cutting schemes for each pannel. It is noticed also a slight increase of *cou* when we use the 8 mm cutting tool because of its small cutting diameter and the increased cutting time caused y the fact that cuttings with small diameter tools are made in two steps (each 9 mm deep).

Keywords: pannels, cnc, optimisation, pcd, router, maestro

Introduction

In manufacturing industry, nesting refers to the process of laying out cutting patterns to minimize the raw material waste (Naboni et al, 2015). To minimize the amount of scrap raw material produced during cutting, companies use nesting software (Naboni et al, 2015). It automates the calculation of ideal distribution of the cutting patterns to avoid waste (Schmidt et al). Nesting in the leather industry (and furniture production) is the problem of placing a set of irregularly shaped pieces known as templates on a plane irregularly shaped surface, such that no templates overlap and that the trim loss produced when cutting out the templates is minimised . Manual nesting process has many shortcomings that results in low productivity (Elamvazuthi et al, 2014). Many machine manufacturers offer their own custom nesting software designed to offer ease of use and take full advantage of the features of their specific machines (Lombard, 2018). With the development of the woodworking industry and the continuous improvement of CNC routers technology, production based on nesting has received a substantial growth. More and more, furniture manufacturing companies are investing in the purchase of cnc nesting machines. The main purpose of this work is to present the influence that the diameter of the cutting instrument has on the coefficient of utilization (*cou*) of wooden-based pannels during cutting with cnc routers. For this reason, a typical shelf is taken in consideration and the pannel nesting is done with the Maestro CNC software.

Material and methods

To show the influence that the diameter of the cutting instrument has on the coefficient of utilization of the pannels, we have taken into consideration the production of ten standard wardrobes with 4 doors. The dimensions of the wardrobe are 1800x2700x600 mm and its internal organisation is like in the picture.
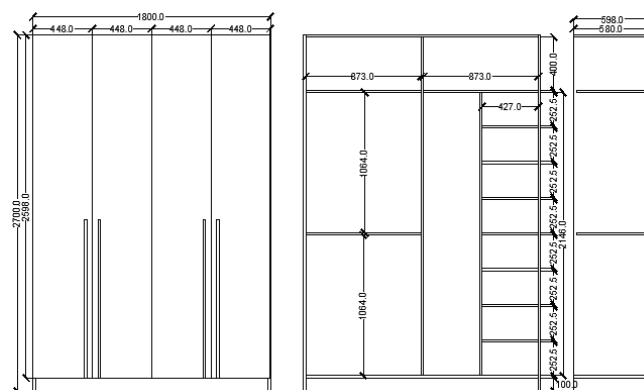
Figure 2 Wardrobe dimensions and its internal organisation

The pannels taken in consideration for the production of the wardrobe are produced by Kastamonu company, based in Turkey. The pannels have thickness h = 18 mm, width = 1830 mm and length = 3660 mm and with a density of d = 650- 830 kg/m^3. From this sheets we will get the pannels needed to produce the wardrobes. As cutting tools used in this experiment, we took diamond cutters with a diameter of 10, 12 and 25 mm. those are suitable to perform different operations like jointing, rabbeting, grooving, copying and dividing cuts of raw material, melamine and laminates, MDF, HPL and veneered panels. High performance on pre-and finish-routing are by its shear angle.

Figure 3 Cutting tool

Table 3 Cutting tools characteristics (CMT catalogue 2023)

Description	D Diameter (mm)	l Cutting length(mm	L Total length(mm)	S Shank diameter (mm)	Z Flutes
140.03956	10	25	72	12x40	1+1
140.121.61	12	35	85	12x40	1+1
142.251.61	25	36	100	25x55	2 + 2

The software used for nesting the pannels into the melamine sheets is Maestro CNC (nesting module). This is a software that is provided by SCM Group and is used with its cnc machines. In order to verify the impact that the diameter of cutting tool has on the *cou* of the pannels we will rectangular nesting with three different tools (10, 12 and 25 mm). Each tool was fitted in a HSK F63 tool holder and inserted into the cnc machiune magazine.

Results and Discussion

Nesting with three different diameters results are shown in the table 2. There we can see that we have not a big difference in the required pannels to produce ten wardrobes. Cutting scheme is what changes when we use different diameter tools. For each cutting scheme we see slight decrease in *cou* as the diameter increases. The best result is achieved when 12 mm tool is used, we have less pannels required to produce the wardrobes, eleven cutting schemes and best *cou* of 81,778%.

Table 4 Nesting results

Cutting schemes			Pannels required 3660x1830			Cou %		
d=10	d=12	d=25	No	No	No	d=10	d=12	d=25
1	1	1	6	6	5	92,040	92,040	90,298
2	2	2	1	1	3	91,911	91,911	90,172
3	3	3	3	3	1	91,653	91,653	89,854
4	4	4	1	3	6	87,046	86,210	89,695
5	5	5	1	1	3	86,093	86,043	85,733
6	6	6	3	2	1	85,733	85,959	73,867
7	7	7	1	1	2	85,884	85,867	67,934
8	8	8	2	2	1	85,959	82,864	62,667
9	9	9	2	2	9	82,215	82,215	52,132
10	10	10	1	1	1	67,934	62,667	34,755
11	11	-	1	9	-	57,400	52,132	-
12	-	-	9	-	-	52,132	-	-
13	-	-	1	-	-	17,377	-	-
Total			32	31	32	75,644	81,778	73,711

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INVESTIGATING THE WINTERING EURASIAN WOODCOCK (*SCOLOPAX RUSTICOLA*) DYNAMICS IN CENTRAL ITALY.

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Abstract: The Eurasian Woodcock (*Scolopax rusticola*) is a species of high and widespread hunting interest and although the species has been recently confirmed as "Least Concern" by the IUCN, the limited available information about its population size and dynamics in Europe raise concerns regarding its actual conservation status. The Department of Agricultural and Forestry Sciences planned and coordinated a multi-year monitoring project, involving skilled personnel and expecialized pointing dogs with the aim to assess the relative abundance index (ICA) of the subpopulation wintering in central Italy (Lazio region) and evaluating its interand intra-annual trends. ICA is defined as the number of woodcocks sighted during a 3.5 hour counting session.

Through a stratified sampling procedure, 234 sampling units (SU) have been identified, evenly distributed between hunting (H) and non-hunting (NH) areas. The survey method was standardized, employing a maximum of 2 skilled observers with 2 pointing dogs with specific qualification per SU. Three counting sessions were conducted in January, and one session per week between February 1st and March 15th. Descriptive and variance analysis have been performed, using management type (H or NH), phytoclimatic band, month, and decade as variables and grouping factors. Between the years 2019 and 2022, the ICA, showed an increasing trend in both H and NH areas.

The ICA is significantly affected (p<0.05) by the hunting management, with higher values in NH areas compared to H ones. Our results describe the absence of significant ICA variations traceable to pre-nuptial migratory movements before the month of February.

Keywords: abundance; monitoring; pointing dogs; pre-nuptial migration; woodcock

Introduction

The Eurasian Woodcock (*Scolopax rusticola*) is a migratory wading bird which nests in Northern and Eastern Europe in the summer and, winters in Southern and Western Europe [1-2]. It is considered wintering and a partial nester in Italy. The woodcock a species of great hunting interest [3] and in Europe, it is hunted during the winter migration period, except for Holland, Belgium (Flanders), Slovenia and in the Swiss German Cantons [4]. However, information relating to the size and dynamics of the Woodcock population in Europe is still poorly known [3]. However, information relating to the trend of the wintering populations is lacking for the most part of EU with the exception of Spain, Greece, Gibraltar and Iceland where it appears to be stable, while in Albania it is decreasing [5].

Material and Methods

Study Area: The study area is represented by the Lazio region, of central Italy, and has an area of 17.242 km².

Data Recording: The sampling units were initially identified by assessing the environmental suitability of the Lazio region for the daytime resting places of woodcock through Geographical Information Systems (GIS), since the counting method involves searching for the species by pointing dogs during the day.

Through a *stratified* sampling, in the Lazio Region 234 sample areas (UC) of about 100 ha have been identified, potentially suitable for the daytime resting place of the woodcock and equally distributed between scheduled hunting areas (H) and prohibited hunting areas (NH). Areas above 1,200 m have been excluded as they represent a limited factor for the presence of the species, as snow cover persists on the Apennine mountains for most of the winter. In 2019, 2020, and 2022 (excluding 2021 due to Covid-19), three counting sessions were scheduled from December 20th to January 31st (on non-hunting days), and one session per week between February 1st and March 15th (on weekends). The survey units (teams) were composed of a maximum of two surveyors and two dogs certified after specific training courses and qualification tests.

Relative Abundance Index: to ensure the comparability of our data with those collected under other monitoring protocols performed in the wintering area of the species [6-7] the abundance index (ICA) has been calculated as the number of woodcocks observed during a 3,5-hour counting session (ICA3.5).

Statistical Analysis: The statistical analysis of the data was conducted using STATISTICA 7 software (StatSoft, Inc.). Initially, for each year, descriptive and variance analyses were performed using the type of land management (hunting or non-hunting), months (January, February, and March), decades (A = Jan I; B = Jan II; C = Jan III; D = Feb I; E = Feb II; F = Feb III; G = Mar I; H = Mar II), and phytoclimatic band (Lauretum, Castanetum and Fagetum) as factors and grouping variables.

The effect of individual factors and their interactions was tested using Full Factorial Anova in the GLM (General Linear Model) procedure. Pairwise comparisons were conducted using Fisher's LSD test. For each statistic, significance was set at p<0.05.

Results and Discussion

The number of active operators/year, active dog/year, active UC/year, total activity day, total effort (h), encounters

(n° animals) are reported in Table 1 for each year.

Table 5. For each year, the number of Active operators/year, Active dog/year, Active UC/year, Total activity day, Total effort (h), Encounters (n°) were reported.

	2019	**2020**	**2022**	**Pool**
Active operators/year	91	95	66	84 (mean)
Active dog/year	113	114	81	107 (mean)
Active UC/year	160	100	67	109 (mean)
Total activity day	293	358	218	869
Total effort (h)	862,78	1.470,56	641,81	2.557,2
Encounters (n° animals)	251	335	221	807
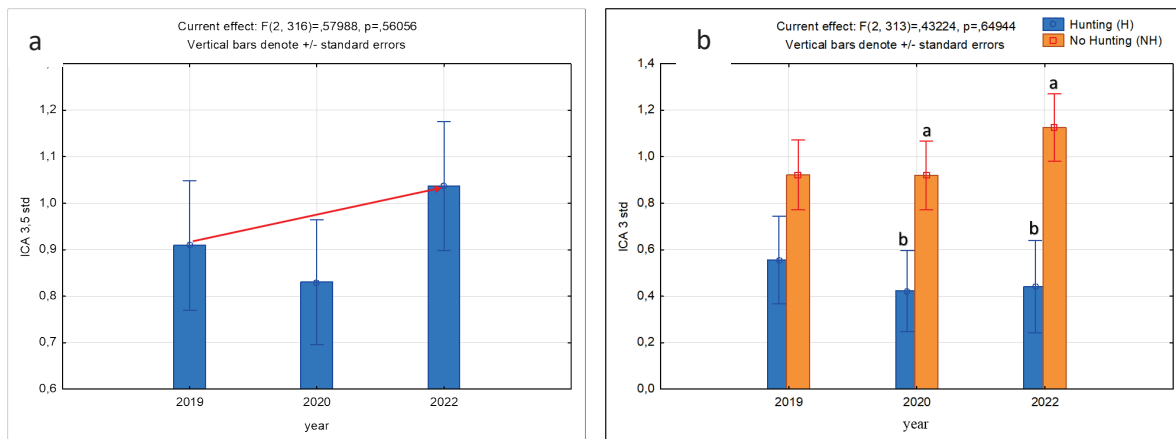
Figure 4. a) Inter-annual variations abundance (ICA 3.5 std) of wintering woodcocks; b) Inter-annual variations in the abundance (ICA 3.5 std) of wintering woodcocks in hunting and non-hunting areas.

The year effect was found to be non-significant (Fig. 1 a), showing a positive trend in ICA3.5 std, which increased from 0.91 ± 0.15 (mean ± SE) in 2019 to 1.04 ± 0.015 in 2022. Although no significant differences in the index are evident (Fig. 1 b), the ICA 3.5 std consistently appears higher in NH areas, and pairwise comparisons have shown statistically significant differences between H and NH areas, except in 2019.

The effect of the decades showed a non-significant trend, with a more pronounced decline between the third decade of January (decade C) and the first of February (decade D). Significant differences ($p < 0.05$) were observed only between the three decades of January and the third of February (decade F).
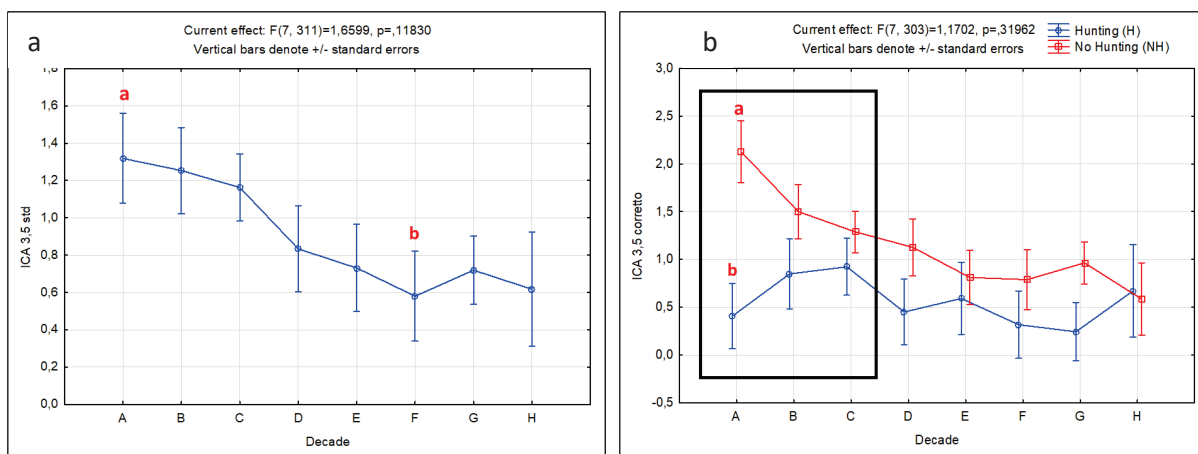
Figure 5. a) Trends and intra-annual (between decades) variations abundance (ICA 3.5 std) of wintering woodcocks; b) Trends and intra-annual (between decades) variations abundance (ICA 3.5 std) of wintering woodcocks in Hunting and No Hunting zones.   A = I Gen; B = II Gen; C: III Gen; D = I Feb; E = II Feb; F = III Feb; G = I Mar; H = II Mar.

Similarly, the interaction between the decade and land management type did not reveal significant changes in ICA. However, an inverse trend was noticed: a) a gradual decline in ICA 3.5 std in no-hunting areas and b) an increase in ICA 3.5 std during the first three decades of January, followed by stabilization in areas where hunting is permitted. This inverse pattern may be due to animal redistribution resulting from reduced disturbance/threat factors like hunting, which had previously caused increased presence in no-hunting areas (the "refuge effect").
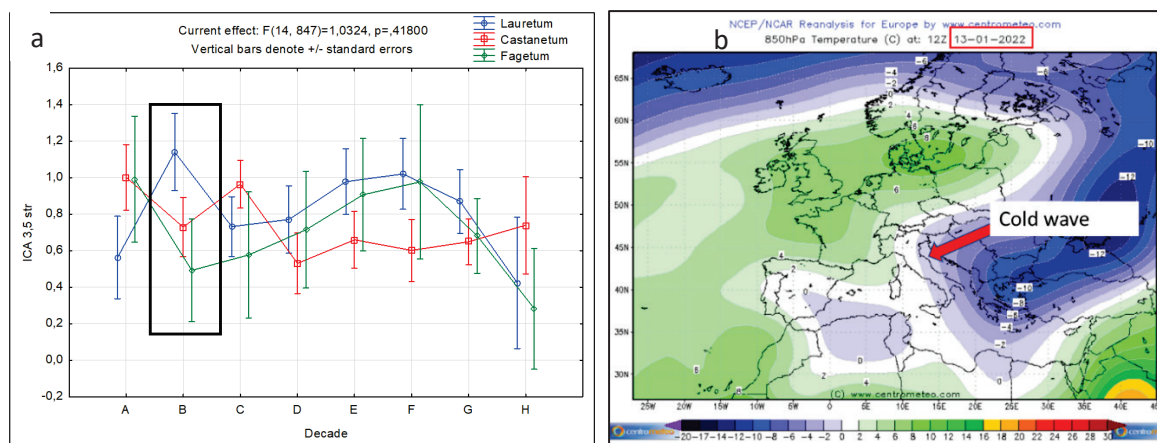
Figure 6. a) Trends and intra-annual (between decades) variations abundance (ICA 3.5 std) of wintering woodcock in relation to phytoclimatics bands; b) temperature (c°) data in relation to the cold wave that occurred in the 2nd decade of January (B).   A = I Gen; B = II Gen; C: III Gen; D = I Feb; E = II Feb; F = III Feb; G = I Mar; H = II Mar.

The interaction between decades and phytoclimate did not reveal significant variations in ICA 3.5 std. However, an inverse trend of the index was observed in the second decade of January (B), with an increase in Lauretum and a decrease in Castanetum and Fagetum.

Conclusion

The results did not show any indicative signals of the onset of prenuptial migration movements before the month of February. Specifically, it seems that it is only in the third decade of February that a substantial drop in the index (Fig. 2 a) is observed, suggesting the beginning of migration. These findings are consistent with those of another study [8], who placed the likely onset of prenuptial migration in the second decade of February in various Italian regions.

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DIVERSITY AND ECOLOGY OF EPILITHIC DIATOMS OF LAKE DUSHKU

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Abstract

The epilithic diatom communities of Lake Dushku were investigated in the years 2016-2019. Lake Dushku (alt. 1110 m, area 22 ha) is situated near the city of Gramsh and constitutes a very rich ecosystem and a tourist point in Albania. The study aims to determine the composition, diversity and ecology of epilithic diatoms of Lake Dushku. Sampling carried out monthly (sediments, stones and aquatic plants in littoral zone of the lake) over three successive years revealed 74 diatom taxa with *Achnanthes*, *Cymbella* and *Gomphonema* being the most abundant species while other genera are represented with seven or fewer species. *Fragilaria crotonensis* was the most dominant taxon in the sampling examined throughout the investigation. The values of diversity and evenness indices are high during spring and fall. Based on cluster analysis for monthly samples of epilithic diatom, there are two different groups at the lowest similarity level. The associations between June and July 2017 are the most significant with 87.07%. The number of epilithic diatoms showed positive correlation with dissolved oxygen and negative correlation with temperature.

Key words: Diatom flora, fresh water, substrate, epiphytic algae.

EVALUATION OF THE QUALITY OF BEECH WOOD PELLETS DURING HANDLING AND TRANSPORTATION BY FREE FALL TEST (CASE STUDY)

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Abstract: Wood pellets are a solid and theoretically renewable biofuel made from compressed sawdust. In Albania wood pellets are used for residential heating. Mechanical durability, percentage of broken pellets and generated dust during handling and transportation are important for quantifying the quality of pellets, which causes a loss of calorific value. During long-term storage, wood pellets tend to disintegrate as a result of compression and friction between them, the presence of cracks and increased moisture due to the lack of air, but also self-ignition at temperatures above 50°C and the presence of wood dust particles with dimensions smaller than 0.42mm. A series of experiments were conducted using five different heights of free fall of beech wood pellets (100% Fagus sylvatica) produced in Albania. The concrete surface covered with tiles was chosen as the impact surface in the collision of the pellet sample bags. Weighing the dust obtained from each hand sieve of the sample (10 plastic bags 24cm x 30cm filled with 300g wood pellets) for a period of 2 min with sieves of different sizes was used to determine the amount of dust generated by the free fall test. It was concluded that the different free fall heights and the amount of dust generated by the wood pellets are statistically significant. The relationships between these parameters were found to be linear.

Key-words: wood pellets, beech, free drop test, collision impact

Introduction

Biomass still remains a future market in Albania encouraged by the development of the wood industry and the increased ways of obtaining it in the country. There are many ways of using biomass, but among the most important is the production of wood briquettes and pellets for heating purposes. The global wood pellet market size was valued at USD 8.23 billion in 2021 and is expected to reach USD 27.52 billion by 2029 [6]. Dust generation is related to the durability of wood pellets during transport, storage and handling. Their production is focused on ensuring the right quantity and quality in accordance with the standard EN 15210, while use of unsuitable equipment and logistic chain concerning the careless handling and distribution of the products is often left out of consideration [1, 9]. The ability of wood pellets to remain undamaged during handling and transport is called "mechanical durability" [7]. Paraphrasing Gilvari & al (2021) this definition provides an indication of the extent to which the material can retain its original shape, given in the production process, while in practice the durability is characterized by measuring the amount of pre-defined small-size particles created in laboratory tests [2]. According to most of the literature, the limit for evaluating the mechanical stability of wood pellets is the percentage of grain size between 3 and 5mm, obtained after 3.15mm (1/8") sieve or other laboratory tests [3]. According to the literature, mechanical durability depends on the characteristics of the raw material; specifically by the type of biomass, the size of the grains, the moisture content of the material, the use of adhesives, the parameters of the pelletization process and the storage and packaging conditions [10]. Generated fine and dust is not predominant, but it remains a problem for the pellet production industry due not only to the quantity and impact geometries when particles fall, but also affects their calorific power. Paraphrasing Kofman [8], due to its fragile nature during handling and transportation, the wood pellets will begin to wear and break as a result of compression and friction between them, and disintegrate in contact with air moisture for a long time. The fine dust from damaged pellets tends to remain airborne in case of subsequent handling. pellet dust can be very fine and take a long time to settle, and can form a dust cloud and can be hazardous to health and self-igniting, an elevated risk of segregation, arching and equipment fouling [2, 5]. Wood pellet is one of the largest internationally traded solid biomass commodities used for energy purposes and can be transported by road, rail and sea, depending on the quantity and distances [4]. In some cases, pneumatic transport is also used during loading and unloading for distances up to 20m. Pellets can be transported unpackaged in containers or in plastic bags with a volume of 1 to 1.5m³, in bags of 18 to 20kg or in smaller bags of 10 to 15kg for domestic use. The transport of pellets in unpackaged condition is not widespread in our country due to the small amount of production and demand for use by small and medium consumers. During this transport, the wood pellets may be subject to impact or free fall. Impacts and collisions can occur between the pellets themselves, or on hard (metal or concrete) surfaces. The free fall of pellets packed in bags/sacks can be single or repeated from the maximum height (maximum height of silos) up to 21m. Despite numerous technical reports that provide detailed advice on the handling and storage of solid biomass in general [1], there is little information to be found in the scientific literature on beech (100% Fagus sylvatica) wood pellets, which can to be considered for now as the most widespread local production, referring to the products of the 6 main companies producing wood pellets in Albania. The objectives of this study are to evaluate the mechanical durability of the beech wood pellets, which can be disintegrated as a result of compression and friction between them and from the impact of the collision on a concrete surface paved with tiles. These objectives can be achieved by conducting single free fall experiments from heights similar to those of the handling and transport process of pellets in 15kg bags.

Materials and methods

"Premium Bio Pellet", produced by the local company "Alcani L.L.C.", packaged in 15kg bags, was chosen to carry out the single free fall tests. The pellet is based on 100% beech (Fagus sylvatica). The beech pellets of each bag were first sieved with a 3.15mm sieve to have only whole pellets before the test and to evaluate the mechanical durability given by the manufacturer. The single free drop test was chosen as a method of evaluating the mechanical durability during storage and handling of beech pellets packed in bags. The tests were conducted near the building of the Faculty of Forestry Sciences, which offers a concrete floor with tiles on its interior and exterior. 300g beech wood pellets are packed in each plastic bags with dimensions of 24 x 30cm and with zip-fix fastening. The bags are thrown only once from a height of 3m, 6m, 9m, 12m, 15m and 21m (other building) on a concrete surface. For each height, 10 bags are thrown. 2 types of measurement procedures were performed. The pellets were then sieved by hand for 2 minutes on a 3.15mm (1/8") sieve according to the procedure given by EN 15210-1:2009. They were first sieved with 10 mm, 5 (4)mm and 3.15mm sieves to evaluated the mass of the whole beech pellets. Sifting was then continued with 2mm, 0.5mm and 0.2mm sieves to evaluate the size-classified particles as a result of collision impact. The mass of the whole pellet, lumps and fines are weighed for each measurement. The sieves were obtained from the Laboratory of the Faculty of Agriculture and Environment. They are steel sieves, certified according to EN DIN 4197.

Fig.1. Plastic bags thrown from 3m and 9m height

Fig.2. Measurement procedure

Results and Discussion

After sieving the entire mass of 15kg with sieves of 10, 5, 4 and 3.15 mm, the mass of size-classified particles after sieving was determined, which was compared with the mechanical durability of the beech pellets declared by the manufacturer.

Tab.1. Size-classified particles after sieving

Bag's No.	Whole pellets mass, kg	Mass of pellets, g				Mass of generated fines, g		Mechanical durability MD, %	EN 15210-1: 2009 %
		Whole pellets >10mm	5 mm<Whole pellets<10 mm	Whole pellets >4 mm	3.15mm< Lumps <5 mm	Fines <3.15 mm	%		
1	15			482.79		**284.55**	1.897	**98.103**	>97.5
2	15	496.57	138.39		278.27	**356.69**	2.377	**97.623**	

In Tab.2, the results of the free fall tests are given, namely the mass of dust generated by the collision of pellets bags thrown from different heights.

Tab.2. The collision impact of pellets bags thrown from different heights on concrete surfaces

Height, m	Average mass of pellets bag, g	Generated dust < 3.15 mm, g	Average mass of whole pellets without plastic bag, g	Average mass of pellets and generated dust, g	Average mass loss, g
3	300.043	1.515	298.129	299.643	0.4
6	300.004	3.173	296.412	299.585	0.419
9	300.011	4.749	295.031	299.78	0.231
12	300.031	5.989	293.064	299.053	0.978
15	299.942	6	292.666	299.068	0.874

For both bags of 15kg, a mechanical durability of beech pellets resulted in an average value of 97.863%, i.e. about 0.363% more than the limit value of 97.5% required by EN 15210-1: 2009. From the results of the free fall tests it was concluded that the maximum GD is observed for two throwing heights of 12m and 15m.
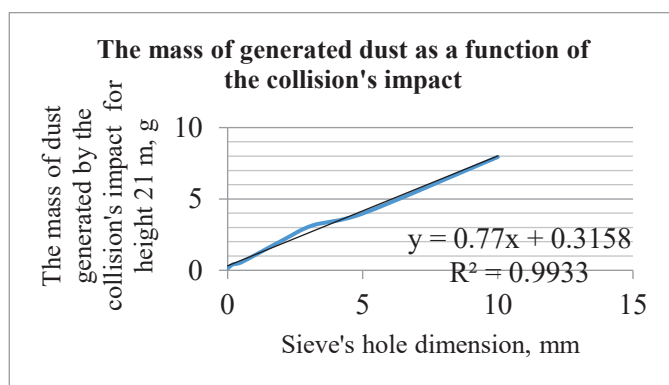
Fig.3. Sieves set

The minimum and maximum mass of GD was about 1.5g and 6g, respectively. For a 15kg bag, this refers to an average value of about 75g and 300g (the comparison factor is 50 (15000g/300g=50). GD showed a decreasing trend due to the collision impact on the concrete floor when passing from one sieve to another with mine. The graph appeared almost linear, with the equation $y = 0.77 \cdot x + 0.3158$; with an estimated regression coefficient (approximately 1) of $R^2 = 0.9933$.

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ROLE OF HOMEGARDENS AS IMPORTANT AGRO-ECOSYSTEMS FOR *IN SITU* CONSERVATION OF PLANT BIODIVERSITY.

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Abstract

Rural communities traditionaly are supported in plant resources to meet their vital needs such as food, fire, furniture, fiber, etc. Home gardens play an important role within the overall agricultural system. They are considered as very complex agro-ecosystem, rich in species, managed appropriately over decades. The study aims to understand the important contribution and benefits of home gardens to the well-being of rural communities, and at the same time to provide useful information that can support and encourage local communities to develop their home gardens in a sustainable manner, as a form of *in situ* management and conservation of plant biodiversity. Through field observations, different information was collected from the farmers of the two villages in Berat district, on the aspects related to the use of plants (different uses of plant resources, the frequency of harvesting plants), to the diversity of agricultural species present in their gardens and farms as a preferred way to preserve these natural resources, etc. The data of this study will help define the "plant-local community relationship" which is important for the sustainable use of plant resources in the rural area.

Key words: biodiversity, conservation, home gardens, management.

Introduction

Genetic diversity is a key element in farmers' livelihood strategies, especially in areas with high ecological, climatic and economic stresses and risks. According to researchers [9], agro-biodiversity is a subset of natural biodiversity that includes plant genetic resources used for food and agriculture (crops, cultivars, weeds and wild relatives). Different studies suggest that the maintenance of genetic variation within agricultural crops [11; 2], provides a wide range of essential goods and services that support ecosystem functioning, and has become an important element of sustainable agriculture [10; 7; 8]. Agrobiodiversity also provides farmers and breeders with raw materials for the selection and continuous adaptation of crops toward changing environmental conditions [1] or to the needs of a growing human population [5]. Home gardens as very complex microenvironments [4; 3], usually integrated within a larger nearby ecosystem, have been described in different studies as constant and diverse niches formed by a close collaboration between nature and human culture. The purpose of this study is to highlight the use of gardens and family farms in our country in the conservation and sustainable use of plant genetic resources. Recognizing the important contribution and benefits of home gardens for the well-being of the rural community, as well as the little existing information on home gardens in Albania, this study aims to make a modest contribution to the addition of useful information that can support and encourage local communities to develop their home gardens in a sustainable manner.

Material and Methods

Study area: The study was conducted in two villages of the Berat District Administrative Unit. For the selection of the two villages, the main criteria used, was that of the diversity of the species, the status and importance of the agricultural lands and home gardens. First, a review of the written literature was carried out on elements such as: Description of family gardens as complex agroecosystems, Management of genetic resources on the farm, Factors influencing the conservation of biodiversity in home gardens and the challenges of conservation strategies of plant genetic resources.

Data collection: Data collection took place from April to August 2023. Farmers in the study area shared information based on a semi-structured questionnaire, designed to collect data on various aspects as: demographic data of the farmers, and then with elements related to the use of plants resources. Detailed information on the study and the importance of conducting it, was known to the farmers of the study area, before we led the surveys and field observations.

Data Analysis: The data collected was carefully checked for extensiveness and consistency. Descriptive statistics such as frequency and percentage of data were used in the analysis. The quantitative data collected were managed to find the Jaccard Index (Jaccard, 1912), also known as the Jaccard similarity coefficient. It is used to measure the similarity and diversity between limited sets of samples and is defined as the size of the joint divided by the size of the union of the sample sets.

Results and Discussion

The data of the farmers has been collected to describe the characteristics of our sampling population, which is an important aspect of the study and needs to be carefully examined. In order to understand the most active group in agriculture in the two villages, the age range of the respondents was taken into consideration. The highest percentage (42.68%) was represented by respondents aged 45 to 60, while the least represented age group was 15 to 30 with 7.31%.

Gender indicates the role of men and women in the agricultural community and helps to understand the portion of their involvement in agriculture. Our data suggest a representation of 64.6% of the interviews as male farmers, and the rest of the interviews were represented by women. The years of agricultural experience of farmers have an important relationship with the perceptions and choices made in the daily life of their agricultural activity, such as in the selection of the cultivar, soil treatment, the various supplies for safe production, etc. Most of the interviews (32.9%) had experience of 30 to 40 years in agriculture.

The availability of agricultural land is related to the source of income and the opportunities that farmers may have for improving their livelihoods. About the size of the land, our farms own a small area of land (0–3 ha). The surveyed farmers told us that their agricultural land was planted mainly with four groups of crops, such as cereals, fruits, and vegetables, and recently the development and cultivation of aromatic agricultural plants have taken place. To our question, *where do you get plant seeds for planting* (buy or circulate them)? Farmers for at least the two plant groups mentioned above, cereals and vegetables, told us that, in the highest percentage, they got this seed from the previous season of planting. According to them, 40% of the seed that was used for planting in the fields was purchased as certified seed, while 60% of the seed is seed from the area provided by the farmers themselves, through the circulation of the seed year after year between them.

All the farmers responded that they do have problems with their agricultural production. The reasons for the problems, and in particular the diseases appearing in the products planted on their farms, are related by the farmers to the climatic conditions, which have been variable, especially in recent years, being characterized by alternating temperatures and extreme events such as torrential rains or prolonged drought. Another problem appearing on their farms is the development of weeds, which affect the production of specific species, negatively affecting the final yield. In particular, problems appear in the culture of chives. The presence of insects is another negative factor appearing as a problem for farmers in this area. Plant species present in family gardens in 43.9% of cases were represented by shrubs, 34.14% as trees, and 21.95% as herbaceous plants. In 68% of cases, they were for personal use as food by farmers; in 14.6% of cases, mainly those of aromatic medicinal origin were used for curative reasons in the form of extract to treat flu, kidney-related diseases, etc. In the 82 farmers surveyed and from the field observations, a total of 47 plant species were identified, part of 29 families, and were present (planted) for different uses in their gardens. Meanwhile, in their fields, they resulted in a total of 14 plant crops, which were planted mainly for commercial use.

The Jacard coefficient or the Jaccard Dissimilarity Index was used to measure the level of similarity and the diversity that exists between the garden species groups of the two villages under study. According to the data it turns out:

Jaccard index = (number in both groups) / (number in each group) * 100

IJ=39.74%

The calculated value suggests that the family gardens of the two villages present high diversity, or variability in relation to the plant species planted by the farmers.

Next, we calculated the Jaccard distance, to assess how different the two groups are in the study. It is complementary to the Jaccard index. According to the data it results: D= 1-39.74%=60.26

Even in this case, the result of the Jaccard Distance suggests that in terms of the presence of the species found in the family gardens between the two villages, the level of variability is high, at a value of 60%.

Conclusions

The study aims to help understand the important contribution and benefits of home gardens to the well-being of rural communities and, at the same time, provide useful information that can support and encourage local communities to develop their home gardens in a sustainable manner as a form of in situ management and conservation of plant biodiversity. The results of our study, based on interviews and field observations, support the assertion that family gardens are important sources for maintaining agricultural plant biodiversity. In the 82 family gardens of the two villages selected for study, a total of 47 plant species belonging to 29 families were identified. Meanwhile, in the agricultural lands, farmers mainly cultivated for commercial use about 14 plant crops, which belonged to 8 plant families. The community of the study area has a good understanding of climate change indicators and how they affect the security of their agricultural products. This study can contribute to increasing and improving the knowledge of how these traditional storage and production systems are incorporated into modern systems.

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LAKE OHRID'S SMALL-SCALE FISHERY: SERVICE DIVERSIFICATION AND FISH STOCKS CONSERVATION

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Abstract

The study aimed the evaluation of small-scale fishery in Lake Ohrid, fishery diversification possibilities and their impact in fish stocks and the Lake ecosystem. The long-term success of the conservation and management programs of the Ohrid transboundary ecosystem depends on the level of the community that lives in the ecosystem and hang on its natural resources, to make the right decisions regarding its sustainable management and economic sustainability. The study gathered data from a variety of sources to understand the situation of Lake Ohrid's fishery. These sources included state agency reports, the lake's management plan, interviews with fishermen, meetings with local stakeholders, and consultations with fishery authorities and local governments. Fishery is one of the most essential services offered by Ohrid ecosystem, with the total annual production of 155.4 mt (2022). Fishery income is a small fraction of the area's total economic and agricultural earnings. However, for the fishermen of the villages along the lakeshore, it is the main source of livelihood, supporting hundreds of families. The fishery management tools applied in Albania are discussed and compared with those the Republic of North Macedonia uses in the eastern part of the Lake. Drafting of joint management plans for Ohrid ecosystem in general and for some fish stocks in particular, as well as the harmonization of fishery management tools would ensure sustainable fish stocks and conservation of the Lake ecosystem.

Keywords: Lake Ohrid, small scale fishery

Introduction

Lake Ohrid is considered also as one of the most important continental water bodies for inland fishing due to its size and the presence of various fish species, including several endemic ones with high trade values, such as two species of endemic trouts: *Salmo letnica* and *Salmo ohridanus*. Fishing has played and continues to play an important role in the Lake Ohrid region, especially for the population of the towns and villages surrounding the Lake. The current situation of fish stocks in the Lake is very different from what it used to be. Fish stocks have been subjected to numerous pressures, such as pollution and habitat degradation, the introduction of invasive species and obviously unsustainable fishing [1, 2]. The status of certain stocks is not clear, because the published data are very limited and timely. Small-scale fishery (SSF) in the Lake is carried out using boats and artisanal fishing gear. There are no recent studies on the Lake's salmonids stocks. Opinions about their abundance are different. The opinion of some fishers, based on the slightly increase of the catches in recent years, support the increase of Ohrid trout biomass due to increase of formality of fishing activity in the Lake and stocking programs undertaken for *S. letnica* [3]. Contrary to this finding, other authors indicate an increase of fishing mortality [4] and a reduction of *S. letnica* and *S. ohridanus* stocks [5]. As high value fish stocks continue to decline, it is necessary to adapt fishing activity to target other species with less market value and greater abundance. The study aims to evaluate the response strategies to changing ecosystem, the fishermen's perception and preparedness for fishery diversification, and to adopting management tools that restrict fishing of certain species that have been subjected to high fishing pressure over the years.

Subjects and Methods

Information on fishing, the management of fishing activity in the Albanian part of the Lake has been collected from the official documents of the Ministry of Agriculture and Rural Development [3, 6, 7, 8].

nterviews and questionnaires were conducted with fishermen operating in Lake Ohrid and members of Fishery Management Organization (FMO). 80 fishermen, holders of fishing right, residents of the coastal villages Piskupat, Udënisht, Mëmëlisht, Lin, Buqeze and Pogradec (city) have been interviewed. All fishermen interviewed were male and aged between 20 and 60 years. The information collected was related to fishing activity, catches and their structure, social and economic conditions of fishermen's families, income generated from fishing, fishermen's perception on fish stocks, and possibilities for diversifying catches and economic activities that will preserve and increase their economic well-being while conserving the fish stocks. The information obtained was processed and presented in graphical form. The data were used to evaluate the fishery and its diversification from the perspective of the fishers.

Results and Discussion

A comparison of the fishery management tools applied in the Albanian and Macedonian parts of Lake Ohrid reveals differences in the closed seasons' time and duration and in the minimum allowable sizes at catch for the main fished species [7, 4]. The fish species populations of Lake Ohrid are common stocks shared between Albania and North Macedonia. Therefore, their conservation and sustainable use require unified management tools in the framework of joint management plans for certain species and harmonization of fisheries regulations.

In 2022, the Albanian part of Lake Ohrid produced 155.4 mt of fish per year, comprising 93 mt of Ohrid trout and 19.7 mt of belushka trout. According to the opinion of fishermen, the species that are most fished in the Lake are Ohrid trout (*S. letnica*), belushka trout (*S. ohridanus*), chub (*C. squalus*), common carp (*C. carpio*), bleak (*A. scoranza*) and European eel (*A. anguilla*). While the species that have suffered the greatest reduction according to the perception of fishers are: Ohrid nase (*C. nasus*), belushka trout (*S. ohridanus*), common carp, eel and Ohrid trout.

In order to ensure long-term viability of SSF, it is becoming obvious that there is a need to address the social and economic aspects of fisheries management. The graphs below show some of the answers that were analyzed to evaluate the social-economic state of the fishermen and the possibilities to improve and diversify their activities with the intention of achieving more sustainable fishery and a healthier ecosystem.

The sustainability of SSF is threatened by various factors, including over-exploitation of fish stocks, illegal fishing, seasonal bans, biodiversity loss and transformation, habitat degradation, complex regulatory frameworks, rising costs, changeable market demand and inefficiencies in supply chain.

To cope with the ever-changing conditions some of the response strategies that should be adapted are:

- Reduction of catches for high value species through reduction of fishing effort and extended seasonal bans.
- Shifting the fishery toward species that have a lower market value, such as bleak, barbel, chub, and creating added value through processing.
- Setting up FMO based fish markets and organizing supply chain.
- Promotion of recreational fishery and services related to tourism (fishing guides, fishing competitions, information centers, etc.).
- Investing for technological innovation, that will increase productivity, address safety issues, improve management and conserve the resources.
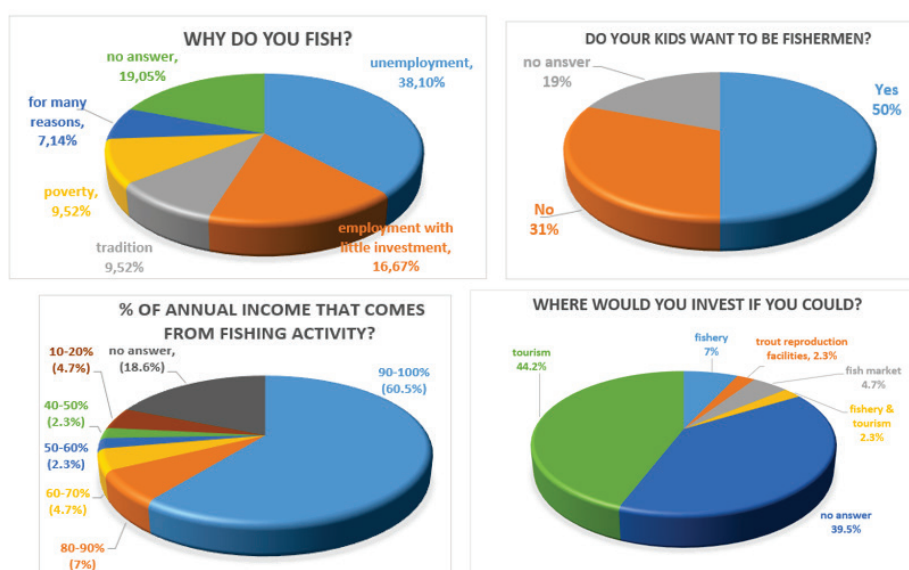
Figure 1. Fishers' answers related to their social and economic state.

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COMMON CARP AND CHUB CATCH ANALYSIS IN OHRID LAKE

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Abstract

The study aimed the evaluation of catch structure and catch effort of two cypriniform fish species of Ohrid Lake: common carp (*Cyprinus carpio*) and chub (*Squalius cephalus*). Evaluation of catch, gear used and effort were based on data provided from Fishery Management Organization of Ohrid Lake. The fishermen that operate in the lake are organized in the Fishery Management Organization. There are 220 fishing boats of which 70 boats are equipped with fishing nets and long lines and 150 boats are equipped only with long lines. The fishing activity is mainly performed with 4.5-5.5 m length motor boats with engine power ranging 3.5 – 15 Hp. The size of the fishing nets used for the catchment of these two species is 500 m in length, with mesh size 36 mm for chub and 60 mm for common carp. The total production of the lake for these two species in the years 2021, 2022 was respectively 6.1 and 6.75 ton for the chub and 2.9 and 2.45 ton for the common carp. The catch per unit of effort (CPUE) ranged from 0.6 kg/day/boat in 2021 to 0.7 kg/day/boat in 2022 for the chub and from 0.3 kg/day/boat in 2021 to 0.25 kg/day/boat in 2022 for the common carp. The months with the highest production were respectively for common carp, the april of 2021 and 2022 with 1.7 and 1.2 tons, while for chub, the april 2021 with 1.4 tons and august, september of 2022 with respectively 1.5 tons each.

Keywords: common carp, chub, CPUE, Ohrid Lake

Introduction

Ohrid Lake is of tectonic origin and, having an estimated age of about two to three million years [1], is considered the oldest lake in Europe. The lake is located between Macedonia and Albania. Its catchment area (combined with Prespa Lake) comprises about 2,600 km² [5] and the lake's surface is about 358 km².

A remarkable characteristic of Ohrid Lake is its enormous depth of about 289 m; the mean depth is 151 m [7]. Furthermore, the water is exceptionally clear with transparency to a depth of as much as 20 meters [7]. According to [11] estimated retention time of the lake water volume is 83 years.

A special characteristic of Ohrid Lake is its high degree of endemism [1]. Since 2002, all licensed fishers are organized in a (FMO) which has the responsibility and duty to manage a landing site, and to participate in the co-management of fisheries resources [6].

Previous research has shown that fishes (including endemic and commercially exploited species) spawn in many (if not all) areas along the shorelines [12]. Nonetheless, there are specific zones in the lake which are of particular importance to the local fish fauna as certain places seem to be exceptionally good spawning sites or, because of the composition of aquatic vegetation, provide shelter from predators. In-depth information (including shore zone and littoral vegetation) about these habitats is given by [3]. According to [4] for the years 2021 and 2022 recent catches of all Albanian Inland Waters sum up respectively to about 654 and 586 tons for the common carp and 21 and 17 tons for the chub.

Material and Method

The study aimed the evaluation of catch structure and catch effort of two cypriniform fish species of Ohrid Lake: common carp (*Cyprinus carpio*) and chub (*Squalius cephalus*). Evaluation of catch, gear used and effort were based on data provided from Fishery Management Organization of Ohrid Lake. The data collected for 2021 and 2022, were the product of a total small-scale fleet consisting of 220 fishing boats. The size of the fishing nets used for the catchment of these two species is 500 m in length, with mesh size 36 mm for chub and 60 mm for common carp. Fishing activity is mainly performed with 4.5-5.5 m length motor boats with engine power ranging 3.5 – 15 Hp.

Results and Discussion

In the course of data gathering recent catches for common carp and chub of Albanian Ohrid Lake fishers in the years 2021, 2022 was respectively 6.1 and 6.75 ton for the chub and 2.9 and 2.45 ton for the common carp. Comparing the catches for common carp and chub of Albanian Ohrid Lake with the recent catches of all Albanian Inland Waters for the years 2021 and 2022, common carp made 0.4% of total catches and chub made 29% and 39% of total catches. CPUE for chub has increased, from 2021 to 2022 which may be an indication that we have had an increase in the reserve for this species. While for the common carp, the CPUE values has lightly decreased (Figure 1).
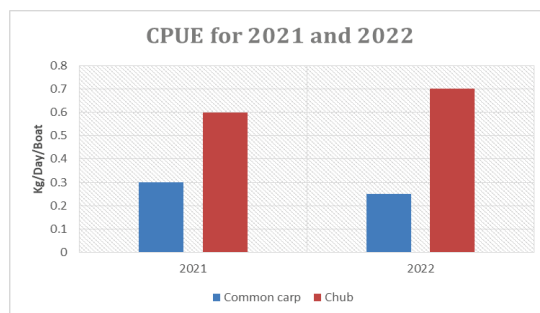
Figure 1 Catch per unit effort (CPUE) for the chub and common carp in Ohrid Lake

The months with the highest production were; for common carp, april of 2021 and 2022 with 1.7 and 1.2 tons, while for chub, april 2021 with 1.4 tons and august, september of 2022 with 1.5 tons each (Figure 2).
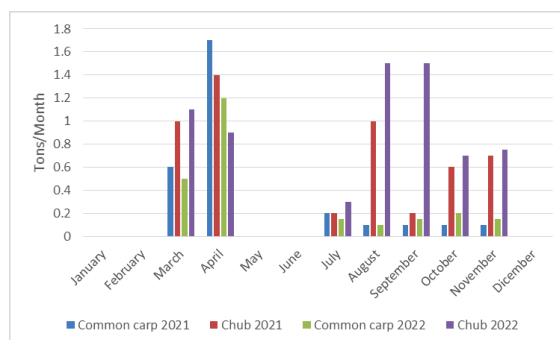
Figure 2 Catchment in tons/month of chub and common carp in years 2021 and 2022 in Ohrid Lake

Available fishery statistics for Ohrid Lake shows that, in the past, Ohrid trout (*Salmo letnica*) and belushka (*S. ohridanus*) contributed considerably to the total annual catches of commercial fishers [8, 2]. For this reason, the lake has occasionally been characterised as typical salmonid water or "lake of trout" [10, 9].

Aknowledgments

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PERSPECTIVES AND POTENTIALS FOR ENERGY RECOVERY FROM WASTEWATER IN KOSOVO

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The increasing demand for energy and the need for water pollution control are two major problems that can be holistically addressed by recovering energy from wastewater treatment. There is much potential for a greener and more sustainable future if this idea is further researched, technologically developed, and widely adopted. The aim of this study is to (1) present international research and application experiences, to (2) put them into context with the current situation in the wastewater (and energy) sector in Kosovo, and to (3) evaluate related perspectives and potentials for energy recovery from wastewater. To this end, a detailed study will be conducted to collect and evaluate data on existing wastewater treatment plants, future implementation and expansion projects, wastewater characteristics, existing technologies for energy recovery (e. g. wastewater heat recovery, biogas application for combined heat and power generation), and related investment and operating costs. Furthermore, energy recovery potentials from wastewater and sewage sludge processing will be estimated. This also includes the feasibility of related integration into existing energy supply systems. The study will be carried out in the broader context of European Union (EU) sustainability and environmental initiatives, focusing on the EU Green Deal, the EU Circular Economy Strategy, and the pending recast of the EU wastewater treatment directive. It shall foster the utilization of so far untapped energy potentials of wastewater by converting it into useful forms such as electricity, heat or biofuels, to contribute to the generation of clean and renewable energy.

Key words: *urban wastewater, sewage sludge, energy recovery, EU directives*

DEADWOOD IN EVEN-AGED FORESTS: A CASE STUDY IN SEGGIANO, ITALY.

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Abstract

Deadwood is essential in an ecosystem because it plays a significant role in carbon immobilisation, in humus formation processes, providing a wide range of micro- and macro-habitats for animal, plant, fungal, insect and bacterial species, participates in the cycle of nutrients and carbon, interacts positively with the microclimate and generally increases the overall productivity of an ecosystem. Deadwood is explicitly mentioned and politically recognised in the MCPFE of 2003 as one of the indicators adopted for Sustainable Forest Management; furthermore, the standards for forest management certification direct its evaluation. The volume and composition of deadwood depend by the type of forest, the age of the stand, the disturbances present, the composition of tree species and the intensity of harvesting. Information about deadwood is extensively documented for unmanaged forests, while for productive forests it is much more limited. The forest stand studied consists of an even-aged beech forest (*Fagus sylvatica* L.), actively managed with shelterwood management system by Consorzio Forestale dell'Amiata, and it is located in Seggiano municipality (Italy). The aims of this study are the quantification and qualification of the deadwood found and the evaluation of deadwood in relation to the accessibility to the forest. The results obtained were compared with data collected from other studies in productive and non-productive forests. The deadwood amount was in accordance with the deadwood standards of the productive forests of Europe, while they were lower than the values found in protected areas for beech forests. In addition, it was observed that accessibility to the forest did not affect the volume and type of deadwood. This case study provides indications on the levels of deadwood found in a beech forest managed according to classic silvicultural systems without deadwood management having been specifically introduced.

Key Words: snag, log, stump, beech forest, forest management

Introduction

According to the Global Forest Resources Assessment 2005, forest deadwood can be defined as all non-living woody biomass not contained in litter, either standing, lying on the ground, or in the soil [5]. This definition highlights the three main components of dead wood: *Standing Dead Trees* (STD or snag), *Lying Deadwood* (LD or log) and *stump*. In ecological terms, the importance of deadwood has been widely recognized: it is a key factor in the biodiversity conservation providing a wide range of micro- and macro-habitats for various plant and animal species, with particular reference to saproxylic organisms [14]; it improves the stability of slopes [8]; it increases water storage capacity and nutrient availability [9]; it promotes natural tree regeneration creating an optimal substrate for seeds [15]; it contributes to nutrient cycles and plays a role in forest carbon sequestration [1, 12]. The importance of deadwood is politically recognised in Europe by the Ministerial Conference on the Protection of Forests in Europe [13] where pan-European indicators for Sustainable Forest Management were defined. Deadwood is explicitly mentioned among the indicators adopted for Sustainable Forest Management (Indicator 4.5). The volume and composition of deadwood depend on a set of variables [11]: the type of forest, the age of the stand, the disturbances present, the composition of tree species, the climatic characteristics and the intensity of harvesting. Information about deadwood is extensively documented for unmanaged forests, but it is significantly more limited for productive forests. This was the context within which this investigation was carried out, in order to quantify and qualify the deadwood present in an even-aged beech forest actively managed, evaluating the effects of silvicultural treatments on deadwood, by comparing the values obtained in a parcel that has been harvested 10 years ago with a parcel where forestry treatments were carried out last year. In addition, an evaluation of deadwood in relation to the accessibility to the forest was carried out.

Material and Methods

This study was carried out in area managed by Consorzio Forestale dell'Amiata, located in Seggiano municipality (Italy). The forest stand studied consists of an even-aged beech forest (*Fagus sylvatica* L.), managed with shelterwood management system. Two parcels, namely, #9 (unharvested in 2022, 14.84 ha) and #12 (harvested in 2012, 12.64 ha), were selected within the study area for data collection. Two circular sample plots with an area 1256 m^2 (r = 20 m) were established within of each parcel: one sample plot was carried out far from the forest viability (Plot #2 and #4) and one close to it (Plot #1 and #3). At each plot the diameter at breast height (DBH) was measured, and their stem volumes were calculated by local volume tables. For each sampled snags and stumps we recorded the DBH, height, volume and decay class. Lying deadwood was recorded through 2 linear transects, at right angles to each other, with a length of 50 m respectively. Each log intersecting the lines was measured for DBH (threshold DBH of 3 cm) and decay class. The decay class was determined according to the CWD classification system described by Behjou *et al.* 2018 [2] (5 classes ranging from 1 (recent death) to 5 (highly decayed deadwood)). *Standing Dead Trees* volume was calculated by the formula: $V_i = \left(\frac{D}{200}\right)^2 \pi \times H_i \times 0,75$,where V_i = volume of the *i* snag (m^3), D = diameter of the *i* snag (m), H_i = height of the *i* snag (m), 0,75 = reduction coefficient.

The volume of *stumps* was calculated by the formula: $V_i = \left(\frac{D}{200}\right)^2 \pi \times H_i \times 0,85$,where V_i = volume of the *i* stump (m^3), D = diameter of the *i* stump (m), H_i = height of the *i* stump (m), 0,85 = reduction coefficient.

Lying Deadwood volume was calculated by the formula: $V_i = g_i \times 1$,where V_i = volume of the *i* log (m^3), g_i = basal area of the *i* log (m), 1 = linear transect width. The ratio (RSS) of snags volume to all stand volume was calculated for each parcel as

a snag-creativity index. For lying deadwood creativity, the ratio of lying deadwood volume to volume of standing live trees (RDT) was also used. For comparing snag longevity, the ratio of lying deadwood volume to snags volume (RDS) was calculated for each parcel. In addition, the ratio of stump volume to volume of standing live trees (RST) as harvest intensity index and the ratio of CWD volume to stand volume (RDW) were calculated.

RESULTS AND DISCUSSION

Volume values of standing live trees and deadwood for each sample plot are showed in Table 1. The volume of living trees in the parcel #12 (347.40 m³/ha) was slightly lower than volume in the parcel #9 (411.18 m³/ha). Quantitative data show higher values of deadwood in parcel #12 (15 m³/ha) than in parcel #9 (9.76 m³/ha). In both parcel, logs contributed more to the total deadwood volume, followed by a discrete presence of stumps, while snags are poorly represented. The reasons are linked to past silvicultural practices that involved the removing of decaying trees that could later become snags, probably to simplify cutting and logging activities. The distribution of CWD of each parcel into the different decay classes is shown in Figure 1 and Figure 2. In both parcels the volume of deadwood was concentrated in the highly decayed classes. These values are consistent with the different forest operations that have taken place on the two parcels. In Table 2, the deadwood dynamic indices were presented.

Regarding the evaluation of deadwood in relation to the accessibility to the forest, logs (most suited component of deadwood for fuel wood) were found in all five decay classes but mainly in DC1, DC4 and DC5. The presence of DC1 logs indicates that deadwood on the ground is not collected by the local population to collect fuel wood, and this is confirmed by the presence of DC4 and DC5 logs because this presence shows that the deadwood once fallen remains on the soil and decays. It also indicates that deadwood presence on the ground is linked to disturbance events that can be time-spaced, a fact highlighted by the lack of some decay classes. Statistical differences by deadwood category between the least accessible and most accessible parts are presented in Table 3.

The results obtained were compared with data collected from other studies in productive and non-productive forests.

Christensen *et al.,* 2005 [3] analyzed data on the volume of deadwood in 86 beech forest reserves, covering most of the range of European beech forests, the main value found was 130 m³/ha. However, the same authors point out that the amount of deadwood in productive forests is between 10 and 20 times lower than in unmanaged forests.

Surveys in Finland, Sweden, Germany, France, Belgium and Switzerland show that the average deadwood volume in production forests is less than 10 m³/ha [4, 6, 16-18]. In Italy, the volume of deadwood in forests, regardless of tree species composition and sylvicultural management, has been estimated at around 8.8 m³/ha [10]. In the beech forests of Emilia-Romagna the estimated volumes are around 8.3 m³/ha while in those of Tuscany the volumes are slightly higher (10.9 m³/ha) [10]. Quantitative data on the presence of deadwood in forests are very variable and fragmentary, lacking often threshold values. This is due to the different types of management investigated, the frequency of natural disturbances and the different inventory methods adopted. For these reasons, it is not easy to analyze and compare the data collected. An overall view of the situation shows that the amount of deadwood found in this study is in accordance with the deadwood standards of the productive forests of Europe, especially considering that it is common in the forests of the Consorzio Forestale dell'Amiata to use forestry operations residues to produce wood chips. This case study provides indications on the quantities of deadwood found in a beech forest managed according to classic silvicultural systems without any dedicated deadwood management practices being implemented. In order to provide Sustainable Forest Management, it is essential to create deadwood management plan that increase not only the quantity of deadwood but also the diversity (decay stage and dimensions). For this purpose, it is first necessary to improve knowledge of the amount of deadwood present and then to try to define minimum thresholds of deadwood that need to be preserved in the forest, in relation to different structural, management and compositional types, to design and apply effective conservation actions for forest ecosystems.

Table 1 – Volume values of trees, snag, log and stump

		Standing live trees (m³/ha)	Snag (m³/ha)	Log (m³/ha)	Stump (m³/ha)
#9	**Plot 1**	480.92	1.86	4.96	2.17
	Plot 2	341.43	0.77	7.15	2.59
	Tot	411.18	1.32	6.06	2.38
#12	**Plot 3**	423.11	0	23.03	3.22
	Plot 4	271.69	0.33	11.95	1.73
	Tot	347.40	0.16	12.35	2.47

Table 6 – Deadwood dynamic indeces

	RSS (%)	RDT (%)	RST (%)	RDW (%)	RDS (%)
#9	0.0032	0.0147	0.0058	0.0237	4.5955
#12	0.0005	0.0356	0.0071	0.0431	75.3167

Table 3 – Statistical differences by deadwood category between the least accessible and most accessible parts in the parcels 9 and 12. (p-value < 0.05 indicates significant difference)

	Parcel 9			Parcel 12		
Deadwood category	SNAG	STUMP	LOG	SNAG	STUMP	LOG
Density (n ha⁻¹)	>0.05	<0.05	<0.05	<0.05	<0.05	>0.05
Average diameter (cm)	<0.05	>0.05	>0.05	<0.05	<0.05	>0.05
Basal area (m² ha⁻¹)	<0.05	>0.05	<0.05	<0.05	<0.05	>0.05
Volume (m³ ha⁻¹)	<0.05	<0.05	<0.05	<0.05	<0.05	>0.05
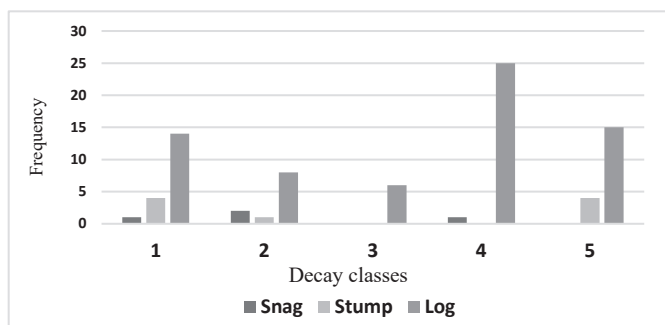
Fig. 2 – Distribution of snags, logs and stumps of parcel #9 into the different decay classes
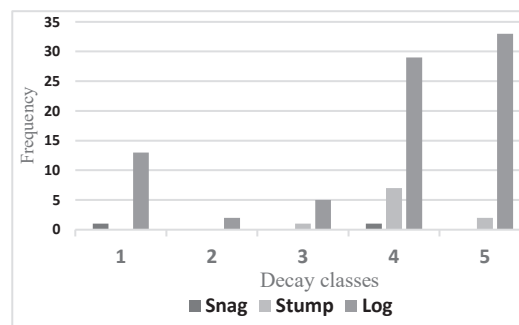
Fig. 1 – Distribution of snags, logs and stumps of parcel #12 into the different decay classes

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AGROFORESTRY AS ONE SUSTAINABLE PRODUCTION SYSTEMS IN AGRICULTURAL AND FARMS, AN OVERVIEW ABOUT AGROFORESTRY PRACTICES IMPLEMENTATION ON MALIQI REGION, ALBANIA.

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Abstract

Since the most primitive societies, communities have had two main problems; housing and food. The first problem was solved by adapting their life to caves and forests, and later to palafite buildings like Maliq, where they were better protected in every direction. At first they provided food in nature, in a wild state, but then they started to plant some plants from wild seeds near their settlements in the forest where they got wood for their huts and later for fire, they started to keep some animals or birds wild that were tamed over time. And certainly in these prehistoric times where communities produced grain, wood and poultry together, they seem to be the beginnings of the development of agroforestry practices. So they produced for daily consumption, but also reserved something for the hard winters of that decade full of snow and ice. Agroforestry first started in Finland, Germany, etc., and also in the Mediterranean region very early time, with very good geographical, climatic and soil conditions, in Greece, Italy, in African countries. In Albania, where recent discoveries in region of Maliqi (Sovjan, ect), but also the latest discoveries in the neighboring region of Pogradec (Lin) show that agricultural and agroforestry practices in these regions were practiced thousands of years ago, among the oldest farming in Europe, something that indicates the presence in these lands of the ancestors of the Albanians thousands of years ago and who were engaged in agroforestry in a way that was quite developed for the time.

Key words: *agroforestry system, companion planting,* diversity *of products,* Maliq, Albania.

Introduction

So, in the beginning, these human populations in many cases lived in the forest, used for shelter, food, everything that resulted from the forest, when the fire started, they took wood from the forest for construction, heating and later cooking. Also for food and the security of meat through the capture and later hunting of wild animals, they get fruits, mushrooms, roots and edible plants and everything.

Then they started using primitive tools, stone axe, they started to cut parts of the forest, they built huts there with wood. Then the principle of **slash/cut and burn** began to be applied and thus wider areas were opened up by deforestation, which were quite suitable for planting agricultural products because they were soil rich in organic manure and humus from the forest leaves that they had rotted for years and centuries, and there was much needed moisture. On the other hand, with a lot of intuition from the communities, the areas or terrains away from the forests was being treated, where in these areas away from the forests which were planted with agricultural crops, or even in pastures, between them, inside them, where there were trees, they did not cut them but they guarded them and where there were none, they began to plant trees and fruit plants for shade, fruit, protection from the wind, etc. So there they started implementing agroforestry practices. For agroforestry there have been several concepts and definitions, but we in this paper will used some definitions as FAO for Agroforestry. In agroforestry systems there are both ecological and economical interactions between the different components.

Material and Methods

The **methodology** consists on: the collection, administration of an ample literature on the development of agroforestry in Maliqi region in the past, and secondly concrete researches in the field of the development of agroforestry practices in Maliqi region currently, where from a matrix analysis the comparative analysis leads to the **conclusion** that agroforestry practices are superior to monoculture systems in agricultural farms, where some main **results** include a variety of products in a unit, diversification products, bio products, with a lower risk of failure, distribution of expenses for more products, employment of people in rural areas, more financial income per unit, etc

Study area.

Agroforestry practices have also been used and in the territory of our country, in Albania, where in fact in the past, especially in the feudal system and in the time of fragmented lands and with little mechanism, practices were almost applied throughout the country was of agroforestry systems. Albania is a small country located on the Balkan Peninsula, on the south eastern part of Europe, between geographic coordinates 39° 8' and 42° 9' latitude and 19° 16' longitude. With only 28,748 km^2 total surface area, most of the territory is close to the sea and mountains, and as result it has different climatic zones and a well-defined vertical vegetation structure.(Haska 2011). Average altitude from the sea level is 708. So, about 61 % of Albania territory is more than 600 m above sea level; 25 % is between 300-599 m above sea level, and only 14 % lies 0-299 m above sea level. (Haska. et al 2010). The population of Albania on January 1, 2023 is 2,761,785 inhabitants, suffering a decrease of 1.1%, compared to January 1, 2022. (INSTAT 2023).The capital of Albania is Tirana. More specifically, our study is focused on the region of Maliq, a rather wide territory that is included under the jurisdiction of the municipality of Maliq, which has very good geographical, climatic and soil conditions, but also a very old tradition for the development of agroforestry. Maliqi region, with many villages located especially in the plain areas, and in the hilly and mountainous areas, it has been implementing agroforestry practices for years. Villages such as Sovjani, Pirgu, Zvirina, Podgorija, Vlocishti, ect very well alternate the

planting of fruit trees such as apples, pears, plums, etc. with vegetables such as cabbage, peppers, tomatoes, or combined with wood and bees and animals.

Results and Discussion

And certainly in these prehistoric times where communities produced grain, wood and poultry together, they seem to be the beginnings of the development of agroforestry practices. So they produced for daily consumption, but also reserved something for the hard winters of that decade full of snow and ice. Agroforestry first started in Finland, Germany, etc., and also in the Mediterranean region very early time, with very good geographical, climatic and soil conditions, in Greece, Italy, in African countries. In Albania, where recent discoveries in region of Maliqi (Sovjan, ect), but also the latest discoveries in the neighboring region of Pogradec (Lin) show that agricultural and agroforestry practices in these regions were practiced thousands of years ago, among the oldest farming in Europe, something that indicates the presence in these lands of the ancestors of the Albanians thousands of years ago and who were engaged in agroforestry in a way that was quite developed for the time.

Agroforestry at different stages of time they have been relatively different, but again they have a common axis: in a surface unit they were presence of trees, crops and animals. In this sense, international organizations such as FAO have defined it in such a way as: Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components. (FAO-2023)

There are three main types of agroforestry systems: Agrisilvicultural systems are a combination of crops and trees, such as alley cropping or homegardens; Silvopastoral systems combine forestry and grazing of domesticated animals on pastures, rangelands or on-farm. The three elements, namely trees, animals and crops, can be integrated in what are called agrosylvopastoral systems and are illustrated by homegardens involving animals as well as scattered trees on croplands used for grazing after harvests. (FAO-2023)

Agroforestry is the interaction of agriculture and trees, including the agricultural use of trees. This comprises trees on farms and in agricultural landscapes, farming in forests and along forest margins and tree-crop production, including cocoa, coffee, rubber and oil palm. Interactions between trees and other components of agriculture may be important at a range of scales: in fields (where trees and crops are grown together), on farms (where trees may provide fodder for livestock, fuel, food, shelter or income from products including timber) and landscapes (where agricultural and forest land uses combine in determining the provision of ecosystem services). (WA-ICRAF 2023)

Agroforestry is agricultural and forestry systems that try to balance various needs: 1) to produce trees for timber and other commercial purposes; 2) to produce a diverse, adequate supply of nutritious foods both to meet global demand and to satisfy the needs of the producers themselves; and 3) to ensure the protection of the natural environment so that it continues to provide resources and environmental services to meet the needs of the present generations and those to come. (WA-ICRAF 2023) From the above definition it is concluded that the Agroforestry system is about the mutual relations of trees with agricultural crops where these trees are used for their agricultural characteristics and at the same time we have benefits both from the trees on the areas planted with agricultural crops, but also from agricultural crops planted to forest farms where these partnerships are quite efficient.

Also, agroforestry systems have long been supported by the institutions and structures of the European Parliament, and in many countries of the European Union support is given to these practices, where it is emphasized in relation of agroforestry system that: *It is a dynamic system combining trees, crops and/or livestock on the same area of land in some form of spatial arrangement or temporal sequence.*(EP-2023), where correlations between trees, agricultural cultures and livestock give more products, services and benefits than if they were separated or monocultures.

A country neighboring Albania, Greece, with close climatic and land conditions, successfully develops agroforestry systems. Agroforestry systems are a traditional land use practice in Greece. They are widely distributed all over the country and constitute important elements of the rural landscape. They include all three types of systems: silvoarable involving trees and crops grown on arable land, silvopastoral involving trees and pasture/animals grown on forest and arable land and agrosilvopastoral involving trees, crops and grazing animals grown on arable land. Trees may be forest species or cultivated trees grown for fruits, naturally regenerating or planted, evergreen or deciduous; crops may be annual or perennial species; and animals may be sheep, goats, cattle,pigs or chicken. The area covered by these systems is estimated to be more than 3 million hectares or 23% of the whole country.(V.P. Papanastasis et al. 2009)

Acording the fao three are more important agroforestry systems; **agrisilvicultural** system, combination of crops and trees, **silvopastoral** system, so here forestry and grazing of domesticated animals on pastures, rangelands or on-farm, and **agrosylvopastoral** system here are together trees, animals and crops. (FAO-2023). Albania, a Mediterranean country with very good land and climate conditions, in the past covered with forests everywhere, bushes, endless pastures, animals, birds, etc. The rural populations here have also asked to be provided with the benefits of nature and mainly the forests. Thus, and in Albania, they opened areas from the forests for planting under the theory of burning, cutting and planting plants, but on the sides and in the middle of these areas they left uncut some trees from the forest, species such as hornbeam, oak, ash, maple, etc, or along the flow lines they left a part unplanted, with a width of about 1-1.5m which was covered with grass or small bushes called "mezhda" in the Albanian language, which significantly reduced the erosion processes and served as a passage or for watering the planted surfaces.

From what we described above, in our country, but especially in the region of Maliq, different agroforestry systems have been developed and implemented, which have turned out to be quite efficient, but in the end there are three main components of these systems: trees, crops agricultural and animals, whereas in the monoculture agricultural systems, only one type of grain, it fom our obsefrvation in terrain as well as on the agricultural experience over the centuries, we are giving below a matrix comparison between these two systems in table no. 1

Tabela 1. Agroforestry and monoculture system

Evalutation components	Agoforestry system		Agcriculture monoculture system	
	Advantazhes	Limittiins	Advantazhes	Limitations
Sustainability of system	☺☺☺	☻	☺	☻☻☻
Knowledge, tradition	☺☺☺	☻	☺	☻☻☻
Duration	☺☺☺	☻	☺	☻☻☻
Kinds per unit area	☺☺☺	☻	☺	☻☻☻
Biodiversity	☺☺☺	☻	☺	☻☻☻
Erosion proces	☺☺☺	☻	☺☺	☻☻
Variety of products	☺☺☺	☻	☺	☻☻
Failure production possibility	☺☺☺	☻	☺	☻☻
Pests and diseases	☺☺	☻☻	☺	☻☻
Ecosystem service provide	☺☺☺	☻	☺	☻☻
Wild life presence	☺☺☺	☻	☺	☻☻
Social side	☺☺	☻	☺	☻☻
Occupation	☺☺	☻	☺	☻☻
Yields	☺☺	☻	☺☺	☻☻
Costs	☺☺	☻	☺☺	☻☻
Financial benefits	☺☺☺	☻	☺☺	
Culturale Service	☻☻☻	☺☺	☺☺☺	☻
Mechanization	☻☻☻	☺☺	☺☺☺	☻

Grade evaluation: Advantages: Low☺, Moderate☺☺, Haigh☺☺☺.

Limitations : Low ☻ , Moderate ☻ ☻ , Haigh ☻ ☻ ☻ .

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PARASITE FAUNA OF PRESPA NASE *(CHONDROSTOMA PRESPENSE KARAMAN, 1924)* FROM LAKE PRESPA, N. MACEDONIA

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ABSTRACT

During the parasitological investigations on Prespa nase *(Chondrostoma prespense)* from Lake Prespa (N. Macedonia), 11 parasite species were found: *Trichodina sp., Myxobolus sp., Gyrodactylus sp., Dactylogyrus elegantis, D. vistulae, Paradiplozoon zeller, Diplostomum spathaceum* (larva), *Tylodelphis clavata* (larva), *Raphidascaris acus, Ergasilus sp.* and glochidia of *Anodonta cygnea.* The total prevalence of infestation was 83,33% and the highest prevalence was of *Myxobolus sp.* (found in 50,0% of Prespa nase) while glochidia of *Anodonta cygnea* found at 30,56% of fish and the lowest prevalence is with *Ergasilus sp.* and *Trichodina sp,* (2,78%). The average intensity of infestation was 9,49, and the highest level was that of *Myxobolus sp.* (23,66) and glochidia of *Anodonta cygnea* (20,45). Findings of *Trichodina sp., Myxobolus sp., Gyrodactylus sp., Dactylogyrus elegantis, D. vistulae, Paradiplozoon zeller,* and glochidia of *Anodonta cygnea* for Prespa nase from Lake Prespa and N. Macedonia. Among the parasite species found out in Prespa nase from Lake Prespa, the greatest pathological influence was associated with *Gyrodactylus sp., Dactylogyrus elegantis, D. vistulae, Paradiplozoon zeller, Diplostomum spathaceum* (larva), *Tylodelphis clavata* (larva) and *Ergasilus sp.*

Key words: parasite fauna, Prespa nase, Lake Prespa.

HEADING TOWARDS THE CIRCULAR ECONOMY IN THE WOOD PROCESSING SECTOR IN ALBANIA – PERCEPTIONS OF THE WOOD PROCESSING INDUSTRY ACTORS

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Abstract

During the last years, the concept of the circular economy has taken an important role in literature, as well as in the production sector all over the world. The concept of the circular economy was introduced lately in Albania in general and in the wood processing industry in particularly. The European Commission defines a circular economy as a process by which "the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized". In general terms, a circular economy concept is commonly characterized as an approach that can reduce resources consumption by slowing, closing or narrowing natural resource loops. The concept of a circular economy has emerged as a promising paradigm aimed at minimizing waste and making the most of natural resources, attracting at the same time significant public and private interests. The wood processing industry carries the ecological burden of intensive use of raw materials, adhesives, dyes and coatings. This paper presents the results of the survey with 20 wood processing companies related to reuse and recycling processes in their production processes. Data is gathered using a close ended questionaire with the production process responsible persons in the companies. The results shows that 75% of the companies are involed in reuse and recycling processes.

Keywords: circular economy, wood, furniture, skills, industry

Introduction

The global wood production industry plays a crucial role in meeting society's demands for construction materials, furniture, paper, and more. However, this industry is also closely tied to various environmental concerns, such as deforestation, habitat degradation, and carbon emissions. To address these challenges and promote sustainability, there is a growing need for transition towards a circular economy model within the wood production sector.

As a country that is trying to join the European Union, Albania will need to align its legislation in this direction. In order to achieve this, the involved parties need to be engaged and informed about the benefits and challenges of this process and how businesses can benefit from this kind of transformation.

The concept of the circular economy in Albania, was previously used in the draft of the National Integrated Waste Management Strategy (2018-2023) The main goal, mentioned at the beginning of the document, is the transition from a linear economy to a circular one.

This is a natural fact of an human life. Through the consumption of various products, we meet our daily needs and build our lifestyle. This consumption includes food products, clothing, technology, energy, transportation, and many others. Ideally, we should take care of recycling and reversing products whenever possible. This includes recycling clothing, recycling electronic appliances, wood furnitures and practices that return products into circulation.

A circular economy (CE) is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible (Iacovidu et al, 2021). CE has been gaining popularity because it helps to minimize emissions and consumption of raw materials, open up new market prospects and, principally,increase the sustainability of consumption and improve resource efficiency (Tunn et al, 2019).

A circular economy aims to transition from a take-make-waste approach to a more restorative and regenerative system. It employs reuse, sharing, repair, refurbishment, remanufacturing and recycling to create a closed- loop system, reducing the use of resource inputs and the creation of waste, pollution and carbon emissions (Geissdoerfer et al, 2017).
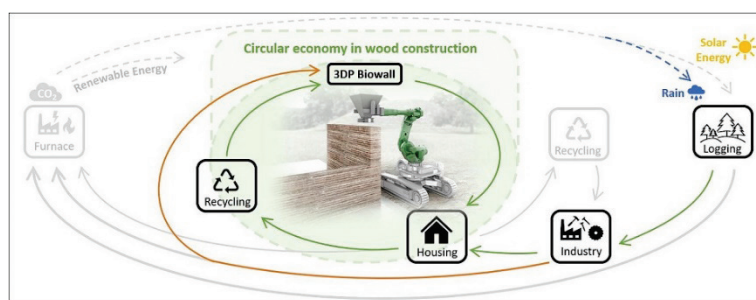
Figure 7 Life-cycle of wood construction (TripleWood, 2021.)

Material and Methods

This research began with the need to identify strategies related to CE that could be stimulated wood procesin in companies. At First,er made a selection of some companies operating in the wood Industry Cluster (WICA) located all over the country. Then, we had a face to face interview to adopt all their effort to go from a linear economic production into the cirluar economy.

Circular economy in the wood industry

Recycling of wood and strategies regarding a circular material use are rarely practised. Wood is still widely thermally utilised, which means that the raw material is no longer available for construction purposes(S. Rüter und S. Diederichs, 2012). The concept of CE is a new one in the industry of wood production in our Country, even so there are a lot of wood processing indusries are willing to update their prodatioin into e recicling and reusing process. Wood is a crucial element in advancing a circular model, as it seeks new and inventive methods to revitalize urban areas, boost sustainability, and addopt innovative energy solutions.

Results and Discussion.

This paper presents the results of the survey with 20 wood processing companies related to reuse and recycling operations in their production processes. Data is gathered using a close ended questionnaire with the person responsible for production in the companies. The results shows that 75% of the companies are involed in reuse and recycling processes. The other companies have not adopted a recycling process for their wastes. They don't have any concept of developing a strategy on reusing their waste materials and the benefites gained from this.

Figure 8 Pellets produced by "Erald" Shpk (left) and "Dafinor" Shpk (right)

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EVALUATION OF WATER QUALITY IN THE WATER BODIES OF THE TIRANA WASTE TREATMENT AREA

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Abstract

Waste management has a significant impact on water quality. Waste is a source of water pollution through leachate generation and uncontrolled effluent discharge into water bodies.

Sharra landfill was one of the most polluted areas in the country until 2018. The disposal of Tirana's waste in Sharra started at the end of the '80s. Until 2018, the waste was disposed in an uncontrolled manner causing high water pollution. In 2010, UNDP identified Sharra landfill as an environmental hotspot in Albania. For the rehabilitation of this hotspot, in 2018 the Tirana Waste Treatment Area (TWTA) was created to improve the waste management system in this area.

The objective of this study is to evaluate the quality of surface water in three catchment basins within the area of TWTA after the change of the waste management system.

To achieve the objective, 20 water samples were taken in three catchment basins within the TWTA during 2 years with a frequency of every 6 months and the physico-chemical parameters such as pH, dissolved oxygen, COD, BOD, $N-NH_3$, $N-NH_4$, $P-PO_4$ were analysed.

The analysis' results demonstrated that the surface water quality in the TWTA is within the threshold values.

Through this study, it was indicated that the change in the waste management system in TWTA and discontinuance of the uncontrolled leachate discharge in water bodies has led to the improvement of the water quality in the water bodies within the TWTA.

Key words: water, quality, management, waste.

1. INTRODUCTION

The Sharra waste disposal site, from 2017 the Tirana Waste Treatment Area (T.W.T.A) is located in the southwest of Tirana. The disposal of Tirana's waste in Sharra started by the end of the '80s.

Sharra landfill was one of the most polluted areas in the country until 2018. Until 2018, the waste was disposed in an uncontrolled manner causing water pollution. In 2010, UNDP identified Sharra landfill as an environmental hotspot in Albania [1]. For the rehabilitation of this hotspot, in 2018 the Tirana Waste Treatment Area (TWTA) was created to improve the waste management system in this area.

In this project, 8 lots will be built, starting with the rehabilitation of the existing Sharra landfill, ending with the construction of the Waste to Energy Plant. The project for the construction of this plant is complex and in compliance with the standards and directives of the EU for their construction and operation.

The objective of this study is to evaluate the quality of surface water in three catchment basins within the area of TWTA after the change of the waste management system.

2. MATERIAL AND METHOD

To achieve the objective, 20 water samples were taken in three catchment basins within the TWTA during 2 years with a frequency of every 6 months, from May 2021 to June 2023, and the physico-chemical parameters such as pH, dissolved oxygen, COD, BOD, $N-NH_3$, $N-NH_4$, $P-PO_4$ were analysed.

In the waste management process, one of the sources of surface water pollution is leachate created by the decomposition of waste. Leachate generation has different phases and each of these phases contains several reactions that have a direct impact on the quality and quantity of leachate. In order to assess the state of surface waters, sampling was carried out at 4 different points selected in the surface waters within the TWTA.

Sampling and analysis were carried out according to the requirements of the ISO 17025: 2017 standard for testing and calibration laboratories. The bottles used were 1.5 litre. The transport of the samples was carried out in a thermal box at a temperature of 4˚C according to the technical requirements of the laboratory. The transport of the samples, the registration

procedures and analysis were completed within the day of sampling in the accredited laboratory Qendra e Monitorimit të Mjedisit (QMM).

3. RESULTS AND DISCUSSIONS

The analysis' results demonstrated that the surface water quality in the TWTA is within the threshold values. Below are given the coordinates and the map of the sampling points for surface waters within TWTA, as well as the results of the conducted analysis.

No.	KRGJSH E	N
1	479946.913	4573775.459
2	479922.481	4573099.908
3	479873.734	4572720.895
4	480927.795	4573339.376

Table 1: Surface water sampling points coordinates

Figure 1: Location of the surface water sampling points within TWTA

Table 2: pH results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
May 2021	8.28	8.21	8.17	8.43
December 2021	8.22	8.18	8.15	8.37
June 2022	8.26	8.63	8.63	8.58
December 2022	7.95	7.91	7.78	8.26
June 2023	7.82	7.93	7.8	8.08

According to DCM no. 177/2005 "On the permitted rates of liquid discharges and zoning criteria of receiving water environments", the pH values in surface waters should vary in the range of 6 - 9.

The pH results in the samples taken for analysis are within the range of 7.78 to 8.63, which indicates that the water is alkaline. In conclusion all the water bodies are within the norm.

Table 3: DO results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
May 2021	5.2	5.1	4.7	4.9
December 2021	5.6	5.4	4.9	4.7
June 2022	6.8	6.8	8.8	7.7
December 2022	6.8	6.9	8.9	8
June 2023	6.6	6.8	7.1	7.8

According to the standards set by the ECE (Economic Commission for Europe), it is as in the table below:

ECE	Quality class				
	I	II	III	IV	V
[mg O_2/l]	>7	7 – 6	6 – 4	4 – 3	<3

Referring to the results from the analyses performed, the water bodies are classified as II-III class.

Table 4: BOD-5 results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
May 2021	1	1	1	1
December 2021	1	1	1	1
June 2022	10	3	2	10
December 2022	11	10	10	10
June 2023	12	11	10	10

BOD indicates the content of organic matter that can undergo microbiological degradation in the water sample, under natural conditions [2]. The analysed samples' results fall within the allowed rates determined by the legislation in force, as the norm is 25mg/L.

Table 5: COD results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
May 2021	10	10	10	10
December 2021	10	10	10	10
June 2022	17	10	10	17
December 2022	2.4	2	2	2
June 2023	2.2	2	2	2

COD indicates the content of organic matter in the water sample, which can be oxidized by a strong oxidizing agent, such as potassium dichromate. The analysed samples' results fall within the allowed rates determined by the legislation in force, as the norm is 125mg/L.

Table 6: N-NH4+ results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
June 2022	3.18	1.25	1.25	2.27
December 2022	1.02	0.9	0.91	1.13
June 2023	1.03	0.91	0.84	0.98

Organic materials in landfills can decompose, producing ammonium as a by-product. Proper landfill design and management are essential to minimize the leaching of ammonium and other contaminants into nearby surface water bodies. Referring to the DCM no. 177/2005, the norm for total nitrogen is 15 mg/L.

Table 7: N-NO$_3^-$ results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
June 2022	1.7	1.8	1.7	1.8
December 2022	1.1	<1	1.1	1.5
June 2023	1.1	<1	1.4	1.3

European surface water quality standards for nitrate (N-NO$_3^-$) are established through the Water Framework Directive (WFD). The maximum allowable concentration for N-NO$_3^-$ in freshwater ecosystems, was typically set at 11.3 mg/L. The sampled surface waters are below this threshold value.

Table 8: P-PO$_4$ results

	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4
June 2022	1.22	1.19	2.04	1.94
December 2022	1.13	1.08	1.89	1.76
June 2023	1.09	1.06	1.78	1.68

The phosphate standards established under the WFD are designed to protect water quality, aquatic ecosystems, and human health.

4. CONCLUSIONS

As indicated in the paragraphs above, DCM no.177/2005 as well as the WFD were taken for comparison of the results. From the results of the analysed parameters at different points of the TWTA no excess values are observed.

Through this study, it was concluded that the change in the waste management system in TWTA and discontinuance of the uncontrolled leachate discharge in water bodies has led to the improvement of the water quality in the water bodies within the TWTA.

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REDUCING THE IMPACT OF GHOST GEAR ON SEA TURTLES, IN DRINI BAY: RESULTS OF LIFE-MEDTURTLES PROJECT

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Abstract

Abandoned, lost or discarded fishing gear (ALDFG), also known as 'ghost gear', include all kinds of fishing equipment that are lost in marine waters. The Food and Agricultural Organization (FAO) of the United Nations considers marine debris and ALDFG an area of major concern (Macfadyen et al., 2009). Many aquatic life that gets caught in the abandoned fishing gear, nets or traps die, suffering and painful death from suffocation or exhaustion.

The purpose of this study is to reduce the level of sea turtles mortality caused by ghost gear, by reducing the level of ghost gears on the seabed.

Reducing the ghost gear effect on sea turtles implements in 3 synergic modules: (1) underwater survey, (2) removal of ghost gears located and (3) raising fishermen's awareness and trust building with fishers which is essential to ensure effective results supporting the ethical motivation of fishermen for the responsible management of fishing equipment.

A 9.6 % reduction in the amount of lost nets in Drini Bay has caused 12.8 % of turtles to be saved from getting stuck in lost nets.

Based on the effect of the results of the study, the direct impact of ghost gears on the population of sea turtles in the studied area is obvious. It is almost impossible to remove all ghost gears from the seabed, but we can have a very big impact on increasing the awareness among fishermen to minimize the discarding of fishing nets on the seabed.

Key Words: Ghost gear, underwater survey, mortality, sea turtle awareness

Introduction

UNEP (2001) describes the diverse impacts that marine debris – including ghost gear- can have on marine flora and fauna, including: harm to wildlife directly through entanglement and, ingestion, smothering of the seabed and habitat disturbance, persistent toxic chemical pollution in the ocean - particularly from plastics, transportation of invasive species between countries, and between seas. The estimated 640.000 tons of fishing gear lost, abandoned, or discarded annually- around 10% of the marine debris, exerts a large but uncertain impact on marine species (Macfadyen et al., 2009). Ghost fishing is a severe threat for all seven species of sea turtles found worldwide. Turtles must come to the surface to breathe so when they are caught in a net or on a fishing hook, they cannot surface and drown. According to Casale (2008), sea turtles in the Mediterranean Sea, can probably be captured both by ghost longlines and set nets. Regarding longlines, sea turtles can be captured by hooks as long as the baits are in place, then the hooks no longer become attractive but sea turtles can still get entangled in the main line and branch lines. Ghost set nets capture fish for months, thought with a decreasing capacity (Erzini et al., 1997). Sea turtles can be attracted by these dead fish, so the probability of capture is increasing.

The purpose of this action is to reduce the effect that ghost nets have on sea turtles, by reducing the level of ghost nets on the seabed.

Material and Methods

Reducing the impact of ghost gear in sea turtles implements in 3 synergic modules. (1) Underwater survey (2) Removal of ghost nets (3) Code of conduct and awareness

Module 1. Underwater survey are made in Drini Bay, in the positions claimed from fishermen for presence of ghost nets, in order to identify the exact position of ghost nets on seabed. The data and locations are presented on a map, indicating the exact location of the ghost gear.

<u>Module 2.</u> Following the identification of the abandoned fishing gear location, divers have remove the ghost gears where there was possible. Ghost gear that has been successfully retrieved were hauled on board and returned to shore.

<u>Module 3</u>. A code of conduct for fishermen is produced and distributed, to raise awareness among fishermen on the impact of ghost gears in marine environment, promoting the correct discard of used fishing gears.

To measure the impact of ghost gears on sea turtles, we focused on the number of reports of sea turtles found stuck in nets lost by fishermen.

Results and Discussion

Operations to extract ghost nets from the bottom of the sea in the Drini Bay area have been carried out from 11 dives by the HAS society, through specialized divers, reducing the number of lost nets from 67 to 59- about 1.5 km of ghost gear removed from seabed.

In order to measure the effect that the removal of a part of ghost nets had on sea turtles, we compared the number of reports from fishermen throughout 2019 where the cleaning of the seabed from lost nets has not started, with the reports received during 2022 after 1.5 km of ghost gear had been removed.

From the surveys, it was seen that the number of turtles stuck in ghost gears during 2019 was 117, and in 2022 it is reduced to 102 stuck turtles.

In other words, cleaning the seabed by 1.5 km of ghost nets has led to a decrease in the number of sea turtles trapped in ghost nets by 12.8%.
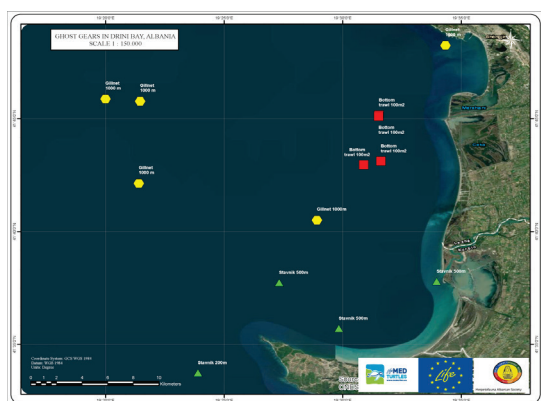
Fig 1. Coordinates monitoring from divers in

the retrieval of Ghost nets in Drini bay.
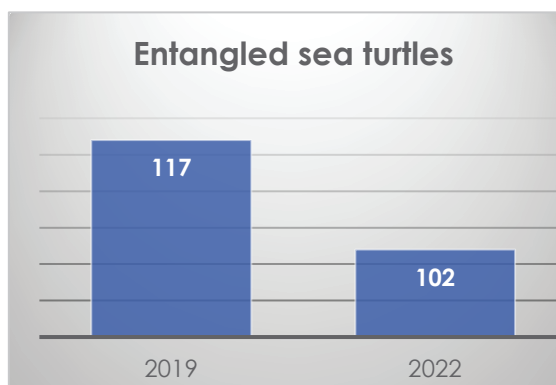
Fig 2. Number of sea turtles reported stuck on ghost

gears

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BEECH FORESTS IN KORÇA REGION AND A POST HARVESTING EVALUATION ABOUT THEM, ALBANIA.

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Abstract

The world is still rich in forests, despite the human interventions in them and climate change in the global ranking. Thus, today the world has a total forest area of 4.06 billion ha, which is 31 % of the total land area.. This area is equivalent to 0.52 ha per person, but although forests are not distributed equally among the world's people or geographically. In the last decades forests valued more for their multifunctional role, which includes a wide range of functions and services, such as: biological, ecological, social, aesthetic, recreation, cultural, other functions (creates microclimates, reduces the speed of rainfall, creates the conditions for the fauna living animals), but production of wood products/biomass, as in the past, but even today, remains one of the main functions of the forests. In Albania, the technologies of building houses, bridges, etc. were very backward and in the beginning of 1945 they were based on two raw materials: wood and stone. The fact is that the industry of using wood and construction materials and then the industry of wood and paper as a very good source for meeting the needs and requirements for wood and wood derivatives of many other branches of industry and Albanian society as well as increasing the income in the budget, engaged a large number of large workforce and specialists, creating a large number of structures that operated in the forests and dealt with the processing of timber. But, forest harvesting operations, however careful and with modern tools, again impact the various environmental components of a forest ecosystem. Also very important is and natural regeneration of forest and development forest stand in the future. So, something about above will treated in our paper.

Keywords: beech forest, beech forests, post harvesting evaluation, Korça region.

Introduction

World has a total forest area of 4.06 billion hectares (ha), which is 31 percent of the total land area. This area is equivalent to 0.52 ha per person although forests are not distributed equally among the world's people or geographically. The tropical domain has the largest proportion of the world's forests (45 percent), followed by the boreal, temperate and subtropical domains. **[4].**Albania has about 1,860,000 ha of forests + pastures, 65% of the territory, forests 1,310,000 ha or 46%, pastures 550,000 ha or 19% **[1].** European beech (Fagus sylvatica L.) is a major and wide-spread forest tree species with a natural occurrence from Scandinavian to Mediterranean countries and ranging from the Atlantic influenced climate in West-Europe to the more continentally influenced regions in Central and South-Central Europe, covering an area of roughly 14 million ha of forest land. **[9].**

Of course that harvesting operations, and different technologies used as well as infrastructures implemented in forests in many cases have caused some negative impacts including the erosion phenomena. Cutting/felling operations, inland transport traces, wood collection points/assortments, tractor tracks, animal transport traces, forest roads, landings, etc., are some of the most essential activities that cause some problems. Due to the urgent needs of the economy, timber began to be cut beyond the norms of annual growth and the annual harvesting possibility. In 1990, the year after which the period of transition begins, a production of 1,186,100 m^3 of timber divided into 456,700 m^3 of timber material was realized, and 729 400 m^3 of firewood.**[7]**

Material and Methods

The methodology consists on: the collection, administration of data in relation of beech forest in Korça region and the way and time of their harvesting years before in past time, and after realization concrete expedition in terrain in all forests economy with beech forests in Korça and collect data using the *checklist method*, with the aim of evaluating some significant indicators on the beech forest ecosystems in the Korce region in relation to: the general condition of these ecosystems, as well natural regeneration and in beech forest after harvesting operations and actually today, forest cover vegetation in those surface with beech forest, presence of erosion phenomena, forest landscape situation in new forests installation, presence of fauna in ecosystems with new forests, presence of forest fires, forest situation about of their healthy, pests and diseases, the level of biodiversity presence, provided of ecosystem services, etc.

Results and Discussion

As mentioned above, Albania is still quite rich in forests in relation to the area covered by them, regardless of some of the significant indicators such as annual growth per ha and m^3 volume per ha, which leave much to be desired for the main types in the country, because they are low, including here the beech forests. So, from the last national forest inventory data has a surface covered with forests with about 1.2 million ha, 36% of the country's surface; where 97% are public forests and 3% private; - with an average: 0.42 ha/inhabitant; with 55 million m^3 standing volume, from this 67 % of the total area is productive forests **[1],** which can be used for the application of harvesting operations where in most parts the application of forest use has

been applied. In this framework, the type of beech in Albania takes the first place in terms of area and volume of the national forest fund. According to the cadastral data of 2017, forests with beech have an area of about 171 000 ha (about 17% of the forest area of the country). But mostly beech is valued for the volume it provides as a species, which reaches about 20.4 million m^3 (40% of the forest fund of the country), with an average volume of 119 m^3/ha.[2]. Beech forests have higher average annual increment than some others species as follows: European beech forests 2.14 m^3/ha, oaks 1.24 m^3/ha, pine 1.45 m^3/ha. However, some species with low surface area have higher increment such as fir with 2.92 m^3/ha, and poplar which has 3.60 m^3/ha [6]. In relation with E. beech in Albania exist and Nature reserve integrate (NRI) in some districts of the country, about 27 units with a surface area exceeding 2,313 ha. [6].

The region of Korça has the geographical position as well as good climatic conditions for the development of diverse plant vegetation. The district of Korça is located in the southeast of Albania, with an average altitude of 850 m. In the middle of it is the field of Korça, surrounded by mountains and hills. The district of Korça has about 194,000 inhabitants (according to the year 2004), an area of 2,180 km², the administrative center is the city of Korça. These suitable soil and climatic conditions have made a series of natural vegetation ecosystems grow in the region of Korça, dominated by forests, pastures and meadows. [5,8,10].

Thus, the Korça region has forest wealth as: total 55 720 ha with 2.098 million m3, according to governance-high forests: 21 500 ha to 1.604 million m3 (14 500 ha of coniferous and 6990 broadleaf), coppice 27 920 ha with 449 000 m3, shrubs 6300 ha with 45 000 m3. According to property: state: 50 940 ha to 1.949 million m3, communal 3600 ha with 116 000 m3 and private 1180 ha with 33 000 m3 ha[5,8,10].According to functions 12 590 ha protection forests and 43 130 ha of productive forest. Korça region has many productive forests, some of the main kinds for the production of timber are: beech, pine, fir, oak, etc, hornbeam as firewood etc. And undoubtedly, the beech forests have been and remain among the most important in this region for the production of timber.

There are forest parts where forest harvesting operations have been applied, such as Strelcë Forest Economy, with a total area of 5025 ha, including pastures, forests according to Management Plan of this economy 2020 with high forests of 1933 ha; coppice of 684 ha; shrubs of 737 ha; and total amount of 3354 ha forests, while the remaining parts are pastures, or Bofja of Dusharit, Shere-Panarit as well as Gorice are the most important not only in the Korça region, but also rank among the most important in the country for beech forests and their production. Forests are increasingly being valued in recent decades for their multifunctional role and especially for the ecosystem services they provide, where Es are defined as the benefits society receives from ecosystem functions. However, their role in the production of wood biomass and wood assortments still remains primary, and will be so for a long time all over the world. It is very important that implementation of forest harvesting needs firstly a plan, so planning of timber harvests is one part of overall forest management planning, which is itself a component of comprehensive land-use planning [3]. So, cutting timber without a plan for the forest is not appropriate forest management [9], fortunately, in the application of logging in the beech forests in the region of Korce and in Albania, regular exploitation was done with a technical and economic plan, and it continues today. [7].

Undoubtedly, a series of forestry operations applied during the exploitation of beech forests in the region of Korce have caused a significant impact on these ecosystems, and when these operations are carried out properly, there is no doubt that the concerns on the ecosystems are smaller. In the Kerce region, it is noted with pleasure that the current state of the beech forests is in a very satisfactory condition, thanks to the successful applications of the harvesting cuttings in them.Thus, from field expeditions and data collection in forest economies with the type beech and its mixture as Bofja of Dushari, Strelce, Shere-Panarit, Lubonje-Vithkuq and Gorice-Prespe, harvesting operations were applied years ago and now there is a new generation in these forests. So, in our work, we will present a post-harvest evaluation related to the work of exploitation and the harvesting of timber in the beech forests in Korça, the impact from these harvesting operations and the real situation of beech forests today in the region of Korça. Such operations as: cutting/felling operations, forest road construction and their functions, construction and functions of tractor roads, tracks, also and inland transport traces, or points that serve for wood assortment collection, landings, or animal transport traces, as well as track/pista for transporting various assortments of wood from the felling-place to the collection points. On the other hand, it is indisputable that the cutting intervention initially gives a visual impact on the landscape if the cutting intervention is not in the right percentage. In order to minimize those negative phenomena, special care should be taken from the design of the harvesting technological project and definition of the technological scheme to the implementation in the terrain harvesting/exploitation forest operations using environmentally friendly techniques and tools for minimizing negative impacts on beech forest ecosystems. [7].

So, after some concrete expedition in terrain in all forests economy with beech forests in Korça and collect data using the checklist method, reaching on conclusion that harvesting of beech forests has been quite effective and has ensured a satisfactory natural regeneration with some evident results such as: excellent natural regeneration, uniform forest cover, no visible phenomena of erosion, forest landscape and very attractive new forests, restoration of fauna in ecosystems with new forests, non-appearance of forest fires, healthy forests from pests and diseases, a high level of biodiversity presence, offering a wide range of ecosystem services, etc.

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THE ANALYSIS OF THE IMPACTS ON THE WATERS OF THE FAN RIVER AS A RESULT OF THE DEVELOPMENT OF THE ACTIVITY OF THE COMPANY "BERALB SHA."

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Abstract

The development of society constantly requires a wide use of water in its various fields such as industry, agriculture, trade, transport, electricity, hygiene and most importantly for drinking water.

All the waters that are used have their impacts on the quality of the water environment, since their use for human purposes includes in itself human activity on these water bodies and changes their natural properties.

The discharge of liquid urban, agricultural and industrial waste without any kind of preliminary treatment is the main source of surface water pollution in our country.

Their discharge has progressively affected the water quality of rivers, lakes, coastal areas and the environment in general. Today, rivers and coastal areas have become collectors of all urban and industrial discharges

Water resources as a national natural asset are subject to continuous use with increasing intensity and permanent risk of pollution from human activities.

In this context, in the following we will analyze how the activity of the subject "Beralb sha" affects the waters of the Fan river.

Key words: water resources, monitoring, pollution, water treatment.

Introduction

The Fan River is an important natural resource in Albania, which is considered one of the most beautiful regional rivers. The river is an important natural resource as it is used by the inhabitants of the area for domestic, agricultural and livestock purposes.

The impact of anthropogenic activities, such as industrial pollution, can have significant consequences on the river ecosystem and on human health. This scientific research will focus on the impact of copper and zinc metals on the Fan River and how their toxicity can affect the river's water quality and biodiversity. The water analyzes will be carried out to identify the current levels of copper and zinc metals in the study area. The biological methods will be used to assess the impact of copper and zinc metals on the biodiversity of the river. The balance of communities of microorganisms and water organisms will be tracked through the analysis of indices of water health and species diversity.

The results of the research are expected to show changes in the water quality and biodiversity of the Fan River in relation to the levels of copper and zinc metals. This will lead to the assessment of the potential risk and consequences of pollution for the ecosystem and for the community of people living in the river area.

Material and Methods

The methodology followed is based on self-monitoring data carried out by the company "Beralb.sha" but also on a series of information describing the flora, fauna, structure and texture of the soil, climate and water resources of the area. Information on legislation, standards of metals in rivers, as well as a series of principles on the environment.

The main hypotheses of the research on the pollution of the subject of copper processing in the Fan River are:

The first hypothesis "Pollution from the accumulation of copper in the Fan River is caused by the activities of the industrial network that processes copper." This hypothesis suggests that copper pollution in the river is directly related to the activities of the copper processing industry. The research will focus on identifying sources of pollution, methods of waste treatment and to assess the impact of industrial actions on the Fan River.

The second hypothesis: "The impact of pollution from the accumulation of copper in the river is harmful to the environment and the health of the local community."

This hypothesis suggests that copper pollution in the river has negative consequences for the environment and the health of people living in the area.

The research may be required to assess, through available data and treatment studies, the impact of copper pollution on surrounding vegetation, fauna, and the impact of consumption of contaminated water on the health of residents. These two research hypotheses cover the pollution of the copper processing subject in the river and offer an opportunity to take the necessary measures to improve the situation.

On 13/06/2023, water samples were taken in the Fan river, three strategic points were selected for taking samples, which is the Kimza stream, where the water from the subject's pre-treatment tubs flows directly. The second point is the confluence or confluence of the stream in the Fan River and the third point is in the Fan River. The procedure was carried out correctly and in favorable climatic conditions.

Results and Discussion

The table shows the values of the standards allowed for mg/l in surface water, which is 0.10 mg/l, and the orange color shows the measurements made for the years 2020-2023, values that come from self-monitoring with the exception of 2023 for which water samples were taken and sent to the laboratory of the Department of Environment and Natural Resources on 06/14/2023. The copper level value in 2023 is 757.25 mg/l. Very high value beyond any standard
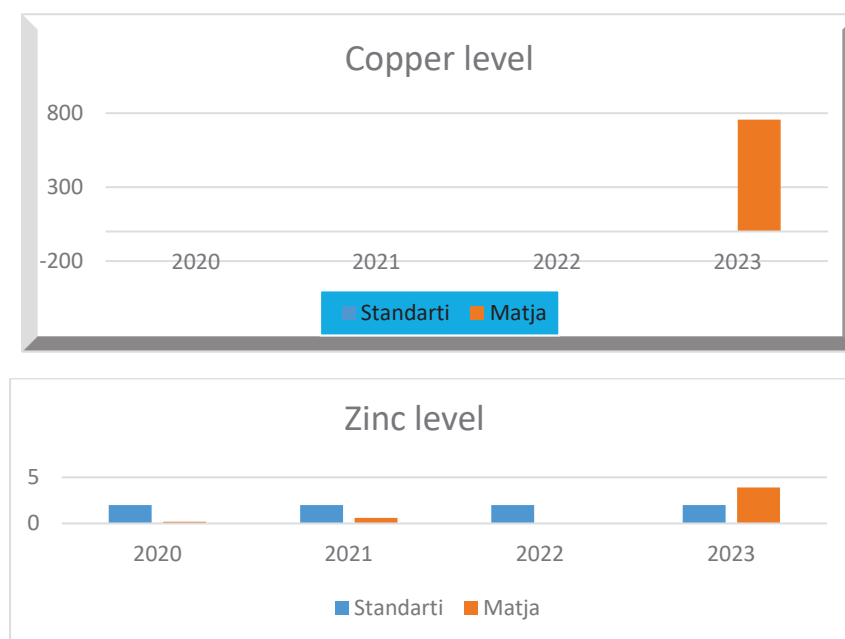
The high levels of copper and zinc in water can have a major impact on river flora and fauna. These heavy metals are toxic to living organisms and can cause harmful effects in the aquatic environment. Some possible impacts are:

The direct toxicity: Copper and Zinc can be harmful to beneficial microorganisms and aquatic fauna. High levels of these metals can cause the death of plants and algae that support the aquatic ecosystem. This can have a negative domino effect for the river basin and its entire ecosystem.

The bioaccumulation: High levels of copper and zinc can lead to bioaccumulation in aquatic organisms. This means that these metals can accumulate in various organisms, including fish and animals that live in the river. If animals or humans consume these contaminated organisms, they may be exposed to general toxicity and health effects.

The negative impact on plant and animal health: High levels of copper and zinc can cause physical and metabolic damage to river flora and fauna. These metals can damage the circulatory system of these organisms, as well as hinder their normal growth and development.

The changes in the biodiversity of the river: High level of copper and zinc can lead to changes in the biodiversity of the river. Fish and animals that are more sensitive to the digestion of these metals may become extinct or have a reduced population. This can also affect the entire food chain of the river and its ecological stability. In general, the high level of copper and zinc in the water can have a significant negative impact on the flora and fauna of the river. It is important to monitor and reduce the pollution of these metals in water to preserve aquatic ecosystems.

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The law "On integrated management of water resources"
The law "On environmental protection"

IDENTIFICATION OF *COLLETOTRICHUM ACUTATUM* COMPLEX BY MOLECULAR AND MICROSCOPIC METHODS

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The aim of this study was to identify the species within the *Colletotrichum acutatum* complex that were found in *Vaccinium corymbosum*, *Fagus sylvatica*, and *Salix* sp. shoots from Poland using classical and molecular methods. In addition, we have reported the complete mitochondrial (mt) genome sequences of *C. fioriniae*, *C. lupini*, *C. salicis*, and *C. tamarilloi*. These sequences have been compared with other publicly available mt genomes of the Colletotrichum species to identify their unique features and possible applications in genetic diversity studies and species identification. We made observations on a blueberry, beech and willow plantation. The symptoms were characteristic of anthracnose. In the case of blueberry and beech, based on morphological characteristics, the causal agent was identified as *C. fioriniae*, while in the case of willow, the cultured species was identified as *C. acutatum*. Species identity was confirmed by next-generation sequencing using the MiSeq platform. Identification of *C. fioriniae* in blueberry was confirmed based on TUB2, EF1 and ACT gene sequences, and in beech using TUB2, EF1, ACT, GS, CAL, CHS, GAPDH, HIS3 sequences by performing a BLASTp search in GenBank and of *C. salicis* species from willow was confirmed by performing a BLASTn search with six sequences according to polyphasic analysis. The complete mitochondrial genomes of *C. fioriniae*, C. lupini, *C. salicis*, and *C. tamarilloi* appeared as circular molecules with sequence lengths ranging from 30,020 bp (*C. fioriniae*) to 36,554 bp (*C. lupini*) (Okorski et al. 2018; Pszczółkowska et al. 2016, 2017, 2020).

KEYWORDS: *Colletotrichum acutatum* complex; species identification; NGS; comparative genomics.

MANAGEMENT OF WILDLIFE IN KOSOVA REPUBLIC, CURRENT SITUATION, PROBLEMS AND CHALLENGES

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Abstract

The aim of this study was to analyze the state of wildlife management in the Republic of Kosovo, both in open and closed hunting areas, as well as in hunting reserves and farms established for the cultivation and management of wild animals. The assessment of the current state of wild fauna was made on the basis of source data obtained from the direct managers of the hunting areas and from the owners of hunting reserves and farms established for the cultivation and management of wild fauna. The study methodology consists of the collection of existing data (secondary data) followed by a qualitative study where 45 in-depth interviews were conducted with different interest groups dealing with the management of wild animals. The findings of the study showed that among the main problems for wildlife management were: the non-establishment of joint and private hunting areas, illegal hunting, lack of wildlife inventory at the national level and at the hunting ground level, the lack of professional expertise as well as the low level of funding for the design of management plans. Among the challenges for the common hunting areas, most of the hunters' associations affirm that the annual rent for the hunting areas of 600 - 4500 euros/year is relatively high and it is difficult to secure such financial means from their side. Almost 82% of the interviewees were proposing that the management for the two hunting areas "Blinaja and Duboçaku" should be done by specialized entities who meet the conditions for wild fauna management.

Keywords: management, wildlife, species, hunting area, situation, translocation.

1.   Introduction

The aim of this study was to present data on the current situation in the management of hunting areas in the Republic of Kosovo and to analyze the problems that need to be addressed for future solutions. Wildlife management and hunting before 1999 was regulated by the Law on Hunting [6]. Since June 12, 1999, Kosovo has been administered by UNMIK, which partially implemented the 1979 law. In the meantime, UNMIK issued its own Regulation No. 07/2000 for certain measures mainly related to hunting weapons regulations [9]. To achieve this goal, in this paper we try to collect field data for open and fenced (fenced) hunting areas and at the same time obtain the perceptions of the different stakeholders involved in wildlife management. According to the Law 02/L-53 "On Hunting" [10] and the special provisions of the Administrative Decree No. 6/2009 on the management of open hunting areas [7], the responsibility for the management lies with the municipalities, but the approval of the Ministry must be obtained for the implementation of the activities. In the "National Strategy for Wildlife Management" it is highlighted that the condition of wildlife and hunting in Kosova is not good [2]. Since 2016, there are a number of breeding farms engaged in breeding and translocation of wildlife species. In this context, part of this study was also to see how is going the situation on breeding farms for wild animals, especially on the management of red deer (Cervus elaphus L.), roe deer (Capreolus capreolus L.) and wild boar (Sus scrofa L.) [4], [5].

2.   Materials and methods

The research methodology used for the study on wildlife management in the Republic of Kosovo consisted of several research tools. These research tools consist of a) Desk research, which involves the collection of secondary data (existing data), analysis and review of the entire legal framework for wildlife management, documentation and various related reports on the state of wildlife, as well as the state of institutions responsible for wildlife management. b) Qualitative research consists of in-depth interviews with key stakeholders [8], [1] involved in wildlife management. First, the key stakeholders were identified, and then an in-depth interview was conducted. The study was extended to the common open hunting grounds ("Duboçaku"), closed hunting grounds (hunting reserve in Blinaja) and wildlife management in 3 farms, namely: (Sharban Farm in the Municipality of Pristina, Farm "Orllan- Baraina" in the Municipality of Podujeva, Farm of Dumnicë e Epërme in the Municipality of Vushtrri) dealing with the management of deer), as well as the management of wild boar in the Farm - Llaushë in the Municipality of Skenderaj and in the Wild Boar Reserve "Kroni i Hajnave Gremnik" in the Municipality of Klina. Part of the study was the identification of stakeholders involved in wildlife management: state institutions (Minister of Forests and Wildlife), the Kosovo Forestry Agency (APK), the Kosovo Federation of Hunters (FGJK), the Federation of Hunters (SHGJ), wildlife management and breeding companies. In-depth interviews were conducted through direct field visits, during which interviews were conducted with the identified stakeholders, and the status of fauna management in the countries included in the study was closely observed. During the site visits, information was obtained on the numerical and health status of wildlife in reserves and on farms, as well as on the problems and challenges faced by this sector. Interviews have been described as one of the most commonly used methods for data collection, especially in qualitative research [8], [1]. The interviews were conducted between April and June 2023. The participants in the in-depth interviews were as follows: (i) the Federation of Hunters of Kosovo; (ii) the Association of Hunters of Kosovo; (iii) the Department of Forests and Wildlife (Minister); (iv) fauna management operations; (v) staff in the management of opened and closed hunting areas.

Table 1 The following table gives the spread of in-depth interviews included in the study

No.	Actors interviewed in in-depth interviews	Number of persons interviewed
1.	Federation of hunters	5
2.	Hunters Associations	20
3.	Department of Forestry and Fauna (Ministry)	5
4.	Farms for wildlife management cultivation	10
5.	Management personnel in open and closed hunting areas	5
	Total	45

3.   **Results and discussions**

The main findings of this research were:

✓ The main problems for wildlife management were: the non-establishment of joint and private hunting areas, illegal hunting, lack of wildlife inventory at the national level and at the hunting ground level, the low level of funding for the designing of management plans.

✓ It was noted by most of the hunters' associations that the annual rent for the hunting areas of 600 - 4500 euros/year is relatively high and it is difficult to secure such financial means from their side.

✓ In most of the interviews (almost 82%) proposed that the management of the two hunting areas "Blinaja and Duboçaku" should be carried out by specialized entities.

✓ About 50% of the administrative entities (hunters' associations) have adjusted their administrative status.

✓ Wildlife breeding farms in the Republic of Kosovo have developed strongly from 2016 until today and have become an economic and tourist attraction.

✓ The translocation of wild animals (deer and roe deer) has been considered generally successful so far.

✓ The wildness level in breeding farms it is considered high, especially for the roe deer in the Vushtria farm.

✓ The creation of good conditions in the fenced hunting areas has shown active reproduction

Recommendations:

a) **The Government should approve a regulation dealing with tasks and duties in the management of wildlife on hunting areas of special importance "Blinaja and Duboçaku".**

b) **The inventory of wildlife needs to be urgently for whole hunting area of Kosova, but especially in the Blinaja and Dubocak.**

c) **The evaluation of wildlife translocation on a number of farms needs to be supplemented by a series of studies related to analyzing of dynamic population, population growth, density, and its survival.**

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THE ALLOMETRIC EQUATIONS FOR EVALUATION OF STEM VOLUME AND ABOVEGROUND BIOMASS OF BLACK PINE (*PINUS NIGRA*. ARN) IN ALBANIA

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Abstract

The accurate estimation of tree volume and above-ground (AGB) biomass throuhg alometric equations and biomass expansion factors (BEF) play key roles in stand and country-level forest biomass and carbon stock estimation. However, specific allometric equations for volume and biomass estimation as well as BEFs are not available for natural forests of black pine (*Pinus nigra* Arn.) in Albania. The present study aimed (1) to develop allometric equations to estimate the standing volume and AGB of *P.nigra*, and (2) to estimate BEF applicable for estimating the AGB of natural black pine forests and carbon stocks. A total of 178 trees from 6 locations with DBH ranging from 6.0 to 53.0 cm were sampled for stem volume and biomass analyses after felling. We have tested several allometric equations based on diameter at breast height (DBH) and height (H) as independent variables. Our results based on measurements revealed that stem volume and biomass were gradually increased with increasing DBH, while a different trend was observed for height. The quadratic, power and linear models were the most accurate equations for volume and biomass estimation. BEF values ranging from 1.30 to 1.50 and these values can be used in the greenhouse gas inventory at the national level for Black Pine in Albania. However, biomass equations, which include DBH were more precise than equations that are solely based on H. These allometric equations are available to be used for the estimation of stem volume and natural black pine forest biomass and carbon stocks in Albania.

Keywords: *Pinus nigra*, allometric equations, volume, above-gound biomass, carbon stock.

1. Introduction

The lack of allometric equations to estimate standing volume was noted during the last National Forest Inventory (ANFI 2020). Therefore, there is a necessity to develop these equations based on predicted variables, such as diameter at breast height (DBH) and total height (H). The limitations of equations from other countries emphasize the need for location-specific studies, especially for main species in the country. The study presents the volume equations developed for *Pinus nigra* Arn. which is an important conifer species growing from north to south of Albania.

2. Material and methods

2.1 Study area

Data used in this study were collected from 7 locations comprising natural and artificial stands of *Austrian pine* mixed with other species (see Table 1).

Table 7. Characteristics of the sampling sites in the study

Nr	Location	Code	Geographic coordinates		Elevation (m)	Aspect
			North	East		
1	Germenj (Erseke)	GER	40° 14' 14"	20° 38' 40"	885	NE
2	Vithkuq (Korçë)	VITH	40° 30' 11"	20° 36' 17"	1260	NE
3	QafeMali (Fushe-Arrez)	QAM	42° 03 '36"	20° 00' 33"	554	SE
4	Gomsiqe (Puke)	GOM	42° 02' 29"	19° 51' 53"	792	NW
5	Librazhd	LIB	41° 18' 37"	20° 16' 49"	774	NE
6	Bishnice (Pogradec)	BISH	40° 55' 32"	20° 26' 06"	1282	SW
7	Skenderbegas (Gramsh)	SKE	40° 45' 46"	20° 15' 35"	746	SW

2.2. Methods for equation development

The circular sample plots allocated at uniform intervals of 200 m distance between each other were established in each location. The number of sample plots varied from 18 in GER site to 36 in VITH site. In each sample plot were measured DBH and H for each tree, and then were grouped in DBH classes. The sampled trees in each site were chosen to ensure a representative distribution by DBH classes. Before cutting the sampled trees, DBH were measured, while the H measured to the nearest 0.01m, after the tree felled. In total, 392 trees were felled and the destructive method was used. First, we sectioned the stem; (i) every

1 m (tree length up to 10 m) and measured diameters along the stem at 0.5 m, 1.5 m, 2.5 m, 3.5 m from the stump until the total length was reached or (ii) every 2 m (tree length over 10 m) and measured diameters along the stem at 1.0 m, 3.0 m, 5.0 m, 7.0 m and so on until the stem end. We calculated the volume of each section using the Huber formula (Avery and Burkhart 1994).

$$V_{log} = l \cdot g_{0.5}$$

where: V_{log} is log volume, $g_{0.5}$ = cross-sectional area over bark in m^2, obtained in the middle of each section, and L = length of each section in meter(m).

Total stem volume (V_{stem}) was calculated as the sum of the volume of each section (V_{cs}),tip (V_{non-m}) and stump (V_{stump}): V_{stem} = V_{cs} + V_{non-m} + V_{stump}

Collection of wood discs from the stems were performed from the base, middle and top of the stem and were sent to the laboratory for weighing and age determination. Prior to analysis, data of felled trees (DBH & H) were tested for normality and homogeneity using Kolmogorov-Smirnov test. We tested one linears and four non-linear models using DBH and H as independent variables. The adjusted coefficient of determination (R^{2}Adj), root mean square error (RMSE), and Akaike Information Criterion (AIC) were used as goodness-of-fit criteria to evaluate the developed volume equations. The performance of each volume equation was estimated by the following statistics: (i) the total relative error(TRE) and mean predictor error (MPE) (Dong et al. 2019). If the values of TRE were less than that value of MPE, then the developed volume model was considered reliable.

3. Results and Discussion

Table below depicts the main dendrometric variables of each forest stand in seven locations.

Nr	Characteristics	VITH	GER	GOM	QAM	BISH	LIB	SKE
1	Mean tree of basal area	21.2	17.7	17.3	16.8	20.9	18.5	26.8
2	Mean height (m)	13.6	14.6	7.4	13.5	11.0	9.6	10.7
3	Tree number per 1 ha	2200	1383	1450	2000	967	1183	1240
4	Mean tree volume (m^3)	0.21	0.20	0.08	0.04	0.22	0.14	0.42
5	Basal area (m^2/ha)	77.68	34.1	34.2	44.5	33.27	31.8	69.91
6	Mean volume (m^3/ha)	462.0	282.7	116.0	80.0	212.74	165.62	520.8

One way ANOVA indicated a siginficant difference among mean DBH of each location (F =15.873; p<0.05) and tree heights (F =3.868; p<0.05). LSD test showed a significant difference between mean DBH of SKE site with other locations and between QAM vs BISH and QAM vs LIB. In case of tree height, the LSD test showed a significant difference between GER and other locations.The Kolmogorov-Smirnov test indicated that DBH and tree height H data of 392 felled trees had non normal distribution. Several equations expressing the stem volume (Vol) as a function of DBH and tree height (H) were developed and the most accurate equations for volume preiction were those where TRE were less than MPE values.

Model	Location	R^{2}Adj	RMSE	AIC	TRE (%)	MPE(%)
Vol = - 0.2033 + 0.02403*D	GER	0.841	0.02	-23.64	0.01	0.04
Vol=0.071+0.00105*D + 0.000277*D^2 + 0.000009*D^3	GER	0.931	0.01	-35.51	26.7	28.1
V=0.071+0.00105* D + 0.000277* D^2 + 0.000009*D^3	GER	0.678	0.01	-10.78	60.45	68.54
Vol = - 0.0607 + 0.02349 H - 0.001700 H ^{2} + 0.000105*H	GER	0.975	0.01	-39.34	76.54	99.82
V = 0.000158 * D $^{2.38509}$	GER	0.897	0.0071	-14.52	85.45	99.34
Vol=-0.545+0.0417*D	LIB	0.893	0.07	-171.88	0.6	4.3
Vol=-0.0731+0.01593*H	LIB	0.77	0.111	-117.62	2.03	12.3

Vol=0.1313-0.02236*D+0.001246*D^2-0.000004*D^3	LIB	0.974	0.03	-269.29	19.4	65.4
V= 0.3422-0.0114*H+0.0146*H^2-0.00041*H^3	LIB	0.837	0.09	-139.89	0.1	0.73
Vol=0.0001142* (D)$^{2.43522}$	LIB	0.968	0.03	-257.78	87.79	104.73
Vol=0.0233*D-0.2381	BISH	0.85	0.18	-29.72	0.56	2.55
Vol=0.03089-0.008799 *D + 0.000783*D^2- 0.000001 *D^3	BISH	0.99	0.03	-256.5	80.31	86.88
Vol=0.07446*D-0.03553	QAM	0.91	0	-69.41	0.48	15.2
Vol=0.03607-0.01381 *D + 0.001714*D^2- 0.000038 *D^3	QAM	0.98	0	-82.25	27.91	88.52
Vol=0.1004-0.05948*H + 0.01099*H^2 - 0.000525*H^3	QAM	0.6	0	-40.76	1.31	56.85
Vol=0.000109*D$^{2.46471}$	QAM	0.97	0.17	-3.75	0.25	7.55
Vol=0.000045*D$^{2.74173}$	SKE	0.77	0.19	-78.45	0.06	6.36

We recommend the use of models where tree volume is estimated from DBH, because it is easily and accurately measured in the field. The best-fit models to estimate total volume from DBH and tree height(H) adjusted well in the interval of diameters sampled (2.5–64.0 cm) and height (2.0-25.5 m). These models should be carefully used outside the specified DBH and tree height range.

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EVALUATION OF MICROBIOLOGICAL AND PHYSICO-CHEMICAL PARAMETERS OF VELIPOJA BEACH, ALBANIA

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Abstract

Velipoja Beach is located on the Northwest of Adriatic Sea, with a length of 14 km long, from the Buna Estuary to the Vilun Lagoon until near "Rana e hedhun". The purpose of this study was to evaluate the quality of seawater on Velipoja beach in five stations, that are most frequented during the summer season. The evaluation of the water quality was based on microbiological and physico-chemical parameters. Evaluations of the results were done based on Directive 2006/7/EC for inland waters, coastal and transitional waters. Seawater samples were tested mainly for *E. coli*, *E. faecalis* (ISO 7899-2)*, S. faecalis, Heterotrophes* in accordance with European Standards using the membrane filtration method (ISO 9308-1). In this paper we will present only the values of *E. coli*, and some physical and chemical parameters such as: pH, conductivity, TDS, Cl⁻, turbidity. The monitoring of these areas was done monthly, from May 2023 - September 2023. Based on the data received, it is shown that in Velipoja Center there is the highest concentration of *E. coli* with 134 CFU/100ml. About the evaluation of physico-chemical parameters is concluded that in Velipoja beach, pH values range from 7.69-8.2, estimated according to recommended standards 6-9. Electrical conductivity (EC) values ranged from 18.3 - 53.8 µS/cm. The turbidity ranged from 0.17-0.76 NTU/FNU. The TDS ranged from 36.610 – 37.660 mg/l. The Cl⁻ values ranged from 199.9-300.5 mg/l. Based on Directive 2006/7/EC for inland waters, coastal and transitional waters our sampling points met the Directive for Escherichia coli for Excellent quality/250 CFU/100ml water, Class (A). The pollution increases during July and August and the reason is due to the high number of people visiting the beach during summertime.

Key words: bathing water, *E. coli,* sea water quality, physico-chemical parameters.

Introduction

The Albanian coast is one of the most beautiful and important natural assets of our country with a length of 450 km, having a great impact on the development of tourism and the economy of our country. However, one of the most problems for our country is microbiologic water pollution on marine ecosystems carried out from the urban development, uncontrolled constructions of buildings such as: hotels, beach bar, restaurant setc., which use septic tanks, due to the lack of sewage system, and discharge them into the sea, becoming in this way a potential source of sea water pollution. Swimming in this seawater with faecal contamination increases the possibility of getting different infections and gastro-intestinal diseases. For this reason estimation of microbiological water quality is very important for public health (Borrego, 1991).

Velipoja beach is the greatest beach of North Albania. The beach has a length of about 14 km long, from Buna estuary to the Viluni lagoon until near "Rana e hedhun". V elipoja is known for it's pure sea and curative sand. The number of tourists visiting Velipoja beach has been increasing in recent years. The control of the environment was done to evaluate the quality of seawater on Velipoja beach in different stations during season and to put in evidence if the bathing water present any risk for humans and to guarantee healthy ecosystems (UNEP/MAP, 2003). Evaluation of water quality is performed by measurement of some physico-chemical parameters and concentration of pollution indicators organisms such as: *Escherichia coli* (WHO/UNEP, 2003). *Escherichia coli* is an indicator of faecal pollution and water contamination (Todar, 2007).

Material and Methods

Bacteriological and physico -chemical parameters were carried out from May 2023 - September 2023 on the seacoast of Velipoja, Albania. The seawater samples were taken monthly from 5 stations: Buna Estuary, Ada beach, Velipoja Center, Viluni lagoon, and Rrjoll (figure 1). *E. coli*, *E. faecalis S. faecalis, Heterotrophes* were estimated using using the Membrane Filtration Method. In this paper we will present only the values of *E. coli*, and some physical and chemical parameters such as: pH, conductivity, TDS, Cl⁻, turbidity. Each, seawater samples were colllected from 30 cm under the surface, using single-use sterile plastic containers, with a volume of (250 ml), at a distance 10-20 m by sea coast.

Figure 1. Map of monitoring stations on the costline of Velipoja beach, Albania

The samples were placed in a thermo-box and transported at the same day to the laboratory for the analysis of microbial parameters (Figuers & Borrego, 2000). In this manner water samples could be kept their condition and could not be transformed by transportation. Microbial analysis was tested for significant indicators, *Escherichia coli*, according to the Membrane Filtration Method (ISO 9308-1). To determine *E. coli*, 100 ml of water was filtered through bacteriological filters 0.45 mμ and the filter placed in Petri dishes with endo agar that was incubated at a temperature of 37 °C (± 0.2 0C) for 24 hours. All location beaches were evaluated using the Directive 2006/7/EC the management of bathing water quality (table 1).

Table 1. Directive 2006/7/EC of the European Parliament and of the Council (2006), for coastal waters and transitional waters

	Parameter	Excellent quality	Good quality	Sufficient	Reference methods of analysis
1	Escherichia coli (cfu/100 ml)	250 ([1])	500 ([1])	500 ([2])	ISO 9308-3 or ISO 9308-1
2	Intestinal enterococci (cfu/100 ml)	100 ([1])	200 ([1])	185 ([2])	ISO 7899-1 or ISO 7899-2
([1]) Based upon a 95-percentile evaluation. See Annex II.					
([2]) Based upon a 90-percentile evaluation. See Annex II.					

Environmental parameters: pH, conductivity, TDS, Cl- and turbidity were estimated using standard methods (APHA, 1998). In this paper we will present only a part of these parameters. The analytical methods used for physico-chemical and microbiological parameter are included in the table 2.

Table 2. Analytical methods for physico-chemical and microbiological analyses on the costline of Velipoja beach, Albania

No	Parameter	Method of analysis
1	pH	S SH EN ISO 10523:2012
2	Conductivity	S SH EN 27888:2001
3	TDS	Indirect method from Conductivity
4	Cl-	S SH ISO 9297: 2000
5	Turbidity	S SH EN ISO 7027:2001
6	*E. coli*	Membrane Filtration Method (ISO 9308-1)

Results and Discussion

The purpose of our study was to evaluate the quality of seawater in Velipoja beach in five stations, that are most frequented during the summer season. Table 3 present the values of *E. coli* for each month and also the minimum values, maximum values and mean. The highest concentrations of *E. coli* were detected at July and August at all the monitoring stations. This could be due to the high number of people visiting the beaches in this coast line during summer time. In July 2023, the highest values of *E. coli* were detected in the Velipoja Center with 134 cfu/100 ml, because during the season it was very populated with tourists. The highest values in August were detected in the Buna estuary with values of 110 cfu/100ml and in Ada beach with values of 54 cfu/100ml. The minimum concentration of same parameters are registered at Viluni station: *E. coli* concentration 6 cfu/100ml during August. According to Directive 2006/7 EC the waters of the coast of Velipoja are of excellent quality. This

is confirmed by previous authors (Mankolli. H, Lika. M, 2006) and (Bushati. N, Neziri. A, 2019), classifying Velipoja beach with excellent quality water.

Table 3. The values of *E. coli* in marine ecosystem of Velipoja beach, Albania

Indicator bacteria	Station	Mean	Minimum	Maximum	May	June	July	August	September
E. coli (Cfu/100 ml)	Buna Estuary	74	0	110	68	0	94	110	100
	Ada beach	16	2	54	2	2	18	54	2
	Velipoja Center	55	0	134	0	60	134	20	60
	Vilun lagoon	3	0	6	0	6	2	6	2
	Rrjoll	10	0	24	0	12	16	24	0

Table 4. The average values of physico – chemical parameters of marine ecosystem in Velipoja beach, Albania

Stations	pH	Conductivity (mS/cm)	TDS (mg/l)	Cl⁻ (mg/l)	Turbidity (NTU/ FNU)
Buna Estuary	8.12	18.3	12.800	199.9	0.17
Ada beach	7.69	52.3	36.610	299.9	0.38
Velipoja Center	7.85	53.7	37.590	300.01	0.33
Vilun lagoon	7.93	53.8	37.660	300.5	0.33
Rrjoll	7.90	53.2	37.240	298.4	0.76

Based on the data shown in table 4, the pH values ranged between 7.69 - 8.12 with and all the sampled waters showed pH values close to neutral or slightly alkaline. Electrical conductivity (EC) values ranged from 18.3 - 53.8 mS/cm. TDS ranged from 36.610- 37.660 (mg/l). The Cl⁻ concentration ranged from 199.9 -300.5 mg/l. The turbidity ranged 0.17-0.76 NTU/FNU.

By the results obtained after the statistical data, which were presented by the table 3, and table 4 was clear that on Velipoja beach all the sampling stations for the physico-chemical and microbiological parameters meet the EU norms. The pollution increases during July and August and the reason is due to the high number of people visiting the beach during summertime. According to Directive 2006/7/EC of the European Parliament and of the Council (2006), concerning the management of bathing water quality, the quality of coastal waters in the bay of Velipoja during the period of investigation for *E. coli* are in category "Excellent quality".

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IMPLEMENTATION OF STANDARDS AND QUALITY MANAGEMENT SYSTEM IN THE WOOD INDUSTRY IN ALBANIA

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Abstract

For more than 25 years, the "Quality Management System" has been leading the business world in success and development. The notion of quality in business is focused on savings and additional revenue that organizations can realize if they eliminate errors throughout their operations and produce products and services at the optimal level of quality desired by their customers. Errors can take any form - for example, producing the wrong number of parts, shipping the wrong product, or sending an incorrect invoice to a customer. The quality management system aims at the development of the enterprise by improving the management system and increasing the products quality .After the 90s, the wood industry enterprises in Albania have increased in number and developed with machinery. They have faced demands with refined clientele and with increased competition in the market. The authors will present a research and findings of efforts to improve quality and management systems in the wood industry in Albania.For the data collection it was conducted a survey using a questionnaire with ten biggest companies in the wood industry sector which operate in various regions of the country.The changes in the legislation for the applicants, in tender requirements with public funds, which must be certified according to specific standards for the product and with the management system standard ISO:9001, has brought changes in mentality, application of quality management and product quality.

Keywords ; wood, standard, quality management system, product quality ,wood industry

Introduction

Certification is an activity related to standardization, necessary to guarantee and develop the quality of products and services, to protect people's health and life, to protect the environment, etc. Certification is an act in which an independent third party declares that a certain product, process or service conforms to a specific standard or other normative document. Certification is done by independent external organizations. Such organizations, usually accredited, carry out certification or registration of conformity with requirements such as those of ISO 9001. This is called third-party certification. Certification bodies are certification bodies that can be public or private. The certification bodies control the characteristics of the enterprise system, the production process, the products or services that must be kept in accordance with the chosen technical standards. System certification certifies the conformity of the organization's quality management system according to the standards of the EN ISO 9000 series.

In the resect years in the SME's they need the implementation of a quality management system. These systems are designed to help organizations improve management processes, raise awareness of the importance of customer service, manufacturing of products on the accepted quality standards (Heras-Saizarbitoria, Boiral, 2015)

-Quality management system (QMS)

A quality management system (QMS) is a system that documents the policies, procedures, and controls necessary for an organization to create and deliver high-quality products or services to customers, and therefore increase customer satisfaction.

-ISO 9001

ISO 9001 is the most internationally recognized standard adopted by many organizations as a reference in developing a quality management system (Zeng et al., Citation2005).

-The scope of the implementation of an QMS

The scope is defined by ***identifying the products, services, and processes that are covered by the*** *QMS for* achieving the desired results.

-The benefits of QMS for the wood sector
1. Improved Customer Retention and Satisfaction
2. Promoted Continuous Improvement
3. Work safety
4. Enhanced Internal Communications
5. Streamlined Employee Training
6. Increased Efficiency and Reduced Waste of wood
7. Improved Decision-Making
8. Improved Company Culture
9. Increased Profits

Material and method

Data collection was carried out in the form of a face to face surveys with the companies selected.

The present article is focused in the surveying 10 biggest wood processing industry operating all over Albania.

The general perception is that most furniture manufacturing companies require ISO certification to improve quality. In this context, it is often perceived as a marketing tool within the export furniture manufacturing industry. However, many researchers note that firms are not sure whether ISO certification has succeeded in instilling quality in their enterprises. Although there are many wood-based companies in Albania and some of them are furniture manufacturers and exporters, the ISO certified share within the industry is relatively small compared to the total number of furniture companies. . Therefore, this study was undertaken: (1) to determine the level of awareness of ISO 9001 certification among furniture buyers and the level of certification among manufacturers in the Albanian market; (2) to identify the main benefits and goals of ISO 9001 certification among Albanian furniture manufacturers; (3) to evaluate the reasons for approval and disapproval of ISO 9001 certification among furniture manufacturers; and finally (4) to identify the main benefits and challenges faced by ISO and non-ISO certified manufacturers from the perspective of furniture buyers

The established relationship between ISO certification and customer satisfaction, product quality and reliability was used as the research framework for this study. A set of structured questionnaires was used to survey 10 furniture manufacturers. For the manufacturers' perspective, 7 ISO and 3 non-ISO furniture manufacturers were surveyed. The result showed that manufacturers ranked quality improvement as the most important attribute. For ISO-certified manufacturer respondents, improvement in delivery time, quality and management were their main drivers for becoming ISO-certified. However, the impact of the ISO system on product marketability is limited.

On the other hand, most international furniture buyers were aware of ISO certification and have requested that their suppliers be ISO certified. ISO certification generally improves the overall performance of furniture companies, and large-scale companies have a greater tendency for ISO certification. Undoubtedly, ISO certified suppliers provided higher levels of customer satisfaction compared to non-ISO certified suppliers. From the perspective of buyers, foreign furniture buyers prefer to buy from ISO certified companies, due to the higher degree of trust in their business and product quality. This study shows that ISO certification had significantly influenced the management of furniture enterprises. The study also showed that the goal for ISO certification was also driven by an external factor such as the requirement of the law and government regulations in applying for tenders with public funds.

Results and discussions

It is not easy to have a correct answer to the question of the importance of quality management system for the companies, and the effect they have in their management process. Each organization or company has its goal in their production

Despite the benefits expressed by the majority of manufacturers, the low level of adoption of the ISO system in the furniture sector can be explained by the high cost of certification and the lack of perceived benefits of certification by furniture manufacturers. Finally, the study found that ISO certification is a useful tool to increase management competence within the furniture manufacturing sector. It seems that concerted efforts should be made to raise awareness of the benefits, so that ISO certification to be extended to the entire furniture industry in the future.

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COAL CLINKER ASH ASSESSMENT FOR NITROGEN, POTASSIUM, AND C/N TRANSFORMATIONS.

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Abstract

Plant nutrient leaching is one of the biggest limitations in agricultural crop production, chiefly on sandy soils. The utilization of coal clinker ash (CA) remains subdued in cropping systems, yet its characterization reveals that it has the capability to improve poor agricultural soils. This study was done to assess the potential of CA to improve nitrogen and potassium retention as well as its influence on the C/N ratio in sandy soils. Leaching experiments were conducted in a greenhouse with an uncontrolled environment at Tottori University in Japan. Using cylindrical PVC pipes, 50 cm in length and a diameter of 10.5 cm, one end was closed with a water-porous material to allow for drainage. The treatments included control (sandy only), CA1 10 %, CA1 20 %, CA2 10 %, CA2 20 %, and rice biochar (positive control) at 5 % w/w, replicated three times. The concentration of total NO_3^--N leached was significantly affected by the application of clinker ash, with CA at 10 % for both types leaching at par with biochar. Solution K was leached highest in CA1 at 20 % and for $NH4^+$-N retention, CA2 treatments retained the highest amount. C: N ratio of sandy soil was equally affected and improved by the application of clinker ash. After the leaching period, pH and EC tested were significantly affected by the application of clinker ash. Clinker ash is embedded with characteristics that are critical in improving the nutrient and chemical properties of sandy soil.

Keywords

Nitrate, Ammonium, Potassium, Leaching, Incubation, Retention

PUBLIC PERCEPTION AND ACCESSIBILITY OF ENVIRONMENT-FRIENDLY ALTERNATIVES FOR CLIMATE & CARBON-FOOTPRINT REDUCTION ACTION IN ALBANIA

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Abstract

The purpose of this research is to explore the perception of Albanian consumers on the relevance and accessibility of environment-friendly consumer alternatives in Albania, and discuss various simple technological solutions that can serve to encourage environmentally-friendly behaviour and assist in the reduction of the individual carbon footprint across our cities. We have adopted a simple random sample in selecting 500 individuals of different backgrounds and profiles to study their experiences and opinions on environmental issues, consumer choices, and the availability and accessibility of environmentally-friendly products and services in Albania. It results that 60% of our respondents have little to no information on eco-friendly businesses in Albania, including who these are and how they operate. 80.2% of our respondents feel that the prices of these businesses are relatively-to-much higher than the prices of other available alternatives in the market. In the study we have employed various statistical tools, including descriptive statistics and chi-square tests to analyse the key factors affecting consumers' choosing of eco-friendly alternatives. Based on the survey's results, we have concluded that the use of simple everyday technologies, such as mobile applications, may be an effective method of enabling Albanians to take climate action in their daily lives. We believe that the use of these applications would also serve as an educational and empowering mechanism for potential users of eco-friendly products and services in the country, and it would also strengthen the network of green businesses, where these latter could have the chance to collaborate with one-another, thus strengthening Albania's green economy.

Key words: environmental-friendly alternatives, consumer behaviour, environmental education, green businesses, climate change

Introduction

Climate change is a major risk to sustainable development and should be addressed with priority by all countries, both on the government level as well in the individual level. Goal 12 of the Sustainable development Agenda 20230 by the United Nations is a call for action to promote development while protecting the planet. As a member country of the United Nations, Albania should commit to the fulfilment of the SDG Goals;the Sustainable Development Goals Report [8] emphasises that responsible consumption is key to sustain the livelihoods of current and future generations and it is also integral to recovery from the pandemic. Albania should also adhere to strong climate action and protection of the environment as part of the EU accession agenda. Despite the approval of important strategies that address the environment and climate change adaptation, there are still significant gaps in place in regards to complying with EU legislation and standards [7]. Based on a combination of political, geographic, and social factors, Albania is recognized as vulnerable to impacts from climate change, ranked 75 out of 181 countries in the 2020 ND-GAIN Index [10]. The ND-GAIN Index ranks 181 countries using a score which estimates a country's vulnerability to climate change as well as their readiness to improve resilience [6]. This Index is calculated to help businesses and the public to act and invest for more efficient responses to global challenges.

Figure 1 shows Albania representing a national ecological deficit, meaning that the Ecological Footprint of its population exceeds the biocapacity of the area available to that population, or that the country is net-importing biocapacity through trade or emitting more carbon dioxide waste into the atmosphere than its own ecosystems absorb. The percentage in which personal ecological footprint in Albania exceeds biocapacity is 75%

Figure 1. Ecological Footprint and Biocapacity for Albania

Source: National Footprint and Biocapacity Accounts 2023 edition (Data Year 2019) [7].

Apart from the legislation and policy gaps, referring to Goal 12 of the Sustainability Agenda, we need to change our consumption habits and shift our energy supplies to more sustainable ones if we want to make a positive difference in the environment and reduce our vulnerability to current and future climate-change-derived risks and negative impacts. In order to change consumption habits in the population, we need to first change the perception of the consumers. The purpose of this research is to explore the perception of Albanian consumers related to issues of the relevance and accessibility of environment-friendly consumer alternatives in Albania,as well as to provide recommendations about technological solutions that can serve to encourage environmentally-friendly behaviour among the population and assist in the reduction of the individual carbon footprint across our cities.

Methodology

The research instrument that we used for this paper is a questionnaire with 15 structured questions regarding the perception of people living in Tirana on the relevance and accessibility of environment-friendly consumer alternatives. We have adopted a simple random sample in selecting 500 individuals of different backgrounds and profiles to study their experiences and opinions on environmental issues, consumer choices, and the availability and accessibility of environmentally friendly products and services in Albania. We used a pilot questionnaire which was sent to a few number of respondents in a prior stage. The method we used for data collection was through email, while 500 was the total number of respondents in Tirana. We used SPSS version 20 and the Word Excel softwarefor data processing. The first part of the questionnaire was focused on respondent background-related questions such as age, gender, and education. Most of the respondents were women, and the most frequently encountered age group was 31-40 (see table 1).

Table 1: The distribution of respondents by Age and Gender

Age	Nr.	Percent
Up to 30	179	35.8
31-40	187	37.4
41-50	99	19.8
50+	35	7.0
Gender	Nr.	Percent
Female	411	82.2
Male	89	17.8

Source: Author's calculation based on Survey data

Results and Discussion

When asked how familiar they were with the concept of environmental protection, most of the respondents responded that they are familiar with the concepts of global warming and climate change, while the least known concept was the carbon footprint. Almost the same distribution, regarding how familiar they were with concepts related to environmental protection, is also attributed to each separate gender and age category (see figure 1 and table 2).

Figure 2: How familiar are you with the concept of environmental protection?
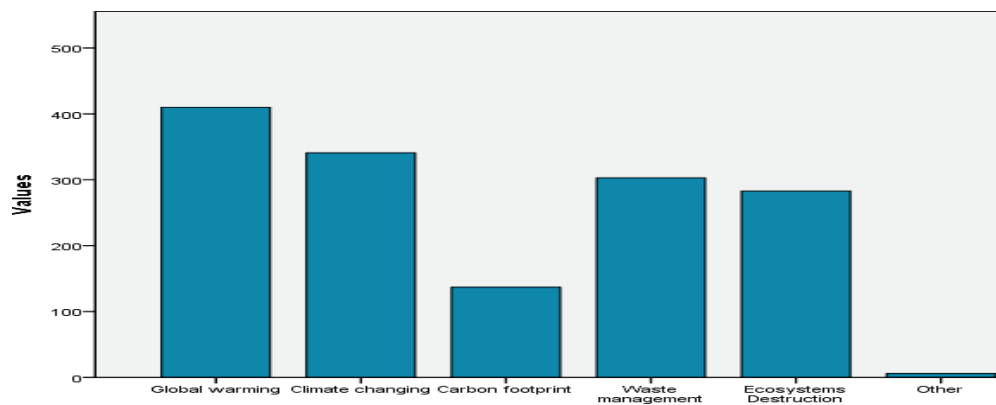
Source: Author's calculation based on Survey data

Table 2: Distribution of respondents by gender and age regarding how familiar they are with the concept of environmental protection (in percentages)

	Global warming	Climate changing	Carbon footprint	Waste management	Ecosystems Destruction
Gender					
Female	84.2	68.4	26.5	60.1	57.7
Male	71.9	67.4	31.5	62.9	51.7
Age					
Up to 30	89.6	73.2	19.6	57.0	58.1
31-40	83.4	69.0	31.0	64.2	57.2
41-50	72.7	60.9	33.3	60.6	52.5
50+	62.9	60.0	31.4	60.0	57.1

Based on the respondents' opinion, the personal choices of individuals may influence the improvement of the environment –58% of respondents affirm that "if every person would try to reduce theirown carbon footprint, the total impact on the protection of the environment would be very large", where conversely, approximately 33% of the respondents think that their choices have an impact, but the biggest impact should come from government-directed and businesses' policies to protect the environment. It results that there is an effort by consumers to reduce the use of plastic as one of the pollutants of the environment, as well as to reduce the percentage of waste they create or to reuse products as a way to reduce waste, figure 3.

Figure 3: Do you make personal efforts to protect the environment?
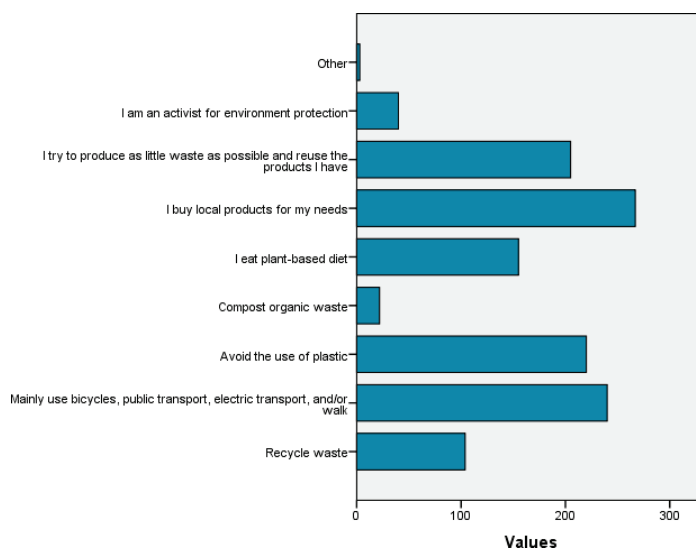
Source: Author's calculation based on Survey data

Young respondents are more willing to use mostly bicycles, public transport, electric transport or to move on foot, as well as avoid the use of plastic, or produce less waste and reuse of the products they already have. The statistical test that we have used shows that there is a correlation between the age of the consumer and the personal choices (actions) of individuals in improving environmental problems (χ^2=28.28, p-value=0.000), but not with the gender of the consumers (χ^2=12.9, p-value=0.114). A high percentage of the respondents (in spite of the gender or the age) bought local products. Mainly men tended to use more the bicycle and other green ways of travel to protect the environment, while women in a higher percentage declared that they tried to avoid using plastic but not with statistically significant changes (p-value>0.05).

The results of the survey showed that 54.4% of consumers tried to make their consumer choices as much as possible in accordance with their principles, and for approximately 34%, their personal principles completely influence their consumer choices. An important element in consumer purchase decisions is the price of the product. The results show that consumers were interested not only in the price of the products but also in the quality of the product: approximately 46% of them pointed out that they were interested in the price as well as in its quality, and only 5% of them were interested in the quality of the product without being interested in its price (figure 4).

Figure 4: How important is the price of a product/service in your consumer choices?

Source: Author's calculation based on Survey data

Approximately 72% of the respondents answered that they tried to maintain a balance in their choices between price and impact on the environment, approximately 18% answered that they are always ready to choose an environmentally friendly product/service regardless of its price. Only approximately 10% of respondents were focused only on price, and saw it as very important and would not buy an environmentally friendly product if it is more expensive than an alternative product/service. We looked for a relationship between the age or gender of individuals and how ready they would be to choose an environmentally friendly product/service regardless of its price. Statistical testing showed that this would be independent of age (p-value>0.05) and gender (p-value>0.05).

Consumers involved in the survey were asked about their interest in environmentally friendly products, their involvement in activities related to the environment and their information about such alternatives. The results of the survey showed that 60.2% of the respondents had no information or little information about eco-friendly businesses in Albania. Approximately 31% of them had general, vague information but were not convinced about their strategies or even that they could buy products from them, and only 9% of them were well informed about these types of businesses. The prices of environmentally friendly products were considered high and very high compared to the prices of other alternatives by 80.2% of respondents, and only 19.8% considered them as prices comparable to other alternatives, figure 5.

Figure 5: What is your opinion about the prices of environmentally friendly products/services offered in Albania?
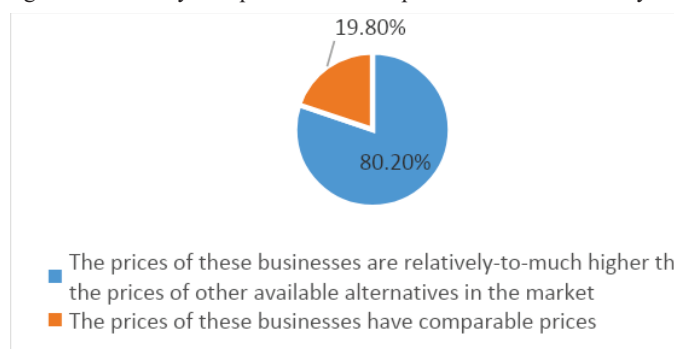
Conclusions and Recommendations

From the results of our survey and other similar researches [1], we noticed that there exists a market of potential consumers in Albania who are interested in making more environment-friendly choices and want to be more informed. However, living an environment-friendly lifestyle is not always easy. According to a Harvard Business Review Research [9], there is an "intention-action" gap as 65% of the respondents of the study report positive attitudes toward eco-friendly products and services but only 26% of them follow through with their wallet. One of the objectives of this research was to explore ways of possibly filling this "intention-action" gap. When asked about the potential use of technology and mobile-based applications, approximately 93% of the respondents showed interest in the use of technology as an important and quick means of receiving information on possible alternatives of environmentally-friendly products and services in Albania with a reduced price. Such technology would increase their awareness for sustainable development [5], and could have the powerful potential to allow them to learn about environmental problems in theory, receive specific localized environmental news & information about Albania, and provide them with the opportunity to measure and consider their impact on the environment through tips and interactive tools, such as a Carbon Footprint tracker. As consumers are often unaware of their carbon footprint in their daily consumption, such apps that track individual consumption and report the emissions caused can help consumers control and reduce their carbon footprint [3].

A suggested use of mobile-based applications would also be to provide users with opportunities for environmental activism through/in the form of in-app-posted events, organized from local actors (such as environmental NGOs) who already work on improving and raising human capital in capacities related to overall climate awareness. To conclude, we believe that the use of these applications would serve as an educational and empowering mechanism for already-existing and future/potential users of eco-friendly products and services in the country, and it would also strengthen and accelerate the networking of prevailing green businesses and organizations, where these latter could have the chance to collaborate with one-another through the speed, collectiveness and localization that technology solutions offer, thus having the potential to strengthen Albania's green economy.

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A STUDY ON THE ENVIRONMENTAL BEHAVIOR OF PARK USERS THROUGH OBSERVATIONS AND STATISTICAL TOOLS: THE CASE OF "RINIA" PARK, TIRANA, ALBANIA

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Abstract

The quality of people's experiences in a park is influenced by how they interact with the environment and its surroundings. Understanding this link between park visitors and park features is crucial. Behavioral observations, systematically studying how people interact with their environment, are essential. Landscape architects and environment-behavior researchers conduct such observations, drawing insights to enhance park design. They analyze how the physical features of the park influence people's behaviors. These observations provide data on activities and relationships vital for park suitability and sustainability. This research paper focuses on assessing the design quality of "Rinia" Park, a pivotal green area in the heart of Tirana's city center. We conducted a thorough analysis of park users through surveys, documenting their presence and engagement in "Rinia" Park. This analysis included direct observations on various weekdays, weekends, and different times of the day. The resulting information identifies distinct user groups based on three criteria: assumed user age, gender, and park activities. The research aims to present a methodological approach that could be a basis for future studies on green area utilization. By comparing data categorized by functional zones, a model is developed to suggest improvements in the design of public green spaces through landscape design.

Key words: park experiences, behavioral observation, environment interaction, landscape architects

INFLUENCE OF THE RIVERS ON THE WATER QUALITY OF THE LITTORAL ZONE OF LAKE OHRID BASED ON PHYSICO-CHEMICAL AND BIOLOGICAL INDICATORS

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Abstract

The aim of this paper is to assess the water quality in the main tributaries of Lake Ohrid (Sateska, Koselska and Velgoška) as well as their influence on the lake littoral. The complex physico-chemical and biological (microbiological, phytoplankton and zooplankton) research, will create scientific basis for taking proper measures for Lake protection. The sampling was done seasonally during 2023, at six sampling points with standard limnological methods. Carlson's trophic state index calculated on basis of the total phosphorus and Chl a indicate best water quality and belong to oligotrophic and oligo-mesotrophic state in Daljan, mesotrophic condition near the river Sateska inflow, and the worst quality categorized as eutrophic in Grašnica.The microbiological results shows faecal and organic pollution of Lake Ohrid tributaries. River Velgoška with worst quality is in IV and V class, while rivers Sateska and Koselska are mostly in III class. Many species of crustaceans and rotifers show high tolerance for changing environmental conditions and thus may serve as indicators of the water quality. The Index of saprobity based on bioindicator species was between 1.61 and 1.84 which indicate water quality of I,IIand II category. From the obtained results, higher concentrations can be observed for the content of organic biodegradable substances as well as for nutrients (concentration of total nitrogen and total phosphorus). In general, based on all researched parameters, intensive anthropogenic influence is visible, especially in Velgoška River and Grašnica littoral, which contributes to the accelerated eutrophication, i.e. aging of the aquatic ecosystem.

Key words: trophic state, Carlson's index, saprobity, eutrophication

ASSESSMENT OF POLLUTION DEGREE FROM HEAVY METALS IN MATI RIVER BASIN

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Abstract: Mati river basin is formed by Mati river with significant tributaries Fani i Madh, Fani Vogël and Urakë. The basin area is rich in mineral resources and mining is listed among major contributors to heavy metal pollution. This study aimed to assess the degree of heavy metal contamination and discuss the identified the sources of pollution. Literature confirms that Mati river which passes a rich mineralogical area in Cu and Cr minerals shows high levels of heavy metals (Cullaj A, 2000). Evidence by other authors indicate presence of heavy metals in sediments near mining sites in Kurbnesh, Rubik, and downstream Burrel former industrial smelter where the waters are acid in nature. Sediment analysis indicate levels of *Cu up to 624 mg kg, Cr up to 812 mg kg, Fe up to 79 g kg, etc.,* (Gjoka F. et.al., 2010). Anthropogenic sources such as mining, metallurgy (smelters), use of fertilizers in agriculture etc., highly contribute to water and sediment contamination. Being nonbiodegradable, heavy metals accumulate in the environment. There is a tendency to settle in the soil when the clay content, organic matter and pH are higher (Briffa J. et al., 2020). If due to erosion heavy metals end up in river, because of dilution their concentration values are lower. Solubility of metals in water, as confirmed by scientific evidence also depends on pH level. In low pH waters they tend to be more toxic, as they become more bioavailable (Saalidong BM, 2022).

Keywords: Mati river basin, heavy metals, water pollution.

I. Introduction

Water quality is affected and controlled by anthropogenic sources such as industrial discharges, mining and metallurgy, use of fertilizers in agriculture et., and natural sources including precipitation, weathering, erosions, mineral deposits and geological phenomena.

Being the primary recipient of solid and liquid waste discharges, generated by those sources surface waters are highly vulnerable to contamination. Ground water is better protected against direct runoffs and waste disposals, however, once contaminated, it remains contaminated for longer periods (Pye VI, 1983).

In the study area hundreds of tons of heavy metals are inherited as stockpile residues of former factories located in Laç, Rubik and Burrel (UNEP, 2000). Numerous abandoned copper mine sites and mines can be found upstream Fani river. A large active chromium smelter is located in the upper part of Mati (Kumanova Xh. et.al., 2012). The mining site in Munelle, located north of Albania represents one of the most important copper deposits in the area. Albania has a large surface covered by serpentine soils and the country is characterized by a high density of mines and metal smelters (Shallari S et al., 1998).

Scientific research performed by different authors in the last decade, focused on investigating the soil, sediment and water pollution. In specific areas, near mining sites and smelters a high presence of heavy metals in sediment and soil is found. Levels of Copper (Cu), Chromium (Cr) and other metals appear to exceed the standard limits. High concentrations of Cu (including Nickel (Ni), Arsenic (As) and other elements) in river sediment is argued to be originated from erosion of magmatic rocks and successive transport towards the riverbeds of the eroded materials (Gjoka F. et.al., 2010).

The aim of this study is to assess the pollution degree in Mati river basin. Site monitoring results and various data series available by other authors were used.

II. Mati river Basin

Study area: Mati river basin is drained by the principal river of the Mati, with significant tributaries formed by the Fani i Madh, Fani Vogël and Urakë tributaries. Mati river is 115 km long with a watershed surface of 2441 km^2. Maximum average water speed is 103 m^3/sek and average flow 42.6 l/sek/km^2 (Kabo, 1990 cited by (A. Cullaj et al., 2005). Fani, its main tributary is formed by Fani i Madh and Fani i Vogël, joining in the vicinity of Rrëshen.

For the purpose of management at river basin level (EU WFD, 2000), 5 sub-basins are identified and mapped in the study area (*Figure 9*).
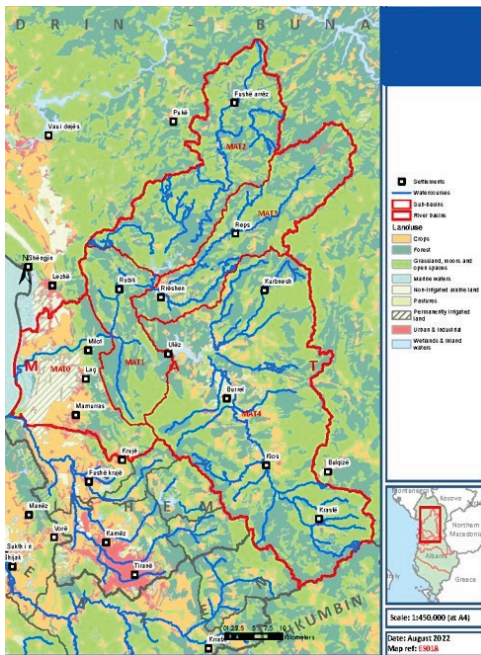
Figure 9River basin boundaries and sub-basins division
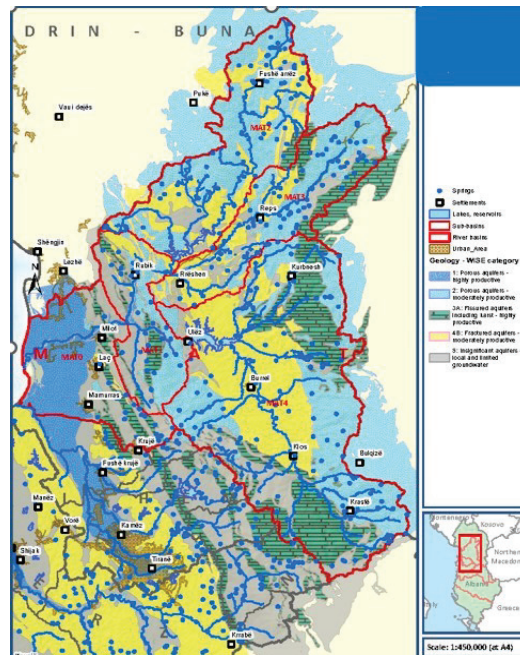
Figure 10 Geological Map of the study area according to (AMBU, 2022).

The study area is represented by geological formations (

) of Trias, Jure, Cretaceous, Paleogene and Quaternary ages, classified in five groups: magmatic, Carbonate, flysch, sandstone and conglomerate and quaternary formations (SHGJSH, 2002).

III.   Anthropogenic human activity

Untreated urban wastewater is one of main contributors to excessive levels of BOD_5 in receiving surface waters in the study area. There is no treatment facility apart from the wastewater Treatment Plant situated in Lezhe which serves only to this city.

However, data obtained by monitoring campaigns of October 2020 and June 2022 (samples analyzed by Agricultural University of Tirana) in Mati and Fan (Vogel + Madh) rivers indicate lower values of BOD_5 (
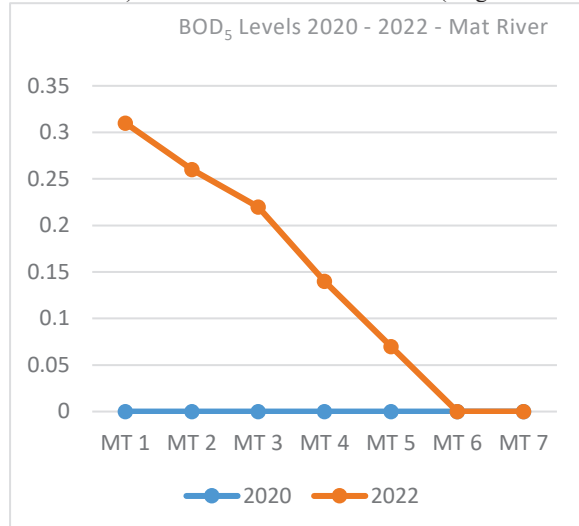
, *Figure 4*). The sampling locations vary between the two campaigns. Fewer samples taken in June 2022 compared to the previous campaign. The aim was to assess the differences in seasonal monitoring at key sampling points, located nearby municipal wastewater outfalls.
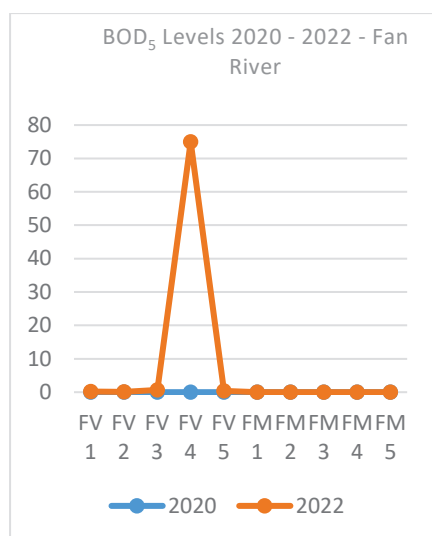
Figure 12 BOD5 trend for Fani river measured by Agricultural University of Tirana in 2020 and in 2022.
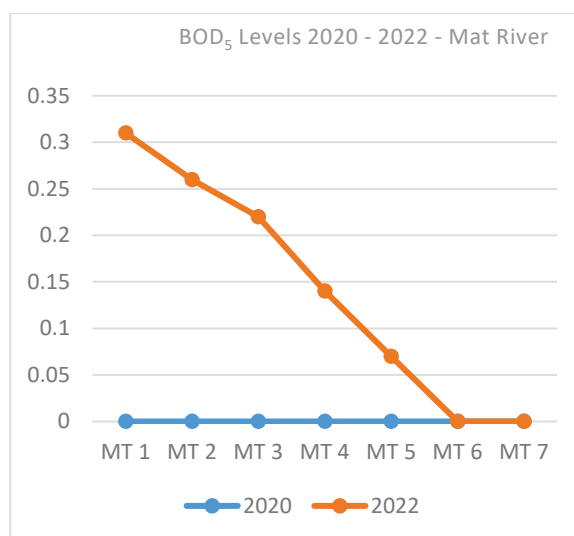
Figure 11 BOD5 trend for Mati river measured by Agricultural University of Tirana in 2020 and in 2022.

Frequent illegal gravel mining is another concern in the area leading to a growing pressure in water quality. Although prohibition of gravel extraction in Albania is in force since many years, illegal extraction continues to be a present threat (

Figure 13). National authorities report for approximately 11,433,898 m^3 of gravel removed from the river basin, based on official quantities defined in the permits issued since 2006. The actual volume removed and soil losses however is yet to be estimated, and the consequences too.

Figure 13 Locations of River Gravel Extraction Activities (adapted from the original Map of AMBU 2020)

Extraction of the river gravel from the riverbed highly affects river continuity. Erosion caused by gravel extraction marks a very spread phenomenon in Albania (HOXHA E., 2014).

dumpsites pollutes the surface and groundwater

Surface and groundwater quality is in constant threat from municipal illegal solid waste dumpsites. 20 dumpsites are identified in Mati catchment area, many of which located in the vicinity of Fan and Mati rivers (MTE, 2018).

IV.   Results and Discussion

Water quality assessment in Albania has always been considered fragmented, limited to a few physical-chemical parameters, etc., (A. Miho, 2005). This study sough to assess the pollution degree in Mati river basin. A review of previous studies and monitoring results provided by other authors was made. Average levels of key elements are shown in Table 8. Most of sampling points are near former factories or smelters, in their nearby areas comprising soil, water and river sediment. The data vary in time therefore the time changing water fluctuations must be taken into account too.

Table 8 Heavy metals presence in water and sediment over the years in Mati river basin

	WATER (mg/l)	SEDIMENT (mg/kg)
Cu	15.57183333	426.47
Cr	6.524166667	238.635
Fe	3.95	41404.995

Chemical analyses on Mati river before the 1990s show high content of metallic ions (iron, manganese and Cu), which is not surprising for the case of Mati river crossing through a mining area (LUSHAJ B, 2016). According to NIVA's classification (Bratli L.J, 2000) Mati river falls under class III as heavily polluted. Literature indicates high levels of Cu, Cr and other heavy metals in water such as Arsenic 25-100 mg/kg (due to confluence with Cu (P. LAZO, 2007) in areas located near former mining sites. High concentrations of Cr associate with Fan river flows which also proves to be heavily contaminated by this element (Abazi U et al., 2013).

A difference is noticed in results obtained by literature mostly due to different sampling seasons and the diverse sampling locations. High metal concentrations are traced in river sediments too. Previous assessments relate these concentrations to industrial discharges from mining activity in the area. Sediment can be considered a potential source of heavy metals in aquatic environment (Kluska, et al., 2023). However, determining the origin of such pollution in river sediments is challenging due to natural geological formations present in Mati river basin (Rubik, Burrel, Gjegjan, etc.). Average Cr concentrations in assumed by-natural top-soil above serpentine strata are about 2150 mg/kg (Shtiza A et al., 2005).

(Kumanova Xh, 2014) argues that heavy metals from mines, upstream Mati river are not an immediate threat, as the water pH buffering is good. There is however a possibility of re-release of heavy metals from the sediment into the water when hydrodynamic conditions or environmental factors (pH, redox potential, etc.) change, which could lead to secondary water pollution (Kluska, et al., 2023). Heavy metals are also known for their ability to bond with soil under conditions where the clay content, organic matter, and soil pH are higher (Briffa J. et al., 2020). Data sets from previous studies indicate 7–9 pH levels in the region.

If due to erosion heavy metals will end up in river, their concentration values will be lower because of dilution. Solubility of metals, as confirmed by scientific evidence depends also on pH. Heavy metals tend to be more toxic in waters with a low pH (Saalidong BM, 2022). Detailed study on heavy metal bearing particles and their transport mechanisms is needed.

V.   Conclusions

Further investigation of cause-effect relationship of the heavy metals impact in soil, water and river sediment considering their sources and mobility is needed. Design of a thorough monitoring system is necessary here, which would define sampling points selected based on the delineated water bodies according to (EU WFD, 2000) .

Selected heavy metals (e.g Cu, Cr, Fe, As) can be considered for an in-depth assessment to discuss fluctuation of concentrations along the rivers flow.

 Discussing historical data series against up-to-date information is also important to reveal any previous missing assessment of their impacts to water and soil.

Industrial pollution treatment must be reinforced by establishing adequate legal binding measures, EU compliant standards and emission limit values for better control of discharges, and by also developing realistic river basin management plans.

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INTEGRATED SEWAGE SLUDGE MANAGEMENT IN ALBANIA

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Sewage sludge is the final by-product from wastewater treatment plants. The main component includes phosphorus and heavy metals like Cadmium, Copper, Nickel, Lead, Zinc, Mercury and Chromium. Adequate treatment and environmental management are a must to reduce the negative impacts of reuse and or disposal. Due to the rapid rate of urbanization and industrialization increased sewage sludge production from wastewater treatment plants has become a worldwide challenge. In response to this issue European countries are working towards a more circular economy approach under the European Green Deal, focusing on the opportunities to achieve zero pollution and reuse practices. The EU Sewage Sludge Directive (86/278/EEC) adopted in 1986, provides the means to encourage and ensure the appropriate reuse of sewage sludge in agriculture. The aim of this study is to provide an understanding of how sewage sludge is currently managed in Europe and how it can be managed in Albania. Any findings resulting from this study shall feed the Albanian case and contribute to future sustainable developments. Wide stakeholder's participation is needed to build an adequate treatment and reuse system. Solutions for efficient and flexible sludge management should be based on experimental studies and should take into account the local conditions. Literature and previous studies on best practices also confirm the necessity for further analysis about the type, quantity and content of sewage sludge in order to identify the most efficient means of management.

Keywords: wastewater treatment plant, heavy metals, circular economy, reuse practices

INTEGRATED WASTEWATER MANAGEMENT IN ALBANIA - A CASE STUDY ON THE ISHMI CATCHMENT

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ABSTRACT

Water is an essential resource for humans and nature. Due to climate change, increasing urbanization, and industrialization many areas in Europe are facing pressure on this vital resource. Wastewater treatment plants play a significant role in improving the quality of urban and aquatic environments, as its main focus is the protection of public health and the environment. However, wastewater treatment plants, if adequately constructed and operated, can also contribute to delivering the broad goals of the European Green Deal. Consequently, the aim of this study is to provide water pollution control concepts including circle economy principles. In Albania, intensified stakeholder collaboration is required to develop joint solution approaches towards meeting the demands of integrated wastewater management. Albania is at a first stage of implementing new technologies and concepts for improving wastewater management and promoting sustainable development including water reuse and energy recovery. This study focuses on the case study of the Ishmi catchment, located in the center of the country. The research objective consists of: a) the development of a wastewater related inventory (e. g. for preliminary pollutant mass balancing) b) the elaboration of concepts for monitoring and modelling of wastewater quantities and qualities on the catchment level c) the development of decision support procedure for implementing water pollution control concepts.

Key words: circle economy, river basin, inventory development, monitoring, modelling

THE EFFECTS LAND USE POLICIES IN ENVIRONMENTAL IMPACT AND LAND-COVER IN ALBANIA

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Introduction

Rural areas in Central and Eastern Europe have experience of radical changes in government policy. Privatization policy has been a key force driving agrarian transformations. By way of restitution or distribution, Central and Eastern European governments have transferred ownership of land, natural resources, and other assets from state and collective entities to private actors. By the end of the 1990s, ownership patterns and farm structures demonstrated a massive change. The shares of agricultural land under state and collective ownership decreased across Central and Eastern European countries, thereby increasing the land in private ownership. Albania has amongst the lowest amount of agricultural land per capita (0.22 hectares) in the region. Only 24 % of Albania consists of agricultural land, while 36% is forest, 16% is meadows and pastures, and 24% is unproductive land, as urban land and inland waterways. The main objective of the proposed paper is to identify the relationship between land reforms, and land policies in the environmental impact in Albania during last decade. The paper provides a conceptual framework for understanding the relationship between land policies and land reform in the environmental impact in Albania during the post socialist period. A systems approach is used to describe land use changes in Albania, addressing the complex and dynamic nature of the relationships among the subject matter areas. There are two outstanding characteristics of the development of land relations since 1991 in Albania. The first is the creation of a nation of smallholders-owners of small farms held in freehold tenure brought about by Law 7501. Whatever the deficiencies of the content and implementation of this law the fundamental socio-economic revolution brought about by this law can not underestimated. The second characteristic and one that is directly related to the first is the exuberant urban development and rapid growth of land market that has taken place. While this urban development has not been universal throughout the country-there has been more in Tirana and the south of the country than in the north-it is a striking testimony to the effect of private ownership of land, the existence of a market for land and access to the necessary financial resources to bring about urban development. The main effect of land privatization has been a shift from mechanized to non-mechanized production because new owners face great difficulties in getting access to machinery which was taken over by local monopolies or which remains state property. The land within the management functions of land administration and protection is state and private agricultural land; communal and private forests and pastures, state forests, riverside land, village urban land and unproductive land.

Land tenure during 1945-1946 period

After World War II in Albania embarked on a series of land reforms, beginning with the 1945 Agrarian Law. Within a few years, most of the property of large land owners and religious institutions had been expropriated. The initial beneficiaries were small family farmers. The first radical land reform in Albania was implemented immediately after country's liberation in 1945-1946. In the end of War II, 3 percent of landowners had in possession 27 percent of the agricultural land, whereas 14 percent of peasant had an average of only 1.8 hectares of land. The end of Agrarian Reform radically altered the land ownership structure. State owned land dropped from 18.2 percent to 5 percent, land owned by rich and middle landowners decreased from 52.3 percent to 16.4 percent, religious institutions from 1.3 percent to 0.2 percent. On the other hand, the number of small holders grew from 28.1 percent to 43.2 percent, while that of landless peasants was reduced from 34.6 percent to almost zero.

Land ownership and its structure during the Collectivization Process

The illusion of Albanian farmers about private ownership on land ended very soon, as the Communist Party of Albania, declared the collectivization of agriculture as one of its priorities, while applying the Agrarian Reform. The collectivization was organized in several phases, and totally completed in 1967. With the termination of Agrarian Reform agricultural cooperatives of Stalinist types began to set up. This process that lasted 20 years was accomplished through several stages. Until the end of 1954, 8900 families with 31500 hectares of land joined to form 150 agricultural cooperatives. In the second phase the collectivization was focused to hilly area, gradually extending toward mountain areas of the South and North. The third phase starting in 1965 and ending in 1967 and it comprised all country's territory up to the most remote mountain areas. After collectivization was over, another objective, that of enlarging cooperatives began. Thus, from an average size of 175 hectares per cooperative in 1959, by 1983 the average was 1320 hectares. In 1976, the Socialist Constitution declared all property under state ownership, thereby eliminating even the small amount of land under private ownership. During the last ten years (1980-1990) a continuous deterioration in the economic profitability of agricultural cooperatives was observed. During 1967 when total collectivization of Agriculture was completed, the two types of Land Ownership (Agricultural Co-operatives and Agricultural Enterprises) represented almost the sole forms of the land ownership. The following table presents data on changes in the size of agricultural economies.

Land Reform and Land Cover in Albania after 1991

The overthrowing of political system at beginning of 90s dictated the need to radical changes with respect to the utilization of land. The transition from centralized economy toward market economy was associated with massive destruction of cooperative and state farm assets. The privatization of a large share of agricultural land and the quasi open-access to non-privatized land, especially forest and pasture areas has substantial effects on land cover and land use. Using a per capita basis, each family received equal amounts of arable and non-arable land, fruit trees, vineyards and olive trees. Scarce amount of agricultural land

in Albania (at average 0.22 hectares per capita of population) and high proportion of rural population were an argument in favor of the implementation of the land law.

Main land tenure issues

The agricultural structure comprises some large farms and a million of micro-farms, with an almost complete absence of intermediate-sized competitive, commercial farms. The larger farms, sometimes covering thousands of hectares, are operated by the state, commercial companies, private associations or cooperatives. In contrast, farms less than 1 hectares account for 70 percent or more of the total number of farms in Albania. Most farms are subsistence farms that produce little for the market, but they are often an important source of income and food security for many rural residents.

Land Fragmentation

Land fragmentation has been identified as one of the main obstacles to the development of the agricultural sector in Albania. Law 7501 was drafted in order to ensure a fair division of land amongst agricultural families. However, one of the ramifications of this policy is highly fragmented land plots. Families own several non-contiguous parcels spread over a wide territory which makes farming at an economic scale next to impossible. As a result of this process of privatization, over 90% of agricultural land is now in private ownership (MoAF 2002). On ex-co-operative land, according to Ministry of Agriculture and Food figures of June 2000, 353,718 families owned 439,139 hectares of land divided up to 1.5 million parcels with over 90% granted via a tapi. On ex-state farm land, the figures are 91000 families owning 123.334 hectares of land divided into 300000 parcels. On average each family owns 4 parcels of land, sometimes separated quite widely. A nation of family smallholding has been created.

Illegal urban development

Under communist rule, the free movement of people was severely restricted. More than 60% of the population lived in rural areas. Beginning in 1990, as the restrictions on movement were no longer enforced and because the rural economy was so poor, massive migration from rural areas to urban centers occurred. The state did not have enough available urban housing and mechanisms to rapidly assign land for urban growth and approve building permits did not exist. As a result, informal settlements around Albania's largest cities are wide spread. Although it is impossible to state exact figures it is estimated that over 200,000 illegally occupied land parcels in peri-urban areas have been created.

Soil Erosion

Approximately 20% of Albania is prone to high rates of soil erosion, and the annual soil loss is calculated at 20-90 tons/ha/year and in some cases is exceeds 100 tons/ha/year. Seventy per cent of the country has an average erosion rate of 30 ton/ha/year and only 10% of the total land area has an erosion rate of less than 15 ton\ha\year. Erosion has caused the loss of the thin and fertile layer of topsoil and its nutritive values. Extreme forms of erosion including landslides, of which there are currently 150, 000 ha prone of this phenomenon, constitute a real threat of unpredictable consequences. The land reforms applied in Albania, has affected very much the soil erosion rate. Soil erosion has increased, particularly for the less fertile soils and in the hilly and mountainous areas and appears as surface erosion, as coastal erosion, as rive bank erosion, in the transportation of silt and in the impoverishment of soil fertility. The main factors causing erosion are geo-climatic and human, including deforestation, irrigation with flow, considerable decrease of investments to maintain agricultural land, fires in pastures and forests.

Conclusions

Although Albania is faced with political, economic and social problems, important steps have been achieved. The commitment by the Albanians to abandon five decades of state ownership and control and the steady progress made in completing substantive and procedural privatization laws are laudable. Nevertheless, impediments to a fully functioning land market remain. Issues such as restitution and compensation, illegal occupation of land and other land disputes continue to cloud legal title. Rural condition throughout the region in Albania, have deteriorated during the transition period. There is growing inequality between rural and urban areas, with most of the poor now living in rural areas. These areas are characterized by declining populations that are increasingly represented by women and the elderly. Rural infrastructure has often deteriorated considerably and many rural roads, irrigation systems and erosion control measures are in poor condition. An effective incentive to production and conservation of land and water resources in Albania is the right to secure tenure to land and other natural resources. Security of tenure is a major concern of the land user in deciding whether or not to invest in measures to promote conservation or sustainable production on a long-term basis. Land rights must be robust, allowing the user effective control over the resource, and the right to exclude others who might adversely affect its management. An important part of Albanian government policy should be to reduce disparities between urban and rural areas by improving the rural situation.

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Compliance with land protection rules and measures to improve its administration in the framework of the European Common Agricultural Policy.

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Land issues are of crucial importance for economic and social development, increasing well-being and quality of life, poverty reduction, environmental protection and sustainable development, local and central governance. Access to land is the basis of economic and social life in both rural and urban areas.

Land constitutes an asset and a source of wealth for families, individuals and communities, with strong ties to cultural and spiritual values. Ownership and control over land confers very important political power, especially where land is becoming scarcer and therefore more valuable. The issues and conflicts of land and its administration are deeply embedded in the long-term social, economic and political history of a country and must be understood in this context. The rights and duties possessed by individuals or a family are themselves contained in a set of rules and norms, defined and enforced by authorities and institutions that may be those of rural communities and/or the state. No land tenure system can function without a body with the power and authority to define and enforce rules and provide arbitration in case of conflict.

Land ownership is a complex problem involving political, economic, technical, legal and institutional factors. Control over land is an important part of the identity and functioning of rural communities. Land policies determine who has legal rights to access and/or ownership of certain resources and under what conditions, and thus, how these productive assets are used and distributed among different stakeholders. Land policies or reforms often reflect important political compromises between different objectives and key interest groups in rural settings.

The land policy aims to achieve certain objectives related to the security and distribution of land rights, land use and land management, and access to land, including forms of ownership. It defines the principles and rules governing property rights over land and the natural resources it carries, as well as the legal methods of access and use, as well as the validity and transfer of these rights. The land policy details the conditions under which land can be used and developed, its administration, i.e. how rules and procedures are defined and put into practice, the ways in which these rights are ratified and administered. It also specifies the structures stipulated by the law enforcement, land management and conflict arbitration.

Land policy reform is an essential aspect of the policies and institutional reforms needed to promote equitable and sustainable development; it should be seen as an essential tool for securing the broader objectives of social justice and economic development. Land policy reform also has a key role in democratization processes, promoting better governance and decentralization. Given the far-reaching consequences of land policy reform, an explicit multidisciplinary approach is required to ensure that the various implications of reform programs are well understood and that the needs of different stakeholder groups, especially poor and vulnerable social groups can be effectively accommodated.

There is a close connection between "land issues" and the main policies related to it, where we can highlight: land policy and poverty reduction, human rights and social justice, gender equality, land policies and agricultural development , land administration and governance, local government and decentralization, land policy and taxation, land protection and environment, planning and land use policies, etc.

In this perspective, the rules for land protection and measures to improve its administration are taking on a special importance. A very coherent and efficient example in this direction is the special package of measures and policies of the European Union in the framework of the Common European Agricultural Policy, CAP. In the following, we highlight some of the most essential elements of this policy in the context of challenges for the protection of land and the improvement of its administration.

High productivity soil

The Common European Agricultural Policy ensures compliance with soil protection rules and encourages farmers to take a whole complex of necessary measures and actions to improve land management.

Land is an essential non-renewable resource for agriculture and serves as the basis for the production of food, biomass and other resources in the framework of a circular bio economy. Lands support biodiversity, play a central role in absorbing and storing carbon, and provide other ecosystem services, such as water regulation and nutrient cycling. To protect these vital functions and ecosystem services, the Common Agricultural Policy (CAP) supports sustainable land management.

Land "health" is closely linked to agriculture, with agricultural land covering around half of the EU's surface. However, soil in the EU face many challenges such as erosion, degradation, desertification, as well as reduction of organic matter content and loss of biodiversity. Many of the issues that threaten soil health are related to agriculture and an ever-increasing demand for food products and more, including:
• degradation and worsening of soil quality caused by intensive practices;
• soil compaction due to heavy machinery and inappropriate agronomic practices in cultivation;
• damage to biodiversity caused by monocultures and other land use and management practices;
• pollution from chemicals (pesticides, heavy metals, pharmaceutical drugs, plastics, etc.);
• abandoning leaving behind barren lands.

To address these challenges, the Common Agricultural Policy (CAP) aims and strives to ensure that agricultural practices are in line with EU land protection policies, as set out in the current Thematic Strategy for land protection. Sustainable land management is central to many strategies, objectives and priorities of the European Green Deal including:

- "from farm to table" strategy;
- "zero pollution" action plan;
- mitigating the effects of climate change and the possibilities of adapting to these changes;
- biodiversity strategy, according to which a new EU land strategy for 2021 has been announced;
- new action plan for organic agriculture.

Current actions of CAP

CAP implements a series of rules and measures aimed at preserving the role of lands in sustainable farming systems in the EU, in order to allow farmers to:
• provide safe, healthy and sustainably produced food;
• benefit from stable and decent income, taking into account the public goods they provide;
• protect natural resources, improve biodiversity and contribute to the fight against climate change.

Condition/conditionality

According to the conditionality and compatibility rules, all payments made to CAP beneficiaries are linked to a set of regulatory requirements for management and good agricultural and environmental conditions. The Maastricht Treaty requires Europe not to finance activities that degrade land and the environment unless these are justified and accompanied by compensation or compensation measures. "The full payment of direct aid must be linked to compliance with the rules for agricultural land, production and activity. These rules should aim at the integration of basic standards in terms of the environment, food safety, animal health and welfare and good agricultural and environmental conditions in common market organizations".

Since 2003, the payment of compensatory aid, otherwise known as "eco-conditioning", has been clearly dedicated to the respect of environmental criteria for sustainable land management. Conditionality and compliance rules of particular interest to lands include:
- Guaranteeing an efficient land cover;
- optimal land management to limit erosion;
- maintenance of soil organic matter;

Direct "green payments"

Under current CAP rules, farmers must comply with three mandatory practices to benefit from direct "green payments". Each of these practices is beneficial to soil health:
- crop diversification: a greater variety of crops contributes to strengthening the resilience of the soil and ecosystems;
- permanent pastures: they maintain soil fertility and organic carbon content, prevent erosion and promote biodiversity by protecting habitats;
- areas of ecological interest: useful land options include fallows, terraces, peripheral areas of fields or large plots, agroforestry, catch crops, ground cover and nitrogen-fixing crops.

From 2023, the most effective elements of direct green payments will be adapted and integrated into the reformed CAP. Direct payments will continue to contribute to environmental and climate objectives through the new "green schemes" instrument. Starting from January 1, 2023, the new PPB foresees a new payment per hectare in addition to the basic one, which is related to the so-called eco-schemes, i.e. voluntary actions implemented by the farmer in order to adapt to climate change, protection of the environment and good land management. The European Commission has published a document proposing a list of 41 agricultural practices that could be included in the new payment.

Rural development

Rural development (the "second pillar" of the CAP) includes a specific area of action dedicated to preventing erosion and improving land management. In their rural development programs, EU countries contribute to this policy area by adopting agri-environment-climate measures, where farmers are committed to implementing management practices that protect and improve the soil.

EU countries intend to apply several other rural development measures to encourage sustainable land management:
• measures to support organic agriculture help preserve soil health and biodiversity;
• measures to support forest development are effective in combating soil erosion;
• investment targeting and implementation measures can be used to finance machinery for land cultivation to minimize soil degradation and maintain a high level of land cover in autumn and winter, which can limit emissions of greenhouse gases, reduce erosion and increase the content of organic matter in the soil. ;

• measures to support knowledge transfer, advisory services and cooperation can help farmers cope with various threats to soil (e.g erosion, acidification or loss of organic matter) and promote the adoption of sustainable land management practices land, adapted to local agro-ecological and agricultural conditions.

The European Network for Rural Development (ENRD) facilitates the sharing of ideas and good practices in thematic areas related to resource efficiency and water and soil management. The new CAP, which will start in 2023, will include "increased support for healthy soils", in line with the objectives of the European Green Deal.

Specific objective of PPB

In accordance with the proposals of the European Commission, the new CAP 2023-2027 will be structured around nine specific objectives. Sustainable land management will be an essential part of many of these goals, especially those related to landscapes and biodiversity, natural resources and climate change action. In their strategic plans, EU countries aim to have greater flexibility to design interventions to address the most pressing challenges facing their countries, contributing to the achievement of common objectives.

A new green CAP architecture will integrate stricter regulations and offer more opportunities for environmentally friendly agriculture. For example, a significant part of the CAP budget will be allocated to ecological programs, which can support the voluntary practices of farmers. The European Commission has published in January 2021 an indicative list of eco-schemes, including some useful practices for lands.

Nutrient management tool for sustainable agriculture

The new CAP 2023-2027 includes the use by farmers of Fertilizer Management Tools for Sustainable Agriculture. This new tool will give farmers guidance on the application of chemical and organic fertilizers, adapted to the real needs of agricultural crops and guaranteeing compliance with the current legislation on the use of fertilizers. It will promote the optimal use of fertilizers, which will bring economic and environmental benefits, as well as contribute to:
• the digital transition of agriculture,
• better use of digital technologies,
• strengthen farmers' skills in acquiring digital tools and systems with the aim of improving soil fertility and reducing pollution, supporting better management systems,
• in the use of satellite guidance systems,
• the application of specific fertilization, irrigation, etc. systems.

Tracking progress

Through the Common Monitoring and Evaluation Framework (CMEF), the European Commission develops and documents a wide range of indicators to measure the progress made by the CAP in achieving its strategic objectives. The Commission's agro-food data portal includes a "statistical soil control panel", which presents some of the most important soil indicators and provides a framework for complex assessments and studies on this issue.

In November 2020, the Commission published a specific study on the impact of the CAP on sustainable land management, accompanied by several recommendations for the continuous improvement of this management. In line with the European Commission's proposals, the new PPB aims to include a strengthened performance, monitoring and evaluation framework, which will help strengthen accountability and move to a results-based delivery model.

Knowledge, research and innovation

The development of knowledge, research and innovation will be essential for advancing the possibilities of sustainable land management. The Farm Advisory System (FAC) explains to farmers how to adopt sustainable land management practices on their farms, comply with soil protection rules and take advantage of available support for rural development, while informing them about new methods and technologies.

The European Commission, in the frame of the CAP, supports research and innovation to better understand the impact of agriculture and forestry on the earth and to develop new techniques and technologies capable of advancing production systems that protect and improve the earth. In particular, CAP offers innovative approaches to research and innovation, combined with education, training, investment and demonstration of good practices through "living labs" and "pilot projects", as part of the "Healthy Soil Pact in Europe".

The European Agricultural Productivity and Sustainability Innovation Partnership (EIP-AGRI) remains a key instrument of the future CAP to promote the creation, testing and dissemination of innovative solutions resulting from the work of the Operational Groups. These groups connect farmers, foresters, researchers, advisors, businesses and environmental NGOs to collaborate on innovative projects in agriculture and other environmental activities, agriculture and rural areas.

SOIL FERTILITY IN ORGANIC AND CONVENTIONAL FARMING SYSTEMS

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Review Article

Abstract

A healthy soil is initially determined by its fertility, which depends on the interactions of the physical, chemical, and biological soil properties.

Organic farming systems probably emphasize more biological characteristics, which act to create long-term reserves of nutrients for plants, where the use of organic fertilizers is a major factor. A fundamental principle of organic agriculture is to maximize the recycling of nutrients, i.e., returning them to the natural cycle and significantly affecting ecosystem protection. Conventional production systems ensure the direct supply of plants with nutrients taken from the soil through mineral fertilization. This principle does not take much into account the fact that the soil is a living and productive ecosystem. The vision in convectional agriculture is simplified to the sometimes-uncontrolled supply of nutrients from mineral fertilizers with the sole objective of increasing production. Such a practice of conventional agriculture can sometimes be dangerous and with negative consequences on soil quality, water, and biodiversity.

Combining the application of two: organic and conventional production systems together would be a good recommendation for obtaining efficiently high and qualitive crop production in agriculture.

Keywords: *soil fertility, soil biological properties, organic fertilization, organic agriculture, conventional agriculture, fertilization systems.*

I. The impact of soil properties on its fertility

The fertility of the soil is its complex and dynamic ability to supply the plant throughout its life cycle with nutrients water, and air. The interaction of biological, physical, and chemical properties of the soil has a wide impact on the preservation and improvement of the soil fertility.

The fertilization systems of organic agriculture perhaps emphasize more biological characteristics, which act to create long-term reserves of plant nutrients. Attention is also devoted to physical and chemical properties, which are also very important for the development of agriculture. (Maci. A. and L. Miho, 2019); (Perez-Guzman, L. et al., 2021).

The physical soil characteristics directly affect the volume of the root system and the growth of the root hairs of the plants. The plant roots develop optimally in the soil that have a good stability of structural aggregates. It is worth mentioning here the minimum tillage, which positively affects the preservation of the soil structure. Porosity, good filtration, drainage system, water capacity, high density, resistance to strong surfaces and compression also affect the development of the root system of the plants in soil (Khan A., 2019); (Crystal-Ornelas, R. et al., 2021).

While the chemical soil characteristics control the availability of plant nutrients. One of the most important chemical parameters is the soil pH, which determines solubility (available state) of the nutrients and microbial activity in the soil. The normal plant growth for the most of plants requires a soil pH from 6–7 (different authors 6,5–7.5). If the soil pH decreases and is lower than 5.5, then the availability of macro elements N, P, K, Ca, Mg, and microelement Mo decreases as well. The reduction of pH also affects the reduction of the microbiological processes of mineralization of the organic nitrogen, such as nitrification or fixation of atmospheric nitrogen by rhizobium bacteria, which live in symbiosis with leguminous plants. On the other hand, the increase of the soil pH above 8 decreases the availability of macro elements P and K, but also of the main microelements Fe, Cu, Mn, Zn and B (Neina D., 2019); (Marshall, C. B. and Lynch, D. H., 2020).

Another important indicator of the chemical soil properties that must be taken into consideration on the evaluation of soil fertility is also the cationic exchange capacity (CEC), which has to do with soil ability to hold cations (NH_4^+, K^+, Ca^{2+}, Mg^{2+} etc.) from negatively charged colloids (Mäder P. et al., 2002).

II. Long term Doctrine in organic farming

The maintenance and increase of soil fertility has been closely linked to the various systems of fertilization in crop production. We can mention four systems of fertilization most often used in crop production:

- Biodyn: bio-Dynamic
- Bioorg: bio-Organic
- CONFYM: K/Conventional FarmYardManure
- CONMIN: K/Conventional mineral fertilizer

The graph below shows the impact of the fertilization system in the microbial mass accumulation in soil over the long-term period (7 years).

Soil microbial biomass

Long term average (1995-2002)
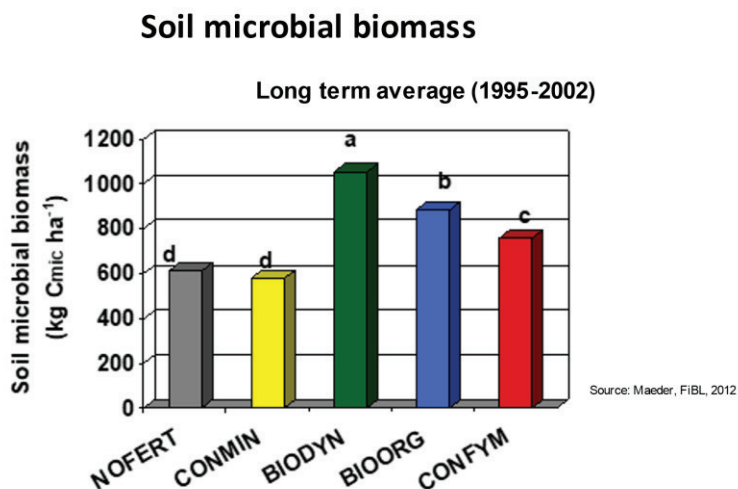
Evaluate d for 0-20cm soil depth in the average soil density of 1.4 g cm^{-3}

SNF/SCOPES

The observed considerable differences in the amount of soil microbial biomass among fertilizing systems is a result of long-term effect of the agricultural system (beginning of the experiment 1977). The positive effect of organic systems on soil microbial mass is obvious Mäder P. et al. (2012), Fliessbach A. et al., 2000; 2012).

The figure below shows the change in pH values depending on the agricultural systems. Comparing the agricultural systems, the results from long-term trial show that the soil pH increases sensibly in organic farming systems (BIODYN and BIORG) approaching optimal values for normal plant growth and development (Fliessbach A. et al. 2007).

The change of soil pH values in different agricultural systems

Source: Fließbach et al., 2007, Agr Ecosys Environ, 118
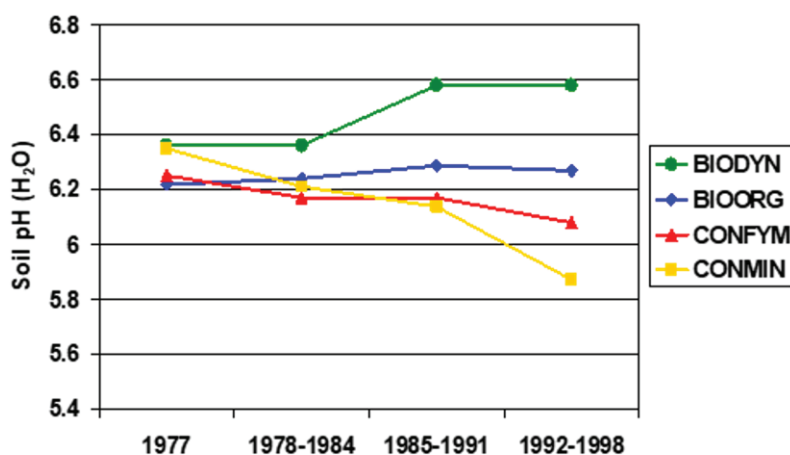
SNF/SCOPES

In organic farming a special importance is devoted to maintaining and improving soil fertility, which is inconceivable without organic fertilization, i.e., food for flora and fauna in soil (Arncken C.M. et al., 2012).

Conventional agricultural systems provide direct supply of plants with nutrients that are taken from the soil through mineral fertilization. This principle does not take much into account the fact that the soil is a living and productive ecosystem. The vision in conventional agriculture is simplified in the sometimes-uncontrolled supply of nutrients with a sole objective of increasing crop production. Such a practice of conventional agriculture can sometimes be dangerous and with negative consequences in soil, water, biodiversity, and quality of crop production (Mäder P. et al., 2007); (Maci. A. and L. Miho, 2019).

The picture below shows the physical, chemical, and biological soil properties effected by the different long term fertilization systems applied on the soil.

The long-term field trial compares organic and non-organic farming systems. The differentiated management of the farming systems has led to system-specific changes of soil physical, chemical and biological properties. The positive effects of biodynamic and bioorganic farming on soil quality and soil biodiversity are evident (Pfiffner L. et al,1996); (Mäder P. et al., 2002); (Fließbach A. et al., 2007).
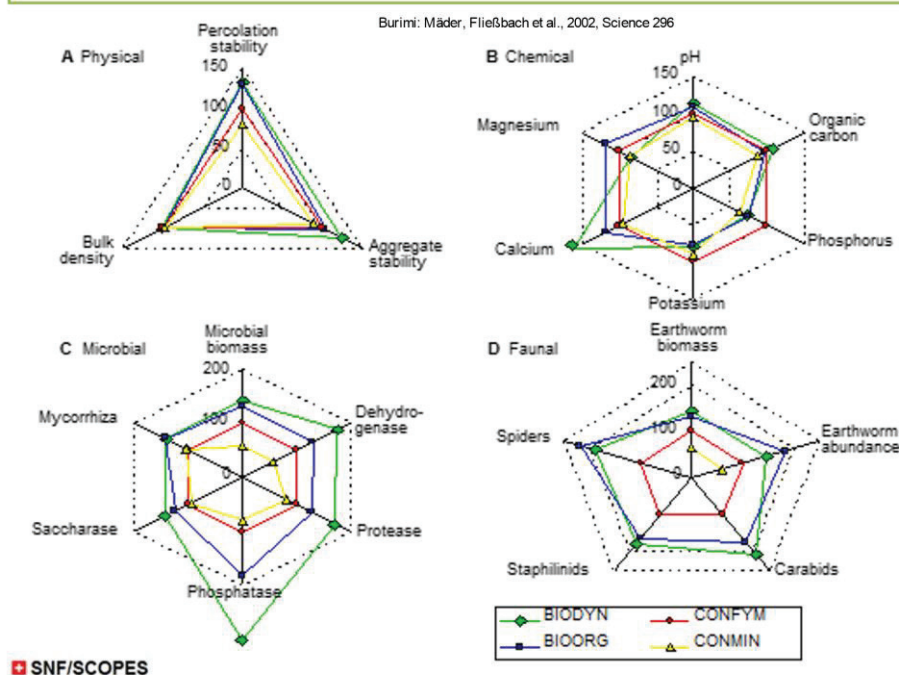
III. The role of microflora and microfauna on soil fertility

A fundamental principle of organic agriculture is the effort to maximize the recycling of nutrients, i.e., their return to the natural cycle by affecting the protection of the ecosystem. Plants cultivated in these conditions are supplied with nutrient elements indirectly, through the soil-plant system, in which a main role play the soil microorganisms, responsible for the processes of decomposition of organic matter, mineralization and transformation of nutrients.

Soil organisms control the closing of nutrient cycling by process of mineralization of organic matter in soil. Soil microorganisms can mobilize nutrients from the mineral components of the soil, air (nitrogen) and organic matter and make them assimilable to plants (Maci A. and K. Mengel, 2001).

The main soil organisms with positive effects on plant nutrition are symbiotic interactions of nitrogen fixing *Rhizobia* bacteria and root *mycorrhizae*, free living soil microorganisms and earthworms. Nitrogen fixing *Rhizobia* bacteria live in nodules on the roots of plant legumes and fix nitrogen from the atmosphere. They absorb carbohydrates from plant roots as the energy source (Mäder P. et al, 2002; 2006).

The root *mycorrhizae*, part of fungi invade the root cells (ecto *mycorrhizae*) or the spaces between cells (endo *mycorrhizae*). Other part live in surrounding soil. The root *mycorrhizae* live with symbiosis with approximately 80 % of crops. Fungal threads penetrated the plant roots allow nutrients to be transferred directly from the soil into the plant's root system (Pfiffner L., Balmer O., 2009).

The fine structure of mycorrhizal mycelia means that they are more effective than plant root heirs at absorbing plant nutrients including phosphorus, nitrogen, potassium, and calcium as well as water. They are transported into the plant in exchange for carbohydrates. Mycorrhizae fungi are believed to use between 4 and 20% of host plant photosynthetic products. The total length of hyphae is typically 200 times the total length of the plant's roots and root hairs. In addition, the hyphae are much thinner than root hairs. They can thus enter tiny micro-pores in the soil, which the relatively thick root hairs cannot penetrate. The

mycorrhizae help plant's resistant against diseases by synthesis of antibiotics. The hyphen secrete slime, which is food for bacteria. The slime of mycorrhizae fungi is helping to stick clay particles in water stable aggregates. The mycorrhizae quickly die in contact with soluble mineral fertilizers and pesticides (Oehl F. et al 2003; 2004).

The figure below shows the effect of P-fertilizer on the growth of flax and leeks in soils with and without mycorrhizae. The Mycorrhizae effect in flax and leeks is equivalent to the application of 150 kg P/ha and 100 kg P/ha, respectively.

Root mycorrhizae
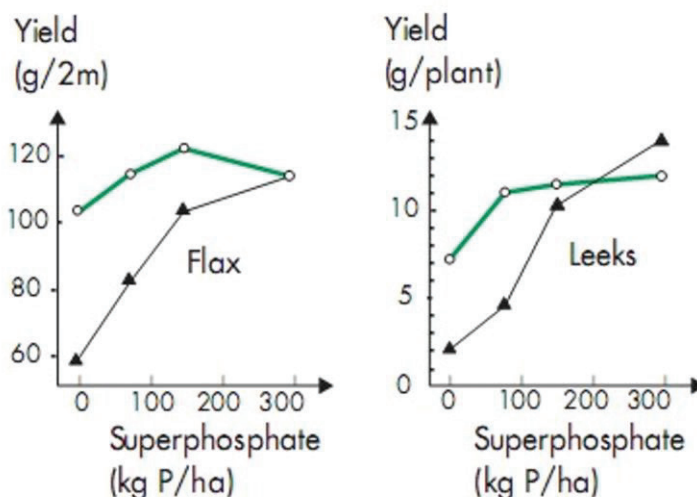
The effect of P-fertilizer on the growth of flax and leeks in soils with o-o and without ▲−▲ mycorrhiza.

The Mycorrhiza effect in flax and leeks is equivalent to the application of 150 kg P/ha and 100 kg P/ha, respectively.

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Source: Eriksen et al., 2003

All free-living soil microorganisms by means of their vital activity influence on release of available nutritional elements in soil by mineralization of soil organic matter and weathering of soil minerals (Maci A. et al., 2007).

The Rhizosphere is the place where the plant roots contact the soil and form an integral part of soil ecosystem. The space around roots is reach on organic matter released from the roots and soil micro-organisms, which feed with this organic matter. The plant roots exude a mixture of different organic compounds known as mucigel. This mixture contains sources of nutritional compounds and energy for the micro-organisms living into the soil (Hildermann I. et al., 2010).

Earthworms are an important factor for soil fertility as well. They process soil and organic residues through its gut. Clay and organic matter are intimately mixed and coated with organic stabilising gums and lime secreted from special gland within the digestive tract. Earthworms play unique role for forming of water stable soil aggregates, make a significant contribution to organic matter incorporation in soil, and enrichment of topsoil with nutrients and humus. They build channels facilitating drainage. They allow exploration of deeper soil layers by plant roots, along with concentrated and readily available supply of nutrients. Earthworms cannot tolerate acidic soils with a pH < 5. An active worm population can process as much as 40 t of dry soil per hectare, or the equivalent of at least 0.5 cm soil annually. Compared to the soil casts are higher in bacteria and organic matter, total and NO_3^- - N, exchangeable Ca and Mg, available P and K and CEC. The weight of casts in cultivated field may reach up to 18 t/ha/annually (Pfiffner L. et al., 1997); (Willer, H., and Lernoud, J., (Eds.), 2018).

The table below shows the relative number and biomass of soil flora and fauna of 15 cm soil layer, which effect on the improvement of the physical soil characteristics.

Relative number and biomass of soil flora and fauna of 15 cm soil layer

Organisms	Number per m²	Number per g	Biomass kg/ha
Micro flora			
Bacteria	10^{13}-10^{14}	10^{8}-10^{9}	450-4500
Actinomicets	10^{12}-10^{13}	10^{7}-10^{8}	450-4500
Fungi	10^{10}-10^{11}	10^{5}-10^{6}	560-5600
Algae	10^{9}-10^{10}	10^{4}-10^{5}	55-550
Micro fauna			
Protozoa	10^{9}-10^{10}	10^{4}-10^{5}	17-170
Nematodes	10^{6}-10^{7}	10-10^{2}	11-112
Other fauna	10^{3}-10^{5}		17-170
Earth warms	30-300		112-1125

Source: Brady, The nature and properties of soils. 1974 [22]

The cultivation of plants and their rotation in organic farming has its own distinct specificities for each culture, characteristics which are taken into consideration in the plant nutrition balance (Esperschütz J. et al.,2007); (Garland, G. et al., 2021).

In the conditions of organic farming the fundamental task of fertilization (organic, green, and various composts) is to maintain and improve the soil fertility, provide nutrients for the soil microorganisms, restore the nutrients to the natural cycle (organic fertilizers produced by the farm itself) and ensure the renewal of nutrient elements removed from the soil through plant uptake. Organic fertilization increases the biological activity of the soil, which is the basis for maintaining and increasing the soil fertility. In a biologically active soil, plants are generally more tolerant, more capable of resisting different diseases and insects by significantly affecting the quality of plant production.

Conclusion

Generally, the fertilization systems in crop production can be collected in two alternatives: Conventional and Organic.

The combination of the two would positively affect not only the maintenance and increase of soil fertility, but also the quantitative and qualitative increase of the crop production in agriculture.

Acknowledgements

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THE ANALYSES OF ECONOMIC AND ENVIRONMENTAL BENEFITS OF REDUCTION SOIL EROSION IN CENTRAL PART OF ALBANIA

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Summary

Soil erosion and associated nonpoint pollution pose critical problems affecting the economic welfare, food security, and public health of Albania. Each year nearly 60 million tons of sediment are deposited by Albanian rivers into the Adriatic Sea. This translates into a national average soil erosion rate of 27.2 tons per hectare per year, which is more than twice the level of "tolerable" erosion established by many countries. This also means that an average of 2.3 mm of valuable topsoil is lost to the ocean each year. Accompanying this topsoil are agrochemicals such as pesticides and fertilizers as well as industrial pollutants, which are transported to reservoirs, rivers, lakes, and the ocean, causing degradation in water quality. The economic consequences of soil erosion in Albania are great. The loss of topsoil has reduced the yields of arable crops (largely wheat, corn, and rice), forage, fruit trees, and vineyards, which are vital to Albania's food security. Many of the country's 630 reservoirs are becoming filled with sediment, which lowers their storage capacity, damages turbines producing hydroelectric power, and augurs catastrophic flooding. The removal of sediments from existing reservoirs or the construction of new basins is costly enterprises that Albania cannot afford. Sediment has accumulated in drainage channels of reclaimed coastal land, causing flooding, accumulation of salts in the soils, and reduced agricultural productivity. The environmental consequences of soil erosion include not only a loss in biological sustainability and diversity but also a decline in water quality and fish and wildlife habitats. Pollutants from agricultural, municipal, and industrial activities that accompany the sediment may threaten human health. The objectives of this paper is to quantify the magnitude of soil erosion and its effects on water quality and to determine the economic benefits of soil erosion control

Studies in the field of soil loss and at the same time its preservation have been constantly the object of soil researchers. This paper is a summary of the soil erodibility assessment work at the water-induced soil erosion monitoring station in the central part of Albania. The purpose of the study was to highlight, evaluate and identify the factors that affect the erosivity of the soil and water flow, mainly surface erosion and surface water flow. The study takes into account the experience of several other Mediterranean countries that have used the methodology applied to estimate the Universal Equation of Soil Loss and surface water flow over a two-year period. The methodology used for the assessment of soil permeability respects the indicators and elements that are applied in the Universal Equation of Soil Loss. The methodology used serves as an indicator of the alignment and integration of our research and scientific work in the field of soil protection and conservation, with colleagues in the Mediterranean countries and beyond.

The results obtained for soil erodibility and surface water flow have been analyzed and interpreted interwoven with the role played by plant cover, the coefficient of land use, the land itself and its slope, climatic conditions and specifically precipitation and temperature. The paper makes a real and modest contribution to soil conservation and protection, becoming part of the country's literature fund in this field, which presents a disturbing and sensitive problem with consequences for the environment in general. The land and climate conditions in our country, the steep and very steep terrain, with low, medium and high vegetation, which in many cases is destroyed; are indicative of a massive, ubiquitous and extremely aggressive erosion. According to the data provided, the soil erosion levels vary from 10 to 70 tons/ha/year. The assessment of soil loss from water and the coefficient of surface water flow, were evaluated on a land surface with a length of 12 ml and a width of 1.2 ml. The soil slope for the test areas is 12%, while the planted plants are perennial meadow with a mixture of Dactyl + Festuk + Lolium, corn and wheat. In the selection of plants, the coefficient of land use or the degree of plant cover on the surface of the soil and the shape of the root system below the surface of the soil were taken into consideration.

Results and Discussions

The analysis of the results has become complex and in two main aspects for climatic, biological and hydrotechnical factors. The first aspect was the role of vegetation in soil loss from surface erosion, while the second aspect was the role of vegetation in evaluating the coefficient of surface water flow. Regardless of the above points of view, we have aimed to evidence the erodibility of the soil, and on the other hand, we have tried to evaluate the influence of the surface water flow on the amplification of the erodibility of the soil. Regardless of the theoretical and scientific interpretation that was given to the obtained results of soil loss and surface runoff coefficient, the role of the above two factors in the climatic and soil conditions was important for us. In our conclusions and judgments, the studies carried out by Albanian researchers have also contributed to the land and especially to that of its protection and preservation. The factors analyzed in this study in the case of rainfall refer to their measurements with pluviometers located at these stations, while other climate indicators are referred to measuring stations in their vicinity. During the study there are used analytical indicators related to average temperatures (at sea level) for the months of July and January, average annual temperatures (in degrees C for the months of January and July, average height of annual rainfall, the average number of days with precipitation > 10 mm as well as the number of days covered with snow).

Conclusions

The analysis carried out in relation to tyhe soil loss separately for the years 2020 and 2021, leads to different conclusions, which are often clear. The ambiguity is related to the scientific nature of soil erosion, and in particular the loss of soil from surface runoff. The treatment of climatic factors in the determination of soil loss through water erosion is extremely different and difficult to bring equal across the years of study. Rainfall, its duration, the intensity of the fall and the presence of frost often means that these elements of the climate unfairly receive the 'weight' and attribute of the factors to be studied. In order to draw conclusions, we have tried to reflect the influence of real factors that have influenced the process of soil erosion. Also, during the study period, we were able to keep in relatively equal conditions all the elements related to the good growth of agricultural plants and the condition of the soil on the test surface. The study is a modest contribution in the framework of continuing the persistent work of soil erosion specialists and experts, who have done and continue to do in this very important field. The results achieved and the conclusions drawn in this paper bring attention to the role of plant cover in the climatic and land conditions of the cetral area in the country. The role and effectiveness of plants in reducing erosion is different and depends on the biological characteristics of the above/underground soil system. Soil losses on the surface where meadows are planted is about 6 percent lower than the surface planted with wheat. Soil loss on a surface planted with 1 and 2-year-old cultivated meadows is about 5 times lower than on land without vegetation (fallow land).

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SESSION

"Animal Medical Science and Welfare, Food Safety and Public Health"

ANALYSIS AND DETECTION OF ANTIBIOTIC RESISTANCE GENES IN WASTE WATERS IN THE "ONE HEALTH" APPROACH

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Antibiotics are one of the most important groups for the treatment of many infectious diseases in humans and animals, including some of the parasitic infectious diseases caused by vectorial transmission. Some of the infectious diseases caused by protozoa, transmitted from humans to animals, are treated through the use of different classes of antibiotics such as sulfonamides, fluoroquinolones, lyncosamides, macrolides, nitromidazoles, tetracyclines, etc. According to the statistical data in Albania for the use of these antibiotics in the last 5 years 2019-2023, it results that the classes of sulfonamides, fluoroquinolones, macrolides and beta lactams are used in a comparable way in humans and animals as part of therapeutic protocols of infectious diseases. The amount of antibiotic use, the characteristics of their biotransformation and elimination by humans and animals in the environment, as well as their circulation in a vicious way from the environment back to animals and humans through ground water constitutes a fundamental threat to the growth of antimicrobial resistance that threatens improve public health. For this purpose, in this study, water samples were analyzed to identify the presence of antibiotic resistance genes in the environment as an ecotoxicological evaluation parameter of the environmental microbiome resistant to antibiotics. Water samples were taken from sewage and analyzed by PCR test.
In these samples were identified: sul1, blaTEM, bla OXA 48, bla CMy-2, tel C, mcr-1.

Key words: antibiotics, resistance genes, infective disease, sul1, blaTEM, , tel C, mcr-1.

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PATIENT SPECIFIC IMPLANTS (PSI) FOR BONE AND CARTILAGE RECONSTRUCTIONS IN VETERINARY APPLICATIONS

Patient Specific Implants (PSI) emerged in the 1990s for human application in consequence of CT introduction but have been rarely used, during the next 20 years, due to their high cost and long development time. The manufacturing technology in use at that time and the lack of efficient surgeon-engineer communication tools are the main reason of that poor success. With the introduction of 3D printers, the use of PSI has been increasing, thanks also to the advancement of software for 3D reconstruction and surgical planning and more efficient communications. Nowadays PSI are also in use in veterinary applications and are demonstrating some clear advantages: reduce risks and surgical times, preserve surrounding tissues, allow a better surgical planning and simplify the surgical steps.The workflow for PSI include: 3D-CT-reconstruction using different softweres, 3D printing of anatomical plastic models, virtual surgical planning, implant/instrument design and manufacturing (validation and surgical training with models. Surgeon-engineer Communication is very easy using standard tools, e-mail, whatsapp, wetransfer, videocall, dropbox, etc. Main results are in cranio-maxillofacial and orthopedic surgery focused on: correction of angular deformities, joint resurfacing of focal defects, severe bone loss reconstruction (revisions, tumors, infections).In this presentation will be showed the planning and the results of the use of different PSI in both experimental models and clinical cases .Surgeon-engineer communication greatly conditions the development time and surgeons who perform a first case tend to repeat and attract others. Development times are often shortened when more cases are done with the same surgeon. PSI are an effective solution in difficult surgical cases, supporting technology is already mature and continues to improve.

AGRI-FOOD PRODUCTS TRACKED WITH DIGITAL BLOCKCHAIN TECHNOLOGY: CONSUMERS' WILLINGNESS-TO-PAY FOR QUALITY AND SAFETY INFORMATION

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Abstract

The growing footprint of the food sector on the Italian economy has led to an increase in food fraud by some producers. In recent years, innovative technologies, such as the Blockchain (BC), have been implemented within the agri-food value chains, preventing the problem of foods fraud, and enhancing their quality control and safety. In this direction, this study aimed to elicit Italian consumers' preferences towards this innovative technology (BC) regarding additional labelling information associated with: (i) BC technology/QR code, (ii) sustainability aspects, (iii) food quality and safety and, (iv) innovation for Italian agri-food products. To this purpose, a Choice Experiment technique has been used. The results revealed a high level of misinformation regarding BC technology. Furthermore, we obtained an overall positive average WTPs of around EUR 0.52. Moreover, there was a slight difference between the attributes towards the BC technology and the digital information on the quality & safety attributes, in which the respondents were willing to a price premium of EUR 0.98 per Kg and 1.03 per Kg, respectively. Nevertheless, respondents were relatively less willing to pay a price premium on providing digital information about the environmental sustainability, social sustainability, and business innovation, whereby the WTPs were estimated at EUR 0.05, EUR 0.25, EUR 0.30 per Kg, respectively. In conclusion, this study has private and public implications in terms of supporting and urging the implementation of QR code on the agri-food labels to affect consumption behaviour, raising social awareness, and enhancing food quality and safety.

Key Words: Agri-food control; Agri-food labelling information; Consumers' preferences; Innovative agri-food; Sustainable agri-food

THE ROLE OF SHEEP AND GOATS IN EPIDEMIOLOGY OF SHIGA TOXIN-PRODUCING *ESCHERICHIA COLI*

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Escherichia coli are a broad group of bacteria that generally colonise human and animal intestines. Although most strains are harmless, some, such as Shiga toxin-producing *E. coli* (STEC), elaborate toxins that can cause a range of syndromes in humans. Even in low infectious dosage, STEC is an effective and serious pathogen of importance to veterinary public health and can translocate systemically and is cytotoxic to microvascular endothelial cells, particularly in the kidney and brain of susceptible human hosts. The disease can proceed to the potentially fatal hemolytic uremic syndrome (HUS), which includes hemolytic anemia, severe renal failure, and thrombocytopenia. STEC is primarily found in healthy ruminants, which are the principal source of human exposure.

Although cattle are known to be common hosts of STEC strains, sheep and lower-level goats also play an important role. Many epidemiological aspects of *E. coli* O157:H7 infection remain unknown, including the role of the human and bovine gut microbiomes in infection. The purpose of this review is to provide an update on current findings describing the role of sheep and goats in the epidemiology of *E. coli* O157:H7. In addition, it will provide recent advances in understanding *E. coli* O157:H7 pathogenesis include molecular mechanisms of virulence, intestinal microbiota, inflammation, and reservoir maintenance.

Key words: Shiga toxin-producing *E. coli,* hemolytic uremic syndrome, sheep and goats, reservoir maintenance, intestinal microbiome

BIOSECURITY ENHANCED THROUGH TRAINING EVALUATION AND RAISING AWARENESS – A COST ACTION TO IMPROVE BIOSECURITY IN LIVESTOCK

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Biosecurity is critical for preventing pathogen entry and dissemination and, as a result, preserving the health of farm animals. Better animal care, more sustainable animal production systems, and reduced antimicrobial use result from healthier animals. Despite these advantages, biosecurity is hampered by a variety of problems, including: i) a lack of knowledge about ways to improve, particularly in large systems or settings with limited resources; ii) a lack of appropriate ways to improve communication; iii) a diversity of methodologies for assessing and measuring the implementation of biosecurity measures and their cost-effectiveness; and iv) a limited number of trained professionals. Several studies have highlighted numerous biosecurity measures used in European farms in recent years. These investigations revealed biosecurity disparities between farming methods and countries. However, the few papers that compared different countries were primarily descriptive, with little additional investigation into the causes of this variability. Furthermore, the majority of these research were undertaken in commercial holdings in Western Europe, therefore information about other production methods or nations is limited. The new COST Action Biosecurity Enhanced Through Training, Evaluation, and Raising Awareness (BETTER) was launched in October 2021 to address these concerns. The network has 300 participants from 42 different countries and includes a diverse experts and professionals from Europe, America, Australia, and Africa. Furthermore, stakeholders from government, industry, and international organizations such as FAO and WOAH have joined the Action. The aim of this study is to present preliminary data and compare existing techniques for assessing biosecurity.

Key words: Farm biosecurity, BETTER COST Action, Biosecurity Evaluation Methods, Raising Awareness

SNAKEBITES IN GOATS IN THE SHKODRA REGION, BASED ON MONITORING OF CASES IN 2021-2022.

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Abstract

The objective of this study was to monitor snakebite envenoming cases in goats caused by venomous snakes of the Viperidae family. The study was carried out in the Shkodra region during 2021-2022. It was developed in close cooperation with veterinarians and farmers of the area by administering a questionnaire and analysing the database for anamnesis, clinical signs, and season of snakebites.

Based on our findings, 86 (n=86) goats were intoxicated by snakes. In July, there was the largest number of cases of intoxication at a rate of 37.21%, but the largest percentage of mortality was in the months of August at a rate of 5.81% of the total snakebites. The way of farming animals, intensive or extensive, and the species of animals have a big impact on snakebites. Snake envenomation in animals causes a combination of local and systemic clinical signs such as neurological, cardiovascular, gastrointestinal, and respiratory systems as well as local symptoms. Snakebite cases are not only a problem for farm animals but also a concern for the rural community and should be addressed under the One Health approach. Our recommendation for every case of snakebite in animals is to be treated by a veterinarian as fast as possible for local and systemic clinical signs and treated with antivenom serum in more problematic cases.

Keywords: Snake, Viperidae, snakebite, envenoming, ruminant, goat.

Introduction

About 400 species of poisonous snakes from different families are known worldwide. In Albania, snakes from the Viperidae family (vipers) cause most cases of poisoning in animal population.
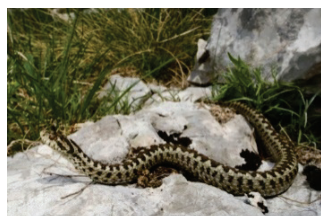
Figure 1. *Vipera ursinii*   **igure 2.** *Vipera berus*   **Figure 3.** *Vipera ammoydes*

In our country, a lot of damage from snakes occurs in all areas and to all types of animals. In the Shkodra area, three species of the Viperidae family have been identified: *Vipera ursinii (Fig 1), Vipera berus (fig.2)* and *Vipera ammodytes (Fig 3)*.

Figure 4 shows the anatomical structure of the venom system of snakes, which consists of two seromucous glands located symmetrically on both sides of the jaws under the masseter muscles. These glands end in two excretory channels which communicate respectively with the two symmetrical teeth which are also channelled and slightly curved. Under the pressure of the masseter muscles, which is exerted on two glands, at the moment of the bite, the introduction of the poison (at the site of the bite) occurs simultaneously [1].
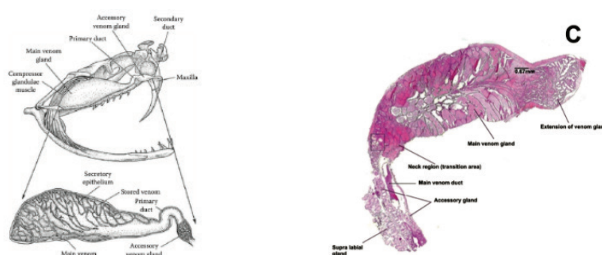
Figure 4 Anatomical structure of the venom system

Viper venom contains various enzymes with cytolytic and necrotizing properties as well as ophidotoxins. These substances aided by the effects of phosphoesterases cause dysfunctions of the cardiovascular system. Proteases exert anticoagulant and necrotizing effects on capillaries, quickly causing edemae at the bite site, which is complicated by capillary rupture, diffuse point haemorrhages [4], [1], [6]. Ophidotoxins (neurotoxins and cardiotoxins), are composed of basic polypeptides that have the ability to act on specific organs and systems [5], [7].

The aim of this work is to monitor snake poisonings and evaluate the problems caused by the Viperidae family in the region of Shkodra in ruminant animals, focusing in particular on goat poisonings by vipers.

Material and methods.

The study was carried out using statistics derived from poisonings in goats in Shkodra area, for 2021-2022. The data on these poisonings were collected, processed, and analyzed according to a pre-designed questionnaire. Data processing and analysis was carried out taking into consideration time and place monitoring as well as the data of contemporary literature about poisoning caused by venomous snakes from Viperidae family.

Results and interpretations

Referring to the data obtained from the questionnaire addressed to veterinarians and farmers in the area, it turns out that the most cases were caused by Viperidae family in farm animal mostly in goats, followed by sheep and cows.

Table no. 1 Number of goats intoxicated and dead by vipers in Shkodra area in 2021-2022.

Animals	Snakebite envenoming cases	Number of dead animals	Percentage of mortality
Goats	86	12	13.95%

The table above shows the number of goats poisoned by snakes and the percentage of their mortality. Frequent bites in goats are related to the way the goats are bred. In the area of Shkodra, there are many herds of goats that graze in nature and belong to the extensive and semi-intensive farming system.

Grazing in nature creates a higher probability of coming into contact with snakes, being accidentally stepped on or harassed by farm animals. Out of 86 goats poisoned by vipers, 12 of them, or 13.95%, ended in death. The high percentage of snake poisoning in goats is again related to the way of grazing and finding food from this species. Goats go to different places to get food, which means that they come into contact with snakes more often compared to other species.

From the table above, we can see that the summer season is with the highest statistics of snake poisoning of goats. The month with the highest percentage of snake poisoning is July (37.21%), followed by August (30.23%) and June (13.96%) of total snakebites. In the Shkodra area, at the end of July and the beginning of August, there is a lack of greenery and the ruminant animals look for food in mountainous hilly areas that are populated with vipers. On the other hand, snake venom in this period is more concentrated and more dangerous for animal life. This is the reason that in the months of July and August we also have the highest percentage of mortality in goats (4.65% and 5.81% respectively of total snakebites).

Tabela 2 Snakebites and mortality by month, the average of the years 2021-2022 in Shkodra region.

Months	Nr of snakebites in Goats	% of the total snakebites	Mortalities	% of mortality in total snakebites
January	-	0	0	0
February	-	0	0	0
Marsh	-	0	0	0
April	-	0	0	0
May	3	3.48%	1	1.16%
June	12	13.96%	1	1.16%
July	32	37.21%	4	4.65%
August	26	30.23%	5	5.81%
September	9	10.47%	1	1.16%
October	4	4.65%	0	0
November	-	0	0	0
December	-	0	0	0
Total	**86**	**100%**	**12**	**13.22%**

Snake envenomation of animals causes a combination of local and systemic clinical signs such as neurological, cardiovascular, gastrointestinal, and respiratory systems as well as local symptoms [3].

The diagnosis in snakebites is not difficult, as both anamnesis and the clinical signs can help in differential diagnosis. The prognosis depends on many factors, so it is reserved.

In all cases of snakebites, it is attempted to intervene as soon as possible with local and general therapy, to prevent the absorption of the poison, its removal from the body and the normalization of the disordered of different systems of animals [2].

Specific therapy usually consists in the use of anti-viper serum in a dose that varies according to the case and the size of the animals, from 5-20 ml.

Conclusion and Recommendations

Snake bites are a constant problem for the animals in the area of Shkodra, with economic consequences that must be taken into consideration. Snakebite cases are not only a problem for farm animals but it is a concern for the rural community and it would be a good idea to be under the One Health approach. Our recommendation for every case of snakebite in animals is to be treated by a veterinarian as fast as possible for local and systemic clinical signs and treated with antivenom in more problematic cases.

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IS THERE A LINKAGE OF SUBSIDIES FOR FOOD PRODUCTION IN ALBANIA, DIETARY STYLE AND ENVIRONMENTAL STATE?

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Abstract

Food systems play a significant role in biodiversity loss, other environmental consequences, and around one-third of anthropogenic greenhouse gas emissions under the current global and regional conditions. Animal products account for a disproportionately large share of the environmental effects of food production, according to numerous researches on the subject, while this is among the rare regional approaches. On the other hand, diets, or the food an individual consumes, and dietary habits are thought to play a significant role in determining how agriculture affects the environment. Against this context, in this article we explore the resulting transfers to agriculture and food associated with different dietary styles. Besides the very low rate of subsidies, we used data from Albania (compared also with Western Balkans and EU), considering both direct transfers through government subsidies and indirect transfers through toleration of environmental impacts and costs. We used similar methods for quantifying transfers, such as defining eight dietary styles in terms of the quantity of various product groups, allocating agricultural subsidies to product groups, allocating environmental impacts to product groups using life cycle assessment techniques, etc. The findings show that present regulations strongly encourage environmentally harmful dietary style (flexitarian, protein and meet focused one) over more environmentally friendly ones that are contrary with objectives coined within national strategies aiming to achieve environmental and public health goals.

Keywords: biodiversity, food systems, emissions, policy, subsidies

Introduction

ood must be farmed, plucked, or captured, moved, prepared, packed, and distributed, cooked, and the waste disposed of. Each of these actions uses energy and results in the release of anthropogenic greenhouse gases (GHGs) [1, 2, 3].It is necessary to produce and make available inputs like electricity and fertilizer at the appropriate time and place, with additional associated GHG emissions [4, 5]. According to studies on the effects of food production on the environment, a disproportionately large part of the effects are attributable to animal products [6]. Therefore, diets—the food consumed at the individual level and dietary practices—are considered a key factor in determining how agriculture affects the environment [7].

Dietary styles are influenced by food prices. Food prices may be affected by agricultural subsidies and by the regulation of environmental impacts or 'externalities' of agriculture. From the perspective of the polluter-pays principle, agricultural subsidies for food production and unregulated externalities decrease the costs of food and especially of food products with high environmental impacts [3]. Agricultural and food policy may therefore influence environmental impacts not only directly through environmental production standards but also through effects on the costs of food and dietary styles. Accordingly, food prices and dietary styles as affected by agriculture and food policy may be an important determinant of environmental outcomes. Prices of foods have an impact on dietary habits [2]. Further on the agribusiness subsidies and rules governing agriculture's "externalities," or effects on the environment, may have an impact on food costs. Agricultural subsidies for food production and unregulated externalities reduce the costs of food, particularly food products with substantial environmental impacts, from the polluter-pays perspective. Therefore, agricultural and food policy may have an impact on environmental consequences indirectly through effects on food prices and dietary preferences as well as directly through environmental production standards. The main objective of this contribution is to explore the transfers associated with different dietary styles induced by current agricultural policies in Albania. Transfers are defined in a wide sense, including the subsidies to food categories and the uncompensated monetized environmental impacts of food production i.e. external costs.

Methods and Data

The official statistics of Albanian agriculture provide detailed tables for the national expenditures for agriculture and nutrition [8]. Unfortunately, however, the expenditure categories do not distinguish measures supporting public goods such as biodiversity conservation and food security and measures that support the production of commodities. The official labels of the measures do not reliably indicate the function of the expenditures.

Subsidies to dietary styles were calculated by multiplying subsidies s per kilogram of product group i with the product quantity of Albanian origin, q, consumed by individuals with the dietary style jk, where j means the dietary style regarding product quantity and k means the meat style.

$S_{jk} = \sum_{i}^{n} (s_{ik} \, q_{ijk})$ (S_{jk}: subsidy associated with consumption style jk; s_{ik}: subsidies per kilogram of product ik; q_{ik}: quantity of product ik of local origin consumed by consumption style jk)

Net transfers associated with subsidies were calculated by subtracting annual tax contributions:

$NS_{jkl} = S_{jk} - T_{jkl}$ (*NS_{jkl}*: net subsidy associated with consumption style jk and income *l*, T_{jkl}: individual annual tax contribution to food subsidies)

Annual tax contributions were approximated by dividing total food subsidy cost by the gross domestic product (GDP) and multiplying by individual income. This implies an assumption that contributions to food subsidies are proportional to the individuals' contribution to GDP.

$S_{jkl} = S/GDP \, I_l$ (S = total annual food subsidy cost; I_l = income level *l)*

The net transfer associated with dietary style jk was obtained by subtracting the average external cost:

$NEC_{jk} = EC_{jk} - EC/P$ (NEC_{jk}: individual net benefit from current regulation of external costs; P: national population). Individual total subsidy and external costs associated with dietary styles are simply the sum of the two: $T_{jk} = S_{jk} + EC_{jk}$ (T*jk*: Gross transfer associated with dietary style *jk*)

Finally, the total net transfer associated with the dietary styles was obtained by summing net transfers due to subsidies and external costs: $NT_{jkl} = NS_{jkl} + NEC_{jk}$ (NT_{jkl}: Total net transfer associated with dietary style jk and income *l*)

Results and Discussions

The budgetary expenditures for the food production& agriculture sector in Albania are presented in Figure 1, while Figure 2 (eight dietary styles combined with cheap, moderate, or costly meat) displays the subsidies related to each dietary style. Before any deduction for individual tax contributions to the subsidies, the gross transfers are the agricultural subsidies for food production related to dietary patterns (Figure, 2). The biggest transfer that is linked to a diet high in meat is more than 15 times greater than the lowest transfer, which is linked to a vegan diet. Similar findings are recently recorded by [1, 3].
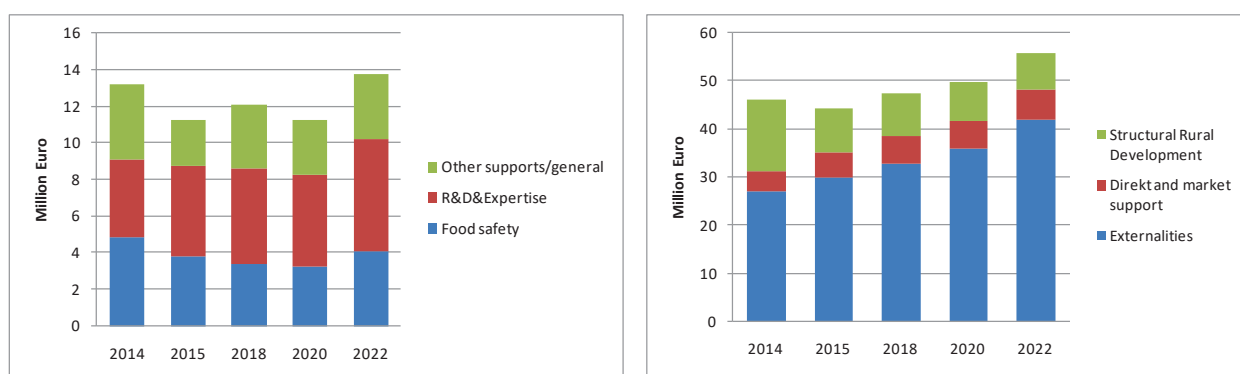
Figure 1 The budgetary expenditure (million Euro) for food production& agriculture sector in Albania
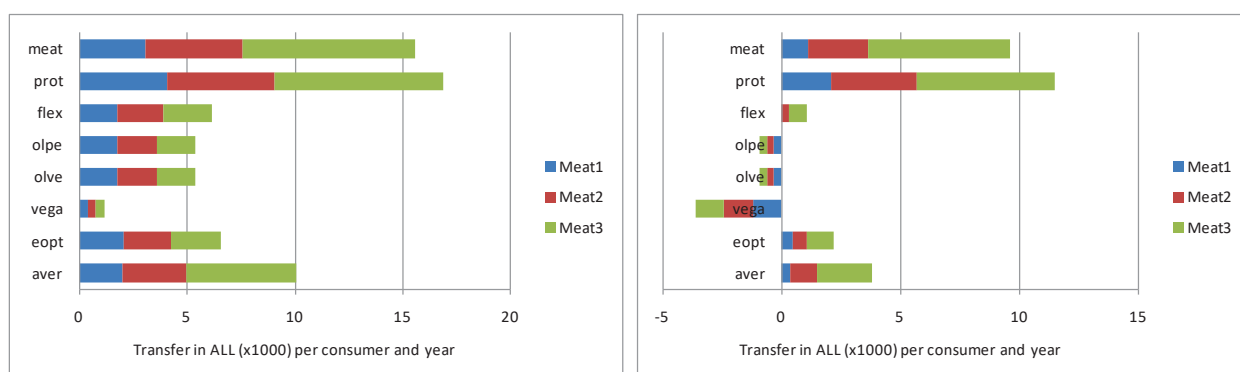
Figure 2 Subsidies associated with dietary styles. First left: gross subsidies and second right the net subsidies after subtracting the tax

Our results shows and clear relationship between the amount of animal-based foods in a diet and its environmental impact that is in line with different recent publications that include GHG emissions, land use, water use, eutrophication and biodiversity. So, a dietary change far from animal-based foods can make an important contribution to reduction of the national and regional environmental pollutants. Looking to the current European and also Albanian governance perspective, the findings have a dose of disturbance. But, on the other side, it is clearly becoming increasingly that agricultural policies provide subsidiaries/incentives that contradict official policy objectives and targets in the domains of climate objectives [9, 10]. So, our main finding is that current agricultural

and food subsidiaries is contradicting official strategies and targets in the field of climate mitigation & adaptation approaches and favors those dietary styles that are incompatible with a healthy nutrition [11].

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PRECISION OENOLOGY: LAORATORY ON CHIP (LoC) FOR POLYPHENOLS DETECTION IN WINE

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In the context of red wine production, the phenolic content plays a crucial role. Components such as anthocyanins, flavonoids, and total polyphenols have a significant impact on the right time of grape harvesting and the overall wine quality, including its body, color, and texture. The amount of polyphenols in grape musts and wines is not only influenced by the accumulation of these compounds in grapes and their cellular maturity but is also greatly affected by maceration and fermentation techniques. Traditionally, the evaluation of polyphenols involves destructive, labor-intensive, expensive, and environmentally unfriendly analytical methods. In today's global market, companies striving to remain competitive must embrace innovation and digital transformation. On this basis, the primary goal of the research here presented is to develop a portable precision enology platform based on acoustic wave sensors and cutting-edge connectivity technology (clouding), addressed to reduce the cost of chemical analyses for wineries while ensuring precise and consistent results. Innovative chemical functionalization strategies for gold-based acoustic transducers capable of detecting polyphenols in wine have been introduced. Employing Quartz Crystal Microbalance with Dissipation Monitoring (QCM-D) instrumentation, two distinct probes based on Gelatin A (Gel-A) and Murine Salivary Protein 5 (MP5) have been created. These probes have demonstrated their effectiveness in detecting polyphenols in commercial wines with no sample pre-treatment or chemical analyses. The obtained results show great perspective and suggest the potential use of these devices for on-site precision enology analysis. This research is funded by Ministero Dell'istruzione, Dell'università E Della Ricerca (VIOLoC project FISR2019_03020).

Key words: surface acoustic waves; QCM; Digital Transformation; Clouding; phenolic content

THE INFLUENCE OF FOOD ENVIRONMENT IN SUSTAINABLE FOOD CHOICES: EXPLORING FAST-FOOD BEHAVIOR AMONG ADOLESCENTS IN ALBANIA

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Abstract

Food environments (FE) constitute socio-ecological domains that influence the accessibility, availability and adequacy of food within a community. Therefore, the Food Environment has a vital role in creating interventions that promote sustainable food systems through sustainable diets. The objective of this study is to explore how food environments impact unsustainable and unhealthy diets, such as fast food consumption. A survey was conducted among 300 adolescents residing in Tirana, investigating their understanding of health-related aspects of fast food (FF), as well as their attitudes toward FF consumption, marketing drivers, and subjective norms. The findings indicate that those adolescents who perceive elevated advantages in FF, in terms of taste, nutritional values and prices, tend to consume FF more frequently. Interestingly, nearly 70% of adolescents recognise that Fast Food is detrimental to their health, associating its consumption with weight gain, heightened fat levels, and health issues. However, adolescents maintain their consumption of fast food despite acknowledging its harmful effects. This may be attributed to the instant gratification cycle (superior taste) and postponing negative health consequences into the future. This behaviour also indicates a lack of agency due to habit forming and highlights the need to understand the underlying psychological mechanisms of this behaviour. Future studies are necessary to explore how nudging behaviour and social tipping processes can help to change consumer mindsets towards more sustainable diets in different food-environment interfaces since information and knowledge do not produce changes in behavior.

Key words, Food environment, sustainable diet, fast food, adolescents, agency, habit

Introduction

Diets play a central role in food system and they can be considered either as the input or the outcome in the pathway to achieve sustainability. Incorporating a healthy eating perspective into food system transformation is essential to ensure that food systems not only provide nutritious foods but also that consumers have access to, can afford and desire healthy foods (Brouwer et al., 2021). Unhealthy diets are usually associated with the triple burden of malnutrition, overweight, and climate change (Horgan et al., 2016; Macdiarmid & Whybrow, 2019) and several studies suggest that the food environment has a critical role to play in developing interventions that promote sustainable food systems through sustainable diets (Caspi et al., 2012; Engler-Stringer et al., 2014). Food Environment constitutes socio-ecological domains that influence the accessibility, availability and adequacy of food within a community (Brouwer et al., 2021). Researchers on food environment and its effects on health have generally fallen into two categories see for review Caspi et al.,(2012). The first focuses on inequalities in access to healthy food, including the existence of food deserts, while the second examines the impact of the food environment on diet, with a particular focus on obesity as an outcome. In relation to the second category, the process of globalisation of food systems has largely affected the food environment by enabling affordable diets that have less favourable outcomes for nutrition, environment and health (Ambikapathi et al., 2022). The above issues are more pronounced in low- and middle-income countries, as they are exposed to globalisation processes that are believed to contribute to unhealthy diets by flooding low-income countries' markets with cheap food and the proliferation of Western-style fast food outlets (Fox et al., 2019). Research suggests that the globalization of Fast Food (FF) has affected more the adolescents' eating patterns in several countries undergoing the nutrition transition (Hanus, 2018). Also, public health literature identifies globalization as a significant cause of obesity, by highlighting the role of soft drinks and Fast Food consumption (Abdullah et al., 2015; Banik et al., 2020; Li et al., 2017; Shori et al., 2017)(Adair & Popkin, 2005; Fox et al., 2019). FF include all the product and services sold in a restaurant or store, rapidly prepared and quickly served in a packaged form or takeout (Monge-Rojas et al., 2013). FF is a combination of products with a high intake of calories offered in an appealing way related to price, place and promotion. Their increased demand is linked to the specific qualities of such foods as easy, fast to prepare, convenient, and relatively inexpensive (Seo et al., 2011). From this perspective, it is interesting to explore the role of the food environment on fast food consumption among Albanian adolescents. Considering that they are relatively more independent, have easy access to FF choices, have a higher

relative interest in FFC, and that this age group is subject to ongoing lifestyle changes that will determine the dietary pattern of the adult individual, it is an important topic to explore. The objective of this study is to explore how food environments impact unsustainable and unhealthy diets, such as fast food consumption.

Material and method

The FF consumption patterns of adolescents in Albania are collected from a survey conducted from 2021 to 2022 in different locations of Tirana city (Albania), with adolescents attending private and public schools (see table 1 statistics). The questionnaire is developed online and printed to involve the children who have no access to information and communications technologies. The questionnaire is structured in four sections. The first section collects the demographic characteristics of the participants, including gender, age, parents' education and employment status, education sector (public vs private) and finally, the place of residence (rural/urban). The second section encompasses questions on the consumption frequency of FF items included in this study. The third section explores the attitudes toward FF, especially those linked to health awareness and marketing stimuli related to FF, such as the impact of advertising, pricing, and restaurant environment factors. The format of analysis applied is based on preferences, in first-person terms, where is asked the extent to which the participant agrees or disagrees with a specific statement. The response categories in preference statements are often Likert scales (1=Strongly disagree….,5=Strongly agree; see Table 2). Other studies in Albania have shown the successful adaptation of the five-point Likert scale, displaying a reliable and discriminative feature (Hasani et al., 2022; Kokthi et al., 2022; Kokthi & Kruja, 2017).

Table 1: Participants characteristics (frequency in %)

Variables	Description	N=300
Gender	1. females,	56,5
	2. males	43,5
Age	Age categories:	
	12-13,	17,8
	14-15,	35,6
	16-17,	13,6
	17-18,	33,0
Mother Education	Low: 1-8 years;	49,2
	Medium: 8-12 years;	35,6
	High: more than 12 years	15,2
Father Education	Low: 1-8 years;	46,1
	Medium: 8-12 years;	42,4
	High: more than 12 years	11,5
Education sector	Public	69,1
	Private	30,9
Residence	Urban areas	93,7
	Rural areas	6,3

Source: Authors elaboration

The target group of this study are young adult and adolescents due to their higher relative interest in FF consumption. Firstly, some of the reasons that explain this behaviour are attributed to the specific qualities of such foods as easy, fast to prepare, convenient, and relatively inexpensive (Seo et al., 2011). Secondly, this group age is subject to ongoing lifestyle changes that become relatively more independent and have easy access to FF choices.

The main FF items consumed by the participants are hamburgers, donner, souvlaki, pizza, french fries and sandwiches. Other studies have also considered these items (Powell & Han, 2011), reflecting the impact of globalization on children's consumption patterns (Adair & Popkin, 2005). The data results also justify exploring the consumption patterns toward different FF items in Table 2. No statistically significant differences are observed in the consumption frequency among the adolescents of Albania and Kosovo.

Table 2: Type of fast of food and consumption frequency

FF type	N=300			
	1[1]	2	3	Mean
Hamburger	39.8	51.8	8.4	1,69
Donner	91.1	3.1	5.8	1,15
Souvlaki	42.9	46.1	11.0	1.68

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[1] Times per week

Pizza	45.0	40.8	14.1	1.69
French fries	36,1	45,0	18,8	1.83
Sandwiches	27.7	62.3	9.9	1.82

Table 3: Perceived benefits and risks toward FF consumption

Perceived benefits on FFC (P)	Mean	Stdeviation	Attitudes toward FFC (A)	Mean	Stdev	Perceived risks to FFC (R)	Mean	
I think that FF provides all the necessary nutritive elements I need	2.05	0.983	I think it is difficult not to eat FF	2.8	1.021	I think that FF is unhealthy	3.8	1.167
I think that FF is offered in ample portions that satisfy hunger	3.07	1.067	I eat FF also when I am dieting	2.2	1.181	I think that excessive consumption of FF causes serious health problems	4.1	1.022
I think that FF is very tasty	3.93	0.939	I eat FF even though I am aware it is not healthy	3.5	1.117	I think that FF products contain so much fat	4	1.027
I think that FF costs much lower than food in restaurants	3.62	1.126	I use FF, although I cook a meal so fast on my own	2.9	1.233	I think that FF has too much salt	2.9	1.113
The restaurants where it is served FF are very nice ones	3.13	0.983	Even if awareness is raised of the adverse effects of FF on our health, I believe that I will continue eating FF	3.1	1.143	I think that FF products are very high in calories	4	1.063
The restaurants where it is served FF are clean and safe	2.68	1.153	I use FF, although fast restaurants are far away	2.6	1.123	I think that FF products make you fat	4.1	0.917
FF restaurant is a pleasant place to have birthday parties	2.72	1.322	I use FF; although there is no advertising on TV, the internet	3.4	1.158	I think that FF products have been stored in freezing for a long time	3.2	1.085
			I use FF, although there is no promotional marketing offered	3.4	1074			
			I use FF, although I have to wait a long time to get it.	3	1.122			

Source: Authors

Result and Discussion

This study shows that adolescents and children are aware that FF consumption is related to health problems. Also, most of the respondents link FF consumption with weight gain, increased fat, and health problems. However, they also relate FF with very high taste products and price convenience. Almost 70% of the adolescents agree that FF are unhealthy. However, about 74-75% of the participants agree that FF have good taste. Additional marketing stimuli such as promotion, advertising, and FF place attractiveness do not affect their consumption behaviour. An interesting finding is linked to the fact that no matter the negative impact of FF on their health, they will continue to consume FF. This result might be linked to the instant gratification cycle. Adolescents and young children are prone to accessible, enjoyable consuming experiences and ignore the future consequences on health. Since health-related problems are not currently evident, they continue with their consumption habit. Even though factors influencing FFC reflect immediate needs and long term health is overridden by the short term benefits of fast food (Dunn et al., 2011), consumer decisions are based on some level of rationality. Analysing factors that shape behaviour, such as attitudes and perceptions, is the starting point that might help inform public health efforts to improve dietary practices.

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BOTANICAL, MICROBIOLOGICAL AND CHEMICAL COMPOSITION OF FRESH AND FERMENTED POLLEN

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Abstract: The pollination of several crops, as well as wild plants, depends on honeybees. To get the nutrients required for growth and survival, honeybee colonies are dependent on pollen supply. Fresh and fermented pollen samples were gathered from an apiary in the Campania region of southwestern Italy. Phenolic profiles were detected by HPLC-PDA, while antioxidant activity was determined by colorimetric assay using 2,2′-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS). The Next-generation sequencing (NGS) based on RNA analysis of 16S (rRNA) and Internal Transcribed Spacer (ITS2) regions was used to identify the bacteria and fungi present in the samples, as well as the botanical origin of the pollen. The plant families most representative were *Fabaceae* and *Rosaceae* for fresh pollen, while *Fabaceae* and *Borraginaceae* for fermented pollen. As for fungi, the following families were the more prevalent in both samples: *Cladosporiaceae* and *Erysiphaceae*. The most present bacteria are found to belong to the following families: *Entomoplasmataceae*, and *Enterobacteriaceae*. From chemical analysis of fresh and fermented pollen samples, it was found that the former is rich in flavonols (rutin, myricetin, quercetin, and kaempferol), while the latter is richer in phenolic acids. Regarding total phenol content and antioxidant activity, these were higher in fermented pollen, resulting in greater heterogeneity in botanical and microbial species. The results of this study highlight that the transformation of fresh pollen into fermented pollen results in important changes in phenolic compounds and microbial communities in the pollen.

Keywords: antioxidant activity, bee bread, flavonoids, Next Generation Sequencing, polyphenols.

Introduction

Honeybees are pivotal in the pollination of both wild plants and crops used in agriculture. As their primary source of sustenance, bees collect and transport pollen to their hives to nourish themselves and their larvae [1]. Stored in honeycomb cells, bee pollen (BP) undergoes a chemical transformation driven, presumably, by bee glandular secretions and bee-associated microbial communities; therefore, fermented pollen, or bee bread (BB), is the result of a series of microbial successions involving molds, yeasts, and bacteria, particularly lactic acid bacteria [2], ultimately creating bee bread. This nutrient-rich substance is consumed by nurse bees to produce royal jelly, a vital source of nourishment for both the queen and developing queen larvae [3]. Pollen is abundant in a variety of vital nutrients, such as sugars, proteins, amino acids, lipids, fatty acids, polyphenols, enzymes, coenzymes, vitamins, and minerals. Despite this, further research is necessary to examine the microbial ecosystem of bee products, including bacteria and fungi. Furthermore, comparative data on the chemical differences between bee pollen (BP) and bee bread (BB) of the same origin is currently lacking in scientific literature [4].

Material and Methods

Samples of BP and BB were collected from an apiary situated in Castelpoto (41°08'42"N; 14°42'14"E; 280 m a.s.l.), in the southern region of Campania, Italy. The total phenolic content was assessed quantitatively using the Folin-Ciocalteu reagent, using gallic acid as standard. Phenolic profiles were detected through HPLC-PDA analysis. To evaluate the antioxidant activity of the samples, the 2,2 azino-bis 3-ethylbenzothiazoline-6-sulfonic acid (ABTS·+) radical cation method was employed, following the protocol established by [5]. The botanical origin of the pollen was identified and bacteria and fungi present in BP and BB were compared through Next-Generation Sequencing (NGS) using 16S and Internal Transcribed Spacer (ITS2) ribosomal RNA (rRNA) analysis. Statistical analysis was performed using the t-test to assess significant differences for $p<0.05$.

Results and Discussions

The most abundant plant families found in fresh pollen are *Fabaceae* (63.47%), *Rosaceae* (22.66%), *Asteraceae* (3.31%), *Boraginaceae* (3.17%), and *Ranunculaceae* (2.59%); meanwhile, in BB, the most representative plant families are *Boraginaceae* (62.22%), *Fabaceae* (32.56%), *Rosaceae* (1.66%), and *Fagaceae* (1.27%). At the genus level, *Trifolium* (63.4%) and *Rubus* (22.66%) were mainly identified in BP, while *Borrago* (66.22%) and *Trifolium* (32.6%) were in BB. As for fungi, the most relevant families were *Cladosporiaceae*, *Erysiphaceae*, *Sclerotiniaceae*, and *Pleosporaceae* in BP, and *Erysiphaceae* (46.92%), *Cladosporiaceae* (38.77%), *Sporidiobolaceae* (7.79%), and *Pleosporaceae* (6.52%) in BB. The following genera were predominant: *Cladosporium* (37.8%), *Botrytis* (13.7%), and *Alternaria* (11.0%) in BP, while *Cladosporium* (38.8%), *Sporobolomyces* (7.8%), and *Alternaria* (6.5%) were found in BB. Within bacteria, the *Enterobacteriaceae* family (78.4%) is the main representative of fresh and fermented pollen samples.

Table 1. Phenolic profiles of Bee Pollen and Bee Bread (µg/g of fresh weight). Data were expressed as mean ± SD (n=3). Different lowercase letters (a–b) in each row indicate significant differences ($p < 0.05$).

Phenolic compounds	Bee Pollen	Bee Bread
Gallic acid	0.26 ± 0.46[b]	3.10 ± 0.57[a]
3,4-dihydroxy-benzoic acid	0.52 ± 0.90[b]	34.60 ± 3.72[a]
2,5-dihydroxy-benzoic acid	n.d.	30.30 ± 5.50[a]
p-OH benzoic acid	n.d.	11.20 ± 3.22[a]
Chlorogenic acid	n.d.	2.45 ± 0.53[a]
Vanillic acid	n.d.	n.d.
Caffeic acid	n.d.	13.80 ± 5.44[a]
p-coumaric acid	n.d.	n.d.
Ferulic acid	n.d.	41.80 ± 2.99[a]
o-coumaric acid	n.d.	25.20 ± 1.76[a]
Rutin	35.90 ± 2.97[a]	n.d.
Myricetin	4.50 ± 0.93[a]	n.d.
Quercetin	13.40 ± 2.20[a]	n.d.
Cinnamic acid	n.d.	23.80 ± 5.32[a]
Kaempferol	2.56 ± 0.84[a]	20.10 ± 1.58[b]

Polyphenols detected through HPLC showed that fermented pollen samples had the highest amounts of phenolic compounds (Table 1). However, for flavonols such as rutin, myricetin, and quercetin, this trend was reversed, with higher levels found in BP samples, except for kaemperol, which had higher levels in fermented pollen. Polyphenols have antiseptic and antioxidant properties. High polyphenol content usually implies greater antioxidant activity because they act as a quencher against radical oxygen species (ROS) [6]. However, statistical analysis of the measured values using the ABTS assay showed no significant differences between BP and BB. Total polyphenols (Table 2) measured using the Folin-Ciocalteu method were in agreement with those determined via HPLC. Fresh and fermented pollen samples were significantly different from each other, with a higher content of total phenols found in the fermented pollen samples.

Table 2. Antioxidant Capacity (mg Trolox Eq./g of fresh weight) and Total phenols content (mg GAE/g of fresh weight) of Bee Pollen and Bee Bread. Data were expressed as mean ± SD (n=3). Different lowercase letters (a–b) in each row indicate significant differences ($p < 0.05$).

Assay	Bee Pollen	Bee Bread
ABTS	6.78 ± 1.80[a]	9.86 ± 1.40[a]
Total phenols	7.55 ± 2.49[b]	14.08 ± 3.49[a]

Conclusions

The phenolic composition of fresh pollen (BP) is directly influenced by the plant species distributed near the sampling site. However, bee bread (BB) is made up of pollen from different plant species and is home to a more diverse group of fungi and bacteria compared to bee pollen (BP). Consequently, the results of this study indicate that the biotransformation of BP to BB, operated by specific microbial groups, influences the composition and content of phenolic compounds detected. BP showed a higher content of flavonoids compared to BB, which is rich in phenolic acids. Phenolic profile differences are likely due to bacteria and yeast metabolism during pollen fermentation, yet this does not show significant changes in antioxidant activity. Therefore, we recommend further research to explore how pollen quality affects honeybee health.

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ON-FARM WELFARE ASSESSMENT OF ALBANIAN DAIRY GOATS USING ANIMAL-BASED PARAMETERS

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Abstract

Albania has a rich tradition of breeding sheep and goats, both of which play vital roles in the country's livestock production. The growing demand for livestock products in Albania has led to an increase in intensive goat farming, raising concerns about animal welfare.
To assess the welfare of goats on-farm, protocols based on the evaluation of various animal-based parameters were used. This study was conducted from May to June 2023 on 10 Albanian intensive goat farms, involving a total of 1,890 goats. Out of this number, 698 dairy goats, 37% of the total number, were individually evaluated.
This assessment was carried out by three trained observers using an adapted AWIN assessment protocol for dairy goats, focusing on animal-based parameters such as:
body condition score, lameness, overgrown claws, presence of the abscesses in the body, udder asymmetry or udder lesions, etc. and pen level parameters such as coat condition, queuing or kneeling at the feeding rack, presence of coughing or heat stress.
Descriptive statistical analysis was performed using SPSS 22.
More than 85% of the evaluated goats exhibited normal body condition. However, there were areas of concern regarding some clinical parameters, with the presence of abscesses at 12.3%, lameness at 10.2%, overgrown claws at 18.6%, udder asymmetry at 12.2%, udder lesions at 7.7%, deformed or asymmetric papillae at 7.1%, and ear lesions at 6.7% of animals.
This initial on-farm study on dairy goat welfare yielded valuable data, highlighting welfare concerns, which can be used as a basis for future studies.

Key word: Body condition score, health, indicator, lameness, udder asymmetry

Introduction

Goats as small ruminants have always been important for the Albanian economy and according to the data they are being bred about 722 000 goats in total (INSTAT, 2022). In the mountainous areas, the growth is realized through small and medium family herds, but a considerable number of farms, mainly in the flat and hilly areas, developed to medium and large farms and the predominant breeds are Alpine and Saanen goats well known for a high milk yield production.
The farmers have increased the professionalization regarding management system, keeping and care of dairy goats, paid attention to the farm buildings, making it possible to create an environment as suitable as possible for breeding goats kept indoors. Often, not all of these systems meet animal welfare standards as demanded by consumers, farmers and defined by EU laws, regulations and directives. For intensive production of dairy goats little is known about its effect on goat health and animal welfare. So far, in Albania there are no genuine animal welfare studies with the exception of some articles of many years ago (Kume, et al. 2004), and there are no specific welfare legislation or husbandry standards for small ruminants in place.
Since the beginning of the 21 century, farming animal health and welfare monitoring systems have been developed with a recent focus on so called animal based indicators on the individual animal level (Whay, Main, Green, & Webster, 2003). These indicators provide a more accurate assessment of animal welfare than resource-based parameters (e.g. space allowance, length of feeding trough) as they provide direct information about the animal's response and its' effects. Also, the European Commission emphasizes the use of science-based animal welfare indicators as a potential tool to simplify the legal framework and allow flexibility to improve the competitiveness of livestock farmers (EFSA, 2012).
To enable the assessment of the health and welfare of goats, special protocols are developed for on-farm conditions to gain insight into the health and welfare situation using quantitative, practical and reliable data. Animal based indicators were applied on 24 dairy goat farms in UK (Anzuino, Bell, Bazeley, & Nicol, 2010) and in Norway (Muri, Stubsjøen, & Valle, 2013), and within a large project (AWIN (European Animal Welfare Indicators Project), 2015; Battini et al., 2014) assessment protocols for sheep and goats were developed. Here, a set of indicators is available to assess animal welfare as a basis to promote improvements in animal production systems across Europe. The protocols were developed for very different production systems, ranging from very intensive to pasture-based systems, and various production environments, ranging from intensive milk production to extensive meat production. The welfare assessment protocols are based on the four principles of well-being

and the twelve criteria developed by the Quality of Welfare Protocol® and are comprehensive and non-complex, so that their application meets current needs.

The aim of this study was to collect data on the health and welfare situation of goats by developing assessment protocols, which will provide the basis to improve conditions by proposing health and welfare standards or improvement measures.

Material and Methods

The study was conducted in 10 intensive dairy goat farms in Albania selected randomly and spread out mostly in the west part from the north to the middle of Albania from 10 May 2023 to 10 June 2023. The condition for farm selection was that farm to have minimum 60 dairy goats per farm. To assess the welfare of goats on-farm, protocols based on the evaluation of various animal-based parameters were developed and used. In these 10 intensive goats farm visited were breed 1,890 goats in total and based on the AWIN protocol 698 dairy goats (50 goats for small farms and 70 goats for medium or large farms) or 37% of the total number, were individually assessed.

This assessment was carried out by three trained observers using an adapted AWIN assessment protocol for dairy goats, focusing on 12 animal-based parameters such as: body condition score, lameness, overgrown claws, presence of the abscesses in the body, udder asymmetry or udder lesions, ear lesions, etc.

Descriptive statistical analysis was performed using SPSS 22 and the Correlation test was used to verifies the influence of the clinical parameters to Body condition score (BCS).

Assessment was performed using sight and palpation to identify potential changes. Each individual was given 3-5 minutes of time to observe and mark on the form all the evaluation according to the relevant fields. Each parameter is scored in two levels: "0" for normal and "1", for the parameters that are considered not normal.

Results and Discussion

During the study, 698 goats which represent about 37% of 1890 in total, were individually assessed and the body condition of goats were very well. All farmers try to fulfil almost 100% the goats needs for food and drinking water. The predominant breeds of goats were Alpine, Sana and very few Malta and Syria goats breed.

The results of the prevalence of body condition and clinical parameters in goats assessed from the 10 goat farms included in the study are shown in Table 1 and 2.

Table 1. Goat assessed according farms and body condition score

Farm Numbers	Total goats number	Pen numbers/Farm	Number of assessed goats	Goats Breeds	Body condition score (0-normal/1-thin)	Lameness (0/1,)	Overgrown claws (0/1)	Hair coat condition (0/1)
1	80	4	60	Alpine / Sana	26.67	15.00	10.00	6.67
2	300	10	74	Alpine / Malta	22.97	14.86	6.76	1.35
3	120	1	70	Alpine / Sana	12.86	11.43	10.00	5.71
4	120	3	74	Alpine / Syria / Sana	10.81	5.41	8.11	0.00
5	150	5	74	Alpine / Sana	16.22	10.81	10.81	0.00
6	220	2	74	Alpine / Malta	12.16	12.16	72.97	0.00
7	70	3	50	Alpine	6.00	0.00	8.00	0.00
8	250	12	74	Alpine / Syria	9.46	9.46	20.27	0.00
9	400	2	74	Alpine / Sana	17.57	20.27	20.27	0.00
10	180	5	74	Alpine / Sana	12.16	2.70	18.92	0.00
Total	**1890**	**47**	**698**		**14.69**	**10.21**	**18.61**	**1.37**

Only 14.69% of evaluated goats were thin or to thin. These results can be related to different health problems like lameness or other diseases. The BCS in thin goat was more influenced by lameness's according to Correlation test (P. 000).

Table 2. The prevalence of clinical parameters in assessed goats

Farm Nr.	Udder asymmetry over 25% (0/1)	Udder lesions (0 / 1)	Deformed Papilla (0 / 1)	Abscesses In front part (0/1)	Abscesses In rear part (0 / 1)	Deformet horns (0 / 1)	Body lesions (0 / 1)	Ear lesions (0 / 1)
1	11.67	6.67	8.33	8.33	5.00	8.33	3.33	5.00
2	18.92	10.81	6.76	12.16	6.76	9.46	5.41	0.00
3	11.43	8.57	7.14	5.71	2.86	4.29	2.86	7.14
4	8.11	5.41	6.76	9.46	4.05	5.41	1.35	5.41
5	9.46	5.41	10.81	8.11	2.70	8.11	2.70	5.41
6	24.32	8.11	6.76	4.05	1.35	6.76	1.35	5.41
7	0.00	0.00	0.00	8.00	2.00	0.00	2.00	8.00
8	9.46	10.81	8.11	16.22	5.41	8.11	4.05	10.81
9	13.51	16.22	9.46	21.62	16.22	10.81	10.81	12.16
10	14.86	5.41	6.76	29.73	6.76	9.46	2.70	8.11
Total	**12.17**	**7.74**	**7.09**	**12.34**	**5.31**	**7.07**	**3.66**	**6.74**

The phenomenon of the overgrown claws were present in almost all farms with an average of 18.61% and it is believed this is related to the non sufficient movement outdoor or in the pasture. The overgrown claws maybe contribute also in the difficulty of movements, less possibility to take food and drinking water.

lameness's also were a clinical manifestation in goats farms in average of 10.21% and this is the most correlative parameters with body condition of goats.

In all visited farms were present the presence of abscesses mostly in the front part of the body and from our opinion this is mostly related to Caseous lymphadenitis (CLA).

The prevalence of the udder asymmetry over than 25%, deformed papilla and udder lesions were 12.17%, 7,09% and 7,74%, respectively.

As a conclusion, the study showed that farms fulfilled 100% the conditions of food and drinking water and there were no animals in line to feed or drink water. A large percentage of the evaluated goats were clean and free of faecal contamination with over 95%. The prevalence of lameness's 10.21% can mostly contribute in the body conditions of goats. This study can be a strong be a strong base for further studies in animal welfare in small ruminants in Albania.

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MYCOTOXIGENIC FUNGI ON CEREALS: CAN THEY REPRESENT A RISK FOR CONSUMER HEALTH IN ALBANIA?

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Mycotoxigenic fungi are reason of both phytopatological and toxicological concern in cereal cultivated areas. To date, their occurrence and the accumulation of associated mycotoxins in kernels are poorly investigated in Albania.

We sampled in 2022, at harvest, wheat (41) and maize (46) samples throughout the country in order to detect toxigenic fungi contamination and related mycotoxins.

All wheat samples showed high fungal contamination (values over 90%). *Alternaria* species, with the exception of four samples, were detected with values from 28 to 99%. *Fusarium* species were detected only in 23 samples, up to 13%. The samples were analysed for accumulation of deoxynivalenol, a harmful *Fusarium* mycotoxin, that was detected in 63% of samples up to 0.08 mg/kg.

For the maize samples, the mycotoxin analyses are in progress. However, *Fusarium* species were detected in 43 samples, with values up to 100%; *Aspergillus flavus* was detected in 37 samples, with values higher than 80% in 8 samples. Black *Aspergilli* were detected in 17 samples, but only two of them were highly contaminated (77 and 96% respectively); *Penicillium* contamination was detected in 28 samples with very variable values.

While in this first year of sampling *Fusarium* and deoxynivalenol contaminations in wheat were low, the high incidence of *Fusarium* and *Aspergillus* species on maize is worrisome. The mycotoxin analysis in the maize samples of this first year and the data that we are generating in the current year, will contribute to provide a clearer picture of mycotoxigenic risk in cereals in Albania.

Key Words: *Fusarium*, *Aspergillus*, *Alternaria*, fungal biodiversity, toxicological risk, deoxynivalenol

PREVALENCE OF SUBCLINICAL MASTITIS IN THE NORTHERN ALBANIA REGION

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Subclinical mastitis (SCM) is one of the most economically important diseases affecting the dairy industry. The SCM does not cause visible changes in the udder or physical changes in the milk as compared to clinical mastitis. The SCM has consequences for animal health and causes important economic losses; its diagnosis and treatment are of particular importance to the efficiency of the farm and the health of the consumer. A clear overview of the prevalence and risk factors in the different regions of Albania is still lacking. The objective of this study was to investigate the prevalence of SCM in the northern Albania region. A total of 80 cows from selected farms in the districts of Lezha, Shkodra, Kukës and Dibra were examined in the study. The California Mastitis Test was conducted for individual cows, and a score of 1 to 3 for any quarter without any clinical symptoms or abnormalities in milk was considered positive for SCM. From the preliminary results, the prevalence of clinical and subclinical mastitis was 30%. The difference between regions were insignificant. According to the preliminary findings, SCM has an impact on dairy cattle in northern Albania. However, more animals should be tested to draw conclusions.

Key words: Subclinical mastitis, dairy cattle, animal health, northern Albania, preliminary results

DETERMINATION OF RESORCYLIC ACID LACTONES IN CAPRINE URINE SAMPLES BY LC-MS/MS.

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Abstract

Zeranol, taleranol, α- and β-zearalenol also zearalanone and zearalenone are resorcylic acid lactones (RALs). Zearalenone is known also as a mycotoxin that is often found in animal feed. The use of Zeranol as a stimulant to increase body weight in animals that are breed for human consumption is banned in the EU. As no data exist on the occurrence of resorcylic acid lactones in caprine urine, in Republic of Albania we have analyzed them using a confirmatory method by LC-MS/MS. The extraction method is based on purification with solid phase extraction columns. The samples were taken from different areas of the country. All samples were collected according to established standards in the Republic of Albania. Fifty two (n=52) caprine urine samples were taken in the study during the period 2022 until august 2023. Of which fifty two (n= 52) were found to be compliant below the decision limit for confirmation (CCα). Based on the fact that all urine samples were found to be compliant, we can conclude that there was no feed contamination or zeranol was not used as growth promoter, but further studies should be done.

Keywords: Resorcylic Acid Lactones (RALs), zeranol, growth promotor, caprine urine, LC-MS/MS.

Introduction

Zeranol (α-zearalanol) and its primary metabolite, taleranol (β-zearalanol), are resorcylic acid lactones (RALs), which also include α- and β-zearalenol, zearalanone, and zearalenone. Administration of zeranol, a non-steroidal oestrogenic growth-promotor compound, which increases live-weight gain in food animals, is banned in the EU [5]. Zearalenone is also known as the Fusarium spp. toxin (F2-toxin) and is commonly found in animal feed [2]. Resorcyclic acid lactones chemichal structures are shown in the figure below.
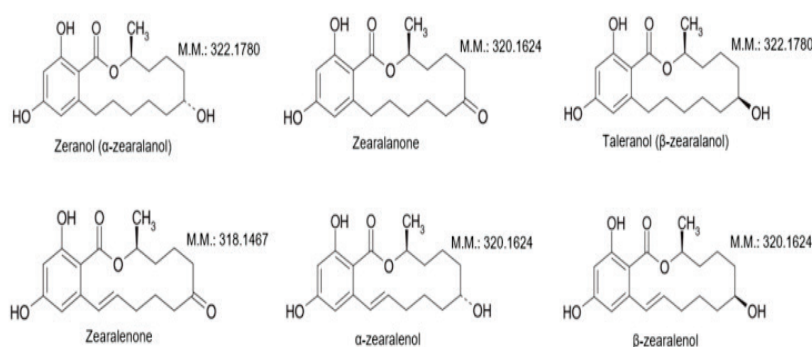
Figure 1 Chemical configurations of Resorcyclic acid lactone [6]

The objective of this study was to determine the resorcyclic acid lactones in caprine urine samples by LC-MS/MS.

Material and Methods

-Study area
Fifty two urine samples from goat were collected respectively during a time period 2022- august 2023. The samples were taken from different regions of Albania. The distribution of the samples is presented in the Table 2:

Table 2. Sampling by location

Region	2022	2023
Diber	1	
Durres	1	1
Elbasan	6	
Fier	5	2
Gjirokastra	4	
Korça	6	
Lezhe	3	
Shkoder	3	1
Tirana	5	
Vlora	11	1
Berat	1	
Kukes		1
Total	***46***	***6***

-Sampling

Sampling is done according to established standards in the Republic of Albania.
Sample Extraction

Pipette 5 ml of centrifuged blank urine into a 50 ml vial. 2 aliquots of 5 ml of blank urine are pipetted into 50 ml vials and fortified at the level of 0.5 µg/ml for α-zearalanol, β-zearalanol and at the level of 1 µg/ml for alpha-Zearalenol, beta Zearalenol, Zearalanone, Zearalenone. 2ml of 2M sodium acetate/acetic acid buffer solution was added (check pH 5.2 ± 0.2). Centrifuge for 10 min at 2000 rpm. Then the samples were purified in the C18 and NH2 SPE column. The samples were dried under a gentle stream of nitrogen and dissolved with 50µl methanol, 50 µl of water.

-Reagents and Standards

alpha-Zearalanol CAS No.26538-44-3
alpha-Zearalenol CAS No.36455-72-8
beta Zearalenol CAS No.71030-11-0
beta-Zearalanol CAS No.42422-68-4
Zearalanone CAS No.5975-78-0
Zearalenone CAS No.17924-92-4
Sodium acetate
Acetic acid
Methanol
Ethyl acetate

-Chromatographic analysis

Flow: 0.5 ml/min.
Column temperature: 50°C.
Injection volume: 10µl.
Injector temperature 10°C.
Eluent A: 0.05mM ammonium acetate:MeOH
Eluent B: Methanol LC-MS.
Polarity: Negative

-Validation procedure

Determination of validation parameters such as linearity, recovery, decision limit for confirmation

CCα, quantification limit is done according [3], [4].

Table 4. Validation parameters for RALs

Item	Zearalenone	Zearalanone	α-zearalenol	β- zearalenol	α-zearalanol	β-zearalanol
LOQ	1	1	1	1	0.5	0.5
CCα (µg/kg)	1.07	1.16	1.07	1.18	0.52	0.53

Results and Discussion

Fifty two urine samples from goat were analyzed during a time period 2022- august 2023 by LC-MS/MS. After analysis, all the urine samples resulted compliant lower than the decision limit for confirmation for all compounds. The results are presented with graphics below in figure 2 and figure 3.

Caprine urine samples analyzed and their concentrations for alpha-zearalenol, beta-zearalenol, zearalanone, zearalenone are reflected in the figure 2. Caprine urine samples analyzed and their concentrations for α-zearalanol, β-zearalanol are reflected in the figure 3.
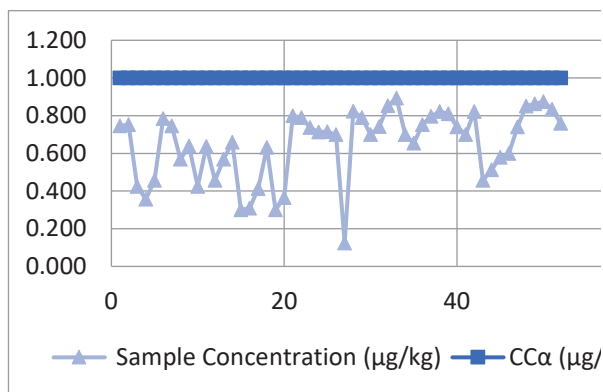
Figure 2. alpha-zearalenol, beta-zearalenol, zearalanone, zearalenone concentrations.
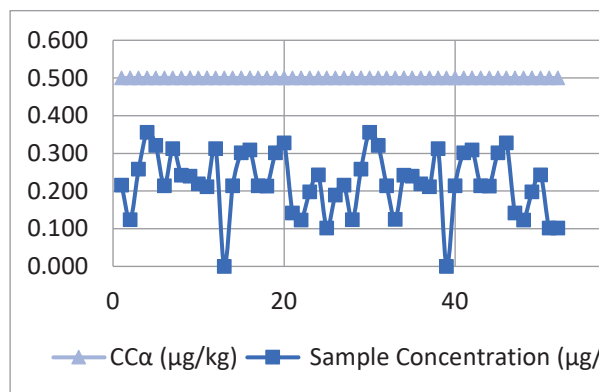
Figure 3. α-zearalanol, β-zearalanol concentrations.

Based on the fact that all urine samples were found to be compliant below the decision limit for confirmation for all compounds, we can conclude that there was no feed contamination with zearalenone or resorcylic acid lactones were not used as growth promoters in goat [1]. But further studies should be done.

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USE OF ESSENTIAL OILS AS NATURAL PRESERVATIVES IN FOOD INDUSTRY - A REVIEW

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The use of natural products like essential oils (EO) as a natural food-grade preservatives is an innovative alternative to synthetic preservatives. By limiting the spread of food-borne infections, EOs, which are generally recognized as safe (GRAS), could be viewed as an alternative for extending the shelf-life of perishable food products. The need to investigate their applications in food is driven by the growing interest within the food business and customer demand for "natural" and "safe" products. The most promising alternative is to employ EOs that have been loaded with nanoparticles. The antibacterial capabilities of EOs for pathogen control in natural and processed foods for human health and animal production, along with contributing to sustainability, are described in several works. Their interaction with a variety of nanosystems offers novel advancements in the fields of pathogen control, micronutrition, and health promotion, preventing the progression of bacterial microevolution and tackling antibiotic resistance. They also come with benefits for the environment being biocompatible and biodegradable. The physicochemical characteristics of these compounds, however, limit their commercial use. The focus of this review is on recent advancements in antimicrobial EO-based nanoparticles and their usage in various food matrices. The results of the literature have been positive, and further investigation is advised for developing strategies regarding the use of EOs on an industrial scale.

Keywords: essential oils, antimicrobial, food preservation, encapsulation

1. Introduction

Consumers' acceptance of food is increasingly being determined by the demand in healthy and eco-friendly products based on natural ingredients and minimal processing. [19]. From this perspective, scientists and the food sector have been searching for environmentally friendly substitutes for synthetic preservatives [3]. The development of safe food-based systems continues to face difficulties despite the fact that the microbiological control of foods is a subject of enormous interest. Some microorganisms can lead to food spoiling, alter the nutritional and flavour profile of the food, and result in toxic effects and foodborne diseases. Food deterioration caused by pathogenic bacteria results in financial losses as well as unfavourable consequences on product quality and safety [7]. This leads the food sector in using higher dosages of synthetic preservatives/antibiotics which on their turn contribute to development of resistance in food spoilage microorganisms. In 52 countries, resistance to priority antibiotic-bacterial combinations is predicted to rise by 17–31% between 2000 and 2030 according to studies on resistance modeling [10]. It is absolutely necessary to make more efforts using diverse ways to assure and sustain food safety.

One promising alternative to synthetic preservatives is the use of essential oils (EOs) derived from different plant materials. The EOs are aromatic molecules with diverse chemical structures that are obtained from plants. These compounds are secondary metabolites that, as defence mechanisms, play crucial roles plants interactions with their habitat [4]. They can be obtained from all plant parts, from roots to the leaves, using various extraction techniques. Numerous environmental, nutritional, and stress-related factors have an impact on the yield and chemotype of EOs. Antibacterial, antifungal, antiprotozoal, and antiviral activities are all present in the EO bioactive components and this is most likely due to the fact that plants secrete these chemicals to defend themselves against a variety of enemies, including bacteria, insects, and herbivores. The destruction of bacteria cell walls and interfering with important metabolic pathways are thought to be the main molecular mechanisms behind the essential oils' antimicrobial activity [20]. By acting through a number of different mechanisms of action in food pathogens their use doesn't cause resistance problems.

Despite all of their beneficial attributes in food applications as preservatives, EOs have some drawbacks, including hydrophobicity, an intensive fragrance and flavor, high volatility, sensibility to environmental factors and cause irritation [13]. The inclusion of these substances into a nano-sized carrier, which not only resolves the above mention problems but also enhances the functional qualities of EOs, is one of the most promising solutions.

In order to identify research topics that would explore applications of essential oils in food, so the use of synthetic preservatives is avoided, this review aims to provide an overview of the present knowledge about formulated nanosystems for essential oils. It focuses on carrier systems suitable for food products and lists both their benefits and drawbacks. There is also a brief description of nanoparticle applications in real foods.

2. EO nano-delivery systems in food industry

In contrast to conventional antimicrobial substances, EOs have a wider range of microbial targets [15], including the ability to bind bacterial proteins and lower pH [21], which improves effect against multidrug-resistant bacteria found in food [18], including *Escherichia coli*, *Salmonella, Shigella*, *Campylobacter jejuni*, *Klebsiella pneumoniae*, and *Staphylococcus aureus*. There are currently food-grade nanoparticulate products on the market, such as yogurt [6] and fruit juices [11] that contain nano-additives and nano-ingredients composed of ω-3 fatty acids. Other companies produced nanoencapsulated vitamins

providing defense against gastrointestinal system degradation, boosting bioavailability [2] and there are also examples offering nanotechnological advantages, which makes microwave thawing of frozen goods easier [14]. Numerous potential uses exist, such as the integration of antimicrobial agents and the decrease of expressive fat in ice cream production (from 16% to 1%) [9].

2.1. Essential Oils with Antimicrobial Activity in Edible Products

The application of EOs as natural antimicrobials and preservatives in food industry is expanding [12]. Their integration into various nanocarriers, usually made of lipids and/or polymers, can be made using a variety of techniques, including emulsification-solvent evaporation, homogenization, spray drying and ultrasonication [5].

2.2 The Downsides of Using Essential Oils (EOs) in Food Industry

The strong aroma, instability, volatility, susceptibility to processing parameters [22] and control to avoid degradation throughout the processing and consumption of food are pertinent EOs drawbacks that hinder their widespread usage in functional food advances.

The possible toxicity of nanoparticles in food has generated considerable concern. Due to their tiny size and the materials employed to create them, especially lipid nanoparticles have the potential to be harmful in a number of ways [16] such as: greater ability to enter biological obstacles, raise of bioavailability of hydrophobic bioactive compounds to a hazardous level and dysregulation of the hormonal or metabolic system.

3. Nano-Delivery Systems

The nano-delivery systems are processed into different forms that are molecularly constructed of various biomaterials in order to interact appropriately with the targets. Thus, depending on the planned application of EO-loaded nanoparticles, the most suitable nanosystems, carriers, and concentrations will be chosen, followed by the most practical preparation technique. To achieve a good formulation, stability over time, and high levels of encapsulation efficiency, prior planning is crucial [17]. The following Table 1 presents food-grade EOs nano-delivery systems intended for food industry [1, 8].

Table 1. Food-grade nano-delivery systems for food industry.

Nano-delivrey system	Structure	Positive features	Negative features	Future research
Liposomes	self-assembled surfactants into amphiphilic lipid bilayers which create globular membranous vesicles (unilamellar or multilamellar) in aqueous solutions	• protection of EOs from environmental factors • optimized antimicrobial activity • biocompatible, biodegradable and non-immunogenic	• low stability, short half-life, low solubility (depending on their chemical formula), oxidation of phospholipids, leakage and fusion of the encapsulated component	• use of extra excipients for multilayer liposomes • solid dry EO-loaded liposomes
Nanoemulsions	droplets of oil dispersed water or vice versa, stabilized by a surfactant and co-surfactant	• increased antimicrobial activity • increased bioavailability • biocompatible, biodegradable, and non-immunogenic	• destabilized through one or several mechanisms including creaming or sedimentation, flocculation and mainly Ostwald ripening	• more stable systems • use of natural surfactants (possibly plant-based)
Solid Lipid Nanoparticles	2nd generation solid lipid enveloped by a surfactant	• improve stability in high temperature & pressure, UV radiation, drying • high encapsulation efficiency • prolonged release	• crystallization, aggregation, particle growth, unpredictable gelation, low encapsulation capacities and a possibility of expulsion of the entrapped compound	• new delivery system which need further research to optimise constituents and preparation method
Nanostructured Lipid Carriers	2nd generation lipid matrix formed by a blend between solid (70%) and liquid (30%) lipids in room temperature, stabilized by a surfactant	• can be incorporated into transparent foods • they prevent lipid recrystallization which triggers expulsion of active components	• difficult to formulate • less stable compared to solid lipid nanoparticles	• new delivery system which need further research to optimise constituents and preparation method
Polymer Nanocapsules	formed by a shell (polymer wall, mainly proteins and polysaccharides) and core (oil core) counterparts	• prevent degradation and enhance the antimicrobial, antifungal and antioxidant EOs activity • with food grade biopolymers commercialization is possible	• still not well studied systems • may present toxicity depending on their size, surface area, reactivity, and concentration	• new delivery system which need further research to optimise constituents and preparation method
Cyclodextrins	Cyclodextrins are cyclic oligosaccharides with glucose units derived from the enzymatic degradation of starch, mainly by *B. macerans*	• improve the EO solubility and physicochemical stability • sustained release, protection to freezing, thawing, and/or microwaving processes	• still not well studied systems • burst release of loaded EO after formulation	• new delivery system which need further research to optimise constituents and preparation method
Chitosan Delivery Systems	obtained through the deacetylation of chitin of crabs and crustaceans	• biocompatible, environmental friendly and low-cost • increased antimicrobial activity • sustained release	• unpleasant taste, fish oil and vegetable oils odor • allergen ability, • low hydrophilicity	• combination with liposomes • better formulations

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PREVALENCE OF *ESCHERICHIA COLI* PRODUCING EXTENDED SPECTRUM B-LACTAMASESIN THE SHKUMBINI RIVER ECOSYSTEM

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Abstract

Recent studies have demonstrated that ESBL-producing *E. coli* are globally common in aquatic environments such as lakes and rivers, detecting viable ESBL producers in a high proportion of water samples. The main objective of this study was to investigate the occurrence, diversity, and phenotypic and molecular characteristics of ESBL-producing *E. coli* in the aquatic environment, in the Shkumbini River Ecosystem. Here, we reported for the first time a high prevalence 66.67 % of ESBL-producing *E. coli* in the river aquatic system in Albania. Antimicrobial susceptibility analysis of the ESBL producing E. coli revealed that 100 % of isolates were resistant to at least one antimicrobial agent in three or more antimicrobial categories thus characterized as multidrug resistant (MDR). Molecular characterization of ESBL producing isolates revealed the prevalence and diversity of the β-lactamase resistance genes among them. The most prevalent ESBL Genotype was blaCTX-M-1 (33.33%, 5/15), blaTEM (26.67%, 4/15), blaOXA-1 (20%, 3/15), and blaOXA-48 (13.33%,2/15). Overall, the findings of our study are worrisome, emphasizing the importance of rivers as potential reservoirs of antibiotic resistance genes (ARGs), imposing serious threats to public health as well as the necessity of a more detailed analysis of genomic features of ESBL *E. coli* isolates to better understand the pathogenic potential and the epidemic characteristics of them in the aquatic ecosystem.

Key words: ESBL-producing *E.Coli*, surface water, antibiotic resistance genes

Introduction

Our study encompassed a range of sampling locations, including areas impacted by human sewage and wastewater contaminated with animal waste from wet markets or slaughterhouses. We collected 8 samples from both upstream and downstream sites. The downstream samples provided valuable information on the presence and concentrations of ESBL-*E. coli*, primarily due to inputs from the surrounding community, including sewage discharges and waste. It is important to note that the upstream site, while not completely devoid of human or animal influences, was chosen as a reference point for comparison with the results obtained downstream within the city. Furthermore, we conducted comprehensive analysis on the total *E. coli* present in the collected samples. Using these total *E. coli* counts, we calculated the proportion of colonies that were ESBL producers among the overall *E. coli* population [15]. Furthermore, we undertook extensive analyses to thoroughly explore their antibiotic resistance profiles, while concurrently investigating the presence of ESBL genes.

Materials and Methods

The proposed methodology introduces a realistic approach to the selection of sampling locations based on field survey and the use of geospatial techniques to account for the impact of human activities [14]. The water from the Shkumbin river has been and is used for different purposes like bathing, washing of clothes, and also for agriculture.

During the study we implemented a standardizes sampling protocol in which the minimum depth of 30 cm below the water surface was consistently maintained, with no samples exceeding 50 cm. Sampling was conducted at predetermined locations, predominantly on bridges. Each sample, consisting of 1 liter, was promptly transferred to a thermos and stored for up to 8 hours for preservation. To ensure proper preservation, we decided to store the samples in refrigerator as immediate analysis was not conducted at that time [3], [7]. The concentration of ESBL-*E. Coli* in water exhibit considerable variation doe to the variability of fecal

Figure 2 Samples location
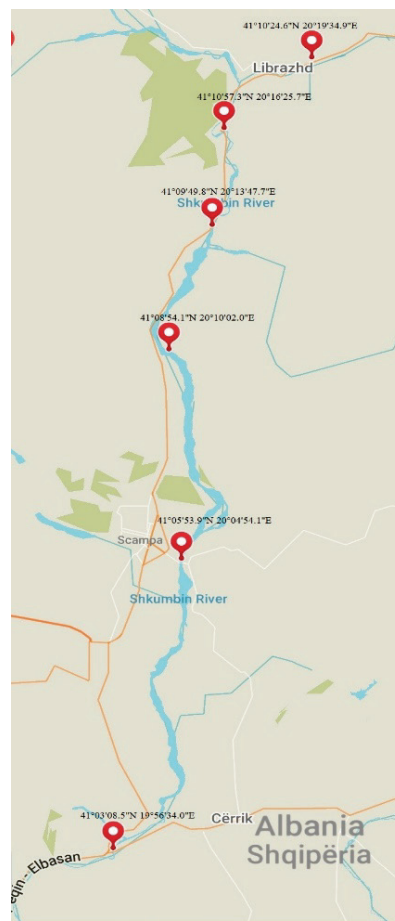
pic nr.1. Samples location

contamination levels different type of waste and the availability of no-contaminated water source as rainfall and upland spring. Because of this we have in front of us a major challenge in accurately prediction water contamination levels in other sampling periods. Therefore, to ensure the presence of countable numbers of colonies, multiple 10-fold dilutions of each sample were analyzed. Another approach was utilized simultaneously due to its advantage of allowing us to isolate pure strains of a single species or segregate strains from a mixed population, selectively reducing or removing unknown organisms. This reduction is achieved thought a repeated process of suspending an initial solution into fixed volumes of liquid diluent [8]. After confirming the presence of gas in the tubes, we proceed with indole test as means to differentiate between *E. Coli* and Enterobacter aerogenes [6], [12]. Simultaneously in order to obtain accurate result, a volume of 100 ml from the sample was filtered through a membrane with pore size of 0.45 mm [10]. To determine the presence of ESBL activity, the membrane was incubated on TBX (Tryptone Bile X-glucuronide) agar plate supplemented with 4µg/ml CTX (Cefotaxime). By adhering to established protocol and employing rigorous purification techniques, we successfully isolated a total of 16 colonies of ESBL *E.Col* [9], [15].

After isolating the ESBL colonies, we continued with phenotypic confirmation methods to confirm their presence. These methods are based on the principle that clavulanic acid can inhibit ESBL enzymes, resulting in a synergistic effect when combined with CTX and Ceftazidime. We conducted the tests using antibiotic disks: Cefoxitin (FOX), Cefotaxime (CTX), Ceftazidime (CAZ), Aztreonam (ATM) and Amoxycillin/Clavulanic Acid (AMC). The incubation was performed at a temperature of 37°C for a period of 16-18 hours [5], [15].

To extract genomic DNA from individual bacterial colonia simple method was applied. Carefully selecting 1 to 5 individual colonies (depending from their size) from the agar plate, to ensure an ample quantity of DNA. Those colonies have been collected by using a sterile inoculating loop and then resuspended in 100 µl sterile deionized H2O. This suspension was placed at 97 ◦C and "cooked" for 5–10 minutes using a water bath, after that solution was shaked for 5 minutes at a rate of approximately 2000-6000 oscillations per minute. To separate the supernatant containing DNA we centrifuge the cell lysate at 15,000 × g, 5–15 minutes. Usually, a small volume ranging from 1-5 µl is added to a PCR reagent mix [1].

For every DNA extracted a various PCR multiplex were employed for molecular characterization including: Mcr-1, Mcr-2, Mcr-3, Mcr-4, Mcr-5[13]; ShV, OXA 1, TEM [11]; OXA, NMD, KPC [2], [4]; CTX-M 8/ 25; IMP, VIM; CTX-M 1, CTX-M 2, CTX-M 9 [2].

Results

The table, displays the findings of six samples that tested positive for ESBL in *E. coli*. These *E. coli* organisms were found in 100 ml water samples that were collected. Out of the six samples that showed growth, 15 distinct colonies were selected based on suspicion of ESBL.

Table 1. Number of E.coli in different terrain

	TBX			TBX +		
	E.coli	Others	Total	E.Coli	Others	Total
S 1	160	212	372	6	24	30
S 2	1	108	109	0	29	29
S 3	256	300	556	16	65	81
S 4	208	200	408	3	12	15
S 5	184	246	430	3	31	34
S 6	480	500	980	45	200	245
S 7	276	550	826	0	260	260
S 8	148	460	608	20	296	316

After conducting synergy tests, we were able to isolate 15 distinct E. coli colonies that tested positive for ESBL. As shown in Table 2

Table 2. Percentage of positive results for each antibiotic combination indicating the presence of the ESBL gene

20%	AMC, CTX, ATM, CAZ
13.30%	AMC, FOX, CTX,ATM
13.30%	AMC, CAZ, ATM,FOX
13.30%	FOX and CAZ
6.67%	AMC, AMT, and CTZ
6.67%	AMC, FOX, CTX,CAZ
6.67%	FOX,ATM
6.67%	AMC, FOX, CTX, CAZ,ATM
6.67%	AMC,FOX
6.67%	AMC, FOX,CAZ

Antibiograms were performed for each of the isolated strains to determine their antibiotic resistance profiles. The obtained results have shown higher resistance of strains towards Streptomycin was 93.33%, Ampicillin 93.33%, 73.33% Gentamycin, 40% Tetracycline and Trimethoprim, 33.33% Ciprofloxacin,26.67% Chloramphenico,13.33% Meropenem and no resistance at all from Imipenem.

Molecular characterization of ESBL producing isolates revealed the prevalence and diversity of the β-lactamase resistance genes among them. The most prevalent ESBL Genotype was blaCTX-M-1 (33.33%, 5/15), blaTEM (26.67%, 4/15), blaOXA-1 (20%, 3/15), and blaOXA-48 (13.33%,2/15).

Table 3.ESBL Genes used in PCR reactions

	ShV	OXA-1	TEM	Mcr - 1	Mcr - 2	Mcr - 3	Mcr - 4	Mcr - 5	CTX -M 8/	CTX -M 1	CTX -M 2	CTX -M 9	OXA	NDIM	KPC
1A	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
1B	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
1C	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	*Positive*	Negative	Negative	Negative	Negative	Negative
1D	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
3A	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
3D	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	*Positive*	Negative	Negative	*Positive*	Negative	Negative
4C	Negative	*Positive*	*Positive*	Negative	Negative	Negative	Negative	Negative	Negative	*Positive*	Negative	Negative	Negative	Negative	Negative
5A	Negative	*Positive*	*Positive*	Negative	Negative	Negative	Negative	Negative	Negative	*Positive*	Negative	Negative	*Positive*	Negative	Negative
5B	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
5C	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
5D	Negative	*Positive*	*Positive*	Negative	Negative	Negative	Negative	Negative	Negative	*Positive*	Negative	Negative	Negative	Negative	Negative
6A	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
6B	Negative	Negative	*Positive ?*	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
6C	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
8A	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative

Discussion

Based on the performed analyses, it is evident that ESBL genes are in circulation in Elbasan region. In relation to antibiotics, the antibiogram indicates the development of resistance against commonly utilized antibiotics in Albania. Following his trend is anticipated to yield more significant repercussions in the future, imposing serious threats to public health as well as the necessity of a more detailed analysis of genomic features of ESBL *E. coli* isolates to better understand the pathogenic potential and the epidemic characteristics of them.

Acknowledgments

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There are no sources in the current document.

Figure and Table content:

Figure 1. Sample's locations

Table 1. Number of *E.coli* in different terrain

Table 2. Percentage of positive results for each antibiotic combination indicating the presence of the ESBL gene

Table 3. ESBL Genes used in PCR reactions

IMPACT OF SEQUENTIAL INOCULATION OF *METSCHNIKOWIA PULCHERRIMA* AND *SACCHAROMYCES CEREVISIAE* ON THE CHEMICAL COMPOSITION OF KALLMET WINE.

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ABSTRACT

Co-fermentation conducted by *Saccharomyces* and non-*Saccharomyces* yeasts has recently gained importance in winemaking, offering the opportunity to produce wines with unique flavor profiles and increased complexity. This study aims to assess the impact of the sequential inoculation of *M. pulcherrima* AS3C1 strain and a commercial *Saccharomyces cerevisiae* strain, on the physical-chemical properties of Albanian Kallmet red wine. The *M. pulcherrima* AS3C1 strain used for the experimental tests belongs to the Di.A.A.A (Department of Agricultural, Environmental and Food Sciences; Campobasso, Italy) culture collection of the University of Molise. The commercial strain of *S. cerevisiae Zymaflore F15 (*LAFFORT Co., Bordeaux, France) was used as reference yeast. Three laboratory-scale fermentation tests were conducted. In M1 and M2 tests, the *M. pulcherrima* AS3C1 strain was inoculated after the de-stemming crusher of the grape and the *S. cerevisiae* F15 strain was inoculated 48 hours after the beginning of the alcoholic fermentation in M1 and after 72 h in M2. The M3 test was inoculated only with *S. cerevisiae* F15 strain (control test). The fermentation was carried out at a controlled temperature of 20ºC and monitored by daily measurements of sugar and temperature. Physical-chemical analyses were performed at the end of alcoholic fermentation. Results showed that the use of *M. pulcherrima* strain AS3C1 in a sequential inoculation with *S. cerevisiae* F15, can influence the chemical composition of Kallmet wine, producing a wine with lower volatile acidity and acetaldehyde, and higher glycerol content. Our findings offer practical information for winemakers aiming to produce unique Kallmet red wines through this innovative fermentation technique.

Keywords: Sequential inoculation, *Metschnikowia pulcherrima*, non-*Saccharomyces*, wine yeast, Kallmet wine.

INTRODUCTION

In the last decade, due to climate change and increased competition in the global market, wine producers have shifted their focus to produce specificy local wine related to the terroir, soil, climate, grape varieties and microbial population.(Padilla et al., 2017). The scientific community and winemakers are always looking for innovative tools to improve wine production and quality. The fermentation process is very complex and is influenced by many factors that contribute to the formation of sensory profile of the wine. The interaction of endogenous grape microbiota or inoculated yeasts during the fermentation process result in the synthesis of particulare aromatic compounds (Romano et al., 2022). In this context, the pratice the co-inoculation, or sequential fermentation with selection strains of non-saccharomyces yeast is a promising strategy for producing exceptional and distinctive wines(Canonico et al., 2016) (Dutraive et al., 2019).

Non-Saccharomyces, when integrated into the fermentation process, offer many advantages that impact the quality parameters of the final wine product. These yeast strains can be used in mixed or sequential inoculation with S. cerevisiae starter culture to achieve various objectives, such as reducing ethanol and volatile acidity levels or enhancing polysaccharides, glycerol, and volatile compounds in the resulting wines (Binati et al., 2020) (Delač Salopek et al., 2022) (Liu et al., 2016). To benefit from these features of non-saccharomyces yeast strains, the inoculation level, time between first and second inoculations and the yeast species are fontamental. An increase of inoculation level of non-saccharomyces yeast in the eraly stage of fermentation, not only improves competitiveness against wild yeast but also enhances the expression of their metabolic activity (Comitini et al., 2011)(Ciani et al., 2006).

Another notable attribute of certain non-Saccharomyces yeast strains is their antimicrobial activity(Kuchen et al., 2019). For instance, Metschnikowia pulcherrima demonstrates the ability to produce the red pigment pulcherrimin through the chelation of iron in the fermentative must, effectively inhibiting the growth of harmful wild yeast strains (Vicente et al., 2020). This non-saccharomyces usually used as biological agent to control the spoilage indigenous populations which can produce metabolites and off-flavors affectioning wine quality and to reduce the use of chemical perseverative SO2 dose. Significantly, this antimicrobial mechanism does not adversely affect S. cerevisiae, preserving the integrity of the main fermentation yeast. (García et al., 2016) (Morata et al., 2020).

Furthermore, non-Saccharomyces yeasts exhibit enzymatic activities such as glycosidase, pectinases, proteases β-glucanases, β-glucosidases, cellulases, xylanases, amylases, lipases, esterases, etc. Notably, the enzyme β-glucosidase and proteases have been associated with the Metschnikowia pulcherrima species (Fernández et al., 2000). These enzymatic activities play a crucial role during fermentation by releasing or producing compounds that positively influence the color, taste, aroma, and stability of wines (Testa et al., 2021).

In the present study, we evaluated the sequential inoculation of *M. pulcherrima* AS3C1 strain and a commercial *Saccharomyces cerevisiae* strain, on the physical-chemical properties of Albanian Kallmet red wine.

MATERIAL AND METHODS

Yeast Strains

The non-saccharomyces yeast strain used in this study *M. pulcherrima* AS3C1 strain was isolated from grape must and belongs to the culture collection of the Di.A.A.A (Department of Agricultural, Environmental and Food Sciences, University of Molise, Campobasso, Italy). This is used as the initial fermentation trials for sequential fermentation with S. cerevisiae commercial strain of *S. cerevisiae Zymaflore F15 (*LAFFORT Co., Bordeaux, France), which was used as reference yeast.

M. pulcherrima AS3C1 strain was chosen for its good oenological properties, (low production of acetic acid, good alcohol production and sulphite tolerance) and strong enzymatic activities such as, proteases, β-glucosidases, lipases, lyases activity. The *S. cerevisiae Zymaflore F15* was rehydrated according to the manufacturer's instructions and the *M. pulcherrima* AS3C1 strain, was grow in Yeast Pepton Dextrose (YPD) medium (1% w/v yeast extract, 2% w/v pepton, 2% w/v dextrose) at 20^0C under aerobic condition for 48 h, was used. The cultures were centrifugated at 5000 rmp for 10 min at 4 ^{0}C, washed twice with sterile physiological solution (0.9% NaCl) before used, and inoculated in Kallmet grape juice to concentration of 7.0 log CFU/ml.

Fermentation experiments

For the laboratory-scale fermentation tests were used the red grape (*Vitis vinifera* cv. Kallmet) that is grown in the Shkodra region, in north of Albanian and transported to the laboratory of Research Food Center, Faculty of Biotechnology and Food. The grapes are crusher, and the must was used for three different fermentations carried out in 5-liter bottles with 4 L of juice. The sequential inoculation was performed (M1) initially inoculated with *M. pulcherrima* AS3C1 (10^7 CFU/ml) and after 48 h, with S. *cerevisiae* F15 (10^7 CFU/ml) and after 72 h in (M2). While the (M3) is used as control test and was inoculated only commercial *S. cerevisiae* F15. The fermentation was carried out at a controlled temperature of 20ºC and monitored by daily measurements of sugar and temperature. The chemical composition of grape must were: pH 3.6; total acidity 4.5 g.L; sugar content 23.75 ^{0}Brix, YAN (yeast assimilable nitrogen) 240 mg/L. The physical-chemical analyses of the grape juice were carried out in duplicate and were performed according to the OIV methods. At the end of alcoholic fermentation, skins were pressed, and the wines obtained were subject to chemical analysis.

Chemical Analysis

The chemical analysis pH, total acidity, volatile acidity, alcohol, reducing sugar, free and total SO_2 was performed according to Internationa Organization of Vin and Wine (OIV) methods. The glycerol, acetaldehyde, malic acid and lactic acid were determined using an enzymatic kit (Boehringer Mannheim, GmbH, Germany).

Statistical Analysis

Analysis of variance (ANOVA) was applied for the data obtained from the experiments, using the SPSS software. The data represent three replicates for each trial fermentation (n=3). The data were considered significant if P-values ≤ 0.05 and the significant differences were determined using Ducan tests.

RESULTS AND DISCUSSION

In the fermentation trials (M1, M2) the inoculated of *M.pulcherrima* AS3C1 strain were in the first stage and after 48h and 72h was then inoculated with commercial *S.cerevisiae F15* to complete the alcohol fermentation. The trials M3 was inoculated only with *S.cereisiae F15* commercial yeast and was used as a control test. The fermentation kinetics was monitored by fermented sugar (sugar in ^{0}Brix). The data showed (**figure1**) that the best fermentation performance was control trial with *S.cerevisiae* as single starter. In sequential fermentation trials M1 and M2 showed similar fermentation kinetics that were slower than for control. The fermentation was complete in 16 days for both trials.

Fermentation process
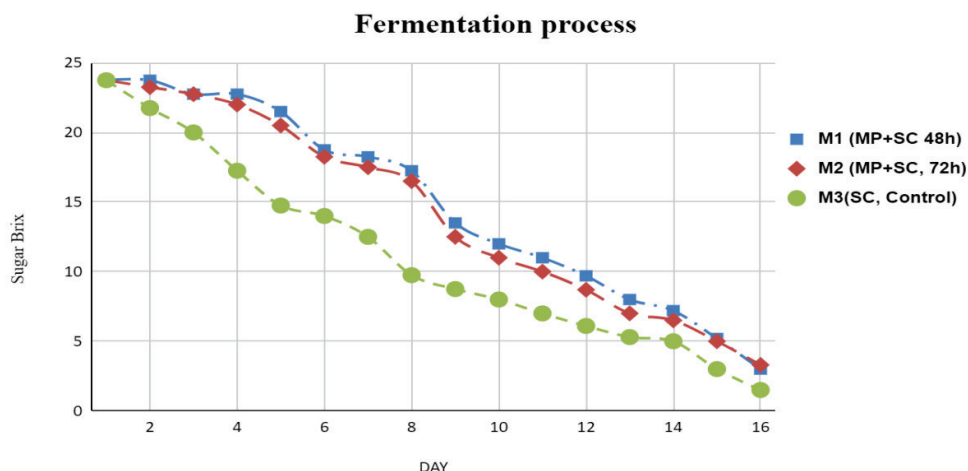
Figure 1. Fermentation kinetics in sequential fermentation trials of *M.pulcherrima AS3C1* strain with *S.cerevisiae* M1, M2, (48h, 72h) and control *S.cerevisiae* M3 on Kallmet grape juice.

The chemical parameters of the wine at the end of alcoholic fermentation are summarized in **Table 1.** The result of volatile acidity in sequential fermentation trials M1, M2 showed significantly lower content when compared to the control M3, these results are also evidenced by other authors (Canonico et al., 2016) (Testa et al., 2021) (Binati et al., 2020). In wine obtained in sequential fermentation the volatile acidity value was less than 0.5g/L acetic, while the control fermentation there was higher volatile acidity content (0.81 g/L).

 The control trial M3 had significant differences in alcohol content 13.1% v/v, compared with the sequential fermentation trials M1 and M2, 12,2% and 12.5% respectively.

For glycerol content the sequential fermentation trialsM1, M2, showed a significant increase when compared with the control M3.

Further, significant differences were found in the amounts of acetaldehyde, use of *M.pulcherrima* strain in combination with *S.cerevisiae,* contributed to obtained wines with lower content of acetaldehyde compared with control, *S. cerevisiae.* The presence of these compounds with high values in wine can lead to a negative effect on wine quality.

Table 1. Chemical parameters of Kallmet wines for *M.pulcherrima* strain yeast in sequential fermenation trials with *S.cerevisiae F15* inoculated after 48h and 72h of fermentation

Components	(MP+ 48h SC) M1	(MP+72hSC) M2	control SC M3
pH	3.60 ± 0.015[a]	3.62 ± 0.010[a]	3.66 ± 0.015[b]
Total acidity (g/L)	7.28 ± 0.026 [a]	7.49 ± 0.005[b]	7.58 ± 0.028 [c]
Volatile acidity (as acetic acid g/L)	0.41 ± 0.010 [a]	0.40 ± 0.015 [a]	0.81 ± 0.015 [b]
Alcohol (% v/v)	12.2 ± 0.20 [a]	12.5 ± 0.11 [a]	13.1 ± 0.15[b]
Glycerol (g/L)	4.04 ± 0.003 [c]	3.25 ± 0.008 [b]	3.03 ± 0.007 [a]
Acetaldehyde (mg/L)	5.02 ± 0.010 [a]	11.6 ± 0.051 [b]	19.2 ± 0.015 [c]
Reducing sugar(g/L)	3.45 ± 0.050 [c]	3.12 ± 0.030 [b]	2.88 ± 0.055 [a]
Malic acid (g/L)	2.20 ± 0.005 [c]	1.80 ± 0.005[a]	1.94 ± 0.005 [b]

Data are means ±standard deviations (n=3), data with different letters (a-c) within each row are indicate significant differences according to Duncan tests (p≤ 0.05)

CONCLUSIONS

The results clearly illustrate that the utilization of *M. pulcherrima AS3C1* as the primary strain in a sequential inoculation alongside the commercial *S. cerevisiae F15* yeast holds substantial promise as a biotechnological tool for enhancing the quality

of Kallmet wine. This innovative winemaking strategy, used with the selection of *non-Saccharomyces* yeast possessing favorable attributes, offers a tangible means of positively impacting the chemical characteristics of wine.

Future investigations will expand upon these discoveries by delving into the vinification of not only Kallmet but also other grape varieties through co-culturing with *M. pulcherrima AS3C1* in conjunction with *S.cerevisiae* strains. Such endeavors will offer a more comprehensive understanding of the applicability of this yeast in diverse winemaking scenarios.

Furthermore, performing better analytical techniques such as HPLC/ GS-MS, it will be possible to have more information on the composition of the wines produced and their evaluation during aging.

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Figure and Table content:
Figure 1. Sample's locations
Table 1. Number of *E.coli* in different terrain
Table 2. Percentage of positive results for each antibiotic combination indicating the presence of the ESBL gene
Table 3. ESBL Genes used in PCR reactions

UTILIZING TOMOGRAPHY AS A TOOL OF EVALUATION THE BONE REGENERATION AFTER THE USE OF SCAFFOLDS IN OSTEOCHONDRAL STRUCTURES: A SHEEP MODEL STUDY.

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Abstract

Bone regeneration is a complex process critical for the treatment of osteochondral defects, often caused by trauma or degenerative conditions, present significant clinical problems in orthopedics. Tissue engineering strategies employing scaffolds have emerged as promising solutions for promoting bone and cartilage regeneration. A group of 36 sheep served as the animal model for this study, with osteochondral defects being created in their joints, exactly on the medial condyles of the right femur. In this study, we investigate the efficacy of tomography as a tool for monitoring bone regeneration after the use of three free cell scaffolds in osteochondral structures by using Hounsfield Scale, which is a relative quantitative measurement of radio density. The free cell scaffolds used are HONEY hydroxyapatite-wollastonite and collagen scaffolds (HWS), HONEY hydroxyapatite-magnesium scaffold and collagen scaffolds (HMS) and BIFACIAL wollastonite and collagen scaffolds (BWS). Results revealed the capacity of tomography to offer detailed insights into the temporal and spatial aspects of bone regeneration. The sequential monitoring provided by tomography enabled the evaluation of scaffold degradation, tissue ingrowth, and the development of a functional osteochondral unit. Furthermore, tomographic imaging enabled the identification of potential complications or abnormalities that may arise during the healing process. By non-invasively assessing the progression of tissue regeneration, this imaging modality contribute to our understanding of the effectiveness of various scaffold biomaterials and their potential clinical applications in orthopedics. This research may facilitate the development of more effective strategies for managing osteochondral defects in both human and veterinary medicine.

Keywords: Tomography, Scaffolds, Osteochondral lesion, Regeneration, Hounsfield Scale.

Introduction

Langer and Vacanti defined tissue engineering as "an interdisciplinary field which applies the principles of engineering and life sciences toward the development of biological substitutes that restore, maintain, or improve tissue function" in the early 1990s. To overcome the well-known limitations of organ transplantation, Tissue Engineering aims to initiate tissue-specific regeneration processes[1]. The extracellular matrix, a three-dimensional (3D) network of macromolecules like proteins that provides physical and biochemical support to the cells, biomolecules, a sizable collection of molecules involved in all cellular processes, and cells serve as the living unit responsible for all biological functions of the body are the three main components of tissue engineering[2]. Biomaterials serve as a scaffold to offer the necessary structural support for tissue growth as well as cell adherence[3]. Osteochondral defects are a common problem in both medical and veterinary practice, with a difficult resolution because current techniques have significant limitations, particularly in terms of cartilaginous tissue regeneration[4]. Articular cartilage and subchondral bone may frequently be harmed by disease and trauma; as a result, the joint develops osteoarthritis, which causes significant pain, joint deformity, and loss of joint motion. The degeneration may initiate in different part of osteochondral structure, such subchondral bone, which deteriorates and becomes less able to support a correct loading, may be the origin of the cartilage degeneration. On the other side, the lesion may start on the cartilage tissue, causing a different impulse to be delivered to the subchondral bone, which then become sclerotic[5]. Bone scaffolds are increasingly utilized to replace and regenerate bone lost as a result of trauma, infection, or disease as well as to promote the healing of skeletal fractures that have not healed on their own[6].

Computed tomography scanning uses Hounsfield units (HU), a dimensionless unit, to express CT values in a uniform and practical format. The measured attenuation coefficients undergo a linear translation, which gives Hounsfield units[7]. The aim of this study was to evaluate the regeneration of osteochondral lesions after the use of various scaffolds utilizing the Hounsfield scale in Computed Tomography.

Material and Methods

After the approval of the Italian Ministry of Health and in strict accordance with the recommendations in the Guide for the Care and Use of Laboratory Animals of the National Institutes of Health the sheep selected for the experimental treatment were identified and stabled for 30 days for acclimatization. Thirty-six adult sheep, all in good condition of health, were submitted to echography exams to exclude eventual pregnancy. The sheep were also treated with anthelmintic drugs and pre-operative orthopedics examinations and X-ray were made to exclude orthopedic lesions and to evaluate the condition of the condyle region of right femurs. The sheep were divided in 4 groups: the first group of ten sheep was implanted with a HONEY
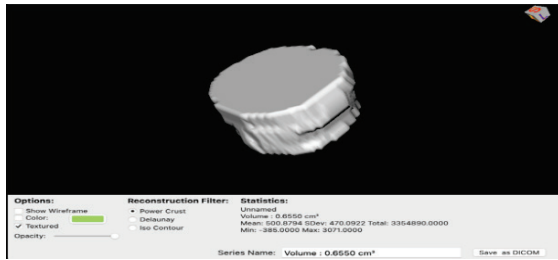
hydroxyapatite-wollastonite and collagen scaffolds (HWS), the second group of ten sheep with a HONEY hydroxyapatite-magnesium scaffold and collagen scaffolds (HMS), the third group of ten sheep with a bifacial wollastonite and collagen scaffolds (BWS) while the last group of six sheep represented the control group. In all the sheep was performed an experimental lesion in the medial condyles of the right femur of 11 mm of diameter x 9 mm of depth using a graduated hand drill of the same size and then during the same surgery the scaffold was inserted. The sheep after the surgery were stabled in the Section of Veterinary Clinics and Animal Production of the Department of Precision and Regenerative Medicine and Ionian Area of the University of Bari. All surgeries were performed from the same team under aseptic setting and both general and spinal anesthesia were made to minimize pain and suffering. All sheep were monitored daily in order to detect any alteration of the clinical condition (food intake, weight loss, urine and feces production, rectal temperature and behavioural changes).

In order to evaluate the regeneration area and determine how the scaffold will respond to osteochondral structures such articular cartilage and subchondral bone, all sheep underwent CT scans at various intervals for each group. The CT scans were done by a GE BrightSpeed 16 slice CT machine. The protocol performed was as follows: helical mode, slice thickness 1,25 mm, 120 kVp, 200 mA, pitch 0,93, convolution kernel "bone plus". The limbs were positioned cranio-caudally and scanned from the distal femoral diaphysis to the proximal tibial diaphysis. Multiplanar reconstructions were performed with a dedicated image analysis software (Aycan Osirix Pro®). For the evaluation of CT images was used HOROS application, the measurements were done in 4 to 7 positions of scaffold implemented in osteochondral structure by selecting the area with closed polygon, CT-bone, No CLUT, Linear Table, and the application showed all the values in Hounsfield Unit inside the determinated area like: Area (cm^2), Length (cm), Minimum (HU), Maximum (HU), Mean (HU), Sum (HU), SDev (HU) and also the ROI Volume that show the conformation in 3D and values of selected area.

Results and Discussion

As shown in Figure 1**, we have recorded all the values obtained by using a closed polygon for each biomaterial used in this experiment and the control group. Additionally,** Figure 2 **illustrates an example of a 3D image displaying ROI volume values for the entire scaffold structure constructed using the ROI values from closed polygons in different segments of the implemented scaffold. Our results indicate that the three scaffold-treated groups and the control group exhibited distinct changes in bone density.**
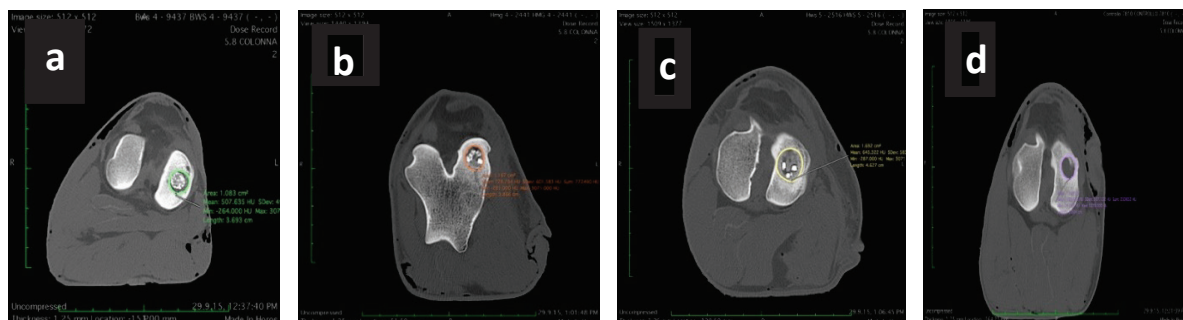
Figure 3. Tomographic image with HU values: a) BWS, b) HMG, c) HWS and d) Control Group.

After data processing, we have summarized the key findings for each group in two tables; Table 1 **displays all ROI values (from minimum to maximum for each component) obtained through measurements with a closed polygon at different positions within each group.** Table 2 **presents the ROI Compute Volume values for the 3D conformation of the regeneration area in each experimental group.**

Figure 4. ROI Volume, 3D conformation and HU values.

The results of this study are shown as follow in two tables:

Group of Sheep	ROI Values						
	Area (cm^2)	Min (HU)	Max (HU)	Mean (HU)	Sum (HU)	Length (cm)	SDev (HU)
HWS	0.908 – 1.692	-346 – 46	2406 – 3072	549.302 – 861.113	353201 – 1159509	3.430 – 4.627	370.917 – 583.052
HMG	0.825 – 1.227	-367 – 242	2902 - 3071	395.397 – 843.483	410817 – 771490	3.226 – 3.963	360.936 – 748.142
BWS	1.006 – 2.957	-385 - -37	1114 - 3071	346.404 – 579.721	469071 – 1253906	3.563 – 6.908	271.384 – 519.939
Control Group	0.904 – 2.597	-199 – 258	818 – 1200	131.081 – 632.188	108407 – 958149	3.398 – 6.030	137.766 – 368.031

Table 4. ROI values from min to max about every indicator in three scaffold-treated groups and control group.

Group of Sheep	ROI Compute Volume Values					
	Volume	**Min**	**Max**	**Mean**	**SDev**	**Total**
HWS	0.5209 – 0.6141	-315 – 46	2409 – 3072	633.3469 – 839.1275	407.9821 – 535.7207	1672186 – 4337793
HMG	0.5612 – 0.6901	-367 - -257	3071	600.2809 – 791.3750	641.4968 – 557.4152	2978694 – 3760614
BWS	0.6550 – 1.0445	-385 - -63	1178 - 3071	470.6141 – 520.3897	284.5521 – 470.0922	2081526 – 4303623
Control Group	0.7170 – 1.4427	-199 - 40	1031 – 1737	182.4793 – 360.1905	186.7148 – 339.4346	1495220 - 5297682

Table 5. ROI Compute Volume value from min to max about every indicator in three scaffold-treated groups and control group.

Regarding the Hounsfield Unit references, when evaluating the mean values across all three scaffold-treated groups, the values fall within the range of 300 – 900 HU, this refers to the presence of proper bone tissue, such as cancellous and cortical tissue, and no presence of soft tissue. Additionally, there is still evident evidence of the ceramic material; however, the bony phase of the scaffolds appears to be well integrated with the surrounding subchondral bone.

On the other hand, in the control group, the values range from 100 – 400 HU, indicating the presence of a significant amount of soft tissue and only a small amount of cancellous and cortical tissue, this refers to the absence of any reparative process in the subchondral bone.

To summarize, the use of tomography as a method for assessing bone regeneration in osteochondral structures has given researchers important new information about the effectiveness of scaffolds in promoting tissue repair. The data obtained through tomography provide a detailed understanding of the composition and density of the regenerated tissue. The study's findings underscore the effectiveness of scaffolds in facilitating proper bone tissue regeneration. Tomography allows for the visualization of the integration of scaffold materials with the surrounding subchondral bone. This is a critical factor in assessing the long-term success and biocompatibility of the scaffolds. The comparison with the control group, which exhibited lower Hounsfield Unit values and the presence of soft tissue, underscores the importance of scaffolds in facilitating reparative processes in subchondral bone. This study provides a solid foundation for further studies and potential clinical applications in orthopedics, offering hope for improved treatments and outcomes in the field of bone tissue repair.

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PRELIMINARY DATA ON THE PRESENCE OF CAPRINE ARTHRITIS ENCEPHALITIS IN THE REGION OF FUSHË-KRUJA, ALBANIA

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Abstract

Caprine arthritis encephalitis (CAE) is a lifelong persistent non-zoonotic infection of goats caused by caprine arthritis encephalitis virus (CAEV). It is an economically important disease that causes chronic inflammatory disease in goats with great economic losses; as a result, screening for this disease is a necessity, also for Albanian goat population. This study aims to present preliminary data for the presence of this virus in goats in the Fushë-Kruja region. The diagnosis of caprine arthritis-encephalitis virus (CAEV) infection was obtained through serological testing using Maedi-Visna/CAEV Ab ELISA which focuses on the detection of CAEV antibodies. A total of 13 blood samples from randomly picked goats of the same herd were analyzed for CAEV infection through this serological method. Out of 13 goats tested, 12 of them resulted positive for CAEV (92%). Based on the serological survey presented on this study CAEV is confirmed as present in Fushë-Kruja region.

Keywords: caprine arthritis encephalitis, goats, Ab ELISA, caprine arthritis encephalitis virus, Fushë-Kruja region

Introduction

Caprine arthritis encephalitis is a lifelong persistent non-zoonotic infection of goats caused by caprine arthritis encephalitis virus (CAEV) which belongs to the genus Lentivirus of the family Retroviridae [4,7]. This virus is composed of the envelope, the capsid and two copies of RNA genome. Its target cells in the body are monocytes, macrophages and dendritic cells [1,10]. The disease was first discovered in 1974, in the USA [4]. The main routes of transmission of CAEV are from infected mother to kid through the ingestion of colostrum/milk, and among adult goats through contact with bodily secretions/excretions [5]. Main clinical signs of CAE include chronic progressive arthritis with enlarged painful joints in adults, giving it the name "Big Knee Disease" and encephalitis in young kids 2-4 months old [2,3]. Some other symptoms include pneumonia, mastitis, progressive paralysis and weight loss. CAE is incurable and at the moment there are no commercially available vaccines. CAE impact in herds includes short productive life, decreased milk production, decreased quality of dairy products and increase of commercial barriers for transport of animals (nannies, bucks) and germplasm (embryos, semen) [6,8,9]. The aim of this study is to present preliminary data for the presence of CAEV in goats in the Fushë-Kruja region.

Material and Methods

Thirteen goats from the same herd were sampled during this study which were randomly picked. All the goats were of Alpine breed, all of them females and their average age was 3.7 years old. Blood samples were taken from jugular vein and serum vacuum blood collection tubes were used. The diagnosis of caprine arthritis-encephalitis virus (CAEV) infection was obtained

through serological testing using IDEXX Maedi-Visna/CAEV p28 Ab ELISA test kit. This kit is an indirect ELISA based on the use of an immunogenic peptide of a transmembrane protein (TM, ENV gene) and of the recombinant p28 protein which enters into the composition of the viral capsid (GAG gene). The appearance of anti-p28 antibodies can occur slightly later than that of the anti-viral envelop protein antibodies. The use of this very stable protein allows the serological detection of a very wide spectrum of serological variants. The cut-off point was calculated according to the kit's instruction manual. Samples with S/P (sample-to-positive ratio) % ≥ 120 were considered positive, those with S/P % ≤ 110 were considered negative and those with S/P % > 110 and < 120 were considered as suspect.

Results and Discussion

Out of 13 goats tested, 12 of them tested positive for CAEV infection (92%) (Fig. 1). Based on the serological survey presented on this study CAEV is confirmed as present in Fushë-Kruja region.
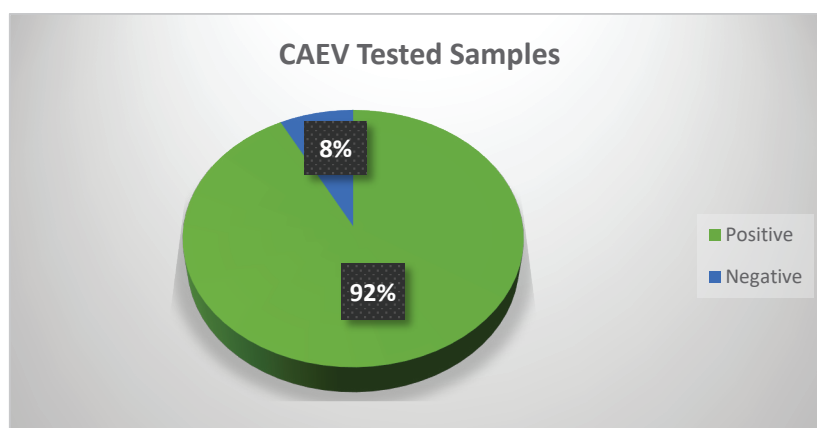
Figure 1: CAEV positivity in the tested samples

Although CAEV has been routinely monitored around the country and positive results have been obtained, there hasn't yet been published a formal international report about the prevalence of this disease in Albania. For this reason, this study is necessary to be carried out in order to estimate the prevalence of CAEV in goat population in Albania.

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PRELIMINARY SEROLOGICAL RESULTS OF WEST NILE VIRUS IN HORSE IN KORÇA REGION

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Abstract

West Nile infection is important for horses and it zoonotic capacity. West Nile Virus is a mosquito-borne virus that can cause brain and spinal cord inflammation or swelling in horses, birds, and people. It has endemic- epidemic status in Europe, and cases are reported regularly in Greece and other European countries. There is limited information about West Nile infection in Albania, while no any structured study is undertaken in Korça district. The aim of this study was assessing the horse health status of West Nile infection in Korça region. We collected 92 individual horse sera blood samples. The samples were collected form animals in ten administrative units of Korça region. The blood samples were collected from jugular vein by plain vacutainer test tube, briefly, approximately 9 ml was collected from each animal by applying welfare conditions. After 30-60 minutes the samples were sent to Fan Noli university laboratory when serum was harvested by centrifuging for 5 minutes with 3000 rpm. In addition, the set of metadata for each animal were recorded. The samples were tested by employing an *enzyme-linked immunosorbent assay* (ELISA) assay. Two out of 92 horse reacted positive for specific IgG West Nile virus (WNV), which indicate that WNV circulate within Korcë region. Further work need to be performed to estimate the prevalence of infection and WN disease status in the study area. Conclusion: The proportion of positive horses is 2.2%, consequently the risk is low in term of frequencies.

Key Words: *Equine, West Nile Disease, zoonotic infection, ELISA, Korça region.*

Introduction

West Nile virus (WNV) is a neurotropic, zoonotic, vector-borne virus in the *Flaviviridae* family has an extremely broad vertebrate host range. Infection of common species of birds has defined those with high vs. low potential to serve as amplifying hosts for the virus. In general, mammals (primates, horses, companion animals) are dead-end hosts for WNV, although some circumstances (e.g. immunosuppression) may allow individuals to become capable of transmitting the virus to mosquitoes. WNV has been isolated from a range of mosquito species, primarily from the genus Culex. [1] [8]

The virus is transmitted in natural cycles that primarily involve Culex spp. mosquitoes and birds and Humans and horses can develop clinical illness after WNV infections but are considered dead-end hosts for virus transmission [2] [3] West Nile virus is maintained in a bird-mosquito-bird transmission cycle. When conditions favor substantial viral amplification within the passerine-Culex transmission cycle, increasing numbers of infected mosquitoes present a equine and human infection risk by mid to late summer. [3]

It is a zoontic disease which even today is a concern for the population where there have been many reportet cases in equines and humans. Recognized as an emerging disease in Europe, the number of WNV outbreaks in horses has increased in the last few years, from two countries affected in 2009 (Italy and Hungary), to seven in 2010 (Bulgaria, Spain, Greece, Hungary, Italy, Portugal and Rumania), and six in 2011 (Spain, Greece, Hungary, Italy, Macedonia and Rumania) (OIE, 2012). [5] . According to European Centre for Disease Prevention and Control Since the beginning of the 2023 transmission season, 79 outbreaks among equids and 198 outbreaks among birds have been reported by EU/EEA countries. Outbreaks among equids have been reported by Spain (27), Hungary (23), Italy (12), France (10), Germany (6) and Portugal (1). Outbreaks among birds have been reported by Italy (154), Germany (18), Spain (14), Bulgaria (6), Hungary (3), France (2) and Greece (1).and EU/EEA countries have reported 599 human cases of WNV infection in Italy (295), Greece (153, of which 2 with unknown place of infection), Romania (68), France (33), Hungary (28), Spain (11), Croatia (6), Germany (4) and Cyprus (1). EU/EEA countries have reported 47 deaths in Greece (19), Italy (18), Romania (9) and Spain (1). EU-neighbouring countries have reported 85 human cases of WNV infection in Serbia (84) and North Macedonia (1). No deaths related to WNV infections were reported by EU-neighbouring countries. [4].

According to its importance and the fact that there is not much data on West Nile in equines in Albania, this study was considered reasonable to be done. Initially, was chosen the southeastern Korça region because of the exchanges that take place with neighboring countries such as Greece, North Macedonia, through which there are also indirect contacts with countries such as Bulgaria, Romania and Turkey. By knowing where disease hot spots are located, public authorities can apply preventation maserments. The main objective remains to determine the health status of the ungulates in this region and then determine the presence of the disease and its potential for distribution.

Material and Methods.

To complete the aim of this study for assessing the horse health status of West Nile infection in Korça region, we collected 92 individual horse sera blood samples. The samples were collected form animals in ten administrative units of Korça region (figure 1) during late summer in agust - september. The blood samples were collected from jugular vein by plain vacutainer test tube, briefly, approximately 9 ml was collected from each animal by applying welfare conditions. After 30-60 minutes the samples were sent to Fan Noli university laboratory when serum was harvested by centrifuging for 5 minutes with 3000 rpm. In addition, the set of metadata for each animal were recorded. The samples were tested by employing an *enzyme-linked immunosorbent assay* (ELISA) assay [8]. ID Screen® West Nile Competition Multi-species ompetitive ELISA kit for the detection of anti-pr-E antibodies in multiple species.

The areas were chosen randomly and to have a distribution representing four different types of geo-climatic characteristics. Liqenas administrative unit represents a region near Liqenas Lake . Cipan unit represents plain area near the Devoll Valley, Leshnje unit represents a mountain region and units such as Drenove, Bulgarec, Zemblak represents plain area near the city of Korce. The zones differ in terms of rainfall, altitude and temperature. Because mosquito-borne disease transmission is sensitive to variations in habitat and climate, geospatial environmental data can be used to develop disease risk maps [6] and olso there can be different influencing factros in mosquites development.

Of all the animal sampled 64 were horses, 11 were mussels and 17 were donkeys. The horses were of different ages and in the range from 0 to 5 years there were 20 animals, from 6 to 20 there were 68 animals and from 21 to 35 there were 10 animals. Of all the animals, 45 were male and 47 were female

At the time of taking the samples, we also received information about the owner, the origin of the animal, the general conditions of keeping the animal, the type of feeding, the implementation or not of prophylactic measures, as well as we made a clinical assessment of the animal. According to the owners it was also evaluated and the presence or not of birds and the presence of different mosquitoes in the area. However, there is a vast range of both avian and mosquito species that can be infected by WNV [7] [8]
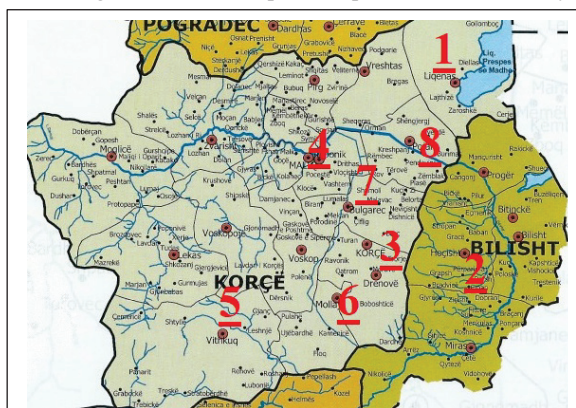
Figure 1: Sampled administrative units. 1.Liqenas Pustec, 2. Cipan; 3. Mborje – Drenovë, 4. Maliq – Vlocisht, 5. Leshnjë – Vithkuq, 6. Mollaj – Kamenice. 7. Bulgarec – Kloce, 8. Zemblak

Results

According to the manufacturer, the optical density was observed and S/N ratio (Sample optical density/Negative control optical density *100) calculated. Samples presenting a S/N ratio less than or equal to 40% were considered positive, while those with a S/N ratio less than or equal to 50% and greater than 40% were considered doubtful, and those with a S/N ratio greater than 50% were considered negative [9].

Out of the 92 sera tested by ELISA IgG, 2 tested positive, 3 were doubtful and 87 were negative. The positive smaples were respecitvli one in Leshnje with seroprevalence value of 32.7374 and present a 15 yerars, female horse and the second wone with seoprrvalence value of 15.5741 present a 17 years old, male horse in Cipan in Devolly Valley.

Discussion

Accordind to some ather articles and European Centre for Disease Prevention and Control the virus is circulating within EU countries includeing Spain, France, Germany, Italy, Austria, Greece, with a worldwide spread [11] [12]. In Albania, are not many studies to prove its presence or not, although in a national level study it appears that it is not present. [10].

These two cases indicate the presence of the virus in the area under study. Considering the number of samples and the area, it does not constitute a significant value, but the importance lies in the fact that the virus exists within the region. This will require a continuation of the study by increasing the number of animals sampled in the equine population but also by sampling the bird population.

The positive cases from the data collected from the clinical control at the time of sampling had no clinical signs of the disease. The animals were presented with normal vital parameters and able to work. In the village of Leshnej, where one case was positive in the current year, there was (according to the villagers) an overpopulation of mosquitoes.

In our country the disease has not been reported previously but this result indicate the presence of virus in Korça region and olso the disease has been reported in the border countries such as Greece and North Macedonia in 2017 (OIE reort) and in other mediterranean countires where with these countries constantly the Korça region and the Albania exchange animals and horses for trading.

Taking into consideration the health of ungulates, the zoonotic character and the importance of the disease in public health, it will be necessary in the future to carry out more sampling and to increase the sampling area, especially in the border areas. Also, the increase in the number of samples and the sampling of birds will enable not only the understanding of the epidemiology and ecology of disease, but we can make and an assessment of the risk factors.

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TITLE: OVERVIEW OF BIOSECURITY IN AQUACULTURE FARMS IN ALBANIA

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ABSTRACT

The biosecurity in aquaculture consists of practices that minimize the risk of introducing an infectious disease and spreading it to the aquatic species, in our case fishes, at a facility, and the risk that diseased fishes or infectious agents will leave a facility and spread to other sites and to other susceptible species. The good practices which are necessary to be apply, also reduce the stress to the fishes, thus making them less susceptible to disease. The good biosecurity measures minimize the fishes' exposure to different pathogens, reduce the amount of medications that we used in aquaculture and meanwhile reduces economic losses from mortalities, and help prevent mandatory depopulation. In our ongoing study, we have included two farms which produce approx. 95% of the total rainbow trout produced in Albania. Our objective was to determining the level of biosecurity that is followed on these farms. Considering that in aquaculture doesn't exist unified international standard for biosecurity we have made and used a questionary with a question fund. Through this study we present a view of the current state of aquatic farms in Albania regarding the concept of biosecurity. We carefully examined the measures that the working staff do every day to ensure safety on the farm. We looked at infrastructure so that we can evaluate the steps that take to avoid epidemics and those steps that are being made when we have outbreak cases. According to this study conducted, we concluded that farms in Albania follow a high safety protocol based on European aquaculture protocols. They have not reported outbreak cases in all these years. In aquatic farms there is an increased and specialized staff in the service they provide. There is an increased interest in farms to obtain detailed information from the veterinary service regarding the disease, measures and treatment of fish that are carried out on the farm. Close cooperation with the right professionals, follow-up advice, timely treatment and the right amount have made these farms today with no evidence of epidemic outbreaks from the moment of creation to the present day.

Key words: Aquaculture, Biosecurity, Bacteria, Diseases, Disinfectants.

Introduction

Over the past decade, a number of important disease outbreaks have increased the industry's awareness off the importance of biosecurity. Examining specific points in production when pathogens (disease-causing parasites, bacteria, viruses and fungi) may be introduced or disease may develop will help producers develop precautionary measures. Major goals of biosecurity are:

- Fish management - (Obtaining healthy stocks and optimizing their health and immunity through good husbandry- (Preventing, reducing, or eliminating pathogens)
- Pathogen's management
- People management – (Educating and managing staff and visitors)

The ease with which a specific pathogen can enter a facility, spread from one system to another, and cause disease depends on:

- The species, immune status, condition, life stage, and strain susceptibility of cultured fish.
- Major environmental factor such water quality, water chemistry, and husbandry practices
- Characteristics of the pathogen, such as biology and life cycle, potential reservoirs, survival on inanimate objects options for legal treatments regulatory status and worker's understanding of biosecurity principles and compliance biosecurity protocols.

Material And Methods

We have taken in considered to studied two farms, (Shkodër and Gjirokaster) in terms of determining the level of biosecurity that is followed on these farms. Based on some points that we have listed below; we have made a questionary to take more information about the state in these aquaculture farms. These points we consider as the main ones to take into consideration after consecutive visits to the farms:

1. Isolation or separation:

A group of animals in quarantine should be physically isolated from other quarantined and from the resident populations. Methods of isolation should be built into the facility and system design (Oidtmann B. C., 2011). If logistics prevent complete isolation, populations should at least be separated by tank or vat. Regardless of the level of isolation, appropriate sanitation and disinfection measures must be used to reduce cross-contamination between quarantined and established populations and between separate populations in quarantine.

2. Observation and diet adjustment

Animals should be observed for normal and abnormal appearance and behaviors throughout the quarantine period so disease problems can be detected early, loss of appetite, for example, is a very common early sign of disease (1. Arthur, 2009). Good nutrition will increase disease resistance and careful adjustment from the diet of origin to the on-farm diet will reduce problems from sudden changes.

3. Sampling and treatment:

Fish in quarantine should be sample for specific diseases of concern at the beginning and the end of the quarantine period and at any time that disease signs develop. Although complete necropsy evaluation of a number of specimens is the best, limited sampling of more valuable specimens can be done without sacrificing the animals by examining small sections of skin, fin and gills for parasites and doing a blood culture for systemic bacterial infections (DeHaven, 2012) The results can then be used to improve quarantine methods and the use of drugs.

4. Pathogen Management.

Not all pathogens are of equal concern. Pathogens vary in their regulatory significance, survivability in reservoirs, pathogenicity, diagnostics, and control (Oidtmann, 2011)Although some pathogens cause disease more readily than others, environmental host factors-especially the species and its immune status ill ultimately determine whether fish become sick.

5. Regulatory significance.

Some diseases and pathogens are considered important internationally and listed by the OIE, because of their economic or environmental importance (Kenton, 2015). Many of these, or, others are also currently regulated by state or local governments.

6. Sanitation and Disinfection.

The difference between sanitation and disinfection may be confusing (4. E.U. (2006) 'Council Directive 2006/88/EC of 24 October 2006 on animal health requirements for aquaculture animals and products thereof, 2006). Both are necessary for good disease control. Cleaning is the first step, it involves removing all foreign material, from objects by scrubbing them thoroughly. Disinfection is the second step it eliminates many or all pathogenic microorganisms.

Another practical method used for disinfections is pH adjustment. (Canberra., 2019) Depending upon the pathogen, either decreasing pH to acidic levels, or increasing pH to extremely basic levels, and maintaining this pH for a specified time period, may be enough to kill all safe stages of a pathogen

Aquaculture number 1 (Aquaculture located in Gjirokastra region).

Fish movement

YES	NO	QUESTIONS
	X	Have you restricted or stopped a fish movement on or off your farm to prevent entry or spread of any disease?
X		Have you implanted strict biosecurity measures for fish water sources, equipment's, vehicles, wildlife vectors and people on your farm.?
X		Are you closely and frequently monitoring your fish stock and wild fish stocks?
X		Do you limit contact between your fish stock and wild fish stock?
X		Do you limit the frequency and number of new introductions of fish onto your farm
X		Do you limit purchases to few sources with known and trusted fish health programs?
X		Do you know the health status and the source of the fish brought onto your farm?
X		Do you only bring animals onto your farm, that have been inspected or tested to be free of the disease you listed above?
X		Do you request copies of treatment records (and vaccination) for all purchased fish?
X		Do you disinfect eggs upon arrival to the farm?
X		Do you require that newly acquired or returned fish for your farm are quarantined for at least 3 weeks upon arrival?
X		Are your quarantine facilities separate from all over fish areas?

YES	NO	QUESTIONS
X		Do prevent the sharing of water, facilities or equipment between newly acquired or returned fish and your currently stocked fish?
X		If equipment must be used elsewhere on the farm, do you clean and disinfect the item before moving it from one location and another location?
13	**1**	**Total number of YES and NO answers**

Farm entrance

YES	NO	QUESTIONS
X		Do you limit access to your farm?
X		Do you have one gated entrance to fish production areas on your farm to better control and monitor visitors and vehicles?
X		Do you keep the gate locked when not in use?
	X	Have you posted signs at the farm entrance to inform visitors to stay off your farm unless they have received permission?
	X	Is traffic on or off your farm closely monitored and recorded?
	X	Do you maintain a log sheet to record any visitors or vehicles that come onto your farm?
X		Do you require delivery vehicles and visitors follow your farm biosecurity guidelines regarding parking and fish contact?
4	**3**	**Total number of YES and NO answers**

Aquaculture number 2 (Aquaculture farm based in Shkodra region).

Fish movement

YES	NO	QUESTIONS
X		Have you restricted or stopped a fish movement on or off your farm to prevent entry or spread of any disease?
X		Have you implanted strict biosecurity measures for fish water sources, equipment's, vehicles, wildlife vectors and people on your farm.?
X		Are you closely and frequently monitoring your fish stock and wild fish stocks?
X		Do you limit contact between your fish stock and wild fish stock?
X		Do you limit the frequency and number of new introductions of fish onto your farm
X		Do you limit purchases to few sources with known and trusted fish health programs?
X		Do you know the health status and the source of the fish brought onto your farm?
X		Do you only bring animals onto your farm, that have been inspected or tested to be free of the disease you listed above?
X		Do you request copies of treatment records (and vaccination) for all purchased fish?
X		Do you disinfect eggs upon arrival to the farm?
X		Do you require that newly acquired or returned fish for your farm are quarantined for at least 3 weeks upon arrival?
X		Are your quarantine facilities separate from all over fish areas?
X		Do prevent the sharing of water, facilities or equipment between newly acquired or returned fish and your currently stocked fish?
X		If equipment must be used elsewhere on the farm, do you clean and disinfect the item before moving it from one location and another location?
14	**0**	**Total number of YES and NO answers**

Farm entrance

YES	NO	QUESTIONS
X		Do you limit access to your farm?
X		Do you have one gated entrance to fish production areas on your farm to better control and monitor visitors and vehicles?
X		Do you keep the gate locked when not in use?
	X	Have you posted signs at the farm entrance to inform visitors to stay off your farm unless they have received permission?
	X	Is traffic on or off your farm closely monitored and recorded?
X		Do you maintain a log sheet to record any visitors or vehicles that come onto your farm?
X		Do you require delivery vehicles and visitors follow your farm biosecurity guidelines regarding parking and fish contact?
5	**2**	**Total number of YES and NO answers**

Satellite view of Aquaculture farms considered in the study

Fig 1: Satellite view of Aquaculture located in Gjirokastra region.

Fig 2: Satellite view of Aquaculture located in Shkodra region

The two farms taken into consideration are the biggest aquaculture farms in Albania. They produce about 95% all the total production. Based on the amount of their productions, where according to the information's given by the farms themselves, the farm in Shkodra region product about 150.000 tons per year, and the aquaculture farm located in Gjirokastra region product about 60.000 tons per year, we think that we can get concrete information of the number of epidemics (if they had), infrastructure. used disinfectants, staff information about biosecurity concepts and good work practiced used
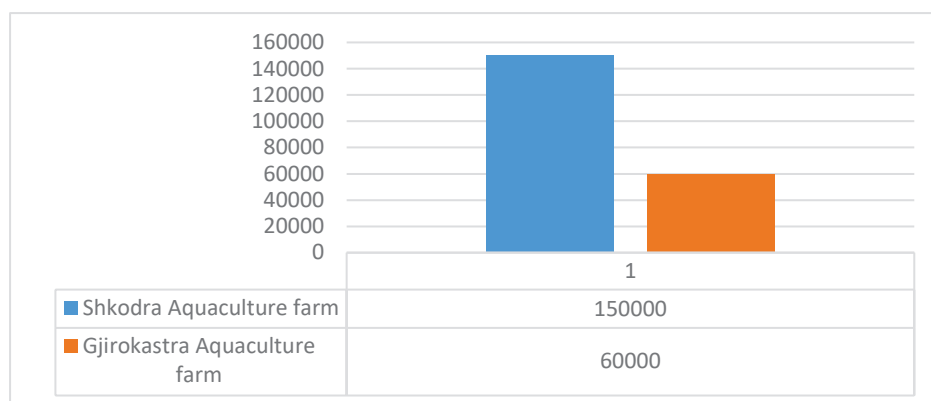
As a result of the questionary we see these two changes in the farm responses (Tab 1). Despite these changes we conclude that other measures taken on farms have been very practical as long as no outbreak cases have been recorded, however, under standard protocols, these two changes must be reflected in the farms to have a 100% guaranteed quality.

Farm One Answers	Farm two Answers
Have you restricted or stopped a fish movement on or off your farm to prevent entry or spread of any disease? (NO)	Have you restricted or stopped a fish movement on or off your farm to prevent entry or spread of any disease? **(YES)**
Do you maintain a log sheet to record any visitors or vehicles that come onto your farm**?** (NO)	Do you maintain a log sheet to record any visitors or vehicles that come onto your farm? **(YES)**
Do you maintain a log sheet to record any visitors or vehicles that come onto your farm? **(NO)**	Do you maintain a log sheet to record any visitors or vehicles that come onto your farm? **(YES)**

From all the visits we have made to these two farms, but also to other acquatic farms for cultivation in the cool waters in Albania, it has resulted that disinfectants that are mostly used are as below:
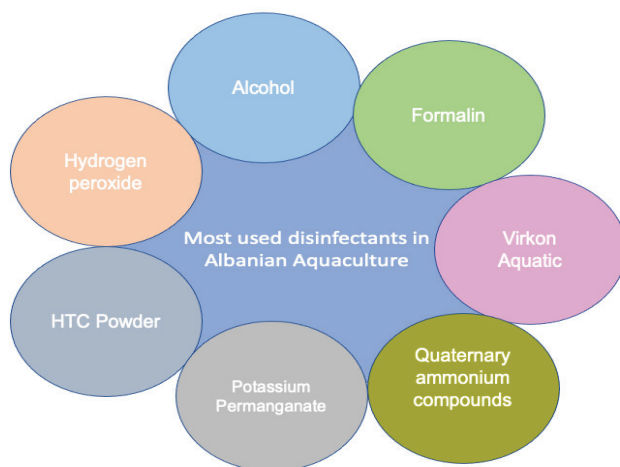
Grafic 2. The disinfectants used in Albanian aquaculture.

RESULTS

The importance of using chemicals disinfectant in aquaculture farms:

Chemical disinfectants are very useful, but vary in their effectiveness against specific disease organisms. Standard doses will kill many pathogens, (5. Huchzermeyer, 2015) but some may require more specific doses or contact times.

In two farms that we have received information about the procedure that they follow to disinfect and the most useful disinfectants are:
- Inorganic chlorine compounds include sodium hypochloride and calcium hypochloride. Sodium hypochlorite is available as a liquid, and calcium hypochlorite as HTH powder. Chlorine disinfectants are effective against many common bacteria, viruses, parasites and fungi. A number of different commercial products are registered by the Epa for use in aquaculture as algicides and piscicides
- *Hth chlorine* can form precipitates in the presence of some organics. Chlorine compounds are very corrosive to metal and harsh to human skin and mucous membranes. Their effectiveness depends on pH (optimal 6.8) since much of the activity is attributed to the hypochlorous acid product. Very low concentrations can kill aquatic organisms, so the accidental exposure of nearby tanks is always a potential problem, Chlorine can be inactivated with sodium thiosulfate. One suggested ratio for inactivation is 7 mg of sodium thiosulfate to 1 mg of chlorine. Chlorine test kits should be used to make sure there are no residue left.
- *Vircon Acid* is a disinfectant with potassium peroxymonosulfate and sodium chloride as active ingredients. Vircon Aquatic kills many common aquatic pathogens. The recommended dilution varies, but a 1% dilution will be effective for most uses. Vircon has minimal environmental impact and is very safe. Virkon Aquatic test strips are available and can be used to determine whether effective concentrations are still present within a given solution.
- *Quaternary ammonium compounds*, which include benzalkonium chlorides and benzethonium chloride are cationic surfactant disinfectants. They are good cleaning agents that kill many fungi, bacteria, and viruses. They leave a residue that can be toxic to fish and must be rinsed off nets and other equipment prior to use.

> ➢ *Alcohols* (isopropyl alcohol or ethanol at concentrations of 60 to 90%) kill many common pathogens of fish (bacteria, fungi, parasites, viruses) and are one of the few readily available disinfectants that are effective against mycobacteria. They are highly effective once surfaces have been cleaned of organic matter and soil.
> ➢ *Hydrogen peroxide* is a strong oxidizing agent that can be effective as a surface disinfectant at 3 % concentration. Because hydrogen peroxide breaks down into oxygen and water, it is considered environmentally safe. 35% PEROX-AID is FDA approved to kill specific pathogens in fish and fish eggs.
> ➢ *Formaldehyde products* are better known to aqua culturist as formalin. One hundred percent formalin is saturated solution of formaldehyde gas in water. Formaldehyde is effective against bacteria, viruses, fungi. Formalin is no longer recommended because of its irritating vapors and potential carcinogenicity in higher concentrations.

Another practical method used for disinfections is pH adjustment. Depending upon the pathogen, either decreasing pH to acidic levels, or increasing pH to extremely basic levels, and maintaining this pH for a specified time period, may be enough to kill all safe stages of a pathogen.

The importance of using good practices on aquaculture farm:

In farms that we have in study, we have shown that the infrastructure is very modern accord to others aquaculture in region. They have rooms with space, they have bathroom with shower, have quarantine space, room observation, separate quarantine rooms. Therefor of the infrastructure that they have is in good condition to prevent any infections and meanwhile they follow the "rules" of good practices on Aquaculture:

1. *Good husbandry* is important to biosecurity. Any environmental conditions or procedures that stress the fish or that may damage the skin fins, gills or intestine will weaken their immune systems and make them much more susceptible to disease. Good water quality/chemistry, nutrition, and handling methods will go far toward preventing disease
2. Good preventive medical practices include quarantine, routine observation, vaccination, and the use of immunostimulants, probiotics, and diagnostics for disease management. *Quarantine* is one of the most important animal management and biosecurity measures. Quarantine is the procedure by which an individual or population is isolated, acclimated, observed and if necessary, treated for specific diseases before its release onto the farm or for live market sale. Well-designed quarantine systems physically separate incoming fish from the rest of the farm. Major components of quarantine include all-in all-out stocking, isolation or separation, observation and diet adjustment, and sampling and treatment.

   All-in all-out stocking. This involves bringing fishes in as a group from only one original source population and maintaining them as a group throughout the quarantine period. It prevents exposure to other pathogens not currently in that population

Referring to the fact that for years since these farms were established, there have been no outbreaks of infection or mass death, it undergoes that biosecurity measures work and yield result.

The amount of preparations used on these farms must be considered as in the long term we may have problems with regard to the resistance concept, different types of pathogens, that may be present, but for different reasons such as virulence, the size of the other cannot create health problems.

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TITLE: IMPROVING THE TREATMENT OF SMALL ANIMAL ACL RUPTURE WITH THE ADDITION OF POROUS TITANIUM SCAFFOLD TO TIBIAL TUBEROSITY ADVANCEMENT SURGERY"

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Abstract

Cranial cruciate ligament (CCL) rupture is a common injury in small animals, often requiring surgical intervention to restore joint stability and function. Tibial Tuberosity Advancement (TTA) has emerged as a major surgical approach for the management of CCL injuries. However, concerns remain regarding the long-term success and rapid healing of the treated joint. This study investigates the potential of incorporating a porous titanium scaffold into the TTA procedure to improve postoperative outcomes. The study included a group of 14 dogs with confirmed CCL tears. The porous structure of the scaffold was intended to facilitate cellular growth, neovascularization, and biomechanical integration, thereby promoting accelerated healing and improved joint stability. Postoperative evaluation included clinical evaluations, gait analysis, radiographic imaging, and histological examinations. Our findings demonstrate promising results for the subgroup that received the addition of the porous titanium scaffold. Increased joint stability, reduced lameness, and improved weight bearing were observed in scaffold-augmented cases compared with traditional TTA cases. Radiographic evidence revealed successful integration of the scaffold and bone ingrowth. Histological analysis showed favourable tissue remodelling and cellular infiltration within the scaffold, indicative of robust healing. This investigation sheds light on the potential benefits of incorporating porous titanium scaffolds into the TTA procedure for the treatment of CCL tears in small animals and improving the overall quality of life for affected animals. Preliminary results highlight improved joint functionality and accelerated healing, warranting further research to prove the long-term effectiveness and safety of this innovative approach.

Keywords: Anterior Cruciate Ligament Rupture, Small Animals, Tibial Tuberosity Advancement, Porous Titanium Scaffolds, Joint Stability, Tissue Regeneration

Introduction

Cranial cruciate ligament rupture (CCLR) is one of the most common causes of pelvic limb lameness in dogs[1,2].Tibial Tuberosity Advancement (TTA) is one of the most frequently used techniques in veterinary orthopaedics to resolve cranial cruciate rupture in dogs. This technique was introduced in 2002 in veterinary medicine by Montavon, Damur and Tepic[3].Currently, one of the most used biomaterials for implants is titanium due to his biocompatibility and resistance to the corrosive activities of the body and its specific force related to its traction force and rigidity[4].The success of implants can be influenced by scaffold characteristics, which are enable the transport of nutrients, growth factors, and the colonization of blood vessels within the porous implant, promoting the growth of new bone tissue.The objective of this study is to outline the surgical procedure and conduct a retrospective assessment of the viability and clinical outcomes over a 3-5 year period when employing a highly porous Ti6AI4V gyroid scaffold, for stabilizing tibial tuberosity advancement in naturally affected dogs with cranial cruciate rupture. We hypothesize that the scaffold will not only ensure long-term clinical effectiveness but also exhibit substantial osteoconductive properties.

Materials and Methods

All 14 dogs belonged to medium-large breeds of different breeds, weighing between 15 and 80 kg, aged between 1 and 10 years. To establish eligibility for the research, a thorough clinical assessment was employed to ascertain the underlying cause of lameness, specifically focusing on a clinical history consistent with cranial cruciate ligament rupture, characterized by symptoms such as lameness and pain. Canines presenting with alternative orthopedic ailments were not included in the study.

Figure 5. Pedal Test and quantitative Numerical Determination of lameness

We performed an orthopedic assessment of the patients (various gaits) and functional tests of the knee joint (sitting test, drawer test and tibial compression test). The score obtained from a LOAD (Liverpool Osteoarthritis in Dogs) questionnaire [5]. Using the pedal test (Figure 1), we studied the distribution of body weight in each limb, which leads to the identification of a loss of load bearing [6]. After diagnosing the condition, the dogs underwent x-ray evaluation and adopting the Common Tangent method and Tibial Plateau angle slope method with specialized DICOM software. Commercial kits from ITC were used, which included titanium plates, screws, and Ti6Al4V alloy cages. These tools were available in different sizes to ensure the adaptability of the total implant to each individual dog (Figure 2).
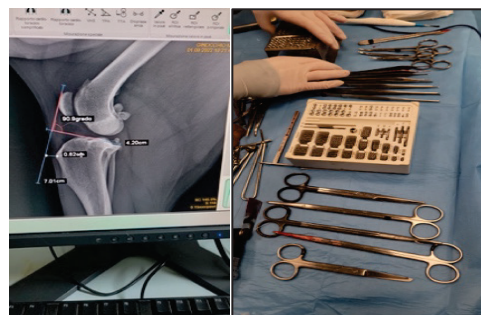
Figure 2. Preoperative radiographic evaluation and general tools with Titanium Implant Kit

The surgery was started with A Maquet hole was made on the medial aspect of the distal tibial tuberosity. With the use of a dedicated guide an osteotomy of the tibial tuberosity was made and with a distractor, this osteotomy was slowly distracted to permit the introduction of a titanium cage into the osteotomy. A proper titanium plate with three screws was applied on the cranial part of the osteotomized tibial tuberosity and on tibial diaphysis to complete the surgery (Figure 3).
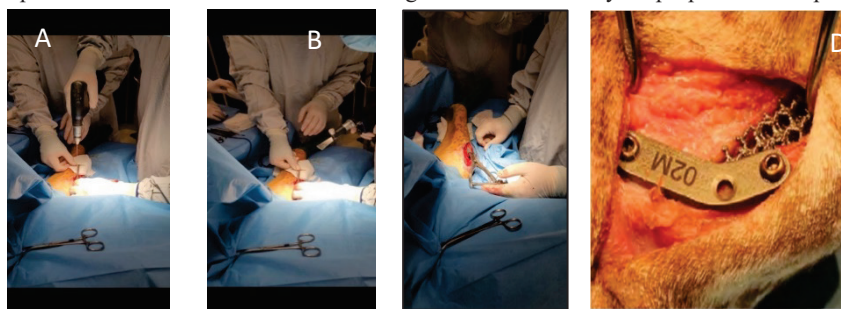
Figure 3. (A) Maquet hole drilling (B) Osteotomy with a surgical blad (C) Implant insertion (D) Titanium secrew and plate

Sutures and postoperative X-ray, to evaluate the results of the advancements, completed the procedure.Patients had the first clinical and x-ray investigation 20 days after surgery for each patient, to evaluate the surgical procedure, implants and scaffold's osteointegration. (Figure 4.)

Figure 4. Radiographic evaluation after surgery

3. Results and Discussion

Approximately 78% of patients were able to bear weight on the limb immediately after awakening from surgery.All patients evaluated at the seven-month mark showed complete recovery and absence of lameness.The study analyzed clinical and x-ray data, LOAD and baropodometric results, on the day of surgery and 5-6 months after surgery. Radiographic projections were used to assess signs of osteolysis, implant failure, or skeletal-related infections.In one case out of 14 dogs, a fracture of the tibial tuberosity due to fixation problems with the Maquet hole was recorded (Figure 5).New bone formation at the scaffold and osteotomy site was observed after an average of 3 months. The porous titanium scaffolds are used in many surgical fields, such as the correction of angular deviations or the regeneration of bone tissue following large losses of substance [7].TTA demonstrated promising results in our clinical experience, making it a valid surgical approach for achieving favorable results in follow-up evaluations.

Over the years the TTA technique has undergone different modifications in the procedure (TTA rapid, first and second generation TTA) [8,9,10] and has been compared with common extracapsular and intracapsular surgical techniques applied to patients suffering from cranial cruciate ligament rupture, such as TPLO [11].The use of high-porosity Ti6Al4V alloy scaffolds with a gyroid structure is justified to improve healing and accelerate

Figure 5. Tibial Tuberosity fracture

integration times of the titanium scaffold. Radiographic evidence confirms early signs of osseointegration within 60 days after surgery. Overall, the TTA technique with porous titanium scaffolds shows promising clinical outcomes and a low rate of complications.

5. Acknowledgment

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EFFECTS OF CHRONIC EXPOSURE TO KADMIUM IN TESTICULAR MORPHOLOGY

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Abstract

In this study, the effect of chronic exposure to cadmium on testicular morphology was studied using the optical microscopy. Cadmium (in form of $CdCl_2$ water solution) was administered intraperitoneally at doses of 0.0005 mg/kg/day (tolerable daily intake, TDI), 0.1148 mg/kg/day (intermediate dose) and 0.2177 mg/kg/day (lethal dose, LD_{50}-5%) in healthy mature *Cavia porcellus* males. After 60 days of administration of toxic compound, the animals were sacrificed and testicle samples were collected and prepared for observation under the optic microscope. Testicular changes were compared with those of normal animals. At high doses of cadmium, the seminiferous epithelium was degenerated and underwent total necrosis. The basal lamina was wavy. The germinal cells are destroyed and the epithelium shrinks. Seminiferous tubules contain only necrotic cells and cell debris. Another evident sign of damage to the testes induced by cadmium, was the augmentation of collagen fibers in the interstitial tissue. In the interstitial space, interstitial cells and Leydig cells were observed. Normal seminiferous epithelium with normal spermatogenesis stages were observed in healthy testes of control animals.

Keywords: cadmium toxicity, testis, spermatogenesis

A STUDY CASE OF THE PERIANAL GLAND TUMOR IN CANINE

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Abstract

Tumors of the perianal gland are common in dogs, they occupy the third place in terms of frequency among all tumors in this species. Perianal gland adenomas are common tumors in dogs, accounting for about 8% to 9% of all epithelial tumors. They are second only to skin and testicular tumors. Hepatoid gland tumors are originate from these tissues, and most commonly develop in intact, older male dogs. Castrated male animals are more affected and it is a very serious problem in their health. Adenomas of these glands also occur in neutered male dogs, spayed female dogs, and, occasionally, in young adults of any gender.Dog of different breeds, age with such pathologies were presented of the Pathology Laboratory, Faculty of Medicine Veterinary, Agricultural University of Tirana, Albania. The neoplastic masses, on gross appearance of them, were of various dimensions (2.3 – 9 cm), ulcerated/solitary of irregular form like to cauliflower. Cyto and Histopathology of the hepatoid tumours were used to established the diagnosis. Cytology revealed differentiation of cells to large hepatoid ones having less eosinophilic cytoplasm. Histopathological, a slight degree of anisocytosis and anisokaryosis was observed in tissue. There are other cells with dark cytoplasm and a higher nucleoplasmic ratio. Their nuclei were round, or oval with reticular chromatin and with some prominent nucleoli. These cytologic and histopathologic findings were consistent with a well-differentiated perianal gland tumor, also referred to as hepatoid gland tumor. Given the relatively uniform appearance of the epithelial cells, it was assumed that these tumors were a benign adenoma. The growth was removed by surgical under the general anesthesia using intravenously with ketamine 15 mg/kg and xylazine 2mg/kg. Cytology and histopathology are the most important techniques for diagnosis of hepatoid gland tumors. The surgical treatment in the case of benign or malignant hepatoid tumor depend on the presence and infiltration of metastasis to other tissues.

Keywords: perianal gland tumor, cytology, histopathology, dog.

Introduction

There are three glandular anatomical structures located in the anal region of dogs like as the anal glands (glandulae anales), the glands of the rectal sinuses (glandulae sinus paraanalis), and the perianal or hepatoid glands (glandulae circumanales) [1]. They are locations where the neoplastic process can develop.

One of the more common neoplasm, in dog, there are perianal gland adenomas, accounting for about 8% - 9% of all epithelial tumors. Older dogs and purebreds (Siberian Husky, English Bulldog, Belgian, Pekingese, etc.) are most affected from neoplasm of the perianal gland [6], [9]. The perianal glands are non secretory modified sebaceous glands occurring around the anus of dogs but they can also be present at other sites like skin of prepuce, tail, loin, groin, posterior part of hind limbs, etc. [8]. Perianal adenomas comprise more than 80% of all perianal tumors and they are the third most common tumor in uncastrated male dogs. They are more rarely in the sterilized females [5]. The carcinoma/adenocarcinoma are rarely tumors 'types and the tendency for the presence of metastases is low but it can invade the lymph nodes and the liver [5], [7]. The larger lesion commonly is ulcerated, and hemorrhagic, hair loss and itching can often be extruded with local pressure [7]. In the literature, there is refer that tumor of the perianal region are dependent on androgen and estrogen hormones [2], [3], [4].

These glands are often named as 'hepatoid glands', because of the cells resemble hepatocytes [6].

The present study case is aimed to obtain the clinical sign, macroscopic features and histopathology diagnosis of perianal gland tumours.

Material and Methods

Three samples of spontaneous canine perianal gland tumor were examined. These samples were collected following surgical removal from dogs presented to the Pathology Laboratory, Faculty of Veterinary Medicine-Agricultural University of Tirana.

Biopsy techniques: The dogs were sedated and the general anesthesia was induced and maintained intravenously with ketamine 15 mg/kg and xylazine 2 mg/kg. An elliptical skin incision of 1 cm was given directly to the tumor growth. The tumor growth was removed and placed in the 10% neutral buffer formalin for histopathological study.

Histopathological study: The tissues were placed in 10% neutral buffer formalin and embedded in paraffin. The embedded paraffin tissues sections of 5 μm were stained with Gill III Hematoxylin and Eosin (H-E) and special stain with Masson Trichrome (M-T). The tissue samples were observed under the light microscope (MOTIC, BA 210).

Two samples were taken from the Siberian Husky breed dogs and one of a half-breed one; they were uncastrated male. The age of Siberian Husky breed dogs were 10 and 12 old years. The animals had defecation problems and lack of appetite. After the examination, a mass was placed in the perianal region. The mass was white in color, relatively not firm in consistency, irregular in shape (with the presence of lobules, similar to cauliflower) and 4.5 cm in size. After removal of the mass and enema treatment for 10 days, the animal began to feed and defecate normally.

The mass size of the 10 years old Siberian husky, was 9 cm. They were round or oval in shape, with irregular edges and ulcerated and necrotic surface.

The dog of half -breed, was one year old. The mass had rounded edges and the size was 1.3 cm.

Results and Discussion

Two samples were collected from two Siberian Husky dogs of 12 and 10 years old. One was taken from a half -breed dog of one year old. They were uncastrated.

The 12 -years old Siberian husky presented disorders on defecation and it has loss of appetite. After the examination, we observed a mass in the perianal region. The mass was white color, with a relative not strong consistency, irregular shape and the size of 4.5 cm. After removed the mass and treatment for 10 days with enema, the dog began to feed and defecate normally.

The mass size of 10 -years old Siberian husky, was 9 cm. IT appeared round to oval in shape, with irregular edges and ulcerated and necrosis surfaces (figure 1).

The mass of 1 - year old half- breed dog was presented in the perianal region. The mass had round edges and its size was 1.3 cm (figure 2).

Figure 1 Macroscopic view of the mass on perianal region in the Siberian Huski dog.

Figure 2 Macroscopic view of the mass on perianal region of the half-breed dog.

The diagnosis of perianal growth was done by histopathological techniques. On histopathology, trabeculae and cords of tumor cells subdivided by well vascularized connective tissue stroma was observed (Figure 3). Sebaceous cells with cytoplasmic lipid vacuoles were also seen. Gland tumor cells between conenective tissue stroma are numerous (Figure 4).
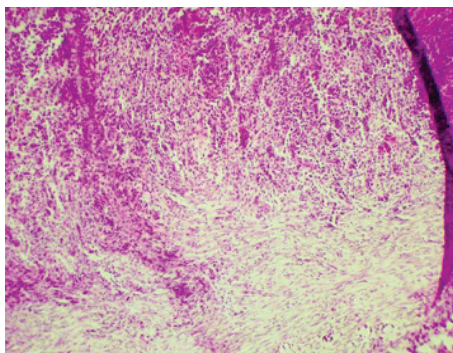
Figure 3. Hepatoid gland adenoma. H-E, X10.
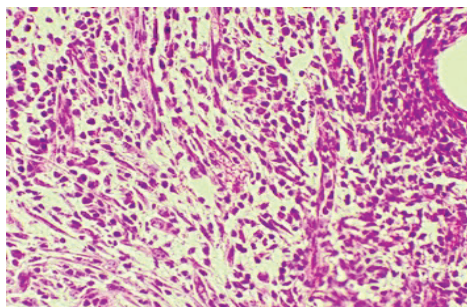
Figure 4. Gland tumor cells between conenective tissue stroma are numerous. H=E, X40.

The well-developed stroma surrounding the hepatoid cells along with lobules was also seen (Figure 5).

These histopathologic findings were consistent with a well-differentiated perianal gland tumor, an adenoma of it.
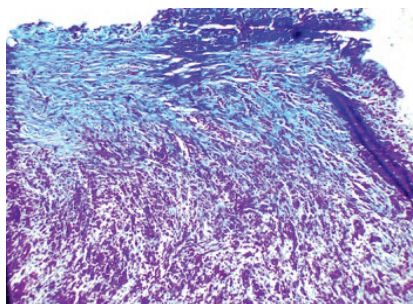
Figure 5. Abundant connective tissue in the stroma of the gland M-T, X10.

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EXPLORING ACRYLAMIDE CONCERNS IN BAKED PRODUCTS: SAFETY, REGULATION AND CONSUMER CHOICES.

REVIEW

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Acrylamide, is a chemical compound that forms naturally during high-temperature cooking processes It has become a topic of increasing concern in the field of baked products. While these delectable treats have been a staple in our diets for centuries, the presence of acrylamide raises valid questions about their safety. Acrylamide is known to be a potential carcinogen, as studies in animals have shown a link between its consumption and the development of cancer. However, it is essential to note that the levels of acrylamide found in baked products are generally low and should not cause immediate alarm. Nevertheless, moderation in consumption is advisable. The taste and texture of baked products are undeniably delightful, but acrylamide formation occurs when certain carbohydrates and amino acids react at high temperatures, such as when bread, cookies, and pastries are baked. To mitigate this, some manufacturers have adopted strategies to reduce acrylamide formation, such as selecting low-acrylamide ingredients, adjusting cooking temperatures and times, adding of enzymes, or different type of additive in order to reduce the production of acrylamide and even labeling their products to inform consumers. Within the European Union, specific restrictions are in place governing the acrylamide content in baked products. These restrictions differ based on the type of product. For wheat-based bread, the limit is set at 50 µg/kg, while for soft bread varieties other than wheat-based, it is capped at 100 µg/kg. In the case of breakfast cereal, the allowable range spans from 150 to 300 µg/kg, and for biscuits and wafers, the range extends from 300 to 800 µg/kg. In conclusion, while acrylamide in baked products is a genuine concern, it should not overshadow the enjoyment of these treats altogether. Instead, consumers can make informed choices by being mindful of their overall diet, opting for products with reduced acrylamide content, and supporting manufacturers that prioritize safety.

Keywords: acrylamide, cereals, baked products, enzymes, additives.

Introduction

Ever since the Swedish National Food Authority's discovery of acrylamide in certain foods subjected to high temperatures in April 2002, there has been extensive research aimed at pinpointing the molecular precursors and elucidating the mechanisms responsible for acrylamide formation [25]. Early investigations into acrylamide formation in food underscored the significant role played by the Maillard reaction [21,23]. The Maillard reaction occurs when naturally occurring amino acids interact with reducing sugars, such as glucose or fructose, during the heating of food. It is responsible for creating the delightful flavors and appealing colors found in numerous baked, fried, or roasted products and dishes. Acrylamide primarily emerges from the amino acid asparagine and naturally occurring reducing sugars like glucose and fructose, which are present in various plant materials, including cereal grains, vegetables (such as potatoes), and cocoa, among others.

The presence of acrylamide in frequently heated foods is deemed a considerable food safety concern by international authorities. Acrylamide exposure varies depending on the dietary practices of different populations and the methods employed in food processing and preparation [17]. The quantity of acrylamide in heat-processed foods is influenced by specific recipe components and the conditions under which thermal processing takes place. It is firmly established that the initial levels of precursor substances and the temperatures used during processing significantly affect the rate at which acrylamide forms in these foods [24]. According to Commission Regulation EU 2017/2158, acrylamide levels in baked products can range from 150-300 µg/kg in breakfast cereals, contingent on the type of flour used in their production, 300-400 µg/kg in biscuits and wafers, 800 µg/kg in gingerbread, and 50-100 µg/kg in bread. For biscuits intended for infants and young children, the permissible limit for acrylamide is set at 150 µg/kg [14].

Mechanisms of Acrylamide Formation

Research conducted since 2002 unveiled the Maillard reaction as a prominent pathway for acrylamide formation, particularly when asparagine is present, serving as a primary contributor to the acrylamide molecule's structure [7, 10, 21]. The Maillard reaction, however, is a multifaceted, desirable process that yields a diverse array of essential flavor and aroma compounds [25]. Nevertheless, alternative reaction pathways have also been proposed. For instance, acrolein, a product of oxidative lipid degradation, can lead to acrylic acid, which can subsequently react with ammonia to produce acrylamide. Additionally, acrylic acid can originate from aspartic acid through the Maillard reaction [16, 24, 29, 30, 31].

Becalski et al. (2003) devised two models to investigate these reactions. The first model included a mixture of six amino acids namely, asparagine, aspartic acid, glutamine, glutamic acid, valine, and lysine combined with glucose as the reducing sugar [28]. The second model represented a simplified version, involving only asparagine and glucose. Their findings suggested that acrylamide is not primarily generated from precursors (especially acrolein) found in the oil itself [8]. They concluded that the presence of asparaginase and glucose at the appropriate temperature plays a crucial role in acrylamide formation, with its occurrence expected at heating temperatures exceeding 175°C for more than 10 minutes.

The combination of asparagine with glucose or 2,3-butanedione (one of several dicarbonyl compounds formed in the Maillard reaction) leads to the significant production of acrylamide in dry products. In contrast, only trace amounts are formed when

asparagine is replaced with other amino acids. Furthermore, heating asparagine on its own at 185°C does not yield acrylamide, underscoring the necessity for the presence of the dicarbonyl reactant and the occurrence of Strecker degradation [21]

Mitigating Acrylamide in Food: Effective Reduction Strategies

Numerous strategies have been proposed to reduce acrylamide levels in food, and some involve the removal or reduction of specific precursors, such as asparagine or glucose. When these precursors are present in lower concentrations, the formation of acrylamide is reduced. Methods for decreasing asparagine content include:

(a) Selecting cultivars naturally low in asparagine.

(b) Suppressing the genes responsible for asparagine biosynthesis to eliminate the enzymes.

(c) Catalyzing the hydrolysis of asparagine into aspartic acid and ammonia through acid- and/or asparaginase/amidase-catalyzed reactions.

(d) Modifying asparagine to N-acetylasparagine via acetylation to prevent the formation of N-glycoside intermediates that contribute to acrylamide production [19].

Another approach to reducing acrylamide formation involves disrupting the reaction process. Acrylamide formation in food exhibits a time-temperature relationship, meaning that altering the cooking temperature or duration can affect the acrylamide levels. Additionally, acrylamide formation is pH-dependent, with an optimum pH for acrylamide formation around 7. In acidic pH conditions, acrylamide formation is inhibited. Lowering the pH of the food system can reduce acrylamide generation by protonating the α-amino group of asparagine, preventing its engagement in nucleophilic addition reactions with carbonyl sources [32]. Asparaginase enzymes also inhibit acrylamide formation. Numerous studies have demonstrated the reduction of acrylamide formation without compromising the sensory properties or nutritional values of baked products [1, 2, 4, 6].

In the food industry, various strategies have been proposed to prevent acrylamide formation, primarily involving the removal of reducing sugars and amino acid precursors or influencing the Maillard reaction by adjusting heating time and temperature [11].

Enzymes are commonly employed in various fields due to their high selectivity, catalytic activity, moderate reaction conditions, and minimal environmental impact. L-asparaginase (EC 3.5.1.1) plays a vital role in reducing acrylamide formation by catalyzing the hydrolysis of L-asparagine into ammonia and aspartic acid, thereby eliminating acrylamide precursors [12]. The use of L-asparaginase is a recent innovation for reducing acrylamide formation, and it effectively converts asparagine into aspartic acid while preserving the sensory properties of the final product [22]. On the other hand, glucose oxidase converts glucose into gluconic acid (GA).

Glucose oxidase (GOx, EC 1.1.3.4) is widely employed in various applications, including GA production, glucose biosensors for diabetes monitoring, biofuel cells, food and beverage additives, low-alcohol wine production, the textile industry, and the production of antitumor drugs and feed additives, thanks to its unique catalytic mechanism and the presence of flavin adenine dinucleotide as a redox carrier during the catalytic process [27].Due to its unique catalytic mechanism, Gox is widely used in GA production, glucose biosensors for diabetes monitoring, biofuel cells, food and beverage additives, low-alcohol wine production, the textile industry, and the antitumor drug and feed industries [13]

Acrylamide's Impact on Human Health

The health concerns associated with acrylamide are primarily linked to its carcinogenic and genotoxic properties [3.5]. This chemical compound has the potential to induce a range of adverse effects, including documented cases of neurotoxicity in humans. Acrylamide triggers specific white blood cell groups to generate free radicals, resulting in a decrease in their cellular glutathione levels. The consumption of acrylamide-containing foods initiates inflammatory responses and oxidative stress, contributing to the development of atherosclerosis. Notably, glutathione is one of the body's inherent antioxidants [26].

The International Agency for Cancer Research (IARC) has classified acrylamide as "probably a human carcinogen," primarily based on findings from animal studies. Acrylamide has shown genotoxic effects in various assessments and is notably neurotoxic, as demonstrated by Hogervorst et al. in 2009 [18]. It is established as a neurotoxin in humans. However, it is highly likely that the levels of exposure resulting from the consumption of acrylamide-containing foods are significantly lower than those needed to induce neurotoxicity, as suggested by Berger et al. in 2011 [9].

The foods contributing the most to these exposures will vary among different countries and depend on individuals' daily dietary habits. Surprisingly, even a food item or dietary component with relatively low acrylamide content, such as coffee or bread, can make a significant contribution to overall dietary acrylamide intake when consumed in substantial quantities [8].

In summary, reducing acrylamide levels in baked goods is a challenging endeavor that requires substantial effort and ongoing research to identify the most effective methods for practical implementation in the food industry. Numerous studies have shed light on potential strategies, including the use of enzymes, lowering baking temperatures, and reducing sugar content in grains, all of which can mitigate acrylamide formation. This formation of acrylamide occurs as a consequence of the Maillard reaction, a chemical process that takes place during the thermal treatment of these products.

Furthermore, it's important to note that consumer awareness and regulatory measures are increasingly influencing the food industry to adopt acrylamide-reduction methods, underscoring the significance of continued exploration and implementation of these approaches. The pursuit of safer and healthier food options remains an ongoing endeavor.

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GASTROINTESTINAL PARASITES OF SMALL RUMINANTS IN KORÇA DISTRICT IN ALBANIA

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Abstract

Helminth infections are some of the most important causes of poor ruminant health and welfare in grazing systems and cause important economic losses. Moreover, anthelmintic resistance is now widespread throughout Europe and poses a major threat to the sustainability of ruminant livestock farming. Gastrointestinal parasitic infections of sheep and goats were investigated in 40 farms in Korça district located in the southeast of Albania. The objectives of this study were to describe the prevalence of gastrointestinal parasites in fecal samples from adult sheep and goats and to evaluate the presence of anthelmetic resistance. A total of 121 fecal samples were collected. *Strongyloides papillosus* was found in 55 (45.5.4%) samples, *Ostertagia spp.* eggs in 49 (40,9%) samples, *Monezia expansa* eggs in 33 (27.2%) samples, *Dictiocaulus filaria* in 27 (22.3%) samples, *Nematodirus spathiger* eggs in 16 (13.2%) samples, *Haemonchus contortus* eggs in 16 (13.3%), *Cooperia spp.* eggs in 11 (9%), *Trichostrongylus axei* in 11 (9%) samples, Coccidian oocysts were found in 5 (4.1%) samples, and *Trichuris ovis* in 2 (1.6%) samples. Risk factors related to animal and farmer status, farm and pasture management were examined for their association with the prevalence of helminth infections. In conclusion, the present study provides the first epidemiological investigation of risk factors associated with gastrointestinal helminth infections of sheep and goats in Albania.

Keywords: Small Ruminants, Helminth Infections, Anthelmintic Resistance, Albania

QUANTITATIVE ANALYSIS OF ASCORBIC ACID IN HONEY SAMPLES OF DIVERSE BOTANICAL ORIGINS FROM KOSOVO

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Honey is a natural food containing different compounds which have high nutritional value and antioxidant activity such as ascorbic acid (vitamin C). Vitamin C analysis is one of the main indicators that can be used to assess the nutritional quality of honey, as it is very sensitive to chemical and enzymatic oxidation, which is accelerated by factors such as light, oxygen or heat. The aim of the present study was to investigate the ascorbic acid contents in different botanical origin honey samples in Kosovo. Therefore, a total of 83 honey samples of different botanical origin were collected from different locations of Kosovo (urban and rural) and analyzed for ascorbic acid concentrations using the spectrophotometric method. According to our results the highest content of ascorbic acid was found in mountain honey and acacia honey samples. Meanwhile pine honey and chestnut honey samples had the lowest content of ascorbic acid among all analyzed samples. On the other hand, honey samples collected from rural areas had higher ascorbic acid content compared to those obtained from urban areas of Kosovo. Further studies need to be done to assess the nutritional content and antioxidant activity of honey samples by examining other honey compounds such as vitamin B, polyphenols etc.

Keywords: Vitamin C, honey, acacia, chestnut, nutrition.

THE INFLUENCE OF THE CONDITIONS AT THE SARANDA-DELVINA AREA ON THE DIVERSITY OF REPRESENTATIVES OF THE PHLEBOTOMINAE-FAMILY PSYCHODIDAE

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Abstract

Climatic conditions in study area significantly influence the diversity of representatives of the Phlebotominae-family Psychodidae, the vector of leishmaniasis. Area in the study was represented with 114 differentiated samples throughout all its diverse territory. Samples in square 15 were collected with OVI type phlebotome mesh. In the area canine leishmaniasis is an endemic disease that affects dogs with a prevalence of the disease at 12.5%. In the area of Saranda-Delvina, out of a total of 114 samples of phlebotomus sampled, 51 samples were differentiated as *Sergentomyia minuta* (with the largest number in Albania), followed by *Phlebotomus neglectus* with 32 samples, *Phlebotomus perfiliewi* with 28 samples, *Phlebotomus tobbi* 2 samples, *Phlebotomus papatasi* at only a species. During the morphological differentiation of any species were identified as *Phlebotomus similis* or other phlebotomus species. Such a high result for *Sergentomyia minuta* (the highest in Albania) with 50 percent of the total phlebotomus species, is reported for the first time for quadrat 15 (Albania is represented by 15 quadrats). A low distribution of Phlebotominae representatives was observed in the coastal area, while the Bistrica river with the other small streams and rivers of the Sarandë-Delvina area, turned out to be the main place for finding phlebotomus. Species numbers and concretely *Phlebotomus neglectus* and *Phlebotomus perfiliei* are species which are confirmed by the main vectors of leishmaniasis, especially in the interior of the Sarandë-Delvinë area. The results of differentiation in the area, evidenced the great role of climatic conditions and its relief in the diversity of phlebotomus species, and the seropositivity of the disease in dogs and clearly shows that leishmaniasis is both a human and veterinary problem.

Keywords: Psychodidae, Phlebotominae, leishmaniosis infection; vector; diversity.

ASSESSMENT OF MILK QUALITY THROUGH THE DETERMINATION OF PHYSICOCHEMICAL AND MICROBIOLOGICAL PARAMETERS

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Abstract

Milk, a complex liquid, serves as a vital source of essential nutrients crucial for children's growth and development. Ensuring the quality of milk, from production to processing, is of paramount significance due to its extensive consumption and its incorporation into a diverse array of products. This research delves into the comprehensive examination of raw cow's milk from a food science perspective, encompassing chemical, physical, and microbiological aspects, along with the associated technological considerations. The study encompassed the analysis of ten milk samples, all sourced from the Pristina region. Eight of these samples were directly obtained from local farmers, while the remaining two were procured from various marketplaces. Employing advanced analytical techniques and adhering to relevant ISO standards, the investigation was conducted using state-of-the-art Bactoscan and Milkoscan devices. The primary objective of this paper is to assess the quality of raw cow's milk by evaluating fundamental physicochemical and microbiological parameters. These parameters include Colony-Forming Units (CFU), Isoelectric pH (IBC), fat content, protein content, solids-not-fat (SNF), total solids (TS), lactose content, freezing point, acidity, among others. The results of this study are instrumental in not only guaranteeing the nutritional value of milk but also in supporting the broader applications of milk in various products, thereby contributing to the overall quality and safety of the dairy industry.

Keywords: Milk quality, Physicochemical parameters, Microbiological parameters, Raw cow's milk, Quality assessment

FISH BIOSECURITY IN EUROPE AND ALBANIA

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Abstract

Albanian legislation on Aquaculture, based on the National Fisheries Strategy, law no. 103/2016 "The Aquaculture" as well as other by-laws and regulatory acts in their implementation, is focused on the economic development aspect and not considering the health aspects. Meanwhile, law no.10 465/29.9.2011 "For the veterinary service in the Republic of Albania" deals with health problems in aquaculture in a superficial way. Albanian aquaculture, faces various challenges and gaps in terms of biosecurity measures which are related to regulatory framework, farm-level management, education and training and environmental impact. Addressing these gaps in Albanian aquaculture biosecurity would require a collaborative effort involving government agencies, industry stakeholders, and research institutions.

Fish biosecurity in Europe refers to the measures and protocols in place to prevent, manage, and control the spread of diseases and pests that can affect fish populations. Eventhough Europe has made significant efforts to establish fish biosecurity measures, there are still some gaps and challenges in the system corelated with: disease detection and surveillance, regulatory harmonization, illegal trade, wild fish populations, emerging diseases, etc. Efforts to address these gaps require collaboration between European countries, international organizations, and the aquaculture industry.

Referring to Albanian EU progress report for improving fish biosecurity is important for the field and involves several steps: training, monitoring and surveillance, quarantine, biosecurity plans, regulations and enforcement, disease management, traceability, emergency response, etc. By addressing these aspects, Albania can work toward improving fish biosecurity, ensuring the health of its aquatic ecosystems, and promoting a sustainable and thriving aquaculture industry.

Key Words: Aquaculture, biosecurity, management, legislation.

EVALUATION OF PESTICIDES RESIDUES IN FRUITS AND VEGETABLES AN EMERGING ISSUE IN ALBANIA: CASE STUDY RESIDUES OF TRIAZOLES IN APPLE

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Abstract

The application of pesticides in agriculture to protect plants from pest and weeds is of high importance to ensure food production and provide good quality of fruits and vegetables. However, despite their advantages related to agriculture sector, the inappropriate use of pesticides may also have negative consequences to the environment and human life. Therefore, the appropriate use of pesticides is required respecting their ecotoxicological properties, environmental conditions and the extent of pest infestations.

This study aims to analyse the issue of pesticides residues in fruits and vegetables in Albania and to evaluate the fate of penconazole and myclobutanil residues in apples. The apple trees were treated with minimum and maximum levels of recommended doses of penconazole and myclobutanil to control scab disease in Starking and Golden Delicious cultivars. The apple fruit samples were collected randomly in different interval days after application. The samples were extracted using QuEChERS method and the identification and quantification of residues were performed using liquid chromatography-tandem mass spectrometry (LC-MS/MS) technique. The pesticide residue data were compared with the Maximum Residues Limit (MRL).

The obtained data showed that the level of triazole residues in all analysed samples was decreased with time. Thus, the level of penconazole residues in analysed samples was reached below the MLR (0.2mg/kg fruit) from 1 to 7 days after application, showing that the application of penconazole as a fungicide to control fungal pathogens is suitable and guarantees the food quality and safety for the consumers. Whereas, the level of myclobutanil residues was reached below the MLR (0.6 mg/kg fruit) from 5 to 15 days after application, showing that myclobutanil is more persistent in apple fruit than penconazole. However, the application of myclobutanil guarantees food safety for consumers by considering the required pre-harvesting interval.

Key words: Apple, pesticide residue, QuEChERS, LC-MS/MS, penconazole, myclobutanil.

1. Introduction

Fruits and vegetables are one of the supplementary sources of carbohydrates, fibers, lipids, vitamins, minerals, antioxidants and other important nutrients. The consumption of these commodities takes the second place on food pyramid of many European countries [2,3,5]. A high intake of fruit has been encouraged not only to prevent consequences due to vitamin deficiency but at the sometime to reduce the incidence of many diseases such as cancer, cardiovascular diseases and obesity [7,8]. Like other crops, apples are highly attacked by pests and diseases during production and require intensive pre-harvest management to produce marketable fruit [6]. In order to maintain the healthy plant and to improve the quality of the fruit it is necessary the application of pesticides [2]. However, the use of pesticides often leads to the presence of pesticide residues in fruit after harvest this either because of many farmers do not follow recommended mixing dose written on label instructions or because of they do not comply with the recommended pre-harvest intervals between pesticide applications and harvesting of fruits [2,4]. Therefore, pesticides should be controlled at optimum level due to their relative toxicity to the human health. Thus, pesticide residue analysis is tremendously an important process in determining the safety of using certain pesticides [2]. This study aims to evaluate the fate of penconazole and myclobutanil residues in apples and to asses if the fruits are safe for the consumers.

2. Materials and methods

The apple trees, Golden Delicious and Starking Delicious cultivars, were treated with minimum and maximum levels of recommended doses of penconazole and myclobutanil   The samples were collected randomly in different interval days after

application in accordance with European Commission Directive 2002/63/EC. Transportation and handling was done through cooling boxes at low temperature (4-5^{0}C). Meanwhile, the extraction and purification of samples was based on QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) analysis method developed by Anastassiades et al [1]. The identification and quantification of pesticides residues was performed through Agilent 1200 LC-MS/MS system.

3. Results and Discussion

The data presented in Tables 1 and 2 showed that the level of penconazole residues in all analyzed samples (Golden Delicious and Starking apple fruit) decreased over time. Thus, the level of penconazole residues expressed as % of MRL, in Golden Delicious varies from 153 % (1st day) to 22.5% (19th day) for cultivars treated with maximum recommended dose, and from 86.50% to 18.50% for cultivars treated with minimum recommended dose (Table 1).

Table 1. Residues of Penconazole Pesticide in Golden Delicious Apple Fruit

Data	min. application (mg/kg fruit)	penconazole residues (%)	% MRL	Max. application dose (mg/kg fruit)	penconazole residues	% MRL
1	0.173	100	86.50	0.306	100	**153**
7	0.059	34.10	29.50	0.080	26.14	40
19	0.037	21.38	18.50	0.045	14.70	22.5
MRL (mg/kg fruit)	0.2					

Meanwhile the data presented in Table 2 showed that level of penconazole residues in Starking Cultivar expressed as % MRL varies from 246.5% to 22.5% for cultivar treated with maximum recommended dose and from 119% to 5.50% for cultivars treated with minimum recommended dose. Furthermore, the values of MRLs expressed as percentage indicate that the level of penconazole residues in analyzed samples was reached below the MLR (0.2mg/kg fruit) from 1 to 7 days.

Table 2. Residues of Penconazole Pesticide in Starking Apple Fruit

Data	min. application dose (mg/kg fruit)	penconazole residues (%)	% MRL	Max. application dose (mg/kg fruit)	penconazole residues (%)	% MRL
1	0.239	100	119.5	0.493	100	**246.5**
7	0.076	34.10	38.0	0.215	43.61	**107.5**
19	0.011	21.38	5.50	0.045	9.128	22.5
MRL (mg/kg fruit)	0.2					

According to myclobutanil pesticide the data presented in the Tables 3 and 4 show that myclobutanil residues expressed as % MRL range from 293.3 % (1stday) to 9.167% (40th day) and from 164.3% to 3.833%, respectively for cultivars treated with maximum and minimum recommended dose.

Table 3. Residues of Myclobutanil Pesticide in Golden Delicious Apple Fruit

Data	min. application dose (mg/kg fruit)	myclobutanil residues (%)	% MRL	Max application dose (mg/kg fruit)	myclobutanil residues (%)	% MRL
1	0.878	100.0	**164.3**	1.760	100.0	**293.3**
6	0.532	60.59	88.67	1.116	63.41	**186.0**
14	0.220	25.06	36.67	0.627	35.62	**104.5**
21	0.064	7.290	10.67	0.395	22.44	65.83
28	0.026	2.960	4.333	0.092	5.227	15.33
40	0.023	2.620	3.833	0.055	3.125	9.167
MRL (mg/kg fruit)	0.6					

Based on the experimental data the level of myclobutanil residues was reached below the MLR (0.6 mg/kg fruit) from 5 to 15 days after application (see Table 3 and 4).

Table 4. Residues of Myclobutanil Pesticide in Starking Apple Fruit

Data	Min. application dose (mg/kg fruit)	myclobutanil residues (%)	% MRL	Max.application dose (mg/kg fruit)	myclobutanil residues (%)	% MRL
1	0.928	100.0	**154.7**	2.085	100.0	**347.5**
6	0.542	58.41	90.33	1.146	54.96	**191.0**
14	0.268	28.88	44.67	0.583	27.96	97.17
21	0.083	8.944	13.83	0.422	20.24	70.33
28	0.028	3.017	4.667	0.161	7.722	26.83
40	0.019	2.047	3.117	0.084	4.029	14.00
MRL (mg/kg fruit)	0.6					

4. Conclusions

The obtained results showed that the level of penconazole and myclobutanil residues in all analyzed samples decreased with time after application. The level of penconazole residues in analyzed samples was reached below the MLR (0.2mg/kg fruit) from 1 to 7 days after application, showing that the application of penconazole as a fungicide to control fungal pathogens is suitable and guarantees the food quality and safety for the consumers. Whereas, the level of myclobutanil residues was reached below the MLR (0.6 mg/kg fruit) from 5 to 15 days after application, showing that myclobutanil is more persistent in apple fruit than penconazole. Therefore, the application of myclobutanil and penconazole guarantees food safety for consumers by considering the required pre-harvesting interval.

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PARASITIC SKIN INFECTIONS IN DOGS AND CATS

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ABSTRACT

Dogs and cats are among the most beloved pets for us, but they are very often affected by various types of ectoparasites, dangerous for them and for their owners. Parasitic infections are preventable and curable diseases, although they take time. The changes they cause in the body are reversible, but it also depends on the degree of damage to an organism, early detection facilitates the veterinarian's work and makes the recovery faster. In this study, dermatitis of different forms was found. After thorough cytological, microbiological and histopathological examination, the underlying cause of the cases was ascertained, and therefore these cases were grouped into specific dermatoses. In dogs, out of twelve cases with dermatitis of an infectious nature, it was found that demodectic dermatitis (n=4), sarcoptic dermatitis (n=5), flea bite dermatitis (n=3) were effectively diagnosed with the help of cytology, history and clinical signs. Also six cases of leishmaniasis were found. The presence of fleas (n=10), presence of yeast (n=4) as well as otitis externa (n=6) were also found in cats. Regardless of the treatment for parasitic infections, it is evaluated of particular importance the control of environment, elimination of the parasites population as well as awareness of animal owners. It is recommended to inform owners and build control programs for ectoparasites. As long as a complete therapeutic strategy for the animal and the environment is included, we should have ensured protection from parasites.

Key words: skin, lesion, ectoparasites, dog, cat

INTRODUCTION

Skin diseases in dogs are considered by practicing veterinarians as one of the most common problems found during their work. The most common ectoparasites in pets are fleas, ticks and mites. But mosquitoes and lice also belong to this group of insects, so dogs too and must be protected from them. These parasites are important not only for the direct impact they have on pets, but also because some of them carry other diseases that are important to both animals and humans (Dr. R. Singh, 2022). The presence of these ectoparasites causes infection. The skin response to parasites varies with the number of parasites, location, nutrition and immune response. The skin reaction is often mediated by immune mechanisms (hypersensitivity). Diagnosing parasitic infections requires identification of the specific parasite involved and this may not be possible with skin biopsy evaluation alone. (J. F. Zachary, 2017).

MATERIAL AND METHODS

The study was conducted in dogs suffering from various skin and subcutaneous diseases, including those of parasitic dermatitis, presented mainly in the May-June period in different clinics in Tirana district. Clinical signs, cytological and hematological findings were recorded. Blood was collected from each case and a complete blood cell count was performed. Skin scrapings, up to bleeding, were taken from representative sites of cases presented with alopecia; itching and erythematous lesions on a clear glass slide and then a few drops of 10% potassium hydroxide (KOH) were added and covered with a coverslip. The samples were then examined microscopically. The application of rapid tests (Idexx Leishmania Snap Test) for the detection of leishmaniasis was carried out.

RESULTS AND DISCUSSION

Parasitic dermatitis is the most common clinical presentation in small animal practice. Cases of dermatitis of various types have been diagnosed. In total, 12 cases of dermatitis of infectious nature ie demodectic dermatitis (n = 4), sarcoptic mange (n = 5), flea bite dermatitis (n = 3) were effectively diagnosed with the help of cytology, history and clinical signs. Hematology revealed a relative neutrophilia and mild eosinophilia. Histopathologically *Demodex spp*. at various stages of maturation were found to damage hair follicles. In addition, allergic dermatitis to fleas has also been observed in a dog. In short, cytology was found to be unequivocally effective in diagnosing parasitic dermatitis (Singla, L. D., 2012). Sarcoptic dermatitis: Out of a total of 12 dermatitis cases, 5 cases of sarcoptic dermatitis were diagnosed and confirmed by microscopic examination of scrapings. The presence of a few to a large number of parasites in different stages of development was the basis of the diagnosis in all cases. The cases were observed in male and one female dog of various breeds between the ages of 1 month and 10 years. The prevalence of mange in relation to age showed that dogs under 6 months of age (4 cases) were more susceptible. The lesions

ranged from papules to thick masses distributed over different parts of the body. Elbows, abdomen and limbs were common sites involved. Lesions localized to the elbow and limb had a tendency to form crusts, while lesions in the abdomen were papular to pustular eruptions. This may be attributed to the inaccessibility of scratching sites for dogs. In all cases there was intense itching, erythema, keratinization, excoriation and poor hair condition.

Demodectic dermatitis: Four cases of severe and generalized demodicosis were observed. The dogs were treated by veterinarians at the scene, but their condition did not improve. All cases were complicated by secondary etiologic agents. The face, forelimbs, abdomen, and thorax and hindlimbs were the most common sites involved. In all cases there was mild to moderate itching. The lesions were characterized by complete alopecia, thickening and wrinkling of the skin around the axilla, scalp and limbs. In two of the cases, the affected areas were greasy and hyperpigmented. In one of the cases, crusting and bleeding were also observed. In the present study, the affected dogs were over 18 months of age and the disease had a generalized form. Cytological findings of deep scrapings and material oozing from collected intact papules were full of *Demodex canis*.

Leishmaniasis: 6 cases of dogs were positive from the tests. Leishmaniasis in dogs is an important veterinary problem, but it is also well documented that infected dogs serve as reservoirs of the parasite and contribute significantly to human transmission in many parts of the world. Leishmaniasis in dog manifests as localized skin lesions that may heal or become chronic, the latter leading to significant tissue destruction and disfigurement. (F. Sasani, J. Javanbakht, R. Samani, D. Shirani, 2014).

In the clinic in the period June-July in Tirana, there was a large number of cats which had the presence of skin parasites. The presence of skin fleas was found in 10 cats that came to the clinic with clear visible signs such as: itching, hair loss, coat color change to skin loss in certain areas such as under the neck, tail and limbs, the presence of excrement, adult fleas, while in 5 other cases the presence of unclear clinical signs: the presence of itchy patches and the appearance of few adult fleas. The presence of Otitis Externa was found in 6 cases with visible signs such as: strong itching in the area behind the ears, unilateral or bilateral, hair loss in the same area, strong shaking of the head, severe pain that did not allow the touch, while in 2 cases visible signs of slight dirt in the ear, and slight itching. From the samples taken from the cat's ear, they were placed on the strip and the adult *Otodectes cynotis* parasite and the presence of dirt that this parasite causes in the ear were clearly visible under the microscope. The presence of skin fungus was found in 4 cases with the presence of hair loss in certain areas, reddened to ulceration, dry skin and sometimes itching.

CONCLUSION

Regardless of the treatment of parasitic infections, the control of the environment, the elimination of the causative population and the awareness of animal owners are of particular importance. We need to inform owners and build control programs for ectoparasites. As long as a complete therapeutic strategy for the animal and the environment is included, we will ensure protection from parasites.

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4. Dr. Rajesh Singh. (2022). Ectoparasites in dogs & cats. Retrieved from https://www.pashudhanpraharee.com/ectoparasites-in-dogs cats diagnosis treatment control measures Ectoparasites are external parasites that, are fleas ticks and mites.

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DETERMINATION OF THE LEVEL OF CADMIUM IN MEDITERRANEAN MUSSEL (*MYTILUS GALLOPRONVICIALIS*) FROM THE SHENGJIN COAST OF THE ADRIATIC SEA.

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Abstract

The purpose of these research was to evaluate the concentrations of cadmium in mussels (*Mytilus galloprovincialis*) caught in the Shengjin coastal area. A total of 45 mussel tissues were utilize to determinate the Levels of Cadmium. All the samples were analysed by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) Thermo iCAP 6000 series. The lower value of Cadmium was 1.14 (µgr/gr) whereas the highest value of was 21.61 (µgr/gr). The mean value of Cadmium was higher than the admissible maximum limit suggests from the Albanian regulation. In order to have a clear view in the levels of heavy metals and trace elements in the bay of Shengjin, further studies are needed for other elements.

Keywords: Cadmium, Shengjin, mussels, limit, concentration.

ASSESSMENT OF ANISOCYTOSIS IN DOGS WITH VARIOUS DISORDERS.

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Abstract

In this study, we evaluated red blood cell distribution width (RDW) and the anisocytosis index in dogs with acute and chronic disorders. These parameters quantitatively and qualitatively express the degree of variability in the size of erythrocytes, respectively. The study included 83 dogs of both sexes, different ages, and breeds with various pathologies that were presented at several veterinary clinics in the district of Tirana during the period from 2020 to 2023. RDW was measured using the "Huma Count 30" hematological analyzer, following a complete blood count (CBC), while the anisocytosis index was manually determined through blood smears. The manual assessment of the anisocytosis index revealed a significant correlation with RDW values. RDW values showed a negative correlation with the number of erythrocytes, hematocrit, and hemoglobin concentration, but did not exhibit a significant relationship with erythrocyte indicators such as MCV, MCH, and MCHC. The anisocytosis index was observed to be increased in dogs with inflammatory leukograms, primarily in animals with neutrophils and a visible left shift. However, the number of leukocytes showed a weak correlation with RDW values. RDW exhibited a more pronounced increase in dogs with heartworm disease and chronic renal disease, while a milder increase in anisocytosis was observed in dogs with liver disease, bronchopneumonia, and diabetes mellitus. Therefore, the anisocytosis index, a simple and cost-effective indicator routinely obtained during CBC examination, can serve as a valuable tool in the diagnosis and monitoring of disease progression in dogs.

Keywords: RDW, anisocytosis, anemia, inflammation leukogram

Introduction

The field of veterinary medicine continually presents fresh challenges in diagnosing and treating canine ailments. Hematological analysis, among the many diagnostic tools available to veterinarians, holds a crucial role in unraveling the complexities of canine health. An important hematological parameter in this regard is anisocytosis, which refers to the presence of irregularly sized red blood cells within a sample. Anisocytosis can provide valuable insights into an array of underlying health issues in dogs, spanning from anemia to systemic diseases, making it an invaluable diagnostic tool for veterinarians[4]. Anisocytosis can manifest as either macrocytosis (enlarged red blood cells) or microcytosis (smaller than normal red blood cells), and each of these variations may signify specific diseases or conditions.

Given that, similar to humans, RDW values may increase in relation to specific disease categories, the primary objective of this study was to enhance our understanding of RDW by examining this parameter in various canine pathologies. This study seeks to explore the clinical importance of anisocytosis and its connection with different disorders in dogs. We will delve into the methods of assessment and the significance it carries for veterinarians in their efforts to diagnose and manage canine patients.

Material and Methods

The study encompassed 83 dogs with documented disorders, representing different pathologies and encompassing both sexes, various age groups, and different breeds. These dogs were presented at four veterinary clinics within the Tirana district during the period from 2020 to 2023. The health status of the patients was determined through a comprehensive assessment that considered their medical history, clinical data for cases that underwent follow-up, physical examinations, and other necessary investigations aimed at establishing a definitive diagnosis. The dogs were categorized as outlined in Table 2, with an additional 13 samples obtained from healthy dogs serving as a control group.

Blood samples for hematological analysis were collected via tubes containing the anticoagulant K3EDTA from the cephalic vein. An automated hematology analyzer, specifically the "HumaCount 30," was utilized to perform complete blood counts (CBC). The following indices were examined: total white blood cell count (WBC), granulocytes (GRAN), total red blood cell count (RBC), hemoglobin (Hgb), hematocrit (HCT), erythrocyte indices, and red cell distribution width (RDW). RDW is considered a quantitative measure of anisocytosis.

The semiquantitative evaluation of erythrocyte anisocytosis in peripheral blood smears was calculated based on the number of abnormal cells per 1000x microscopic monolayer field. To determine the anisocytosis index, ranging from 1+ to 4+, we followed the criteria for quantifying erythrocyte anisocytosis in peripheral blood smears as proposed by authors[2,7], as detailed in Table 1.

Statistical Analysis: The study investigated associations between continuous variables and RDW using Pearson's coefficient correlation. RDW values were compared among different pathologies using one-way ANOVA with Dunnett's correction. All data are presented as mean±standard error of the mean, with a significance level of 0.05 considered as the threshold for statistical significance.

Index of anisocytosis	+1	+2	+3	+4
Number of abnormal cells	7-15	16-20	21-29	>30

Table 1. *Criteria for determining the anisocytosis index*

Results and Discussion

The comparison of quantitative and qualitative anisocytosis assessment methods showed a strong correlation (0.792309), indicating substantial agreement and consistency between the techniques, valuable for clinical and research applications. While automated anisocytosis quantification by RDW offers advantages, visual inspection of stained blood smears remains crucial for detecting hematologic abnormalities and cross-referencing values provided by hematology analyzers[1].

Statistical analysis revealed a negative correlation of RDW with erythrocyte count, HCT, and Hgb concentration, but no significant relationship with MCV, MCH, and MCHC (Figure 1). As depicted in Figure 1, the linear regression analysis shows a very low coefficient of determination between WBC and RDW, underlining the minimal impact of leukocyte count on RDW values in dogs. In contrast, the analysis of the relationship between neutrophils and RDW suggests a significant increase in anisocytosis in dogs with inflammatory leukograms, especially when neutrophils exhibit a visible left shift.
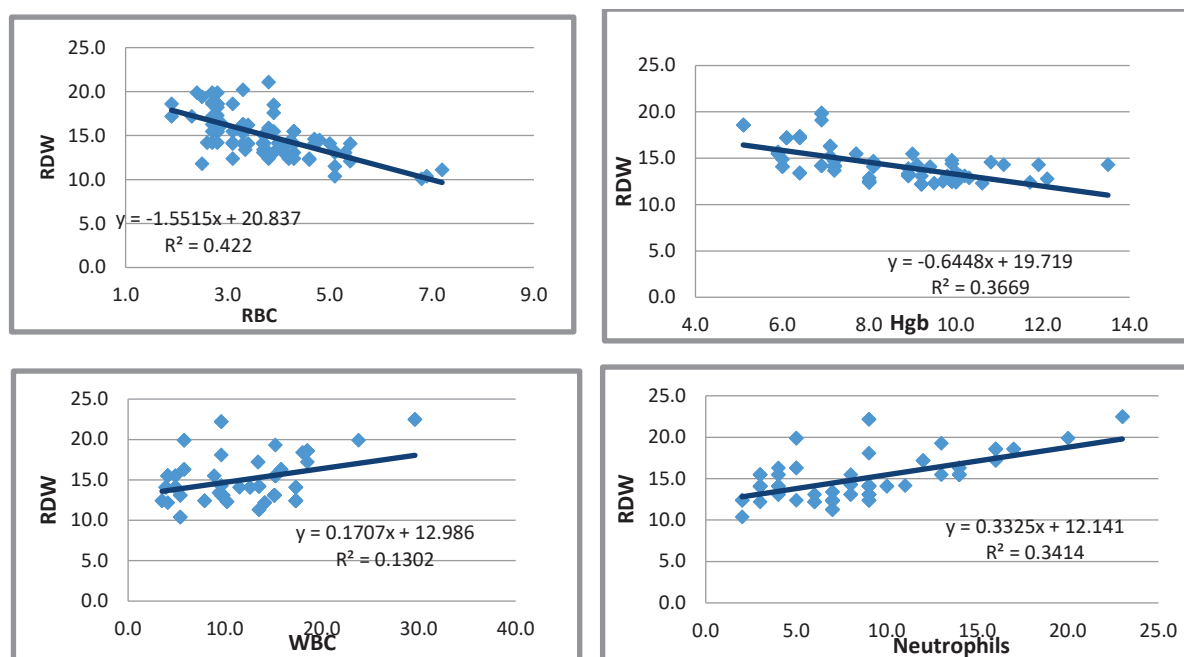
Figure 1. *Correlation between RDW and some hematological parameters*

As indicated in the table 2 and illustrated in the figure 2, RDW exhibited significant increases in dogs with heartworm disease, and chronic kidney disease, while milder anisocytosis increases were observed in dogs with hepatitis, chronic bronchitis, bronchopneumonia, and diabetes mellitus. The elevation of RDW in chronic kidney disease and chronic bronchitis can be attributed to proinflammatory cytokines' influence on erythrocyte maturation, leading to variations in erythrocyte size[5]. Authors propose that factors contributing to the rise in RDW include disruptions in erythropoiesis, chronic inflammation, and nutritional deficiencies, alone or in combination[5,6].

Some authors have proposed that hyperglycemia may exert effects on erythropoiesis and the lifespan of red blood cells (RBCs), and this relationship appears to be more pronounced in cases of complicated diabetes. Results from a study investigating the link between mortality and RDW in Acute Pancreatitis (AP) patients indicate that RDW serves as an excellent marker for assessing the prognosis of AP[3].

In conclusion, these findings emphasize the clinical utility of RDW not only in anemia but also in various organ or system disorders. This cost-effective and easily accessible parameter provides valuable diagnostic and prognostic information.

Type of illness	Number of dogs	RDW			Index of anisocytosis	
		mean ± SD	min	max	mean	min /max
Heartworm disease	15	16.41±1.99	13.4	19.3	2.09	+1/+3
Chronic kidney disease	19	16.25±2.84	12.2	21.1	2.22	+1/+4
Hepatitis	9	13.64±1.62	12.4	17.2	1.63	+1/+4
Bronchopneumonia	12	14.38±1.83	12.3	18.6	1.58	+1/+3
Chronic bronchitis	8	15.40± 3.25	11.3	19.9	2.43	+1/+4
Diabetes mellitus	13	14.55±1.84	12.4	18.7	1.69	+1/+3
Pancreatitis	7	13.23 ±1.70	11.5	16.2	1.67	+1/+2

Table 2. *Average values of RDW according to different pathologies*
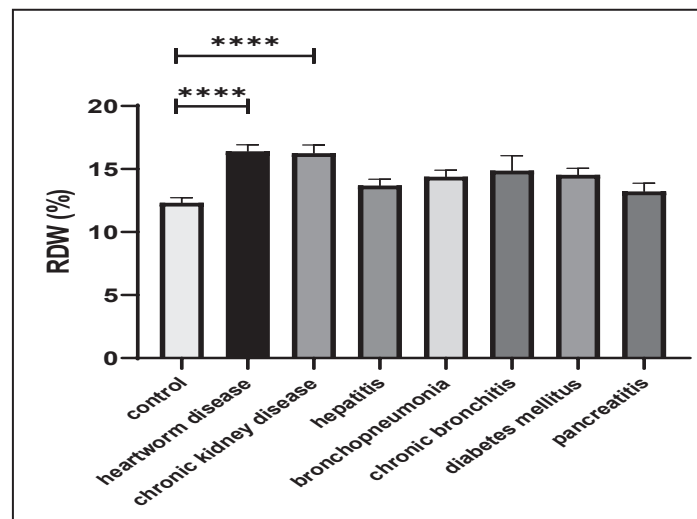
Figure 2. *The RDW values among the different conditions (one-way ANOVA)*

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PERCEPTION OF GENETICALLY MODIFIED FOOD AMONG ALBANIAN YOUNG ADULTS

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Abstract

Genetically modified (GM) foods have been subject of contradictory and concerning subjects since their introduction to food chain in the beginning of 90s. Although GM foods nowadays are considered an important strategy to meet the growing food needs of the world population, the majority of consumers express doubts about purchasing and eating them. Based on aforementioned the present study intend to evaluate the perception of GM food among Albanian young adults. The methodology was based on a cross-sectional survey on participants aged 18 to 25 years old. A total of 121 students at Agricultural University of Tirana with different educational backgrounds completed the questionnaire from March to June 2022. All the data were analyzed with the statistical program SPSS 29.00. Our findings suggest that there are statistically no sex-based differences between participants and the statements: *GM food represent a risk for human health* (one way ANOVA, $F_{(1,119)} = 2.402$, p=0.124); *GM foods are a major concern compared to other food safety issues , such as pesticide residue, feed additive and water pollutio*n ($F_{(1,119)} = 0.124$, p=0.725). However, there is a significant difference in the means of the student's major and their perception toward variable "*GM foods represent a risk for human health*," $F_{(1,119)} = 2.624$, p=0.028). Studies that consider more inclusive sample and a wider range of factors are necessary in the near future for better understanding of Albanian consumers perception and acceptance of genetically modified foods.

Key words: GM food, perception, cross-sectional survey, SPSS 29.00.

Introduction

The world has experienced an overall rise in food demand as a result of population growth along with a change in dietary preferences toward more resource-intensive foods (Fukase E. and Martin, W. 2020). Thus, new plant breeding technologies (NPBTs), including genetically modified and gene-edited crops, insect-based proteins (IBP) offer large potentials for sustainable agricultural development and food security (Qaim, 2020; Kokthi et al., 2021). Consumers, however, are often hesitant to accept them (Siegrist and Hartmann 2020). Therefore, this study aims to evaluate the perception, knowledge, and acceptance of Albanian young adults towards GM foods.

Material and Methods

This research is based on a cross-sectional survey delivered through questionnaire from March through June 2022. Participants in the survey were 18 to 25-year-old students at the Agricultural University of Tirana. Given the contentious nature of GM food, we reasoned that the younger and more well-educated people would constitute the most suitable sample for assessing attitudes toward GM food. Students that completed the questionnaire were pursuing degrees in Veterinary Medicine, Food Science, Food Technologists, Biotechnology, Food Analyzes and Agriculture and Environment. After being coded with cardinal numbers, the questionnaires were classified according to the students' majors. A total sample of 121 undergraduate and graduate students completed the survey on genetically modified foods.

Questionnaire design. The questionnaire design for the survey was based on recent research (Cui et al. 2018; Brosig & Bavorova 2019; Şanlıer & Ceyhun Sezgin 2020) for the perception of younger populations toward GM food. Thus, the questionnaire is composed of two parts. The first part contains questions regarding demographics characteristics, education status, age, gender. The second part contains questions regarding the perception, knowledge, and acceptance of participants of GM foods. A Likert scale was used to design the questions.

Data analysis. All the data were analyzed with the statistical program SPSS 25.00. Crosstabulation, one way ANOVA, were performed to examine the association between nutrigenomics/nutrigenetics and different variables. The independent variables are gender, the major the students attended during the survey. The dependent variables are the level of information and the perception of the students towards GM food.

Results and Discussion

Our data show that the majority of the participants in the survey were undergraduates' students (n=99) and 18.2% (n=22) were attending a master's degree in Biotechnology and Food Analyses. 52.1% (n=63) of the participants were female and 49.1% (n=58) were male. The mean age of participants is 19.75±1.854. The second part of the questionnaire was focused on the knowledge and perception that students have towards GM food. To assess the knowledge that students have towards GM food variables including statements such as: i) "*How do you acquire information on GM food*?," ii*) "Do you know the principles of GM technology such as introducing foreign genes, genetic recombination, and gene expression?"*, iii) "*Do you know any GM food marketed in Albania supermarkets?*", were analyzed and partially displayed in Table 1. Regarding the variable "*Do you know the principles of GM technology such as introducing foreign genes, genetic recombination, and gene expression?"*17.4% (n=21) declare that they do not know anything about GM food compared to 46.3% (n=56) that know something about GM food. Furthermore, 29.8% (n=36) of the participants in the survey do not know any GM food that are marketed in Albania supermarkets.

Table 1: Male and female participants response on items expressed as frequency and percentage

Question 5: How do you acquire information on GM food?							
			TV	Books	Internet	Learning at school	Total
Gender	Female	N	8	10	27	18	63
		% within gender	12.7%	15.9%	42.9%	28.6%	100.0%
	Male	N	11	16	17	14	58
		% within gender	19.0%	27.6%	29.3%	24.1%	100.0%
Total		N	19	44	44	32	121
		% of Total	15.7%	36.4%	36.4%	26.4%	100%

Question 6: Do you think the food from GM crops is risky for peoples' health?								
			Very Risky	Risky	Neutral	Not risky	Not risky at all	Total
Gender	Female	N	12	16	15	10	10	63
		%within gender	19.0%	25.4%	23.8%	15.9%	15.9%	100.0%
	Male	N	13	17	11	8	9	58
		% within gender	22.4%	29.3%	19.0%	13.8%	15.5%	100.0%
Total		N	25	33	26	18	19	121
		% of Total	20.7%	27.3%	21.5%	14.9%	15.7%	100.0%

Question 8: Compared to other food safety issues, such as pesticide residue, feed additive and water pollution, your concerns on the safety of GM foods are?								
			More Severe	Severe	Nearly the same	Les severe	Not severe at all	Total
Gender	Female	N	3	8	16	24	11	62
		%within gender	4.8%	12.9%	25.8%	38.7%	17.7%	100.0%
	Male	N	5	3	15	20	13	56
		%within gender	8.9%	5.4%	26.8%	35.7%	23.2%	100.0%
Total		N	8	11	31	44	24	118
		% of Total	6.8%	9.3%	26.3%	37.3%	20.3%	100.0%

In order to assess the perception of Albanian young adults toward GM food we took under consideration among others the variables: i) *Do you think the food from GM crops is risky for peoples' health*? ii) *GM foods are a major concern compared to other food safety issues , such as pesticide residue, feed additive and water pollution?* as displayed in Table 1 and Figure 1. Our results are comparable with other studies published in the frame of the Albanian and European Union consumers perception toward GM food (Kokthi, 2022; Ichim, 2021; Türkoğlu Coşkun, & Olhan, 2022). To understand if students' perception toward GM food differs between male and female or the perception is depending on their education background a one-way ANOVA was calculated. Our data show statistically no difference in the mean between male and female and their perception that food GM crops is risky for peoples' health ($F_{(1,119)}$=0.294, p=0.588). Furthermore, there is statistically no difference in mean between male and female and their knowledge on GM food technology ($F_{(1,119)}$=0.598, p=0.441). Also, there is statistically no difference in mean between male and female and their perception that GM foods are a major concern compared to other food safety issues, such as pesticide residue, feed additive and water pollution ($F_{(1,119)}$=0.124, p=0.725).
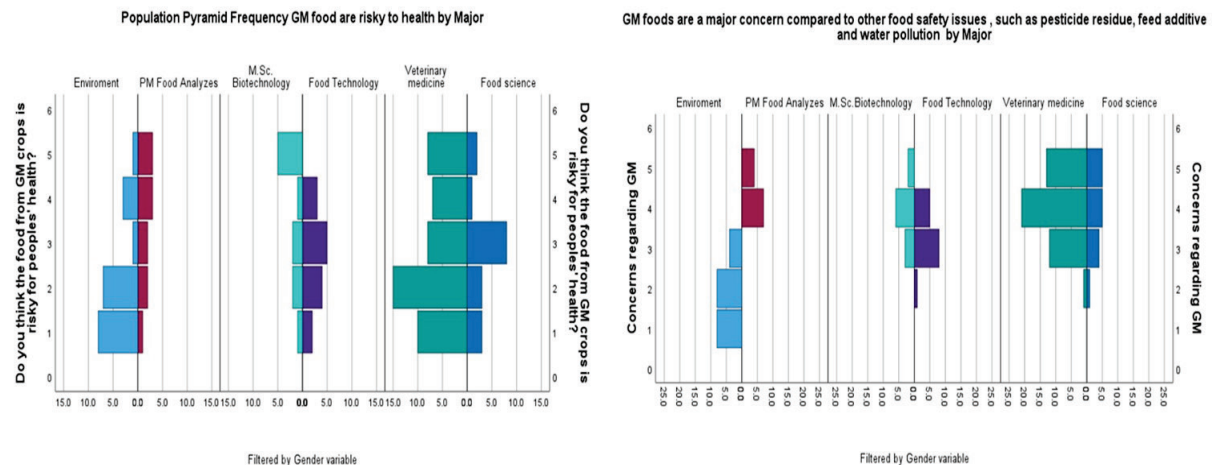
Figure 1: Frequency of variables "*Do you think the food from GM crops is risky for peoples' health*?" and "*GM foods are a major concern compared to other food safety issues, such as pesticide residue, feed additive and water pollution*?" filtered by gender and educational background of the participants.

Our study shows that there is a statistically significant difference in the means of students' major and their perception towards GM food expressed in the variables as displayed in Table 2.

Table 2: One way ANOVA results performed with SPSS 29.00

		N	Mean	Std. Deviation	F	Sig.
Do you think the food from GM crops is risky for peoples' health?	Food science	17	2.76	1.200	**2.624**	**p=0.028**
	Veterinary medicine	48	2.75	1.391		
	Food Technology	14	2.64	1.008		
	M.Sc. Biotechnology	11	3.64	1.502		
	P.M Food Analyzes	11	3.45	1.368		
	Agriculture and Environment	20	2.10	1.252		
	Total	121	2.78	1.357		
Do you know the principles of GM technology such as introducing foreign genes, genetic recombination, and gene expression?"	Food science	17	1.65	.702	**5.727**	**p<0.001**
	Veterinary medicine	48	1.56	.616		
	Food Technology	14	1.86	.663		
	*M.Sc. Biotechnology	11	2.00	.632		
	*P.M Food Analyzes	11	1.73	.905		
	Agriculture and Environment	20	2.45	.510		
	Total	121	1.81	.711		
Compared to other food safety issues, such as pesticide residue, feed additive and water pollution, your concerns on the safety of GM foods are?	Food science	15	3.93	.961	**27.997**	**p<0.001**
	Veterinary medicine	47	3.98	.794		
	Food Technology	14	3.29	.611		
	M.Sc. Biotechnology	11	3.91	.701		
	PM Food Analyzes	11	4.36	.505		
	Agriculture and Environment	20	1.80	.768		
	Total	118	3.55	1.122		

*M.Sc.-Master of science; P.M-Professional Master

Our data show that a complex field like genetically modified food, which necessitates understanding of nutrition, genetics, biochemistry, human physiology, novel experimental technologies is quite challenging to make accessible to consumers in general (Ghimire et al 2023). That is why our results show a clearly statistically significant relationship between education background of the participants and their perception toward genetically modified food. We genuinely believe that further studies are warranted in the future for a better understanding of and acceptance of Albanian consumers towards GM foods.

Acknowledgments

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THE OCCURRENCE OF ERGOT ALKALOIDS IN WHEAT HARVESTED IN ALBANIA DURING YEAR 2022[2]

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Ergot alkaloids (EAs) are mycotoxins produced mainly by the genus Claviceps purpurea. In Albania, there are no investigations on the presence of EAs in cereals so far. The aim of this study is to investigate the presence of EAs in wheat produced in Albania. A total of 20 unprocessed wheat grains were collected from farms in the Myzeqeja and Korca regions and analysed for EAs at the Croatian Veterinary Institute/ Zagreb using ELISA methods. The content of crude nutrients was also determined using the NIRS method.

The concentrations of EAs and ergot sclerotia in all wheat samples were below the detection limits set by the EC (< LOD) and no differences were found between the regions. The results of EAs concentrations were also considered in relation to the nutrient content of the samples. Weather conditions in both regions in 2022 did not lead to differences in EAs concentrations in wheat grown in these regions. Further studies on the occurrence of EAs in cereals produced in Albania are needed over several years.

Keywords: Ergo alkaloids; ergot sclerotia; wheat; occurrence;

THE USE OF PECTOLITIC ENZYMES AND STEMS DURING WINE FERMENTATION OF "*SHESH I ZI*" VARIETY.

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Abstract

The application of new wine production methods has been a recent focus in the food industry. Wine is an alcoholic beverage obtained through the fermentation of grape juice, and various wine varieties are produced based on grape variations. Thanks to its favorable chemical composition for human health and it's potential to prevent certain diseases, wine stands as one of the oldest alcoholic beverages known to humanity. This study aims to investigate the chemical properties of wine produced from the indigenous "*Shesh i zi*" grape variety, cultivated at the Experimental Didactic Farm of UBT, using three different fermentation schemes. In the first experiment, classical fermentation was employed as a control trial (SVC). In the second experiment, fermentation was carried out in the presence of pectolytic enzymes (at a dose of 2 g/HL) (SVE), while the third experiment involved an additional step with the inclusion of stems (50% of the mass) (SVF). All three experiments used the same dose of 5g/hl of SO_2 and were inoculated with commercial yeast at a dose of 20g/hl. The fermentations were closely monitored at controlled temperatures. The evaluation of all polyphenolics (total polyphenols, total tannins, total anthocyanins, and color parameters) was performed using spectrophotometric methods. From this study, we can conclude that to achieve favorable characteristics in wine production, in addition to considering various factors such as the grape variety and cultivation region, it is crucial to implement appropriate fermentation schemes, including enzyme usage.

Keywords: Alcoholic fermentation, stems, pectolytic enzymes, polyphenols compounds, var. "Shesh i zi

Introduction

Wine is an alcoholic beverage produced by fermenting the juice of grapes. Yeast fermentation, and maceration which is a physico-chemical process that facilitates the extraction of anthocyanin and tannins, giving the wine its color and texture (Yoncheva et al., 2018; Niculescu et al., 2018).

One of the primary challenges in the production of red wine is the necessity to work with grape skins and seeds. Emerging technologies not only aid in separating solids through appropriate extraction methods but also help reduce the presence of unwanted wild microorganisms.

Recent studies in the food industry have focused on the implementation of innovative wine production methods (Olga Pascual et al., 2016; Springer et al., 2016). In our study, we will investigate the use of grape stems during the wine fermentation process and the application of pectolytic enzymes, to increase the quality and yield of the wine.

The objective of this study is to provide valuable insights and recommendations for the adoption of advanced wine production techniques, emphasizing both quantity and quality.

Materials and Methods

For the realization of this study, grapes of the Vitis vinifera L. *var*. *Shesh i Zi,* from the UBT Experimental Didactic Farm (FDE) in Tirana, were used. Following optimal ripening conditions, grape samples underwent various fermentation experiments. The first experiment followed the traditional fermentation process, serving as the control test, and was labeled with the code SVC. In the second experiment, fermentation took place in the presence of pectolytic enzymes (at a dose of 2 g/HL) and was marked with the code SVE. The third experiment involved the addition of grape pomace (equivalent to 50% of the total mass of the grapes used in experiment 3) and was designated as SVF. All three experiments were inoculated with the same enological yeast at a dose of 20 g/HL and treated with a consistent dose of SO_2 (5g/HL).

After fermentation at controlled temperatures, wine samples were subjected to analyses of various parameters. Determination of total polyphenols followed the method described by Cetó X. et al, 2012. Total tannins were determined using the method described by Porter et al. 1985. Quantification of total anthocyanins was conducted according to the method described by Puissant and Leon, 1967, while the evaluation of color parameters in both white and red wines was performed as per Glories, 1984. Analyses were conducted with a minimum of three replicates, and all results underwent statistical analysis through factorial analysis of variance (ANOVA). Significance was established with a threshold of $P < 0.05$."

Results and Discussions

Throughout the fermentation process, a series of biochemical reactions take place, which significantly impact the extraction of the compounds responsible for the aromas and flavors in wines (Añón A. et al., 2014).

The polyphenolic indicators, as displayed in the table below, are crucial components in wine. Their content is influenced by a multitude of factors.

Table 1. Total polyphenols, total anthocyanins and total tannins of wine produced with three fermentation schemes from var. *Shesh i zi.*

Wine samples	Total polyphenols (g/L)	Antocianet totale (mg/L)	Taninet totale (mg/L)
SVC	2.58 ± 3.8	377.36 ± 2.5	24.627 ± 1.1
SVF	2.40 ± 8.1	392.93 ± 2.1	25.873 ± 0.8
SVE	2.61 ± 11.6	370.68 ± 2.1	22.917 ± 0.2

a – Mean ± SD

From the results of the study, it was observed that the addition of enzymes had an impact on the content of polyphenols, with a significant level of $P<0.05$. The variation in total polyphenol content can be attributed to a combination of genetic (Fang F. et al., 2008) and technological (Olejar K.J et al., 2016) factors.

As shown in the table, the wine produced with the addition of stems showed the highest levels of total anthocyanin, while the wine produced with the presence of enzymes resulted in lower levels of these compounds. The results of this study showed that grape stem treatment led to an increase in anthocyanin content, showing a statistically significant effect with a value $P <0.05$.

The table above also presents the average values of the total tannin content in the wines produced in the three experiments of this study. From the data it appears that the wine produced with the addition of enzymes showed lower values of tannins, while the wine produced with grape stems showed the highest values. These data are consistent with the results found in the studies conducted by Lamçe et al., 2020.

Color parameters are crucial in evaluating red wine oxidation, as they reflect changes that occur during fermentation and the storage of this product. The results from this study are presented in Table 2.

Table 2. Color parameters of wine produced with three fermentation schemes from var. *Shesh i zi.*

Wine samples	Hue of color	Index of color	Color intensity
SVC	1.58 ± 0.7[a]	0.57 ± 0.1	1.77 ± 0.2
SVF	1.48 ± 0.5	0.61 ± 0.1	1.66 ± 0.2
SVE	$1.58 \pm 0.$	0.60 ± 0.1	1.68 ± 0.2

a – Mean ± SD

As shown in the table, when considering the hue and color intensity, wines produced with grape stems have the lowest average values compared to wines produced with the addition of enzymes and the control. However, in terms of the color index, the wine produced with stems exhibits the highest value for this indicator.

Conclusions

From this study it was observed that the addition of pectolytic enzymes and grape stems during alcoholic fermentation has a positive effect on the improvement of phenolic parameters in wine. Based on the data obtained, we can conclude that in order to produce wine with excellent characteristics, in addition to taking into account factors such as grape variety and growing region, it is essential to apply appropriate fermentation schemes that include the use of pectolytic enzymes or grape stems. However, to draw more comprehensive conclusions, the effectiveness of enzyme or stems application in fermentation should be investigated and analyzed over several wine seasons and with different indigenous or locally cultivated grape varieties.

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DETERMINATION OF AFM1 IN MILK, USING QUICK ALFA M1 STRIP TEST

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Abstract

Aflatoxin contamination in animal and human food remains a major concern, as aflatoxins have carcinogenic properties and are found worldwide. Their high toxicity and distribution, the growing number of potentially contaminated foods and the impact on human/animal health as well as on the economy of a country, represent some of the causal parameters of this emerging risk. The European Commission and the Codex Alimentarius Commission determine that the maximum level of aflatoxin M1 in milk and milk products should not exceed 50 ng / L. In this coherence and from previous results in positive milk samples, our study was undertaken, for the determination of AFM1 in milk samples originating from farms in the region of Vau Deja and Lezhe. Sixty milk samples were collected in the period April-June 2023, and tested with the rapid QUICK ALFA M1 Strip method. The results showed a value lower than 50 ppt (negative) in only 29 milk samples, while 31 samples showed a positive result with a value higher than 50 ppt. This situation requires the intensification of preventive measures for the contamination of animal feed, storage in controlled humidity conditions, as well as national monitoring not only of AFM1 in milk, but also of AFB1 in zootechnical feed. Thus, it will be possible to prevent the spread of the risk of exposure of the Albanian consumer from these mycotoxins.

Keywords: aflatoxin M1, milk, Strip test

Introduction.

Aflatoxin contamination in animal feed and human food remains a major concern; aflatoxins have carcinogenic properties and are found worldwide, especially in warmer and humid climatic regions [8]. AFM1 was classified as a class I carcinogen by the World Health Organization (WHO) International Agency for Research on Cancer in 2002 [10]. The most common aflatoxins are aflatoxins B1 and B2, which contaminate mainly cereals, and aflatoxin M1 (AFM1), which is a hydroxylated metabolite of AFB1 that is excreted in milk by cows fed a diet naturally contaminated with aflatoxin B1 [11]. Reference is frequently made to aflatoxin B1, which is the most prevalent and the most toxic form [13]. Aflatoxin M1 has been demonstrated to be cytotoxic on human hepatocytes in vitro, and its acute toxicity in several species is similar to that of aflatoxin B1; liver cancer has been related to dietary intake of aflatoxins [4], [5]. Yousef and Marth (1989) extensively reviewed information on the stability of AFM1. Studies have shown no significant changes in AFM1 concentration after heat processing (pasteurization or boiling) or UHT processing [9], [1]. Aflatoxin M1 is, in general, stable in cheese, yogurt, pasteurized milk, fat-free or whole milk, and ice cream. In addition, it resists some sterilization processes, pasteurization, and direct heating processes [7].

To protect consumers from the danger of milk and its products, strict national standards for limits of AFM1 levels are set by many countries [15], [2], [6]. The European Commission has set stricter limits for AFM1 content in milk, stipulating that the maximum AFM1 residue in milk must not exceed 0.05 ng/mL [1],[12]. AFM1 represents 95% of aflatoxins detected in milk [3]. Even in Albania, it is required to respect the criterion regarding the presence of AFM1 in milk, according to European legislation.

Thus, with such a low limit for AFM1 and large-scale market-oriented testing requirements, a fast, sensitive, accurate, low-cost, and on-site analytical technique has to be urgently established. This method is significant for monitoring AFM1 in milk and its products and ensuring the safety of dairy products. An immunochromatographic test strip (ICTS) is widely used in the detection of mycotoxins because it is simple, rapid, specific, sensitive and user-friendly [14]

Our study is also based on the use of this method. As a screening method, it aims to obtain information related to the presence of AFM1 in milk, thus helping to provide relevant indications to control authorities, but also to farms where the presence of this mycotoxin in milk is verified.

Material and Methods.

The study was conducted in small farms in the District of Lezha and Vau Deja, during the period April - May 2023. For the realization of this study, 60 milk samples were collected: 14 samples were taken in Lezha and 46 in Vau Deja. The sampling

was carried out by applying the SSH Method 707 ISO, 1999: "Method of collected samples of milk and milk-based products". The samples were transported under cooling conditions to Food Safety Laboratory - Faculty of Veterinary Medicine, where it was carried out testing milk samples for the possible presence of AFM1, Quick Afla M1 Strip Test.

The Quick Afla M1 Strip Test is a rapid kit for the qualitative/semi-quantitative determination of aflatoxin M1 in milk according to European limits (50 ppt). The test is based on a highly specific immunological reaction that occurs between the anti-aflatoxin M1 monoclonal antibody of the strip test and the aflatoxin M1 possibly present in the analyzed milk sample.

The assay was carried out byadding 200 µL of milk sample, the positive control (milkspiked with 1,000 ng/L of AFM 1), and the negativecontrol (supplied by manufacturer) into reaction wellscontaining lyophilized gold particles. Subsequently, after incubation of the plate of reaction wells for 4 min at ambient room temperature, the strip was dipped into the wells vertically. After 4 min, the strip was removed and placed on a horizontal surface with the unmarked side facing up. The strip was allowed to develop color for 1 min after removing it from the well, and the test results were determined visually (Figure 1). The detection limit of this strip was 500 ng/L

Results and Discussion.

The results showed a value lower than 50 ppt (negative) in only 29 milk samples (48,3%), while 31 samples showed a positive result (51,4%) with a value higher than 50 ppt. In the 29 samples positive for the presence of AFM1, 7 of them belong to the Lezhe Region and 22 to Vau Deja. (Chart 1)
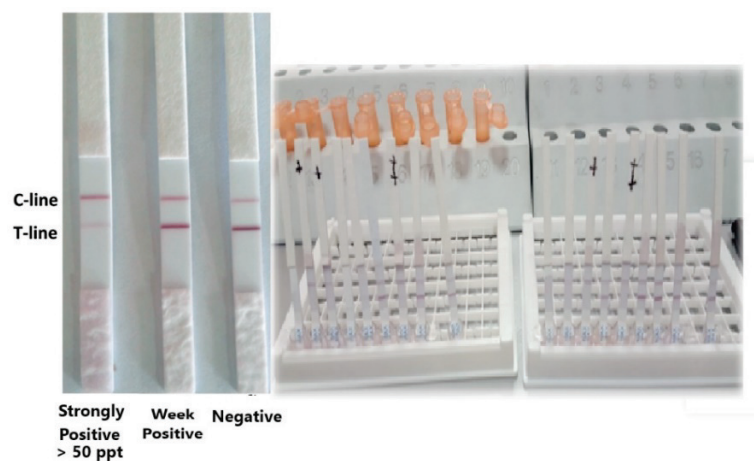
Figure 1. Illustration of Quick Afla M1 Strip Test results.
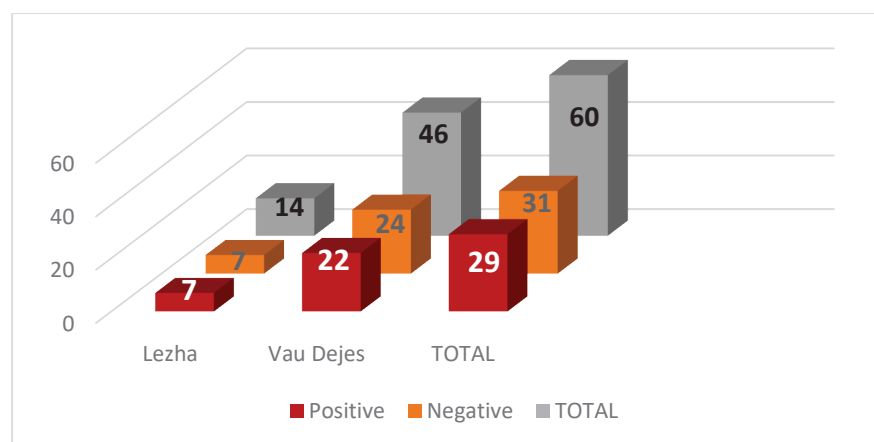
Chart 1. Graphic presentation of results by districts: Lezha and Vau Dejes

This situation requires the intensification of preventive measures for the contamination of animal feed, storage in controlled humidity conditions, as well as national monitoring not only of AFM1 in milk, but also of AFB1 in zootechnical feed. Thus, it will be possible to prevent the spread of the risk of exposure of the Albanian consumer from these mycotoxins.

In these conditions, it is necessary to know the dimensions of the problem of contamination with AFM1 in milk, determined through taking milk samples not only in farms identified as problematic or suspicious. Also, timely monitoring of farms where the presence of M1 aflatoxins has been verified contributes to verifying the progress of the contamination. Therefore, the

identification of the feed that may have generated the presence of AFM1 in milk takes on a great importance to evaluate foods at risk, preventing the distribution and provocation of AFM1 in milk.

The control of the productive chain of milk based on traceability, the strengthening of control in the farms of dairy animals, necessarily requires the analytical control of foods intended for animals, to prevent the presence of AFM1 in milk/its derivatives. The use of screening tests to determine the incidence and risk of AFM1, turns out to be a great help for farmers and consumers. Meanwhile, the possibility with technical assistance from the National and Regional Food Authority through the monitoring of milk with screening methods, we believe that it will efficiently orient the drafting of the national plan for monitoring the presence of AFM1 in milk.

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EFFECTS OF *LYCIUM BARBARUM* SUPPLEMENTATION ON SEMEN QUALITY, OXIDATIVE STATUS, AND HISTOLOGICAL FEATURES OF THE REPRODUCTIVE TRACT OF MALE RABBIT

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Abstract: *Lycium barbarum* (LB) shows several beneficial effects on human and animal health, but its properties on the rabbit buck have been poor investigated. This study examines the effect of LB dietary supplementation on semen quality, antioxidant activity of seminal plasma, and histological aspects of the reproductive tract of rabbit male. Eighteen rabbits were inserted in two different diets: commercial feed (Control) and feed supplemented with 1% of LB (Goji). After a nutritional adaptation period, the animals were subjected to semen collection every 15 days. The libido, semen traits, antioxidant and inflammatory parameters were assessed. Rabbits were slaughter and tissues of the genital tract were collected. The Goji group showed lower abnormal spermatozoa while the concentration, motile and live spermatozoa were higher than the Control (for all: p<0.05). The libido tended to be higher in the Goji group (p<0.1). Histological features such as hyperplasia and functional activity were increased by LB and correlate with some semen characteristics (p<0.05). Conversely, anti-inflammatory and antioxidant parameters were unaffected by diet. These results suggest that LB acts on the reproductive tissues positively influencing semen quality, although further studies are required to appreciate the effect on oxidative stress.

Keywords: Goji berry, semen quality, rabbit buck, seminal plasma, antioxidant and anti-inflammatory capacity, testis,.

HEMATOLOGICAL AND BIOCHEMICAL ALTERATIONS IN DOGS WITH SARCOPTES MITE, BEFORE AND AFTER TREATMENT

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Abstract

In these study we have taken three dogs with the history of localized as well as generalised dry alopecic patches along with moist crusty lesions associated with intense pruritis, severe skin lesions on face and hind limbs. One dog was a Labrador breed 8 years old and two other dogs were Mettis, 4 month and 3 years old. In each dog we did microscopic observation of the superficial as well as deep skin scrapings, also blood before and after treatment, to compare hematological and biochemical changes. Treatment with Ivermectin, Amitraz, Prednisolon and Ceftriaxone was effective in affected dog. Hematological parameters that estimated was leukocytes, haemoglobin (Hb), neutrophils, PCV, erythrocyte (RBC) and biochemical was Blood Urea Nitrogen (BUN), Alkaline Phosphatase (ALP), Alanine Aminotransferase (ALT), albumin, globulin, total protein. Observation of hematological and biochemical parameters before treatment showed leukocytosis, neutrophilia, anaemia, hyperalbumenia, hyperglobulinemia along with rise in AST and ALP levels which came to normal range after recovery.

Keywords: Dog; Ivermectin; Sarcoptes; Alanine Aminotransferase (ALT); Alkaline Phosphatase (ALP)

NEMATICIDAL EFFECTS OF *LAURUS NOBILIS* ESSENTIAL OIL AGAINST GASTRINTESTINAL NEMATODES FROM SHEEP.

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Herbal extracts are of particular interest to drug industry; essential oil with significant anthelmintic activity have the potential to be used as alternatives to conventional chemical drugs. In the present study, we describe the chemical profil of Laurus nobilis essential oil (EO), the in vitro anthelmintic activity of laurel oil against *Haemonchus contortus* and its in vivo anthelmintic effect against the murine helminth parasite model *Heligmosomoides polygyrus*. Chromatographic profil of L. nobilis (EO) extracted from the leaves of L. nobilis have shown the presence of monterpens 1,8-cineol (Eucalyptol) (29.47%), D-Limonène (18.51%) and Linalool (10.84%) in high fractions. The in vitro anthelmintic potential was expressed by an ovicidal effect against H. contortus egg hatching with inhibition value of 3.23 mg/mL and 87.5% of immobility of adult worm's after 8 hours of exposure to 8 mg/mL of L. nobilis EO. Regarding, the in vivo anthelmintic potential, L. nobilis (EO) at 2400 mg/kg bw was completely eliminated the egg output of H. polygyrus after 7 days of oral treatment, together with a 79.2% of reduction in total worm counts. Based on the obtained fundings, L. nobilis EO showed promising in vitro and in vivo anthelmintic capacities against gastro-intestinal parasites.

Keywords: *Laurus nobilis*; essential oil; anthelmintic, *Haemonchus contortus, Heligmosomoides polygyrus.*

WELFARE OF DONKEYS FROM NORTH ALBANIA

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Abstract – The welfare of working donkeys in North Albania is a matter of concern due to the limited information and some times tradition issues of their owners. The objective of this study was to evaluate the welfare of donkeys using a validated protocol that assesses animal-based indicators. A total of 40 donkeys from north were evaluated by means of direct observation of health and behavioral parameters. Significant differences in body condition score (BCS) were observed in animals, 42 % of donkeys exhibited a healthy body condition score. More than 20 % of the older donkeys had usually limb deformities and especially skin injuries in the back. The results of this investigation indicate that animal owner care less of their animals, becouse of the habit to use donkeys only for heavy works. Therefore, it will be of great interest to train and inform owners regarding how good care practices should take place for donkeys used for work purposes.

Keywords *– Welfare, donkeys, North Albania*

PREVALENCE OF *SALMONELLA SPP.* IN CHICKEN AND BEEF SAMPLES FROM RETAIL OUTLETS IN TIRANA, ALBANIA

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ABSTRACT

Among food-borne diseases, Salmonella has the highest disease burden on a population scale and is one of the most often reported causes of food-borne illness in the European Union. The present study evaluated the occurrence of *Salmonella spp.* in beef and chicken meat samples including their processed products. Samples were purchased from November 2022 until May 2023 from supermarkets, butcher shops and wet markets from different regions in Tirana district. A total of 386 samples of chicken and beef were collected and classified into raw, fillet/minced, and processed chicken/beef meat. The methodology used for the isolation, identification and serotyping of *Salmonella spp.* is in reference to ISO 6579-1:2020. All the data were analyzed with the statistical program SPSS 29.00. Among others, crosstabulation, paired t test and relationship map were performed to examine the association between different variables. The first preliminary data show the presence of *Salmonella spp.* in 56.83% (n=104) of chicken samples analyzed (n=183). In beef samples (n=203) *Salmonella spp.* was determined in 26.10% (n=53). Paired t test shows a statistically difference in mean between different paired variables: $t(64)=6.694$, $p<0.001$ (type of chicken samples collected in markets and occurrence of *Salmonella spp.*), $t(72)=6.962$, $p<0.001$ (type of beef samples collected in markets and occurrence of *Salmonella spp.).* We are confident that these results will shed light on the safety and quality of meat and meat products in the Albanian markets. Further studies that consider a larger sample and a genetic serotyping of *Salmonella spp.* are necessary in the near future.

Key words: *Salmonella spp.* chicken, beef, Iso 6579-1:2020, SPSS 29.00.

Introduction

One of the most significant foodborne diseases in the world is human salmonellosis, which is also the second most frequently reported disease in the European Union (EFSA, 2015). Although, meat represents an important source of proteins, it is also considered an important source of *Salmonella* according to different reports (Wang et al. 2023; EFSA, 2008). Poor hygienic conditions and worker practices at various stages of processing can cause meat to become contaminated with Salmonella across the entire production chain (Hussain et al., 2020). To the best of our knowledge, there is limited information regarding the incidence of *Salmonella* in retail raw meat products. Therefore, the main aim of this study is to determine the prevalence of *Salmonella spp.* in different meat samples collected from retail outlets in Tirana.

Material and Methods

Sampling procedure. The sampling procedure was based on Shafini et al. 2017 research. Different chicken and beef samples were purchased from three different retailers (supermarket, butcher, and wet market) in Tirana in different time periods, from November 2022 until May 2023. Samples transportation was carried out in portable refrigerators on ice and were stored at temperature 4°C in the laboratory of Food Microbiology/AQSCERT. All samples were analyzed on average 3 days after their collection.

Growth, isolation, and identification of Salmonella spp. The methodology used for the isolation and identification of *Salmonella spp.* is in reference to ISO 6579-1:2020

Data analysis. All the data were analyzed with the statistical program SPSS 29.00. Descriptive statistics were used to summarize the data. Furthermore, Paired t test was performed to examine the association between different variables.

Results and Discussion

A total of 386 meat samples were analyzed for the presence of *Salmonella spp.*, of which 47.41 % (n=183) belongs to different chicken meat samples and 52.59% (n=203) belongs to different meat beef samples. The prevalence of *Salmonella spp.* in different types of meat samples is displayed in Table 1. Our data show that the mean of prevalence of *Salmonella spp.* in chicken meat samples collected from supermarkets in Tirana is 3.25±2.630 (7.1%), and for the case of butcher shop and wet market is respectively 9.75±3.403 (21.3%) and 13.00±3.916 (28.4%). Furthermore, the mean of prevalence of *Salmonella spp.* in beef samples from supermarkets, butcher shop and wet market are respectively 1.50±1.732 (2.9%), 6.25±2.986 (12.3%) and 5.50±3.109 (10.8%). Our data show that *Salmonella spp.* has persisted mainly in chicken fillet samples and minced samples taken from wet market respectively 9.8% (n=18) and 7.6% (n=14). Our results show a slightly higher prevalence of *Salmonella spp.* compared to other research data published in the frame of the *Salmonella spp.* detection in meat samples in Albania (Beli et al. 2001).

Table 1: Prevalence of *Salmonella spp.* in different sampling sites and in different meat samples.

*Type of samples		Supermarket		Butcher shop		Wet market	
		N	Positive samples *Salmonella spp.*	N	Positive samples *Salmonella spp.*	N	Positive samples *Salmonella spp.*
Chicken samples	RM	10	3	10	7	10	9
	FM	20	7	16	11	21	18
	MM	18	1	17	14	17	14
	PM	17	2	12	7	15	11
Mean ± SD		16.25±4.349	3.25±2.630	13.75±3.304	9.75±3.403	15.75±4.573	13.00±3.916
Total		65	13 (7.1%)	55	39 (21.3%)	63	52 (28.4%)
Beef samples	RM	10	4	17	7	12	4
	FM	21	1	20	10	17	7
	MM	25	1	26	5	10	9
	PM	17	0	13	3	15	2
Means ± SD		18.25±6.397	1.50±1.732	19.00±5.477	6.25±2.986	13.50±3.109	5.50±3.109
Total		73	6 (2.9%)	76	25 (12.3%)	54	22 (10.8%)

*Type of samples acronyms: RM- row meat; FM-fillet meat; MM-minced meat; PM-processed meat
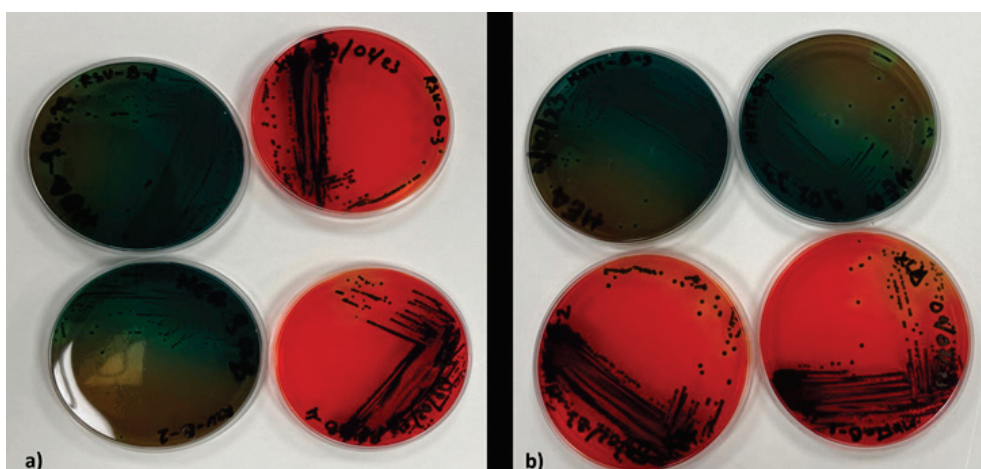

Figure 1: Growth of *Salmonella spp.* from chicken fillet samples in XLD agar and HEA agar. a) passage from RSV broth after 24h of incubation at 41.5°C in XLD agar and HAE agar. b) pasage from MKTTn broth after 24h of incubation at 37°C in XLD agar and HAE agar.

We found a statistically significant difference (p<0.001) in mean between different pair of variables by performing Pair t test with statistical program SPSS.29.00 as displayed in table 2. The difference in mean in the detection of Salmonella spp. was statistically significant in the three sampling sites. Meaning, handling procedure and hygienic condition of the environment and equipment are the main factors in contaminating meat samples with *Salmonella spp.*

Table 2: Pair t test between different variables

		Mean	SD	95% Confidence Interval of the Difference		t	df	One-Sided p Sig.	Two-Sided p Sig.
				Lower	Upper				
Pair 1	Chicken samples from supermarket – detection of *Salmonella spp.*	.846	1.019	.594	1.099	**6.694**	64	**<.001**	**<.001**
Pair 2	Chicken samples from butcher– detection of *Salmonella spp.*	1.273	1.113	.972	1.574	**8.480**	54	**<.001**	**<.001**
Pair 3	Chicken samples from wet market– detection of *Salmonella spp.*	1.413	1.042	1.150	1.675	**10.765**	62	**<.001**	**<.001**
Pair 1	Beef samples from supermarket – detection of *Salmonella spp.*	.753	.925	.538	.969	**6.962**	72	**<.001**	**<.001**
Pair 2	Beef samples from butcher – detection of *Salmonella spp.*	.789	1.037	.553	1.026	**6.638**	75	**<.001**	**<.001**
Pair 3	Beef samples from wet – detection of *Salmonella spp.*	.926	1.195	.600	1.252	**5.693**	53	**<.001**	**<.001**

During sampling we have observed that meats (chicken and beef) are exhibited on the refrigerator shelf as a normal supermarket procedure and are typically sold in a few days as specified on the label. The same situation for minced meat and chicken parts that are sold in packages which are wrapped using cling films. In wet markets raw chicken and beef are sometimes displayed without ice, exposed to ambient temperature as the outlets normally operate in open space. This will lead to different routes of contamination of meat displays at wet markets (Vindigni et al. 2007) as also showed by our results. Hygienic condition and handling of the meats at butcher shops observed were better compared to wet market. Referring to the Guideline "Microbiological criteria for food products" of the Ministry of Agriculture and Rural Development of Albania, 2021, we have categorized the results achieved for the persistence of *Salmonella spp*. as unsatisfactory. *Salmonella spp*. was detected in 25g of meat samples, and log (cfu/g) range from 2-4.05. Our data emphasizes the importance of hygienic condition and handling of the meats and meat products in the three types of sampling sites, and also the ongoing inspections by the bodies in charge of ensuring food safety are crucial, too.

Acknowledgements

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BIOTIN SUPPLEMENTATION IN FEED AND IMPACT IN PERFORMANCE OF PRODUCTIVITY AND REPRODUCTION INDEXES IN COWS.

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ABSTRACT

In two groups of cows, was applied biotin us a supplement in feed with different doses, (10 and 15 mg/kg live weight) one month before and two months of postpartum. The cows were monitored for blood glucose level, body condition, milk production, and for reproductive indicators, pre-service period (PSP), service period (SP) and index of copulation (IC). For Comparisons were monitored the same indicators in controls groups. Biotin supplementation in the transition period in cows showed positive effects on body condition, increasing production and improving reproductive indicators. The cows which was treated with biotin had a higher level of glucose in blood. The difference was up to 3.3 ± 3 mg%. Milk production increased on average from 0.1 ± 0.33 to 1.3 ± 0.53 liters per day. As for as the reproductive indicators, the preservis period was not affected by the use of biotin. Servis period and index of copulation were the indicators most influenced by biotin. In the animals of the groups treated with biotin, the service period was realized with 28.54 ± 0.4 days less, while the index of copulation index was 0.66 ± 0.11 less conceptions for pregnant cow. Between Reproduction indicators and usage of biotin doses has strong correlative relation of negative character (*respectively r = - 0.53 for the service period and r = - 0.609 for the conception index*).

Keywords: *Biotin, glucose, pre service, days open, index of copulatin.*

Note: *The material will be presented with a POSTER*

THE STABILITY OF HEPATOBILIARY ENZYMES AND THE IMPACT OF MEASUREMENT TIME AND BLOOD STORAGE TEMPERATURE.

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Abstract

The study describes how the levels of hepatobiliary enzyme are influenced by the time of blood sample analysis and its storage temperature. Blood samples were taken from 12 clinically healthy cows at the former EDE Didactic Center, Agricultural University of Tirana. The enzymes assessed by the Biochemical Analyzer EMP-168 were Gamma Glutamate Transferase (GGT), Alkaline Phosphatase (ALP), Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST). The samples were stored, at room temperature (25°C), in a refrigerator (4°C) and in the freezer (-20°C). The indicators were measured immediately after sampling (day zero), the second day, the eighth day, the twelfth day and the fifteenth day of sampling. The study showed that the enzyme values began to change significantly ($p < 0.05$), after the second day of sampling in all samples that were stored at room temperature, with the exception of ALP where its values remained stable at all storage temperatures until eighth day after sampling. The GGT values in the samples stored at 4°C and - 20°C remain stable for 12 days, while the AST and ALP values in the samples stored at 4°C do not show significant changes compared to the measurements made on day zero even 8 days after. The 4°C temperature is considered more appropriate to store samples for measuring ALT, since changes in this indicator are negligible even 12 days after sampling. The study showed that in order to have the most reliable results during the assessment of hepatobiliary enzymes, it is important to know the appropriate time for their assessment as well as the sample storage temperature.

Keywords: Hepatobiliary enzyme, room temperature, storage, cattle,

LEARNING THROUGH SERVING IN VETERINARY NURSING: BUILDING A COMMUNITY

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Abstract. Learning through serving is a pedagogical approach that merges theoretical knowledge with hands-on experience, taking instructors and students out of the classroom and immersing them in the community, experiencing the application of the contents of the curricular units into solving everyday issues of their local organizations. By immersing students in work contexts, adaptability and critical thinking skills are cultivated, along with a set of other transversal competencies and attitudes. In this work we share our experience involving students from all the three years of the Veterinary Nursing Course in learning through serving in an ongoing collaboration with a local shelter and animal protection association. A peer-to-peer learning or collaborative learning approach was integrated. Interventions take place both within the school grounds and in the shelter, but also in private practices and in the county in co-organized events and cover clinical and surgical clinical practice, basic canine training and socialization, canine grooming, addressing animal behaviour issues, assistance in record keeping and participation in fostering and adoption processes. The student participation is not mandatory. Increasing numbers of students have joined the project since its beginning. Along with a marked increase in student motivation, this approach promotes active engagement, creativity, camaraderie, and mutual support among learners, creating a conducive atmosphere for knowledge sharing and problem-solving. This experiential learning paradigm enhances technical proficiency and nurtures empathy and communication skills, crucial in the veterinary practice. Additionally, students develop a deeper understanding of the broader societal and ethical implications surrounding animal health.

Key Words: C*ollaborative learning; animal welfare; active learning; transversal competencies.*

Introduction. Service-learning can be defined as a structured learning experience that combines community service with explicit learning objectives, preparation, and reflection [5]. Learning through serving is based on education and training enhancement by actively engaging in community service-oriented activities. This approach emphasizes hands-on experience and practical application of knowledge and skills in real-world settings [6]. Service-learning hinges on the capacity and willingness of college students to take center stage in their own growth, cultivating a sense of mission and a shared unity with the communities in which higher education institutions are rooted and promoting both personal and academic enhancement while addressing communal ongoing needs [3]. In this work we share our experience involving students from all the three years of the Veterinary Nursing Course in learning through serving in an ongoing collaboration with a local shelter and animal protection association.

Subjects and Methods. The implementation of service-learning activities was preceded by the establishment of a protocol between IPVC and the ALAAR, a local non-profit association. ALAAR is headquartered in Ponte de Lima, has over twenty years of existence and owns a licensed shelter for stray dogs and cats. This shelter permanently houses between 85 and 95 dogs, a population that is not static, as well as slightly fewer than two dozen cats. In addition to the animals in the shelter, ALAAR also supports underprivileged families and temporary foster families for rescued animals that cannot be accommodated in the shelter, including veterinary care, and providing food. The need was felt to first characterize the shelter population, shelter routines and practices, functional/ structural issues. Regarding the canine population, and later, the feline (mostly feral population), the students proceeded to the determination of body condition, complete physical examination, and assisting with prophylactic and therapeutic interventions. Students also were involved in foster care of neonates and geriatric dogs and providing post-operative care. An excel collaborative data base was created encompassing all animals in the shelter. The activities were carried out continuously from the Fall of 2022 on, first by small groups of students with the teacher, and later by the students autonomously, more often in pairs and small groups. More experienced and advanced students were paired with less advanced peers. Student participation was voluntary. However, as part of the student individual digital portfolio, it is encouraged demonstration of how theoretical knowledge has been applied in practical contexts. Depending on the curricular unit considered this may be done by performing complete physical examination and describing the findings, assessing body condition using a 9-point scale, following the guidelines for nutritional evaluation from the WSAVA (World Small Animal Veterinary Association), establishing a nutritional plan for an individual, performing behavioral assessments, canine socialization and basic training, and demonstrating a variety of technical skills and procedures. Activities in the shelter and in campus occur at least once weekly, but usually more often. The students organized among themselves and with the teacher the displacement to and from the shelter and the transport of animals, when needed.

Results and Discussion. The program began with three students in their final curricular semester and exponentially grew to the 52 students involved in the activities, one year later. The number on enrolled students is still growing. It is evident a marked increase in student motivation, and theorical knowledge from several curricular units is integrated and applied in field work. Activities depend on students' mutual support. Creativity, autonomy, and responsibility are promoted, along with a sense of self-worth and confidence in their capabilities, enhancing leadership and cooperation. One student organized weekly canine training and socialization session in school grounds, with dogs from the shelter and cooperation from teaching and non-teaching staff, students and member of the community (Fig.1)

Figure 1. Photo taken after one of the weekly training and socialization sessions organized by student Shayenne Gonçalves (second from the left).

Certain aspects of the logistical framework in service-learning coursework align with the well-known concepts of internships and apprenticeships. However, in this case the emphasis is on animal health and welfare promotion and contribution for the good of the community.

Literature on veterinary nursing learning through service is very limited, as opposed to what happens with human nursing, where service learning has been linked to better learning outcomes, refined communication skills, improved clinical and management skills and abilities [2,7], along with a sense of purpose and self-worth [3,7]. Yet, Hebert and Hauf (2015) report that students who participated in service learning did not start out with better pre-service learning marks and that service learning did not lead to higher final examination marks [1]. However, students who had engaged in service learning either had a better understanding of course concepts or they had learned to better express their understanding. These findings suggest, and agree with the literature, in that traditional testing methods do not adequately reflect increases in higher order thinking [2, 4], thus making it more difficult to quantitatively and objectively evaluate the results of learning through service programs.

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THE ROLE OF FOOD LABELING IN PROMOTING FOOD SAFETY

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Abstract. Food labeling is a critical tool for communicating important information about the safety and quality of food products to consumers. As consumers become increasingly concerned about food safety and the accuracy of food labeling, it is important to understand the role that food labeling plays in promoting food safety and informing consumer decisions.

The main purpose of this study is to gather insights into the attitudes and behaviors of Albanian consumers towards food labeling. Another objective is to evaluate the accuracy, completeness, and effectiveness of food labeling for dairy products of Albanian origin, including compliance with legal requirements and industry best practices.

Keywords: food labeling, consumers, safety, quality, food products.

Introduction. Food labeling is not only a matter of marketing but also of consumers. The latter do not want to feel safe only from the point of view of correctness in marketing, but to be really protected by the food industry. The Albanian economy, regardless of its fragility, is trying to inspire producers and consumers for standards and food safety, therefore increasing competitiveness in the economic aspect and the price for the real nutritional values of the products. The opening of markets has brought a variety of products that must be clearly described in all the elements of food safety in order to protect the health of consumers but also to promote the products in a highly competitive market. In this study, we are focused on the milk processing industry and its by-products.

As a trendy concept in the consumer's behavior, we need to see the definitions in the literature for food labeling. Food labeling is increasingly viewed as a potential mechanism to improve people's diets at the population level to tackle escalating obesity rates and associated non-communicable diseases (Cecchini & Warin, 2016). Food labels serve as the primary mode of communication between food manufacturers and consumers, which may influence the consumer's purchasing decision (Satia et al., 2005; Wandel, 1997). They are often recognized as powerful tools of nutrition communication that empower consumers to make healthy food choices (Cecchini & Warin, 2016; Goldberg, 1992; Mejean et al., 2013; Vemula et al., 2014). Most consumers have substantial knowledge and awareness of what they are consuming. This knowledge and awareness are usually collected through the contents, labels, certificates, and logos displayed on the product (Wandel, 1997). Information on food labels could assist consumers in evaluating the components and making better food choices that safeguard their health (Wahlich et al., 2013).

The legal framework and institutions responsible for consumer health in Albania are the Ministry of Agricultural and Rural Development, the National Food Authority, municipal units, and the legal framework: Law No. 9863, date 28.1.2008, 'Food Law'; Law No. 9902, date 17.4.2008, 'Consumer Protection Law'; Decision No. 434, date 11.7.2018, 'Food Labeling and Consumer Information Law'. According to the legal framework, we have three components to food labeling that can be mandatory, additional, and optional. The elements of mandatory include: list of ingredients, allergens, name and address of FBO, nutritious value, storage conditions, name of the food, country of origin, usage instruction, expiration date, and net quantity. This information is essential for raising awareness of consumer behavior. The main objectives of the study are the following:to gather insights into the attitudes and behaviors of Albanian consumers towards food labeling.to evaluate the accuracy, completeness, and effectiveness of food labeling for dairy products of Albanian origin, including compliance with legal requirements and industry best practices.

Methodology. Questionary was used as the main instrument to collect the data. It consisted in 10 questions related to consumer behavior and practices with regard to food labelling. The questionary was built in Google forms and distributed online. The study area was chosen the region of Tirana, as it occupies about 32.9% of the total population. A total of 290 responses was collected in two weeks during March 2023. The selection of consumer was random.

We also conducted our own investigation in several Tirana markets, for 22 milk and yogurt products of Albanian origin. A checklist was elaborated as a guide to ensure that specific information was present and accurate on the food label and to assess if food labelling meets the legal requirements with regard to food safety.

Results and Discussion. Our results showed that 59% of consumers prioritize reading food labels as a practice that underscores their commitment to making informed choices. Almost everyone (98%) recognizes the importance of reading and understanding food labels. However, only 50% of respondents really understand the information on food labels, which indicates that 50% need continued efforts to improve the accessibility and clarity of this information. There is a widespread perception that food labeling is often unclear and lacks vital information. This sentiment reflects a need for greater transparency and clarity in food packaging.

Table 6 The most important elements of food labelling
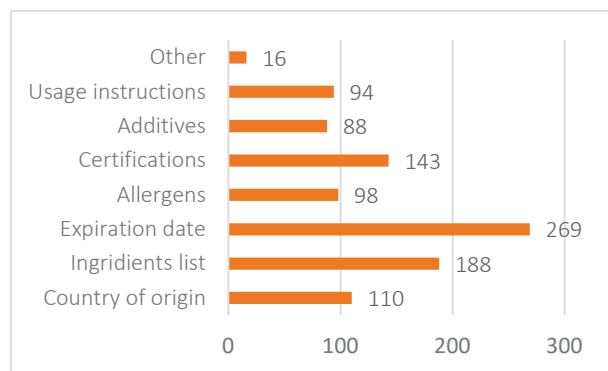
Food labelling elements that were considers as most important for the respondents include: expiration date, as consumers are concerned with the freshness and safety of the food they consume; ingredients, especially for individuals who have specific dietary needs or restrictions; country of origin as they might be interested in supporting local or sustainable food production, and certification as assurance of safety.

The results revealed that 92% of respondents worry about food safety due to concerns like foodborne illnesses and enforcement regulatory issues. This is a strong call for increased oversight and fairness in the food industry. Surprisingly, 72% are aware of government agencies responsible for food safety. This awareness can boost confidence if these agencies act effectively. 83% of respondents have revealed that they make purchasing decisions based on the information found on product labels. This statistic emphasizes the pivotal role of food labeling as a powerful tool for informing and guiding consumer choices. Around 25% have had health problems due to an allergen that was not indicated on the label. Food labels serve as a primary source of information, enabling consumers to make informed decisions about the products they buy, considering factors like nutrition, ingredients, allergens, and more.

Figure 6 Checklist's results

During our observation, we found out that a majority of milk and yogurt products lack essential information related to allergens and certifications. This highlights the necessity for improvements in food labeling practices to ensure consumer safety and confidence.

As conclusion, food labeling plays a critical role in enhancing food safety. It provides consumers with vital information about the products they buy and consume. This information includes allergen details, nutritional content, expiration dates, proper storage instructions, and safety certifications. Food labels also promote traceability in case of contamination, educate consumers on safe handling, and allow individuals to make informed dietary choices.

In the final section of this study, he following recommendations are outlined:

➢ Strengthening and enforcing food labeling regulations.

➢ Public education campaigns to promote greater awareness of food labeling practices.

➢ Adopting digital technologies, such as QR codes, to enhance the availability and accessibility of detailed product information for consumers.

➢ Encourage greater collaboration between government agencies, food industry actors, and consumer groups to promote more effective food labeling and safety practices.

➢ Conduct regular surveys and assessments to monitor consumer perceptions of food labeling and identify areas where further improvements are needed.

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ASSESSMENT OF QUALITY PARAMETERS OF THE ALBANIAN WATER SPRINGS FOR CRAFT BEER PRODUCTION

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Abstract

Water is a fundamental element for life and exhibits unique properties essential for various biological processes. In the brewery sector, water serves as a primary raw material, constituting 90-95% of beer composition, and influences the organoleptic characteristics as well as yeast metabolism during the fermentation. Some cation metals, notably magnesium and zinc, play pivotal roles as co-factors for in many metabolic pathways. Albania boasts different water sources primarily utilized for drinking and agriculture, with limited application in microbreweries. Prior research has primarily focused on physicochemical parameter evaluation, with minimal emphasis on their interpretation in the context of the beer industry. The aim of this research is to assess the suitability of water from different parts of Albania for craft beer production. Samples of spring water were collected from different locations in Albania in order to assess their quality at major supply points. The results reveal great potential for the production of high-quality craft beers, particularly for the production of Lager beers.

Keywords: Water, Physicochemical characterization, Craft beer, Yeast Metabolism

1. Introduction

Quantitatively water is the major raw material used in beer production and its parameter affect the quality of final product (1). Most chemical compounds in beer were either present in the raw materials or they are by-products of yeast metabolism during the fermentation (2). Water has a significant effect on the chemical and sensory characteristics of beer; however, the water must accomplish certain parameters to be used in brewing (3). Water mineral composition plays an important role in yeast vitality during fermentation. Calcium (Ca^{2+}), Magnesium (Mg^{2+}), and Zinc (Zn^{2+}) are essential minerals for proper yeast performance and successful fermentations (4). Calcium is instrumental to many yeast, enzyme, and protein reactions. It reacts with phosphate in the mash to precipitate calcium phosphates and release hydrogen ions, which lower the mash pH (5). Magnesium is an important cofactor for yeast pyruvate decarboxylase but high levels may impossible an unpleasant sour and bitter taste to beer (6). Zinc is a vital yeast nutrient and acts as a co-factor for many yeast enzymes, including the zinc-metalloenzyme alcohol dehydrogenase, the terminal step in yeast alcoholic fermentation (7). Microbiological contamination of drinking water is a major problem beer production. Total Coliforms (TC) and Fecal Coliforms (FC) have long been used as indicators of microbiological contamination of water (8). Albania exhibits a notable abundance of freshwater resources primarily utilized in agricultural activities and as a primary water source for urban centers. While numerous studies have been conducted to assess various water parameters, there remains a significant gap in research concerning their implications on brewing processes. This study aims to investigate water parameters composition across diverse geographical areas in Albania

2. Materials and methods

Water for analysis was selected from different sources of water in Albania and the sampling was carried out according to ISO 5667-5:2006 All sample holders were cleaned and rinsed with solvent and distilled water. The volume was sufficient to provide a representative sample, to allow repeated analyses, if required, and to minimize waste dumping. EDTA Indicator Black Eriochrome, $CaCO_3$, HCl and NaOH were provided by Sigma Aldrich. A pH meter, SI Analytical Laboratory 845 was used to measure the pH. The pH Meter WR/SB70C was used to measure the conductivity. The TURB 430 IR / SET calibrated instrument was used to determine Turbidity. The chlorine ions in water samples were determined using Mohr methods, which are described elsewhere (9). Total hardness, Ca^{2+} and Mg^{2+} were determined through titration with EDTA (10). Zinc was determined by atomic absorption spectrometry by direct aspiration of the sample into an air-acetylene flame. Membrane filtering techniques were used to conduct microbiological analyses using DEV Agar Ready to Use (11).

3. Result and discussion

The normal pH range of drinking water mentioned in the WHO guidelines and beer production is between 6.5 and 8.5. M206 pH value is 8.66 which is over recommended value for beer production. Other pH values of all drinking water samples are found in the range between 6.807 and 7.939. Lowest water hardness value is M207 which is considered moderately hard and the highest M210 which is considered hard water. Lowest and highest conductivity values correspond to samples M207 and M210, respectively. Water turbidity values were less than 0.6 NTU. Regarding Ca^{2+} present in water samples none of the samples is 100 mg/L indicated as acceptable levels of beer production. Only M202 and M205 are near the guidance level of Mg^{2+}. No Chlorine was detected. Bacteriological analysis in DEV agar indicated that there were no TC or FC counts found in the water samples analyzed and it is considerate free from bacteria.

Table 1. Main physical-chemical parameters in the samples. Data were expressed as mean ± SD (n=3).

Parameter	Samples	Value	Guide Level	Maximum Permitted
pH	M200	7.93 ± 0.32	6.5-8.5	9.5
	M201	7.75 ± 0.53		
	M202	6.80 ± 0.41		
	M203	7.68 ± 0.48		
	M204	7.52 ± 0.34		
	M205	7.90 ± 0.58		
	M206	8.66 ± 0.20		
	M207	7.38 ± 0.51		
	M208	7.88 ± 0.34		
	M209	7.76 ± 0.27		
	M210	7.46 ± 0.32		
Conductivity (μS/cm) / Hardness (mg/L)	M200	159.8 ± 11.4 /112 .8 ± 21.4	400/150	-/ 1500
	M201	257.7 ± 19.1 /162.8 ± 9.1		
	M202	165.5 ± 21.4 /253.7 ± 22.8.4		
	M203	172.2 ± 11.7 /128.2 ± 10.1		
	M204	256.3 ± 9.3 /190 ± 19.3		
	M205	337.1 ± 23.1 /221.8 ± 27.9		
	M206	256.3 ± 4.4 /200.9 ± 30.4		
	M207	123.1± 23.2 /97.1 ± 7.7		
	M208	149.0 ± 11.4 /101.8 ± 14.7		
	M209	242.4 ± 24.4 /136.4 ± 20.4		
	M210	575.0 ± 35.4 /312.7 ± 26.9		
Turbidity (FNU/NT)	M200-M210	<0.6	<5	
Ca^{2+} / Mg^{2+} / (mg/L)	M200	22.00 ± 1.4 /14.2 ± 1.2	100/30/	- / - /
	M201	26.9 ± 0.7 /23.3 ± 0.9		
	M202	45.8 ± 2.9 /34.2 ± 2.1		
	M203	27.1 ± 2.0 /13.6 ± 2.7		
	M204	38.2 ± 1.9 /22.6 ± 1.9		
	M205	28.1 ± 1.7 /36.8 ± 3.1		
	M206	5.60 ± 0.7/45.4 ± 0.9		
	M207	21.2 ± 2.5 /10.3 ± 2.2		
	M208	33.0 ± 1.5 /4.2 ± 4.1		
	M209	27.0 ± 2.2 /16.8 ± 1.4		
	M210	44.8 ± 3.0/48.2 ± 3.1		

Conclusion

This preliminary study describes a survey of drinking water composition in Albania used in beer production. All the samples meet WHO regulations as potable water. In craft beer production only M206 water sample which correspond to Labinot area is not suitable for craft beers and needs additives to be adjusted. All other samples should be considerate good for beer production especially for Lager style.

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THE RECOVERY OF PHENOLIC COMPOUNDS FROM OLIVE OIL POMACE USING DIFFERENT EXTRACTION METHODS

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Abstract

Olive pomace is a by-product generated during olive oil production rich in bioactive compounds such as polyphenols which play an important role in food model system due to the antioxidant activity. Recovery of phenolic compounds from olive pomace is considered not only an economic opportunity due to transformation of wastes into valuable product but also it reduces environmental impact. The present study aims to evaluate recovery rate of phenolic compounds from olive pomace by using different extraction methods. Ultrasound-Assisted Extraction (UAE) and Soxhlet Extraction were employed for extraction of phenolic compounds from olive pomace using different solvents including water, methanol, ethanol and hexane. Results achieved from this work showed that sufficient recovery rate were obtained using hexane, ethanol, water and the combination of methanol:water as extraction solvents. Combination of methanol:water (80:20) resulted the most effective regarding to extract amount. From the time point of view UAE method used by different solvents demonstrated short time to extract phenolic compounds, meanwhile Soxhlet method using water as extraction solvent needed longest time. We concluded that both methods used for extraction of phenolic compounds from olive pomace were useful, but UAE provided higher recovery rate compared to Soxhlet method.

Key words: extraction methods, recovery rate, phenolic compound, olive oil, by-product.

1. Introduction

Olive oil production is an important agricultural sector in Mediterranean countries due to the nutritional benefits and its important value to regional economies [3]. In Albania, olive oil production is one of the major agricultural industries, with 15.500 tons produced in the 2022 crop year according to the International Olive Council (IOC) [9]. The olive oil industry generates a large amount of by-products, solid wastes and liquid effluents such as olive pomace (OP), olive mill waste (OMW) and olive mill wastewaters (OMWW) depending on the techniques used for olive oil manufacture [5,6]. Several mechanical extraction processes are employed for olive oil production, such as traditional discontinuous pressing, three-phase and two-phase centrifugal systems. The press and three phase generates large volumes of liquid effluent compared to two-phase centrifugation process which is considered more ecological [13]. The olive mill wastes and by-products have environmental, social and economic significance in the olive producing countries [12].The treatment and disposal of such a huge volume of solid and liquid wastes is a very critical problem, due to their high content of organic matter and phenolic compounds. They causes diverse environmental impacts in terms of resource depletion, land degradation, air emissions, and waste generation [14]. OMWW is considered as one of the most polluting effluents produced by the agro-food industries due to its high polluting load [2]. OP and OMWW could be considered also a low-cost and renewable natural source of antioxidants due to its high content of phenolic compounds with potential influence on human health, such as hydroxytyrosol, tyrosol, and luteolin [12, 16]. Since only 2% of the phenolic compounds in the olives are transferred to the oil and up to 98% are retained in the wastes, olive pomace has been considered to be an affordable and abundant source of biologically active phenolic compounds that have promising potential as antioxidant, anti-inflammatory and antimicrobial agents [15]. For these reasons, recently many studies are focusing on recovery of phenolic compounds from by-products of the olive oil industry and their further use as valuable ingredients in food model system. Different extraction methods using various types of solvents have been applied to recover phenolic compounds from OP [4]. Innovative extraction techniques known as environmental friendly and sustainable provide high extraction performance in a shorter time and ensure the high quality and antioxidant capacity of the phenolic compounds extracts [8]. This study aims to evaluate recovery rate of phenolic compounds from olive pomace by using different extraction methods and various solvent systems including ethanol, methanol and hexane.

2. Materials and Methods

2.1 Sample collection

Samples of olive pomace labeled with specific code (OP1- OP3) were obtained directly from three different olive oil industries located in the south and central part of Albania during October-December (2022). Samples of OP1and OP3 obtained by 3-phase centrifugal extraction process of extra virgin olive oil, were provided by "Musai" and "3-Miqte" olive oil industries with initial moisture content 57% and 52% (w/w), respectively. Samples of OP2 with initial moisture content 48% (w/w), were obtained from "Subashi" olive mill using a Pieralisi "Leopard Decanter" which combines modern 2-phase extraction technology without water addition for production of virgin olive oil. OP was dried at 45-50⁰C for 7-8h in a try dryer in order to prevent the degradation of phenolic compounds. Dried OP was then finely grounded by using a mill flour with an average particle diameter of about 1mm [1].

2.2 Extraction of phenolic compounds

In this study solid –liquid extraction of phenolic compounds from OP using different types of solvent including water, methanol, ethanol and hexane was performed. Ultrasound assisted solid-liquid extraction of bioactive compounds from OP was carry out in an ultrasonic bath, model Cole-Parmer 8893 (47 kHz, 230 W) using 10 g of OP and 50 mL of each solvents. UAE was carried out at room temperature for 60 min. All reagents utilized were of analytical grade purchased from Sigma Aldrich [8, 4]. The recovery of phenolic compounds from OP has been performed also by solid-liquid Soxhlet extraction method using water, methanol-water (80:20), ethanol and hexane as extraction solvent [10]. The moisture content of olive pomace samples was determined gravimetrically by drying 50 g of olive pomace for 24h in an force air drying oven LBX OVF series, at 105 ± 1^0C [11].

3. Results and Discussion

This study aimed to evaluate recovery rate of phenolic compounds from olive pomace performed by UAE and Soxhlet extraction methods using various solvent systems. All the experiments were performed in triplicate and the collected data were subject to statistical analysis (ANOVA) using SPSS ver. 22 software (significance level at 0.05). Table 1 reports mean values of moisture content of OP samples before and after drying at 105 ± 10C for 24h.

Table 1. Moisture content of olive pomace samples initially and after drying process

Samples	Moisture content (initially)(% w/w)	Moisture content (after drying)(% w/w)
OP1	57%	5.4%
OP2	48%	5%
OP3	52%	5.2%

Results of extract quantity expressed in g extract/10g dry sample of olive pomace provided by UAE extraction technique are presented in Figure 1 meanwhile extract amounts of phenolic compounds recovered from olive pomace by using Soxhlet extraction technique are shown in Figure 2. UAE took 50-60 min while the Soxhlet extraction lasted 3-12 h.
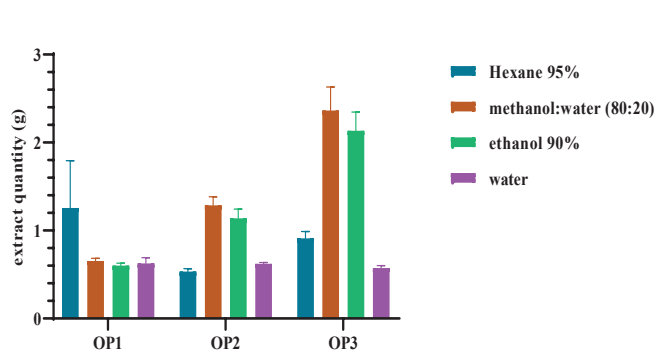
Figure 1. Extract quantity of olive pomace provided by ultrasound assisted extraction (UAE)
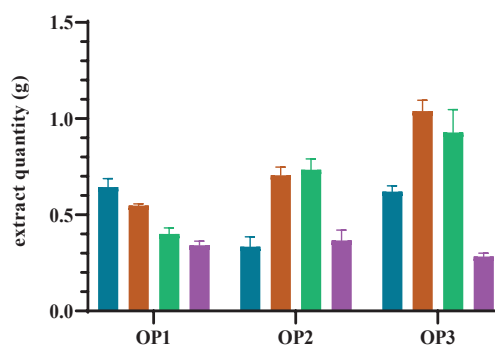
Figure 2. Extract quantity of olive pomace provided by Soxhlet extraction
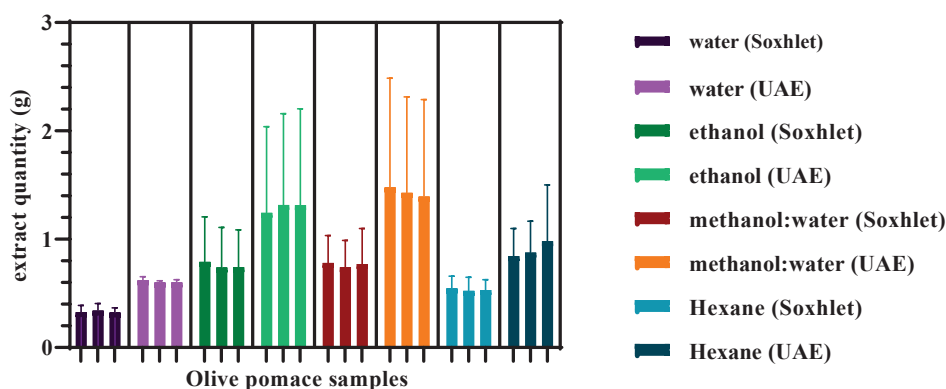
Figure 3. Quantity of phenolic extract recovered from olive pomace by UAE and Soxhlet extraction techniques

It was noted that the highest amount of phenolic extract was recovered from OP3 by both extraction techniques using methanol-water (80:20) as solvent. However a sufficient recovery rate were obtained even by using hexane, water and the combination of ethanol as extraction solvents.

Figure 3 shows comparison of recovery rate of phenolic compounds from OP with UAE and Soxhlet extraction methods using various extraction solvents. Based on results we noticed that the most effective recovery method was UAE using methanol:water (80:20).

4. Conclusions

The results of this study shown that the highest quantity of phenolic extract from olive pomace was obtained using combination of methanol:water (80:20). UAE method demonstrated shorter extraction time than Soxhlet method. It was found that both methods used for extraction of phenolic compounds from olive pomace were useful, but UAE provided higher recovery rate compared to Soxhlet method.

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ASSESSING ALBANIAN CEREALS FOR MALT PRODUCTION IN THE BREWING AND DISTILLATION INDUSTRIES: A STUDY OF WHEAT, BARLEY, AND OATS

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Abstract

In this paper, the main cereals produced in Albania are investigated: wheat, barley, and oats, to evaluate their potential for malt production in the beer industry and the production of alcoholic distillates. The grains undergo the malting process, including wetting, tempering, germination, and early drying. They are assessed as suitable varieties for malt production using traditional malting techniques, with a focus on determining their germination power, malting time, and quality for malt production. The most suitable granulation technique is determined based on the type of malt to achieve the highest sugar content in the cider, aiming for maximum alcohol levels in both the cider and the final product. Subsequently, the samples undergo organoleptic evaluation.

It is worth noting that all three types of grains obtained from local producers are suitable for producing light malt. These malts have a high flour content, particularly wheat, which exhibits low glassiness. Barley has the shortest sugaring time, approximately 10 minutes, while oats have a maximum time of 20 minutes. The evaluation of malt color, according to EBC standards, reveals higher color levels in oats and wheat compared to barley. This variation is typical of the degree of drying and roasting applied to the malt. In the cider produced from these three cereals, distinctive new aromas emerge. Barley malt cider is characterized by apricot aromas, while wheat and oat cider exhibit herbaceous grain notes

Key words— malt, barley, oat, wheat, malting, alcoholic beverages.

Introduction.

"Malting is a process of forced fermentation carried out to obtain a specific amount of proteolytic and amylolytic enzymes [1]. The production of hydrolytic enzymes is crucial for the hydrolysis of endosperm cell wall carbohydrates and the protein matrix. During the germination phase, the biosynthesis of hydrolytic enzymes is stimulated, which are then released into the inner endosperm to depolymerize the polysaccharides and proteins of the endosperm's cell wall, making it more friable. The ideal modification is considered when the first shoot (acrospira) has developed to approximately three-quarters of the grain's length [2]. The germinated grain, or green malt, is transferred to the kiln chamber where hot air is blown to terminate the germ and complete the germination process [3]. The selection of grains for malting depends on their physical structure and biochemical characteristics. Cereal grains with a large size, thin cell walls, and loose endosperm packing absorb water quickly and allow for the even distribution of water and hydrolytic enzymes [4]. A hard grain is one that is resistant to deformation by pressing, cutting, scratching, or penetration by foreign matter, whereas a soft grain is one that easily breaks under pressure [5]. The endosperm structure of good malting varieties can be easily modified and does not impede water uptake and the passage of hydrolyzing enzymes. Grains with high protein content are undesirable because they limit the enzymatic breakdown of starch by inhibiting the access of hydrolytic enzymes, leading to poor malt extract [6]. Higher protein content in malt has a positive effect on increasing foam stability but has a negative impact on increasing haze formation in beer [7]. During the germination stage, various starch hydrolyzing enzymes are produced, released from their bound state, and then activated. During mashing (at 65°C), the crushed malt is mixed with hot water, causing the shorter amylopectin chains and longer amylose chains to rapidly degrade into glucose, maltose, and maltotriose [8], which are further fermented to produce ethanol by yeast. The quality of malt depends on various grain parameters such as kernel shape, size, boldness, hectolitre weight, grain protein content, etc., which affect malt parameters such as malt yield, friability, homogeneity, diastatic power, wort viscosity, saccharification time, Kolbach index, and so on [9].

Material and Methods: In this study, three grains from local producers: wheat, barley, and oats were selected to assess their potential for malt production and its application in the beer and alcoholic distillates industry. After the grains underwent a physical analysis, including the determination of hectoliter weight, grain size, and impurities, they proceeded to other evaluations involving micro malting, micro brewing, and assessment tests utilizing ASBC Analysis Methods to determine the quality of the resulting malts.

Results and Discussion.

The result taken from this study are presented in the graphics below.
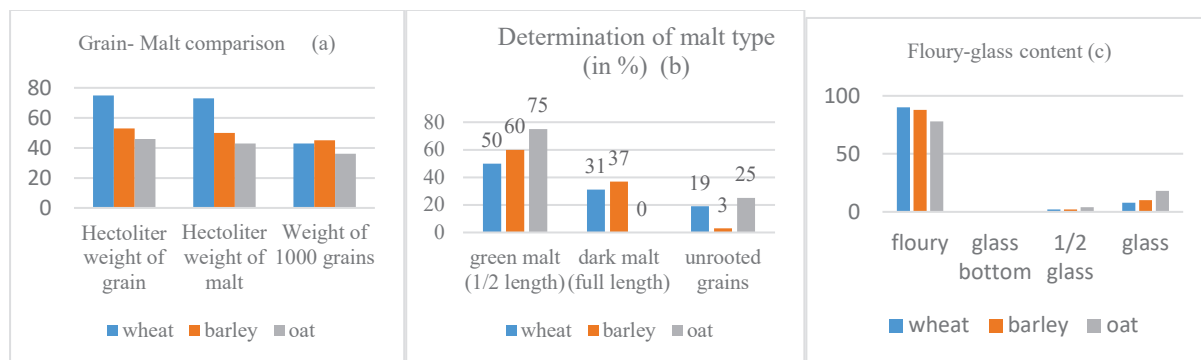
Graph 1. Physical characteristics of the analyzed cereals and malt. (a, b, c)

As it can be observed from the graphic 1.a, the hectoliter weight is higher in wheat and lower in barley and oats, but all three grains fall within the accepted limits for malt processing: wheat (61 - 88 kg/hl), barley (45 - 81 kg/hl), and oats (35 - 66 kg/hl). This is also reflected in the weight of 1000 grains. The determination of malt type is closely tied to the germination potential of the grains. Based on root length, we observe that barley has the highest level of mature grains, while oats have the lowest. This difference is related to the thickness of the cereal grain's covering membrane. All three types of cereal exhibit a high level of root length covering up to half of the grain, making them suitable for the production of light malt.
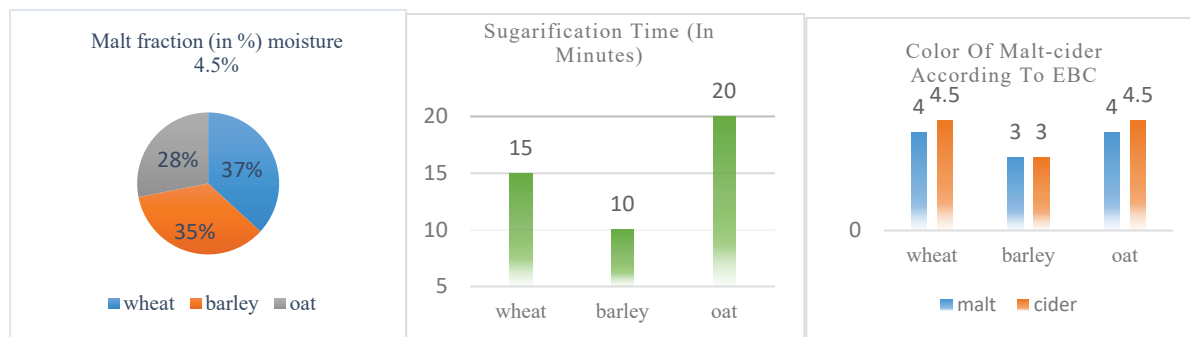
Graph 2. Evaluation of friability, saccharification and color of analyzed maltose.

As shown in the graphic 2 above, the malts produced from the considered grains have a high flour content. Wheat stands out from barley and oats due to its low vitreous character. The highest fragility is observed in wheat, while oats exhibit the lowest fragility, which is considerably below the permissible level for malt fragility. Barley boasts a short saccharification time of 10 minutes, which can be attributed to its high digestibility. Wheat, with a saccharification time of 15 minutes, though longer than barley, still falls within the required range for producing good malt for beer and alcoholic beverages. Oats have a saccharification time of 20 minutes, slightly longer than the first two, but it is considered satisfactory.

Evaluation of malt and cider color according to the EBC method reveals that oats and wheat are characterized by a high malt color, with cider produced from them having an even deeper hue. This characteristic is typical of the degree of drying and maturation applied during the malting process. In contrast, no noticeable difference in malt and barley cider color is observed, which is typical for Pilsen beer.
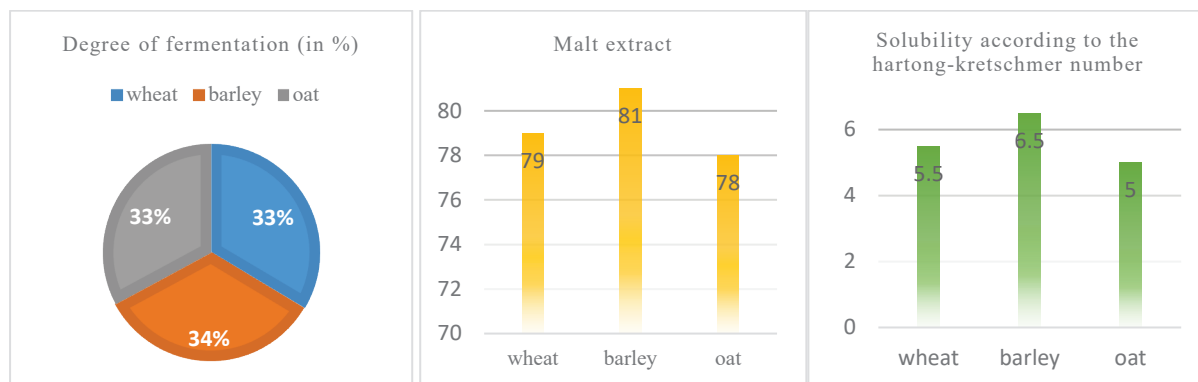
Graph 3. Evaluation of the degree of fermentation, the extract and the solubility of the analyzed maltose.

The fermentation rate in barley and wheat is significantly higher compared to oats; it's about twice as high. Barley exhibits a higher extract level, whereas oats have a lower one. Barley also demonstrates better digestibility, whereas oats have lower digestibility. In analytical determinations, there is a noticeable difference in turbidity levels, with oats showing higher turbidity

and barley and wheat having lower levels. This disparity is related to the solubility of proteins, as defined by the Hartong-Kretschmer number.

Conclusion: At the conclusion of this study, the three types of cereals are suitable for the production of light malt. The malts produced from these grains have a high flour content. Wheat differs from barley and oats in its low vitreous character. According to the determination of the Hartong-Kretschmer number, barley has higher digestibility, while oats have lower digestibility due to protein properties.

Barley exhibits the shortest saccharification time, approximately 10 minutes, whereas oats require a maximum of 20 minutes. Evaluation of malt color, following EBC standards, shows higher color levels in oats and wheat in comparison to barley. This variation is typical of the degree of drying and roasting applied during the malting process. Distinctive new aromas emerge in the cider produced from these three cereals. Barley malt cider is characterized by apricot aromas, while wheat and oat cider feature herbaceous grain notes."

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A CASE STUDY ON LINKING FARMS, LIVESTOCK MARKETS, AND SLAUGHTERHOUSES IN ALBANIA

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Animal movement plays a pivotal role in the transmission of diseases, including zoonotic infections. Consequently, the movement of animals from farms to livestock markets and subsequently to slaughterhouses, or directly from farms to slaughterhouses, has long been identified as the primary pathway for disease spread. This encompasses foodborne illnesses, which are frequently overlooked from the farm level to the livestock market and/or the slaughterhouse. Using a methodology comprising surveys, questionnaires, visits, and in-depth interviews, all slaughterhouses and livestock markets in Albania were evaluated. Study results indicate that slaughterhouses receive relatively few animals, with only 3% of the total number of animals moved and 29% of the transactions. Similarly, the volume of animals moved to markets is negligible, representing just 1% of the total movement volume and 2% of transactions. However, the reality of movement is different than the picture provided by the data as the majority of movements are not recorded. Echinococcosis is the most commonly detected disease in slaughterhouses, followed by cysticercosis and tuberculosis. Confiscated organs and carcasses show a certain seasonal pattern, with the highest numbers of confiscations occurring in late summer and early fall. The monitoring and enforcement of animal health regulations in livestock markets need to be improved, as very few health checks are being performed on animals in livestock markets. Continued surveillance and better training for veterinary inspectors are paramount for ensuring disease control, food safety and animal welfare.

Keywords: Slaughterhouses, Livestock markets, Food safety, Meat inspection, Animal movement, Animal welfare

MEASUREMENT OF IGG CONCENTRATION IN COLOSTRUM, AS A TOOL FOR ASSESSMENT OF PASSIVE IMMUNITY TRANSFER IN CALVES

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Abstract

Passive transfer of colostral immunoglobulins is crucial factor in determining calf health and survival. Among several molecules that colostrum provides, the IgG concentration plays the main role in the transfer of passive immunity in calf. Secure the proper immunity transfer depends highly on the absorption of sufficient mass of colostral IgG. This study aimed IgG concentration measurement in colostrums and in calves' serum to assess the passive immunity transfer in dairy calves and/or failure to acquire the adequate one. Samples were collected from twenty six dairy farms in central Albania between April and July 2023. Were analyzed a total of 248 colostrum samples, and 260 serum samples from calves. The concentration of IgG was determined using brix refractometry (BRIX), and radial immunodiffusion assay (RID). In this study were tested 248 colostrums, and 260 serum samples from calves from 26 farms. Mean colostral IgG level was 68.8 g/L. A total of 60.4% of samples had colostrum IgG level greater than 50 g/L. Mean calf serum IgG concentration was 30.2 g/L. 57 % of calves fed, achieved an excellent passive transfer, and in only 18 % of calves observed a failure of passive immunity transfer. Colostrum management is fundamental in herd management. Studies related to this topic are limited even though several tools are available for measurement of colostral IgG concentration in dairy cattle. These results clearly revealed that continuous monitoring of passive immunity transfer should be in practice. That will help farmers to identify and take measures quickly.

Keywords: IgG, passive immunity, BRIX refraktometry, RID

Introduction

Colostrum provides essential nutrients and passive immunity to calves through immune factors and immunoglobulins, primarily immunoglobulin G (IgG) (Quigley et al 1998). It has 50% more fat and almost five times as much protein as milk. Colostral fat provides energy and is critical for thermoregulation, while the protein is composed primarily of immunoglobulins (Drackley JK. 2008). Calves are born with little or no immunoglobulins and rely on colostrum to provide immune factors such as IgG (BAMN. 2001). Immunity must therefore be acquired passively from good quality colostrum (IgG concentration ≥50 mg/ mL (Weaver et al. 2000, McGuirk et al 2004), the first milk produced after parturition. The transfer of passive immunity (TPI) is defined as the absorption of the maternal immunoglobulin present in colostrum through the small intestine of the calf during the first 24 h after birth (Godden et al 2019). Calves that experience failure of transfer of passive immunity have higher odds for increased preweaning morbidity (Donovan et al 1998), mortality, increased duration of disease, increased pathogen shedding, and reduced growth (Robison et al. 1998). Concentration of IgG is frequently evaluated using radial immunodiffusion (RID) which is considered the gold standard method for this purpose (Weaver et al. 2000), and BRIX refractometer, which is also an extremely useful tool in practice because. TPI can also be used to evaluate colostrum quality (Deelen et al. 2014). In this study we aimed to assess colostrums and serum concentration of IgG immediately after parturition in dairy caws. It, however, did not investigate associations between colostrum management practices and subsequent mortality rates, or calf management practices on commercial dairy farms and associated calf mortality rates.

Materials and Methods

Samples from colostrums (n=248) were selected from twenty six dairy farms, with more than 10 milky caws in the herd, and calve' serum (n=260) collected in the first 7 days after birth. All samples were provided by farm veterinarians and sent to laboratory in cool condition. At the arrival colostrums were tested immediately and then stored at -20°C, whereas blood samples were centrifuged, 2500 rpm for 10 minutes and harvested serum was stored at -20°C until testing. Assessment of IgG concentration was done on colostrum before freezing, using a BRIX refractometer (VBR32T, Optica Microscope Italy). Testing was performed at room temperature. Colostrum samples were thoroughly homogenized before testing according to the manufacturer's instructions. Immediately, 2 to 3 drops of colostrum then were used to fill the measuring disk and the Brix percentage (%) was recorded. Serum samples were analyzed using a single radial immunodiffusion assay (RID). Test was performed according to the technique described by Mancini et al. 1965. 3 μL serum sample and control are deposited in separate wells of a plate agarose gel sold with a bovine IgG-specific antiserum (Bovine IgG Test Kit Radial Immunodiffusion Test Kit for quantitation of bovine IgG in serum or plasma, by Triple J Farms, Bellingham, WA).

Results and Discussion

In this study a total of 248 colostrum samples, and 260 serum samples collected in 26 farms were tested. The overall values are shown in Table 1. Results obtained in culostrum testing by refractometry demonstrated that mean colostral IgG level was 68.8 g/L, ranging from 32.7 to 124.7 g/L. A total of 60.4% (no = 150 out of 248) of samples had colostrum IgG level greater than 50 g/L. Mean calf serum IgG concentration was 30.2 g/L. 57 % (no = 149 out of 260) of calves fed, achieved an excellent passive transfer, greater than or equal to 25 g/L IgG in serum. In only 18 % (no = 46 out of 260) of calves was observed a failure of passive immunity transfer, showing less than 10 g/L of IgG in their serum.

Table1. Overall values obtained by both BRIX refractometry and RID on evaluation of transfer passive immunity in calves

BRIX refractometry (g/L)	Classification	No of animals in each category	% animals in each category
< 40	Poor	45	18.5
41-50	Fair	53	21.1
>50	Excellent	150	60.4
Serum IgG concentration, g/L			
<10	Poor	46	18
10-17.9	Fair	27	10.1
18-24.9	Good	38	14.9
≥25	Excellent	149	57

A Brix value of 22% corresponds to 50 g/L of IgG (Heinrichs et al 2016, Godden et al. 2020). Therefore, a colostrum sample with a value of 22% or greater on a Brix refractometer represents a good quality sample. Results showed that average colostral IgG concentration was 68.8 g/L, ranging from 32.7 to 124.7 g/L. 60.4% of samples had colostrum IgG level greater than 50 g/L, so they met the criterion for high quality (Figure 1).
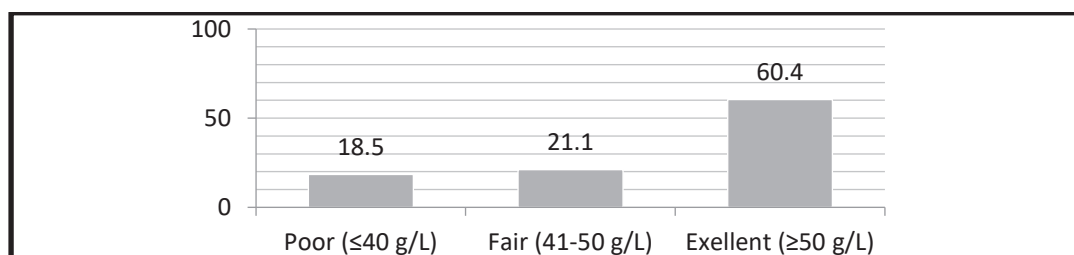
Figure 1. Percentage of colostrum samples by quality (g/L concentration of IgG)

ean calf serum IgG concentration was 30.2 g/L. 57% of calves fed, achieved an excellent passive transfer, greater than or equal to 25 g/L IgG in serum. Only 18% of calves observed a failure of passive immunity transfer, showing less than 10 g/L of IgG in their serum (Figure 2).
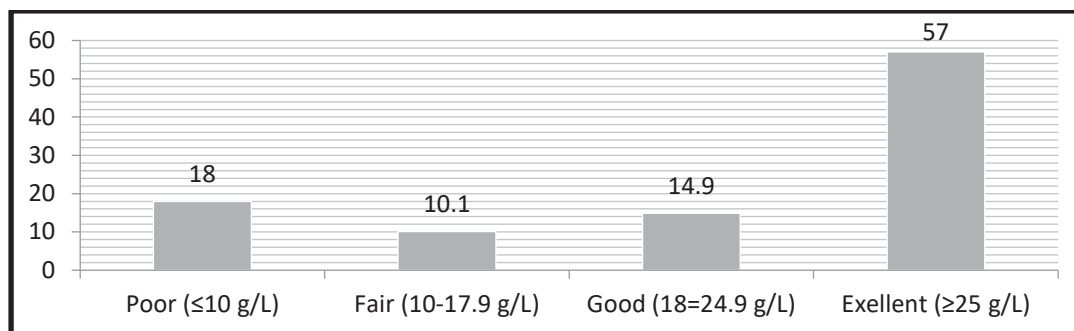
Figure 2. Percentage of serum samples classified by IgG level

The determination of IgG concentrations in all samples measured by RID were positively correlated with the values of Brix percentages measured by Brix refractometry (Figure 3).
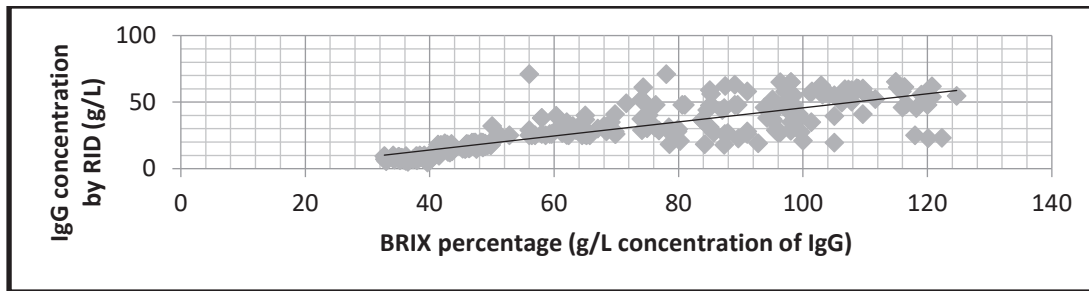
Figure 3. Scatter plots showing the correlation between RID (g/L) and Brix refractometers(g/L)

Direct measurement of the IgG offered by RID overcomes many limitations and inaccuracies that arise from indirect determination of IgG. It is useful to know the exact IgG concentration when measuring the colostrum quality to ensure the actual volume of colostrum being fed to calves is sufficient to avoid FTPI. This result might reflect that there is a high correlation between colostral immunoglobulin concentration and the volume of colostrum ingested by the calf. The limitations of our study include a lack of recorded consistent morbidity events for the calves. Availability of morbidity events would have allowed determination of the association between serum IgG concentrations and morbidity.

Conclusions

Colostrum containing 50 mg/mL or more of IgG is considered to be a high quality feed for newborn calves. If the farm extra good quality colostrum it can be saved for use when it does not have readily available. Lower quality colostrum can be mixed with transition milk and fed to calves that are at least two days of age. Our results showed that measurement of IgG concentrations in colostrum can be very useful in managing colostrum quality and monitoring colostrum feeding practices.

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PROGRAMMED BREEDING OF SHEEP DURING THE BREEDING SEASON IN ALBANIA.

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Programmed breeding on sheep farms is becoming more and more applicable. Sheep are seasonal polyestrous animals and reproduce in a certain season of the year depending on their geographical position. In Albanian conditions, reproductive activity takes place during the summer months (June–August). Good management of reproduction and production on these farms can be helped through estrus synchronization using hormonal treatment. We experimented with the hormonal treatment of sheep during the breeding season. The farm selected for this purpose is located in Toshkez (Lushnja district) and was treated in July 2023. For this purpose, 545 sheep of the Asaf breed were treated. The sheep were divided into six groups, with 90 sheep per group. The hormonal treatment scheme was as follows: Day one: intravaginal sponge placement. Day 14: removal of the intravaginal sponge and injection of PMSG 500 UI per I/M sheep. Day 16: (36–48 hours after removal of the intravaginal sponge) estrus detection and individual natural mating. The daily load for each ram was 2 to 3 sheep. From the 545 treated sheep, 496 (91%) came to estrus. The time of estrus appearance was, on average, 44 ± 6 hours. In consideration of the results, this hormonal treatment was highly effective in estrus synchronization, taking into account the unfavorable climatic conditions during this summer (average daily temperatures above 38°C). We highly recommend this hormonal treatment scheme be used by Albanian sheep farms during the birding season.

Key words: *Programmed reproduction, intravaginal sponge, hormones, natural mating, estrus.*

APPLICATION OF GREEN APPROACHES FOR EXTRACTION OF PHYTOCHEMICALS FROM SOME ALBANIAN TOMATO LEAF WASTE

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Abstract

There is an increasing global trend towards green approaches for valorization and efficiently utilizing agricultural waste. Tomatoes are one of the most widely consumed plants in the world, and their leaf waste is an unexploited source of bioactive molecules. This study aims to investigate the applications of green, environmentally friendly, and sustainable methods for the extraction of compounds of high commercial value. Tomato leaf waste was collected in 2023 in Albania, dried, grounded, and sent to the laboratories of Food Technology and Biotechnology at the University of Zagreb for further analysis. The methods of extraction microwave-assisted (MAE) were applied for polyphenol extraction from tomato leaf, and the results were expressed as mg/L of gallic acid. The effects of different solvents (water, ethanol 30%, and ethanol 60%), temperature (45 °C, 55 °C, and 65 °C), and time (5, 10, and 15 min) were compared. After preparing extracts, an aliquot (100 microL) of supernatants was mixed with Folin-Ciocalteu reagent, saturated Na_2CO_3, vortexed, and kept at 50 °C for 25 min, and absorbance was measured spectrophotometrically. All measurements were done in three repetitions. The MAE method was compared to the simple extraction method. Results show that time does not affect the extraction, but temperature and solvent used. From a comparison of methods, extraction assisted with the microwave showed greater polyphenol content (more than 21% higher) compared to the simple method. Also, greater polyphenol content was obtained in extracts treated at 65 °C (~22% higher compared to other lowest temperatures) and using as solvent ethanol 60% (up to 26% higher compared to water and up to 8% higher compared to ethanol 30%). Considering these results, the application of microwave-assisted extraction can be utilized as an effective, promising green, environmentally friendly, and sustainable method for the extraction of compounds of interest from plant materials, with potential for value addition to other products.

Key Words. Tomato leaf, waste, extraction microwave assisted, polyphenols, green approaches.

Introduction

Tomato (*Lycopersicon esculentum* Mill.) belongs to the Solanaceae family, and it is one of the most widely consumed vegetables in the world, which annual production is 189 million tons [1]. Tomato is a key element of the Mediterranean diet [2] and the second most important vegetable crop worldwide, being consumed either fresh or in the form of processed products, being one of sectors with the greatest impact in the agri-food industries. However, it produces a lot of waste products including the lower leaves and stems. There is an increasing global trend towards green approaches for valorisation and efficiently utilizing agricultural waste. The increasing demand for sustainability in the food and agricultural sectors is leading to the exploration of new approaches to valorize these waste streams to neutralize the cost of disposal. Tomatoes leaf waste is an unexploited source of bioactive molecules. It was speculated that tomato leaf waste represents a rich source of phytochemicals, phenolic compounds, flavonoids, and plant proteins that could be recovered for a broad range of applications. Meanwhile, there has been an increasing concern to develop and include phenolic-rich functional foods in the diet to improve the nutritional and health status [3].

On the other hand, the extraction is an important analytical step, which depends on the specific compounds being extracted, the nature of the sample matrix and size, type of solvent, and the presence of heat-sensitive or volatile. One of the preferred methods for extracting bioactive compounds is microwave-assisted extraction (MAE), which offers several advantages, including higher extraction rate, superior product quality, lower solvent consumption, selectivity, energy efficiency, reduced labor requirements, etc. [4]. Overall, microwave-assisted extraction has proven to be a valuable tool in various industries, including pharmaceuticals, food processing, and natural product research, due to its ability to provide faster, more efficient, and high-quality extractions. In fact, this novel green technology is considered as a potential alternative to conventional solid-liquid extraction of bioactive compounds from plant matrices [5].

This study aims to investigate the applications of green, environmentally friendly, and sustainable methods for the extraction of compounds of high commercial value.

Material and Methods

Tomato leaf waste was collected in 2023 in Albania, sun-dried, grounded into powder, which was protected from light and humidity and sent to the laboratories of Food Technology and Biotechnology at the University of Zagreb for further analysis.

The MAE process was performed according to [6] with modifications, using Milestone S.r.l. – Star S Labstation for synthesis (Milestone Inc. Shelton, USA). Extracts were prepared using different solvents (water, and ethanol: water 30% and 60% v/v), the mixtures were used since ethanol has low toxicity and efficiency for the extraction of phenolic compounds. For MAE optimization, different extraction experiments were done (in triplicate) to evaluate the effect of extraction time (5, 10, and 15 min) and temperature (45 °C, 55 °C, and 65 °C), on the extraction efficiency. MAE was equipped with a monitoring system and with a rotor accommodating up to 10 closed vessel reactions. In this system, the extraction time starts to be counted afterward (holding time). The microwave power was automatically adjusted (0–500 W) to keep constant the extraction temperature.

After extraction, the suspensions were vacuum filtered, and total phenolic content were determined. The total polyphenolic content of the extract (named as TPC) represents the total amount of polyphenols, was measured as gallic acid equivalent (GAE), per gram of dried extract, and is expressed as g-GAE/L. Folin-Ciocalteu method [7] was applied to the liquid extracted phase. In brief, 0.50 mL of Folin-Ciocalteu reagent was added to 100 µL of the sample, basified with 2.0 mL of saturated Na_2CO_3, and diluted with 5.0 mL of distilled water. The samples were vortexed, and kept at 50 °C for 25 min, and were analyzed by UV–vis spectrometry PerkinElmer Lambda 25 UV/Vis Spectrometer (SpectraLab Scientific Inc. Markham, ON, Canada) at 765 nm. All measurements were done in three repetitions.

Results and Discussions

Different methods to extract polyphenols from dried tomato leaf were compared and the results are presented in Figure 1-3. Total polyphenolic content in Albanian tomato leaf (dried) was found in the range 2.1 to 2.9 g GAE/ L.

For MAE optimization, the effect of extraction time (5, 10, and 15 min) and temperature (45 °C, 55 °C, and 65 °C), on the extraction efficiency. Results shown that based on treatment time slight differences were noted among samples. While, the temperature had a greater effect as higher it was (65 °C) the greater were TPC determined. Referring to the type of solvent used, it was noted that extracts prepared with ethanol had greater values compared to water extracts, between ethanol extracted samples were no significant differences, but EtOH 60% (v/v) solvent showed to be more efficient.
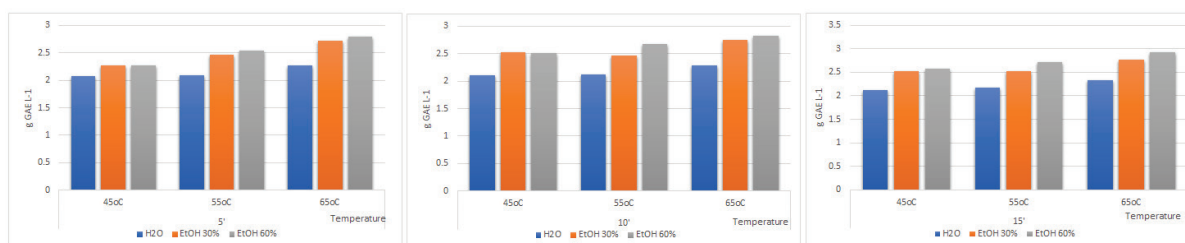
Figure 1: Total polyphenolic content of tomato leaf MEA extracts and the effect of extraction temperature
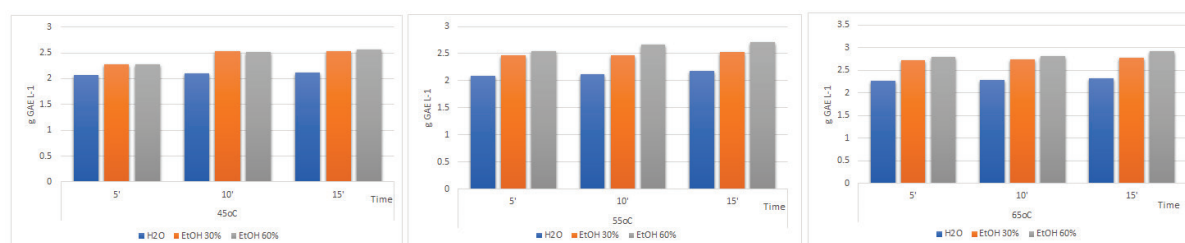
Figure 2: Total polyphenolic content of tomato leaf MEA extracts and the effect of extraction time

MAE and simple extraction were compared for the treatment time of 5 minutes and temperature of 65 °C (Figure 3). Such conditions were selected based on above findings for the extraction efficiency. The extraction assisted with the microwave showed greater polyphenol content (more than 21% higher) compared to the simple method. Also, a greater polyphenol content was obtained in extracts treated at 65 °C (~22% higher compared to other treatment temperatures) and using as solvent ethanol 60% (up to 26% higher compared to water and up to 8% higher compared to ethanol 30%).
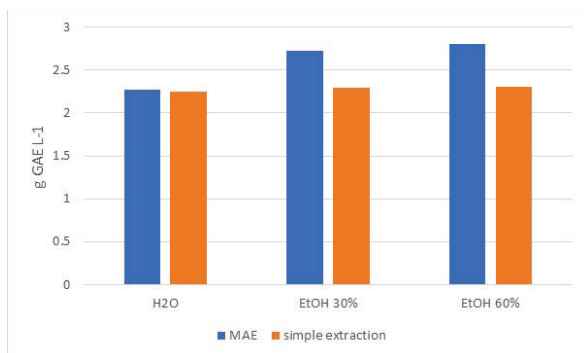
Figure 3: Total polyphenolic content in tomato leaf effect of analytical extraction

Acknowledgments

Conclusions

This study investigated the applications of green, environmentally friendly, and sustainable methods such as microwave assisted extraction for the extraction of compounds of high commercial value found in Albanian tomato leaf waste. For the optimization of MAE, the effects of different solvents (water, ethanol 30%, and ethanol 60%), temperature (45 °C, 55 °C, and 65 °C), and time (5, 10, and 15 min) were compared, also MAE method was compared to the simple extraction method.

Results showed that total polyphenolic content in Albanian tomato leaf (dried) was found in the range 2.1 to 2.9 g GAE/ L. It was found that time does not affect the extraction, but temperature and solvent used, where the greater TPC was achieved for samples treated in 65 °C (TPC was 22% higher), using EtOH 60% (TPC was 26% higher compared to water and 8% higher compared to ethanol 30%), and with MAE extraction method showed (TPC was 21% higher compared to simple method).

Considering these results, the application of microwave-assisted extraction can be proposed as an effective, promising green, environmentally friendly, and sustainable method for the extraction of compounds of interest from plant materials, with potential for value addition to other products. Furthermore, results are promising for future application, considering the increasing global trend towards green approaches for valorization and efficiently utilizing agricultural waste. Also, such results tend to serve to scientific and agriculture community, by proposing alternative ways for fully utilization of tomato plant as fruit and their leaf waste, which so far is an unexploited source of bioactive molecules.

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EVALUATION OF MEAN FLUORESCENCE INTENSITY IN NON-SPECIFIC ANTIBODY AGAINST DOG MYELOID POPULATIONS USING FLOW CYTOMETRY

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Different techniques are currently in use in order to identify dog Neutrophiles and Monocytes. Both, classic manual count and automatic technique can be used with satisfactory results for this purpose. Flow cytometry represents a relatively new technique in veterinary medicine and it is mainly used to identify different leukocytes population using different specific antibodies. Antibodies used in veterinary medicine are species specific, but these antibodies can also be used in other species if its functionality and reliability is proven. To achieve this, many experiments aiming to test if the antibodies of a species can be used to another species, should take place using flow cytometry. In this study we measured the mean fluorescence intensity of CD11b conjugated PeCy5 (Clone M1/70) to observe it's stability in dog neutrophiles and monocytes. An Attune NxT acoustic focusing flow cytometer (Thermo Fisher Scientific) was used to analyze all samples. In total fifteen peripheral blood samples from healthy dogs were collected. Results show that the stability of positive myeloid populations to CD11b is satisfactory. Mean fluorescence intensity was measured in all cases, showing adequate fluorescence with a clear positive signal for myeloid populations.

Key words: Flow Cytometry, Monocytes, Neutrophiles, Antibodies, Dog

A SURVEY OF COW MILK QUALITY IN TIRANA'S MARKET

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Abstract

Milk is an important part of the daily diet. Milk production and livestock rearing are important components of the farming system and smallholder farm operation in Albania. Milk trading (mainly cow's milk) includes both the formal market (processing industries, markets) and the informal market (directly to consumers on the street). Our study consists of a survey of cow milk quality, processed and fresh milk of Tirana markets. Physical and chemical analyses were performed by using Lactoscan Milk Analyzer and for antibiotic and aflatoxin M1 presence by using Rapid Test kits. Analyses were performed on ultra-high temperature processed milk, pasteurized milk, and fresh milk. Physical-chemical analyses showed that a part of the milk samples had water content above the recommended values which is also reflected in the values of the freezing point (above -0.5^{0}C). Fresh milk analyses showed a high fat content, above 3.5%. Processed milk analyses showed that fat content was almost similar to those indicated on the label. Antibiotic tests for *ß Lactams, Streptomycin,* and *Chloramphenicol* resulted in negative for all the types of cow milk analyzed. Rapid tests for Aflatoxin *M1* resulted positive for a part of processed milk samples (above the detection limit of 0.05 ppb), and those for fresh milk resulted negative despite the bad sales condition and control absence.

Key Words: cow milk, rapid Test, lactoscan milk analyzer, Aflatoxin M1, fresh milk

Introduction

Milk is an important part of our daily diet, as it contains a lactose solution with fats, proteins, minerals, and other important nutrients essential and with benefits for human health. Due to the favorable natural resources for cattle and small ruminant's livestock rearing, and milk production activities have a long tradition in Albania, and it is an important component of the farming system for the rural people [4]. Milk processing in Albania follows two main paths, either by direct sales from the farmer in small markets or through sales to milk processing companies, which then sell in the market. In big cities, farmers sell fresh milk in the street market [10]. Data show that during the last few years cow milk production has increased and it makes up about 85% of total milk production [2]. Due to milk's important role in human health, understanding milk's chemical-physical properties is of great importance. Milk's physical and chemical properties depend on inner and structural factors as well as on external factors like post-milking temperature, hygiene, and treatment. Since the milk processing industry is one of the most important sectors of the food industry in Albania, knowing and understanding milk's physical and chemical properties is of great interest even for technological and engineering design and operation of milk processes and processing equipment [9]. Antibiotics are used by cattle breeders for both therapeutic and prophylactic purposes and because of their positive impacts to promote growth and treatment of livestock [11] but it may cause deposition of these drugs in milk or meat. Despite their positive role in animal growth, antibiotic residues in milk may have a negative impact as well as in milk quality, especially in fermentation and yogurt and cheese production [6].

As secondary metabolites produced by fungi, aflatoxins are considered the most toxic and have carcinogenic, hepatotoxic, teratogenic and mutagenic effects in humans and animals [1].

Material and Methods

The objective of our study has been the evaluation of physical and chemical properties as well as antibiotic presence in fresh and processed cow milk, of several Tirana's markets. Physical and chemical analyses were performed by using Milk Analyzer LAC-SA Boeco and for antibiotics and Aflatoxin M1 presence by using Rapid Test kits. MRC PHS-3E pH meter was used to measure milk pH. Analyses were performed on ultra-high temperature processed milk (UHT), pasteurized milk, and fresh milk provided from different markets. All samples were homogenized and brought to room temperature before analyses were performed.

Result and Discussion

The physical-chemical analysis results of all types of milk are presented in Table 1. A part of pasteurized milk samples, as well as a part of fresh milk, had a high freezing point, over the permitted levels [7], and it is reflected by the value of added water. Indeed, added water determined by lactoscan used, is calculated based on values of freezing points [3]. Water values were higher on fresh milk samples because they depend on the way cows are fed (field or stall) as well as on the season in which milk was collected for analysis.

Table 7. Milk physical-chemical parameters

Code	Fat (%)	Density (g/l)	Conductivity (mS/cm)	pH	Solid non-fat (%)	Proteins (%)	Water (%)	Lactose (%)	Freezing point (^{0}C)	Salts (%)
*U1	1.21 ±0.03	1.0313 ±0.0003	4.98±0.005	6.51±0.01	8.48±0.005	3.11±0.02	0,00	4.66±0.02	-0.505	0.69±0.005
*U2	1.31±0.01	1.031 ±0.0003	4.94±0.005	6.55±0.005	8.49±0.005	3.1±0.01	0,00	4.67±0.01	-0.528	0.7±0.005
*U3	0.14±0.03	1.0331 ±0.0003	4.93±0.005	6.6±0.005	8.8±0.005	3.22±0.01	0,00	4.84±0.01	-0.54	0.71±0.005
*U4	2.91±0.01	1.0283 ±0.0003	6.53±0.005	6.49±0.01	8.10±0.005	2.97 ±0.02	1.63±0.5	4.45±0.02	-0.512	0.66±0.01
*U5	3.14±0.01	1.0241 ±0.0003	5.26±0.005	6.65±0.005	7.06±0.01	2.59±0.005	14.9±0.2	3.88±0.01	-0.443	0.60±0.005
*U6	1.04±0.02	1.0541 ±0.0003	6.53±0.005	6.43±0.005	7.35±0.02	2.69±0.01	13.36±0.3	4.05±0.01	-0.451	0.60±0.005
**P1	2.72±0.01	1.0281 ±0.0003	2.73±0.005	6.65±0.005	8.04±0.02	2.94±0.01	3.0±0.3	4.42±0.01	-0.505	0.66±0.005
**P2	2.56±0.02	1.0269 ±0.0003	5.01±0.005	6.68±0.005	7.69±0.05	2.82±0.02	7.69±0.5	4.225±0.05	-0.481	0.63±0.005
**P3	3.77±0.01	1.0245 ±0.0003	4.7±0.005	6.7±0.005	7.33±0.02	2.68±0.005	11.05±0.5	4.03±0.001	-0.463	0.60±0.005
**P4	2.90±0.01	1.0287 ±0.0003	4.81±0.005	6.64±0.005	8.24±0.02	3.02±0.005	0,00	4.53±0.01	-0.521	0.69±0.005
***F 1	5.30±0.03	1.0212 ±0.0003	4.59±0.005	6.7±0.005	6.81±0.01	2.48±0.005	16.25±0.2	3.75±0.01	-0.436	0.56±0.005
***F 2	4.80±0.02	1.0233 ±0.0003	5.06±0.005	6.63±0.005	7.25±0.02	2.64±0.01	10.96±0.2	3.99±0.01	-0.463	0.60±0.005
***F2	5.00±0.01	1.022 ±0.0003	4.95±0.005	6.65±0.005	7.07±0.01	2.55±0.01	13.76±0.1	3.92±0.01	-0.451	0.62±0.005

* UHT milk;   ** Pasteurized milk ;   ***Fresh milk;

Another parameter, related to the freezing point is the low value of SNF, especially protein values on some samples below the recommended values [6]. Freezing point is not a physiologically constant parameter as other factors like feed, breed season, and time of lactation may affect the freezing point of the individual sample. Fat content in fresh milk resulted in high values of over 3.5%, and the fat content of all processed milk samples was similar to those indicated on the product labels.

Antibiotic tests for *ß Lactams, Streptomycin,* and *Chloramphenicol* resulted in negative for all the types of cow milk analyzed. Rapid tests for aflatoxin *M1* resulted positive for a part of processed milk samples (above the detection limit of 0.05 ppb and the allowed level by the EU) [5], but in fresh milk despite the bad sales condition and control absence, resulted negative (Table 2, Figure 1). The presence of aflatoxin M1 on UHT sample milk and on pasteurized milk indicates the importance of performing analyses of milk intended for processing, but also of cow feed and water. Because of their ability to bind to casein milk proteins, aflatoxins M1 can also be present in dairy products manufactured with contaminated milk [8].

According to a Report of Ministry of Agriculture and Rural Development [4], milk production is extremely fragmented, and it should also be considered that most farms with one or two cows produce milk almost exclusively for self-consumption or to feed calves and a part of the milk industry processes imported milk that mostly comes from non-EU countries.

Table 8. Milk rapid test results

Code	ß Lactams	Streptomycin	*Aflatoxin M1*	*Chloramphenicol*
*U1	√	√	√	√
*U2	√	√	X	√
*U3	√	√	X	√
*U4	√	√	X	√
*U5	√	√	√	√
*U6	√	√	√	√
**P1	√	√	√	√

**P2	√	√	√	√
**P3	√	√	√	√
**P4	√	√	X	√
***F 1	√	√	√	√
***F 2	√	√	√	√
***F2	√	√	√	√

* UHT milk; ** Pasteurized milk; ***Fresh milk; √ - negative; X – positive

Acknowledgments

Figure 7. Aflatoxin M1 rapid test results. *Positive (+): Line C is red, line T has no color; OR Line T is lighter than OR equal to line C; Negative (-): Line T and C are both red, and color of line T is deeper that line C*

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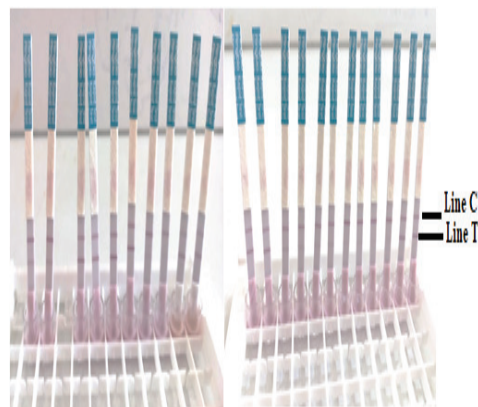
EFFECT OF DIETARY INCLUSION OF INSECT LARVAE MEAL ON THE EXPRESSION OF GENES INVOLVED IN PROTEIN SYNTHESIS AND PROTEIN DEGRADATION IN BREAST MEAT OF THE CHICKENS.

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The major challenge to the world animal farming industry is the shortage of protein feed resources. Insect larvae have been attracting an abundance of interest recently as an alternative and sustainable source of food and feed. Insects such as *Hermetia illucens* (HI) are well-known as an alternative protein source for poultry, and a variety of insects can be used in chicken diets. Recently, an increase of breast muscle weights was observed in broilers fed diets containing HI meal, but the underlying mechanisms of action are currently unknown. Thus, the present study aimed to determine the expression of genes involved in protein synthesis and protein degradation in the breast meat of chickens fed HI meal. A total of 72-day-old male Cobb500 broilers were separated into three experimental groups and were supplemented with either 0% (Group H1-0), 7,5 % (Group HI-7.5) or 15% (Group HI-15) *Hermetia illucens* (HI) Insect meal in their diet for 35 day. Each experimental group with 24 broilers was divided into six cages with four broilers each. To investigate the relationship between the increase of the breast muscle and the signal pathways of protein production such as mTOR, Akt, Foxo, S6K1, RPS6, and eIF2α in broiler breast meat, Western blotting and qPCR were performed. Neither the mRNA levels nor the protein levels of any of the genes investigated differed across the groups. In conclusion, the recently observed increase of breast muscle weights in broilers fed HI meal cannot be explained by an altered expression of genes involved in protein synthesis and protein degradation.

Keywords: insect meal, black soldier fly, protein synthesis, broiler, breast meat

EVALUATION AND CONTROL OF FLY INFESTATION IN A CATTLE FARM IN FIER DISTRICT, ALBANIA

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ABSTRACT

"Pest control" in livestock aims to protect animals from contagious diseases and helps control programs, based on HACCP procedures, for the prevention of these diseases and guarantees food safety and public health.
The objectives of this study are: 1- Argument of the importance of ``Pest Control'', including, the fight against flies, an important element of HACCP procedures for risk control 2-The application of "fly control" in the cattle farm, the epidemiological importance.
For realization of the objectives of this study, we used a rich bibliographic resource.
For the realization of the second objective , the monitoring was it was done
on a cattle farm in Fier, in the second week of June 2022, with an average temperature of 29 degrees Celsius.
*For monitoring of the housefly, are used 5 "spot cards" in a stable with an area of about 200 m² (240 m²), which were evaluated after 7 days
*For monitoring the stable fly were tested 15 animals out of 78 (total) according to the literature consulted. Flies were counted on the four legs of each animal (calf).
According to the results achieved, in this farm fly infestation was problematic for both the house fly and the stable fly. The use of insecticides in this case was inevitable.
With all the recommendations for the integrated management of flies, indifference in this case has no justification, this once again enables the conclusion that raising awareness of the communities about the importance of preventing and fighting flies is a primary task.

Keywords: fly, infestation, control, prevention, insecticides

1.INTRODUCTION.

The "pest control" in animal welfare aims to protect animals from infectious diseases and assists control programs, based on HACCP procedures, to prevent these diseases and ensure food safety and public health.
Pest control represents the action performed on the pests (including the fly) eliminating them
to prevent the development of diseases.
"PEST" represents an insect (fly), rodent, microorganism, etc.
By this term we also mean a plant or animal living on land or water, virus, bacteria or other microorganisms that serve as vectors for the development and spread of diseases, accompanied by economic problems [1,3,4].
The number of pests: (Insects, ectoparasites, rodents, etc.), is large when a preventive hygienic program is not implemented on the farm.
The precise definition of "critical points" with the HACCP procedure, represents a logical, organized and systematic approach, innate to food control, but which is completely tailored to epidemiological observation and farm health management [2,7].
Identifying "critical points" through the HACCP procedure is assessing the probability of a potential risk.

1.1 OBJECTIVES OF THE STUDY

The objectives of this study are:

1. Argument of the importance of "Pest Control", including fly control, important element of HACCP procedures for risk control.

2. Application of "fly control" in a farm of the cattle - epidemiological importance

2. MATERIAL AND METHOD

• To achieve the objectives of this study, it was used a rich bibliographic source contemporary to this problem

• For realization of the second objective, monitoring was realized a cattle farm in fier district in the second week of June 2020, the average temperature was 29 degrees Celsius,

• For monitoring of "fly home", we use 5 "spot cards" in a stable with surface area of about 200 m² (240 m²), and were evaluated after 7 days.

• For monitoring of the "stall fly" selected 15 of the 78 (total) according to the literature consulted. The flies were counted on all four feet of each animal, calf [2,3,4].

Figure 1: *Indicators for the presence of the stable fly infestation were considered the bite marks on the animal`s abdominal area*

Figure 2: *For monitoring the stable fly infestation were counted stable flies on selected animals feet according to this study methodology*

3. RESULTS AND DISCUSSIONS

3.1 First objective: Arguing the importance of "Pest Control" in livestock

Pest Control - an important element of HACCP procedures for risk control in livestock

The application of HACCP principles in farming is a revolutionary step, ``five control", it has an important role to play in this revolution.

3.2 The second objective

3.2.1 House fly monitoring using "Spot" Card"

For this are used 5 "spot cards" for a stable.The situation was alarming and the fly infestation was clearly visible. hygiene in the stables was not applied correctly. At the end of the week, the number of points in the "Spot card" was much more than 100. Chemical control was an inevitable solution [3,5].

3.2.2 Monitoring of stable fly infestation

The monitoring was also carried out in a cattle stable for meat in the district of Fier.

They were numbered flies on the four legs of every animal. 8 flies/animals resulted, so the infestation is acceptable (against 10 which is considerable)

In this livestock unit, infestation by flies was problematic for both the house fly and the stable fly [7, 4].

persuading the importance of preventing and fighting flies is the primary objective.

In the end, we concluded that the use of insecticides in this case was unavoidable.

We recommended the product TWENTY¹ ONE WP 10%

with active base Azamethiphos.

It was used application with a sprayer, with a regular hand pump for spraying, with the following dosages: 125 g/1 liter of water per 100 m² of surface. The result was correct.

4. CONCLUSIONS

➢ The implementation of HACCP principles on the farm is a revolutionary step, "five control",   it has an important role in this revolution.

➢ "Pest control" is of particular importance in pest management in animal/poultry breeding farms.

➢ The situation was alarming and the fly infestation was more visible in the analyzed farm.

➢ In this farm the fly prevention and control program was not implemented.

➢ Prevention and fighting flies is the primary objective.

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ASSESSING THE PHYSICOCHEMICAL AND MICROBIOLOGICAL ATTRIBUTES OF MILK AND ITS BY-PRODUCTS

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Abstract

Milk is an emulsion or colloid produced by the mammary glands of animals, and it has been the subject of scientific scrutiny for more than a century and a half. The exploration of milk's composition and its physicochemical attributes, constitutes a significant field of interest in scientific research and industrial application. In this report, we present the physical and chemical properties as well as the microbiological traits of different types of liquid and processed milk, along with its by-products. The samples were collected from a dairy facility located in the southern region of Albania. Our analysis focused on several physicochemical attributes, including moisture content, titratable acidity, pH level, dry matter concentration, and protein content. When we contrast these physicochemical parameters in cow, sheep, and goat milk, significant disparities in their nutritional quality become apparent, with sheep's milk emerging as the most nutrient-rich among them, surpassing both goat and cow milk. It's worth noting that the microbiological tests conducted on the samples confirmed their absence of bacterial contamination.

Keywords: Milk quality, Physico-Chemical attributes, Microbiological contaminations, Milk By-products.

1. Introduction

Milk and its by-products have long been staples in human nutrition, offering a rich source of essential nutrients and serving as the foundation for a wide array of dairy products consumed worldwide (Claeys, W.L et. Al 2013). The major chemical components of milk include water, fats, proteins, carbohydrates, minerals, organic acids, enzymes and vitamins (Warsewicz, H,G et.al 2019). It is extremely important to prioritize the quality and safety of these dairy products as it has an impact, on both health and the dairy industry. Nonetheless, if stored at room temperature, it has a short shelf life and can quickly become a breeding ground for various microorganisms, especially bacteria, leading to their rapid growth and proliferation (Hou, Q et,al 2019). To ensure the quality of milk and its byproducts it is important to have an understanding of their physical, chemical and microbiological properties (D.L. Van Hekken et.al 2019). The presence of bacteria and the physical and chemical properties of milk, which vary among dairy farms have a crucial impact, on its overall quality. These differences are particularly important in the production of milk by-products as mentioned by AbdElrahman et al. The characteristics of milk along, with changes that occur during seasons affect the composition and qualities of the milk throughout its processing stages (AbdElrahman et al. 2009). The dairy industry depends on a range of milk producing animals, like cows, sheep and goats. These animals contribute to the production of dairy products that have flavors, textures and nutritional benefits. This diversity plays a role in traditions, across the world (Walstra, P et. al 1999). In this research project we investigate into an analysis of milk and its byproducts. Our aim is to discover information, about their chemical and microbial characteristics.

2. Materials and methods

ilk samples were taken in the south of Albania in cooperation with a dairy company operating in that area for a period of five days in May 2023. All sample holders were cleaned and rinsed with distilled water. The volume collected was sufficient to provide a representative sample to allow repeated analyses (three for each sample). The compositional analyses were conducted at the dairy company and the faculty of food and biotechnology. All necessary reagents for the analyses were provided by Sigma Aldrich. A pH meter, SI Analytical Laboratory 845, was used to measure the pH of the selected milk samples to define their quality and safety. The calibrated Lactoscan S standard instrument was used to determine dry matter and protein. The fat content in milk and yogurt samples was determined using Gerber method, which is described elsewhere (Dick H, K ey.al 2001). The added water in milk was assessed through the cryoscopy method. Total plate count techniques were used to evaluate microbiological contamination (Anderson, M 2011).

3. Result and discussion

The microbiological test results displayed on Table 1, for the milk, cheese, butter and yogurt samples (EC, TC, ETB and YMR) show that these dairy products are highly safe and of quality. The fact that there is no contamination, such as Enterobacteriaceae, coliforms, yeast and mold suggests that the production and handling processes effectively maintain the microbiological integrity of these samples. These findings are important not for ensuring consumer safety but, for preserving the freshness and quality of dairy products.

Tabela 1. Microbiological results of Milk/Chees and Yogurt samples.

amples	Type of analysis	Result
Cow Cheese	EC	Sterile
Sheep Cheese	EC	Sterile
Goat Cheese	EC	Sterile
Butter	YMR	Sterile
Butter	EC	Sterile
Pasteurized milk	ETB	Sterile
Pasteurized milk	EC	Sterile
Yogurt	TC	Sterile
Yogurt	EC	Sterile

*EC stands for Echerichia Coli; *YMR stands for Yeast/Mold Rapid; *ETB stands for Enterobacteria; *TC stands for Total Coliform

Table 2 provides an analysis of the composition of cow's, sheep's, goat's milk, cow yogurt, and sheep yogurt over a period of five days in May 2023. The results show that cow's milk maintains levels of dry matter content ranging from 8.55% to 8.58%, fat content varying between 3.8% and 3.86%, and protein composition within the range of 2.9% to 2.97%. The addition of water is minimal, ranging from 0.1% to 0.4%. The pH levels were between 6.66 to 6.69 for all samples, highlighting the reliability and stability of cow's milk composition during this timeframe. On the other hand, the presence of fat to sheep's milk varies between 6.9% and 7.4%. Its dry matter constituent remains consistent at around 10.0% to 10.3%. Similarly, the protein content of sheep's milk stays approximately between 4.7% and 4.8%, while pH levels range from 6.66 to 6.68. It is worth noting that no presence of water is detectable.

Table 2. Main physical-chemical parameters in the Milk

Sample	Date	Dry Mater %	Fat %	Added Water %	Protein %	pH
Cow Milk	11.05.2023	8.58	3.8	0.2	2.96	6.68
	12.05.2023	8.57	3.82	0.4	2.97	6.66
	13.05.2023	8.55	3.86	0.3	2.95	6.67
	14.05.2023	8.56	3.85	0.2	2.9	6.69
	15.05.2023	8.57	3.86	0.1	2.96	6.68
Sheep's Milk	11.05.2023	10.1	6.9	0.0	4.7	6.67
	12.05.2023	10.3	7.0	0.0	4.7	6.66
	13.05.2023	10.0	7.1	0.0	4.8	6.67
	14.05.2023	10.1	7.4	0.0	4.8	6.68
	15.05.2023	10.0	7.3	0.0	4.7	6.66
Goat's Milk	11.05.2023	8.53	3.82	0.0	3.2	6.67
	12.05.2023	8.57	3.86	0.0	3.3	6.66
	13.05.2023	8.55	3.84	0.0	3.2	6.67
	14.05.2023	8.56	3.83	0.0	3.2	6.68
	15.05.2023	8.55	3.87	0.0	3.3	6.66

Additionally, the dry matter content of goat's milk remains unchanging, ranging from 8.53% to 8.57%, while the fat properties fall within the range of 3.82% to 3.87%. The protein content shows stability at around 3.2% to 3.3%, and pH levels fluctuate between 6.66 and 6.67.

Regarding dairy products (Table 3), cow yogurt and sheep yogurt maintained a level of dry matter and fat content for the period of observation. Cow yogurt has a dry matter level ranging from 8.6% to 8.9% and a fat content between 2.4% and 2.7%, while sheep yogurt has a dry matter content ranging from 8.8% to 9.0% and a fat content between 2.6% and 2.8%. These findings indicate that both cow and sheep yogurt consistently meet the quality standards in terms of their composition.

Table 3. Main physical-chemical parameters in yogurt samples

	Date of sampling	Dry Mater %	Fat %		Dry Mater %	Fat %
Cow yogurt	11.05.2023	8.6	2.4	Sheep's yogurt	8.8	2.6
	12.05.2023	8.8	2.5		8.8	2.7
	13.05.2023	8.6	2.6		9.0	2.6
	14.05.2023	8.7	2.6		8.8	2.8
	15.05.2023	8.9	2.7		8.9	2.7

Conclusion

This research outlines an investigation into the quality of milk and dairy items manufactured by a prominent dairy industry in south of Albania. Due to finding of this investigation, we conducted physico-chemical and microbiological assessments on both milk and its by-product samples, finding that the results adhere to all relevant regulations. Furthermore, the absence of EC, TC, YMR and ETB in all tested samples provided confirmation of the effective decontamination of its by-products.

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RISK ASSESSMENT FOR PUBLIC HEALTH BASED ON PESTICIDE RESIDUES IN DIFFERENT TYPES OF HONEY

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Abstract

This research aimed to investigate pesticide residues in different honey types and to assess the risk to public health. Samples originating from pine, multifloral, sunflower, acacia, linden, and canola were collected and analyzed by a QuEChERS method. Analysis of pine honey didn't detect any residue of investigated pesticides. The most detected pesticides in honey samples were chlorpyrifos ranging between 15.1 µg/kg (linden honey) to 22.3 µg/kg (multifloral honey), clothianidin ranging between 12.0 µg/kg (acacia honey) to 22.0 µg/kg (canola honey), dimethoate ranging between 8.9 µg/kg (multifloral honey) to 18.9 µg/kg (canola honey), and thiamethoxam ranging between 4.2 µg/kg (linden honey) to 15.6 µg/kg (canola honey), respectively. The lowest estimated daily intake (EDI) of 128×10^{-3} µg/kg of body weight per day was in acacia honey, and the highest EDI of 265×10^{-3} µg/kg of body weight per day was in canola honey. Similar values of EDI were recorded for multifloral, sunflower, and linden honey (186×10^{-3}, 187×10^{-3}, and 183×10^{-3}), respectively. Honey investigated in this study posed no risk to humans after potential consumption.

Keywords: honeybees, food safety, food analysis, honey, QuEChERS, environment

Introduction.

Organophosphorus and carbamates are the most widely used pesticides, almost replacing organochlorine pesticides. Pesticide residues are transferred to honey by bees that feed on contaminated blossoms, which eventually contaminate the food it contains [7]. Products made from honey and bees are perceived as natural, healthy, and clean [13][14]. There are, however, several environmental problems associated with over-reliance on pesticides, such as pesticide residues in food [4]. When pesticides are applied to crops, they can negatively affect soil [15], and air [17] as well as the flowers that bees collect nectar from to make honey. The food chain may be contaminated with these toxic chemicals, which may affect human health. It is also possible for hives to be contaminated directly or indirectly. The first case may have been caused by pesticide residues caused by acaricides used to control *Varroa destructor* [6]. The second case involves bees being exposed to pesticides when foraging within a few kilometers away from the hive [1]. It is possible that pesticides introduced during processing can suppress the beneficial properties of honey derived from a variety of agricultural and beekeeping practices [2]. Since these compounds may diminish the beneficial properties of honey and, if present in significant amounts, could pose a serious threat to human health, determining them in honey and other bee products has become a growing concern in recent years [9]. Honey residue monitoring helps determine whether this product poses a risk to consumer health Bees and their products may be useful indicators of pollution in their areas based on research by several authors [12]. It is important to examine the possible health effects of honey residues before evaluating their potential risks [5].

Material and Methods.

The pesticide mix standards were purchased from LabStandard (Castellana Grotte, Italy). High-performance liquid chromatography (HPLC) ultra-gradient grade organic solvents were used in the experiment. The analyses comprised 88 honey

samples (9 samples of pine, 23 samples of multifloral, 24 samples of sunflower, 17 samples of acacia, 8 samples of linden, and 7 samples of canola honey) collected from different local markets of Vojvodina (Serbia). Samples were stored in plastic containers in a refrigerator (4 ºC), until further analysis. The sampling was performed following SANTE/11312/2021. Pesticides were detected using an HPLC Agilent 1290 Infinity II chromatograph coupled to an Agilent 6470 TSQ mass spectrometer with AJS ESI (Jet Stream Technology Ion Source). An analysis of pesticides was conducted by LC-MS/MS in positive electrospray ionization (ESI+) and fragmentation of the H+ molecular ion, along with an average recovery rate and R2, respectively. A selected reaction monitoring mode (SRM) for each pesticide detection was performed to obtain the highest sensitivity, whereas two transitions of the SRM were used for pesticide confirmation, taking into account the retention time (Rt) as it relates to each pesticide detection.

Adults' daily average consumption of honey is used to calculate their pesticide exposure. Using the European Commission's maximum residue limit (MRL), chronic effects on public health are evaluated. FAO and WHO recommended acceptable daily intakes (ADIs) as percentages of estimated daily intakes (EDIs), while ADIs were calculated based on a mice model for carcinogenicity: NOAEL = 10 mg/kg of body weight/day. To calculate the EDIs of the pesticide residues, the following equation was used [11]:

$$EDI = (C \times K)/BW$$

where: EDI—estimated daily intake (µg/kg of body weight/day); C—the average concentration of pesticides in honey (µg/kg); K—average consumption rate (kg of honey/day); BW—average human body weight (kg).

Approximately 0.828 kilograms of honey are consumed annually by adult persons. A mean body weight of 70.8 kilograms was set as the normal distribution for European adults aged 20 years and older, respectively.

Results and Discussion.

From the total of 88 honey samples 9 samples of pine, 23 samples of multifloral, 24 samples of sunflower, 17 samples of acacia, 8 samples of linden, and 7 samples of canola honey were investigated to determine pesticide residues. Table 1 summarizes the frequency and concentration levels of pesticide residues detected in all honey samples.

Table 1. Pesticide residues in 88 honey samples of different types (mean concentration and detection frequency).

n – number of samples; sd – standard deviation; nd – not detected.

Pesticide	Type of honey					
	Pine (*n = 9*)	Multifloral (*n = 23*)	Sunflower (*n = 24*)	Acacia (*n = 17*)	Linden (*n = 8*)	Canola (*n = 7*)
	µg/kg±sd	µg/kg±sd	µg/kg±sd	µg/kg±sd	µg/kg±sd	µg/kg±sd
Bendiocarb	nd	3.3±0.2	nd	nd	nd	nd
Buprofezin	nd	nd	5.0±0.1	nd	nd	4.6±0.1
Chlorpyrifos	nd	22.3±0.1	21.0±0.2	nd	15.1±0.1	21.7±0.2
Clothianidin	nd	14.0±0.3	16.5±0.1	12.0±0.2	16.5±0.3	22.0±0.1
Cyproconazole	nd	4.1±0.2	nd	nd	nd	nd
Cyazofamid	nd	nd	nd	17.0±0.1	nd	nd
Dimethoat	nd	8.9±0.1	10.0±0.1	11.0±0.1	17.3±0.2	18.9±0.2
Thiacloprid	nd	nd	nd	nd	3.9±0.1	nd
Thiamethoxam	nd	5.3±0.1	5.8±0.1	nd	4.2±0.1	15.6±0.1

Table 2. Human health risk assessment for different honey samples. ADI - acceptable daily intake; EDI - estimated daily intake; bw – body weight.

	Pesticide	ADI (µg/kg of bw/day)	EDI of pesticide residues of different honey types (µg/kg of bw/day)					
			Pine	Multifloral	Sunflower	Acacia	Linden	Canola
1.	Bendiocarb	4	0	11×10^{-4}	0	0	0	0
2.	Buprofezin	9	0	0	16×10^{-4}	0	0	15×10^{-4}
3.	Chlorpyrifos	10	0	71×10^{-4}	67×10^{-4}	0	48×10^{-4}	70×10^{-4}
4.	Clothianidin	100	0	45×10^{-4}	53×10^{-4}	38×10^{-4}	53×10^{-4}	70×10^{-4}
5.	Cyproconazole	20	0	13×10^{-4}	0	0	0	0
6.	Cyazofamid	170	0	0	0	54×10^{-4}	0	0
7.	Dimethoat	2	0	29×10^{-4}	32×10^{-4}	35×10^{-4}	55×10^{-4}	61×10^{-4}
8.	Thiacloprid	10	0	0	0	0	12×10^{-4}	0
9.	Thiamethoxam	2	0	17×10^{-4}	19×10^{-4}	0	13×10^{-4}	50×10^{-4}
	∑ of pesticides	580	0	186×10^{-3}	187×10^{-3}	128×10^{-3}	183×10^{-3}	265×10^{-3}

Using FAO/WHO's acceptable daily intakes (ADI), Table 2 compares the estimated contribution of honey to these consumptions. ADI refers to a pesticide's amount that can be consumed daily by a person without posing an appreciable health risk. In this research, we found that honey consumption has only a minimal contribution to toxicological risk since the daily pesticide intake is much lower than the ADI. As compared to other research, our results showed lower levels and frequencies of pesticide residues in honey [16]. Over 35% of honey samples of Western honey bees around the world contain pesticide residues, according to previous studies. Additionally, to control the pests or diseases in these crops, many pesticides were used, and these pesticides could remain in the nectar, pollen, water, and soil, which bees will be exposed to [3]. It is important not to ignore the current findings when assessing risks to human health. In the last two decades, raw, unprocessed food has become increasingly popular, especially organic food with proven health benefits, and this trend involves apiculture products as well [10]. In addition, the scientific reviews on the benefits of apiculture products on human and animal health further strengthen the inclination toward these products [8]. Therefore, honey consumption is expected to increase among adults as well as children [14]. Different types of honey were examined for pesticide residues using the optimized analytical method. This method requires few samples, minimizing the amount of solvent consumed, and is simple and rapid. As well as providing quantitative information, MS/MS detection is also useful for confirming pesticide residue in honey. Honey investigated in this study posed no risk to humans after potential consumption, but further investigation into monitoring contamination in the environment is highly necessary.

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INNOVATIVE TECHNIQUES OF OLIVE OIL PROCESSING; EXTRACTION WITH MICROTALCO AND SONIFICATION

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Abstract

The extraction of olive oil is carried out through the centrifugal system, but in recent years, numerous studies have been conducted using ultrasound extraction. To increase extraction efficiency, technological aids such as talc are employed. The Kalinjot cultivar was used for this study. A laboratory mill equipped with a mixer and a centrifuge was utilized for the preparation of olive paste and the extraction of olive oil. The olive paste was divided into four experiments. The first experiment served as a control sample. In the second experiment, it was homogenized for 45 minutes, and 1.5% talc was added. In the third experiment, it was sonicated for approximately 15 minutes and then homogenized for 45 minutes. In the fourth experiment, it was sonicated for approximately 15 minutes and then homogenized for 35 minutes, with the addition of 1.5% talc. The parameters analyzed included the percentage of moisture, percentage of fat, total acidity, determination of K_{232}, K_{270}, peroxide index, pigments, and total polyphenol content.

The obtained results indicated that the combination of ultrasound treatment and the addition of talc, up to 1.5%, can enhance oil extraction and improve its quality. Ultrasonic conditioning and the addition of microtalco reduce the duration of the homogenization process by half. This treatment does not cause changes in the quality indices or composition of the olive oil. Moreover, this treatment significantly increases the phenolic content of the oil.

Keywords: Olive Oil, Olive oil extraction, Olive Oil Quality, Ultrasound and Microtalco

1. Introduction

The olive tree (Olea Europaea L.) grows in a subtropical climate as a traditional main familiar crop in Mediterranean countries. Olive oil is obtained from olive fruit a natural product containing a wide range of bioactive compounds and is a key component of the traditional Mediterranean diet. Olive oil is usually extracted by mechanical pressing. As fruit colour develops some changes occur including fruit weight, moisture content and flesh to pit ratio, fat content and oil composition (Preziosi and Tini, 1990, Balatsouras et al., 1982). Fresh fruit weight increases with maturity for most olive cultivars. The oil content in the fruit is related to the degree of maturity (Rahmani et al., 1997). However, the composition of the olive fruit may vary depending on harvest time, method of collection, storage of fruit, time between collection and processing at the mill. The most appropriate time for the harvest of olives for oil extraction is when the fruit reaches its optimum ripeness (Kiritsakis, 1991). The purpose of this study is to compare the quality parameters and biochemical compounds of olive oil extracted with ultrasound and with micro-talc.

2. Materials and methods

2.1 Study Plan

For the realization of this study 12 kg of fruits were collected from the 'Kalinjot' cultivar, with a ripeness index ranging from 5 to 6. The determination of the ripeness index followed the method established by Uceda and Frias in 1985. Olive oil was extracted from the olive fruits using a laboratory mill equipped with a mixer and a centrifuge. The olives were crushed, and the resulting olive paste was divided into four approximately 3 kg portions for four separate experiments. The first experiment served as the control sample. In the second experiment, the olive paste was homogenized for 45 min, with the addition of 1.5% micro-talc. In the third experiment, the olive paste was sonicated for about 15 min and then homogenized for 45 min. In the fourth experiment, the paste was sonicated for about 15 min and then homogenized for 35 min, with the addition of 1.5% micro-talc. The obtained oil was filtered to remove impurities, labeled, and stored in a refrigerator at a temperature of -15ºC for further analysis. Samples from each experiment were analyzed for quantitative and qualitative characteristics. The quality of the oil, including free acidity, peroxide index, K_{232}, and K_{270}, was determined in accordance with European Regulation EC 2568/91. The total phenol content was assessed following the method described by Vázquez-Roncero in 1973, with the results expressed

as mg/kg of gallic acid. Chlorophylls and carotenoid contents were determined using the procedures outlined by Minguez-Mosquera in 1990.

3. Result and discussion

The composition of virgin olive oil, being a biological product, is subject to various biotic and abiotic factors that induce changes, both in quantity and composition. Table 3.1 presents the quality parameter values for olive oil extracted from a specific olive cultivar using four extraction systems: the classic system, classic system with talc, ultrasonic extractor, and ultrasonic extractor with talc. Among these parameters, the level of free acids in olive oil is of paramount importance, as it not only influences the quality but also determines the oil's classification within specific categories. According to established standards, for olive oil to be classified as extra virgin or virgin, the free acid content should not exceed 1–0.8% oleic acid (CEE, 2015).

Table 1. Main physical-chemical parameters in the samples

Samples	Free Acidity (% oleic acid)	K232	K270	Peroxide Index (meq O2/kg oil)
OOC	$1,071 \pm 0.05a$	$0,252 \pm 0.00$	$0,017 \pm 0.00$	$2,672 \pm 0.00$
OOT	$1,130 \pm 0.00$	$0,224 \pm 0.00$	$0,014 \pm 0.00$	$3,333 \pm 0.01$
OOU	$1,182 \pm 0.04$	$0,247 \pm 0.00$	$0,016 \pm 0.00$	$3,314 \pm 0.01$
OOTU	$0,901 \pm 0.00$	$0,236 \pm 0.02$	$0,015 \pm 0.00$	$2,331 \pm 0.00$

a – Mean ± SD

Based on the results obtained, it is evident that the oil produced by the three studied systems falls within the category of virgin oil. This categorization results from one of the analyzed parameters, namely, free acidity, which slightly exceeds the permissible limit for the extra virgin category. The decline in the categorization of this produced oil may be attributed to the quality of the olive fruit, characterized by high ripeness and fruit damage.

Phenolic compounds not only contribute to the oil's stability but also influence its organoleptic properties (Beltrán et al., 2000). Figure 3.1 illustrates the total polyphenol content of the olive oil extracted in the studied experiments. The results reveal that the oil obtained through ultrasound treatment, along with the addition of talc, yields higher levels of polyphenols.

Chlorophyll and carotenoid pigments remain present in the fruit until it reaches full maturity. These fat-soluble compounds transfer into the oil, impacting its color (Garrido et al., 1990; Beltrán et al., 2000).
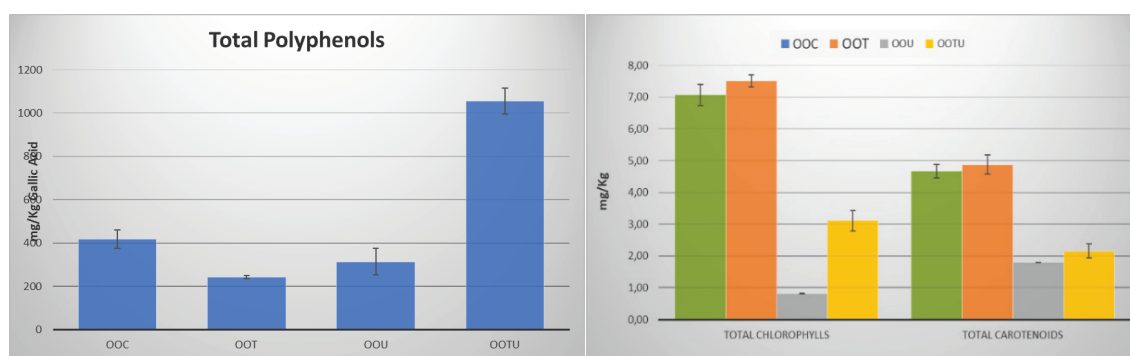
Figure 1. Total polyphenols, total chlorophylls and total carotenoids content of extracted olive oil according to the studied experiments

From the results obtained, it is evident that the oils treated with ultrasound and the addition of talc exhibit higher pigment values, with an approximate amount of 7.93 mg/kg, while the oil extracted solely with ultrasound treatment shows the lowest values. The average carotenoid content of the analyzed varieties is summarized in Figure 3.1. Oils extracted with ultrasound treatment and the addition of talc have the highest carotenoid pigment content, reaching up to 4.87 mg/kg.

4. Conclusion

In the oil processing industry, the addition of talc is essential to prevent undesired processes, such as emulsion formation or challenging paste processing. The results obtained indicate that the combination of ultrasound treatment and the addition of up to 1.5% talc can enhance oil extraction and improve its overall quality.

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USE OF *ARTEMISIA ABSINTHIUM* (L) ON TREATMENT OF SPIRONUCLEOSIS INFECTION IN RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)

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Abstract

Diplomonad flagellates of the genus Spironucleus may cause mass mortalities and huge economic losses in both ornamental and farmed fish species. The aim of the present study was to determine the in vivo antiparasitic activity of Artemisia *absinthium* (L) ethanol extracts and essential oil nanoemulsions for control of Spironucleosis (Hexamitiasis) in rainbow trout (*Oncorhynchus mykiss*). Treated rainbow trout with an average weight of 1.5-2.0 g were fed 21-day periods with the addition of plant ethanol extracts (1.0, 1.5, 2.0, 2.5, and 3.0 g kg^{-1}) and essential oil nanoemulsions (1.0 and 3.0 ml kg^{-1}). The composition of A. *absinthium* (L) was analyzed by GC-MS and the major components were sabinol (42.22%), chrysanthenylacetate (14.73%), epoxy-ocimene (4.97%), thujone (2.19%), d-isothujone (3.97%). The results of the present study showed that cumulative mortalities were decreased in all treatment groups and positive control compared to the negative control. Concentration of 2.5 g kg^{-1} of extract and 3.0 ml kg^{-1} of essential oil nanoemulsion, showed the highest antiprotozoal activity ($p<0.05$). These results suggested that ethanol extract of A. *absinthium* (L) displayed antiparasitic activity against *S. salmonis* and could be the potential to be used in rainbow trout hatcheries.

Keywords: *Artemisia absinthium* L., Spironucleosis (Hexamitiasis), rainbow trout (*Oncorhyncus mykiss)*, nanoemulsion, antiparasitic, treatment

Introduction

Spironucleosis (Hexamitiosis) is caused by the protozoan agent Spironucleus salmonis, and it poses a significant threat to trout farms due to its potential for serious mortality. *Spironucleus* infections are becoming serious, especially under high-density fish farming conditions. The relationship between the intensity and prevalence of infection in this disease is not well known. The parasite is thought to compete with nutrients by damaging the intestinal epithelium. Infections primarily affect the intestine and tend to be chronic in nature. It has been reported that the disease is transmitted by oral ingestion of cysts and trophozoites of the parasite. Fish population density is effective in the occurrence of the disease (Woo, 1999). *Artemisia absinthium* L., a plant widely distributed and naturally occurring in Anatolia, particularly in the Mediterranean region, exhibits diverse biological properties such as antihelminthic, antibacterial, antifungal, antioxidant, antimalarial effects, with terpenoids and flavonoids as active ingredients (Kordali et al., 2005; Bora and Sharma, 2010). Dimetridazole and metronidazole are commonly administered through feed in the treatment of *Spironucleus* infection. However, due to the adverse effects of metronidazole on DNA and cell structure, its use in aquaculture within European Union countries is prohibited by Directive No. 613/98. This study was conducted first time to determine the *in vivo* antiparasitic activity of *A. absinthium* (L) ethanol extracts and essential oil nanoemulsions for controlling Spironucleosis (Hexamitiasis) in rainbow trout.

Materials and Methods

Infected juvenile rainbow trout samples were obtained from trout farms in the Aksu-Isparta region in January-February. The intestinal tissues of infected fish were examined under a microscope. The infected rainbow trout were transported to Fisheries Faculty Research and Application facility. The experiment was set up for 50 fish each group with an average weight of 1.5-2 g, as triplicate. Fish were placed in 400-liter round fiberglass tanks. The research was carried out over two different periods: short-term (7 days) and long-term (21 days) and a running water system was used.

Preparation of ethanol extract and essential oil of *A. absinthium* L.

A. absinthium L. was defined by Prof. Dr. Hasan ÖZÇELİK from Süleyman Demirel University, Faculty of Sciences, Department of Biology. The chemical structure of *A. absinthium* L was determined by the Gas chromatography device (using GC/MS apparatus) at the Experimental and Observational Research Laboratory of Süleyman Demirel University. For preparation of plant extract, After keeping 15 g of dry plant sample in 50 ml of ethanol for 2 hours, it was passed through Whatman No1 filter paper for filtration, evaporation was carried out with the help of a water bath, and the resulting extract was stored at -18°C until use. To obtain essential oil, the crude powder samples (200 g) were subjected to hydrodistillation for 3 hours using a Clevenger-type apparatus.

Preparation of nanoemulsions of *A. absinthium* L. essential oil

Nanoemulsions were obtained according to the method used by Hamouda et al. (1999). Essential oil, ethanol, and surfactant (Tween 80) were used to form the oil phase in the water-in-oil nanoemulsion. For this purpose, plant volatile oil, surfactant, and ethanol were added to a beaker and stirred, then the temperature was adjusted to 86°C in an incubator and left for 1 hour. After removing the mixture from the incubator, it was allowed to cool to room temperature, and then sterilized distilled water

was added to make up 80% of the total emulsion. Subsequently, the mixture was combined in an ice-filled beaker and homogenized using an ultrasonic homogenizer at 72 AMPL for 15 minutes.

Experimental diets

Different concentrations of ethanol extract (1.0, 1.5, 2.0, 2.5, and 3.0 g kg^{-1}) and nanoemulsified *A. absinthium* essential oil (1.0 and 3.0 ml kg^{-1}) were added to the mixture together with sunflower oil (0.05 ml kg^{-1}). Juvenile rainbow trout were fed at 3% of their body weight for 7 days (short term) and 21 days (long term). The negative control group was fed with commercial trout feed at 1% of their body weight. In the positive control group, they were fed trout feed supplemented with 0.5 mg kg^{-1} of Metronidazole.

Determination of the therapeutic effect of *A. absinthium* L.

Determination of survival rate

The survival percentage of the fish (RPS = Relative Percent Survival); it was calculated according to the formula (Amend, 1981):

RPS = [1 - (Mortality in the *A. absinthium* L. fed group (%) / Mortality in the control group (%))]

Determination of the number of parasites in tissues

Parasite density was determined by counting the parasites in the intestine and feces according to Tojo and Santamarina (1998). For this purpose, after the fish were stunned with phenoxyethanol (0.1-0.5 ml l^{-1}), slide coverslip preparations prepared from feces and intestinal contents were examined under a microscope at 400x magnification. In the evaluation; if more than 50 parasites are found in the microscopic area, 4 points (high (+++)), 3 points (medium (++) between 10-50), 2 points (low (+) between 1-10), 1 point (if there was 1 piece, it was interpreted as minimal (+/-)), if no interference was found, it was interpreted as zero score (-).

Data Analysis

The data obtained in the experiment were evaluated with the ANOVA test (Duncan multiple comparison test) in the SPSS 16.0 package program (SPSS Inc, Chicago, IL, USA). When comparing the importance levels of various parameters examined in the experiment, the results are given as mean value and standard deviation. The significance level was chosen as $p < 0.05$.

Results and Discussion

A. absinthium **L. GC-MS analysis**

The composition of *A. absinthium* (L) was analyzed by GC-MS and the major components were sabinol (42.22%), chrysanthenylacetate (14.73%), epoxy-ocimene (4.97%), thujone (2.19%), d-isothujone (3.97%)

Result of relative survival rate (RPS) and cumulative mortality

According to research findings, it was determined that cumulative mortality (%) in fish fed with *A. absinthium* L. extract for 7 and 21 days decreased and survival rates increased, similar to the positive control, the highest mortality was found in the negative control (Table 1).

Table 1. Effect of *A. absinthium* L. extract on relative survival rate (RPS) and cumulative mortality in infected rainbow trout

	Cumulative Mortality (%)		RPS (%)	
	7th day	21th day	7th day	21th day
1.0 g kg^{-1}	11.33± 2.00[b]	13.34± 1.34[bc]	27.68±1.51[a]	32.59±1.16[a]
1.5 g kg^{-1}	8.67±0.67[ab]	14.00± 0.67[bc]	12.50±1.25[a]	29.91±1.34[a]
2.0 g kg^{-1}	8.67±2.00[ab]	10.00±2.00[ab]	25.90±1.16[a]	49.11±1.34[ab]
2.5 g kg^{-1}	8.00±0.00[ab]	4.00±1.00[a]	19.65±5.35[a]	78.57±2.14[b]
3.0 g kg^{-1}	5.34±1.34[a]	8.67±2.00[ab]	45.54±1.69[a]	57.15±7.14[ab]
Positive control	9.34±1.34[ab]	14.00±2.00[bc]	19.65± 5.35[a]	30.36±5.33[a]
Negative control	10.00±0.67[ab]	20.00±1.33[c]	-	-

*Different letters in the same column are statistically significant ($p < 0.05$)

It has been determined that mortality (%) significantly decreased in fish fed with nanoemulsified *A. absinthium* L. essential oil, similar to the positive control group, and their survival rates increased (Table 2). The highest mortality was observed in the negativ*e* control group. As for the RPS values, they were found to be the highest in the groups fed with nanoemulsified *A. absinthium* L. essential oil at a ratio of 3.0 ml kg^{-1}.

Table 2. Effect of nanoemulsified *A. absinthium* L. essential oil on relative survival rate (RPS) and cumulative mortality in infected rainbow trout

	Mortality (%)	RPS (%)
1.0 ml kg^{-1}	21.66±5.77[b]	40.00±21.36[b]
3.0 ml kg^{-1}	6.66±7.63[b]	85.83±15.06[a]
Positive control	11.66±12.58[b]	75.00±25,00[ab]
Negative control	43.33±5.77[a]	-

*Different letters in the same column are statistically significant (p<0.05)

Effect of *A. absinthium* L. on the number of parasites in the digestive canal of rainbow trout

It was determined that *A. absinthium* L. extract group was not effective on the 7th day, but on the 21st day, the group treated with 2.5 g kg^{-1} of *A. absinthium* L. was found to be more effective in terms of the intensity and prevalence of infection similar to the positive control group compared to the other groups (p<0.05) (Table 3).

Table 3. Effect of *A. absinthium* L. extract on infection intensity and infection rate (prevalence) in infected rainbow trout on day 7 and 21

	Intensity of infection		Prevalence (%)	
	7th day	21th day	7th day	21th day
1.0 g kg^{-1}	++	+	82.70±1.51[b]	57.69±3.09[b]
1.5 g kg^{-1}	++	+	83.21±1.06[b]	54.26±1.40[c]
2.0 g kg^{-1}	++	+	83.21±2.03[b]	29.62±1.46[d]
2.5 g kg^{-1}	+	-	86.95±0.12[a]	3.47±0.04[f]
3.0 g kg^{-1}	+	+/-	71.83±0.28[c]	7.29±0.70[e]
Positive control	++	-	55.14±1.48[d]	1.55±0.08[f]
Negative control	+++	+++	88.14±0.79[a]	100.00±0.00[a]

*Different letters in the same column are statistically significant (p<0.05)

It has been determined that all groups fed with nanoemulsified *A. absinthium* L. essential oil were effective compared to the negative control group in terms of parasite count (p<0.05) (Table 4). Regarding the intensity of infection, the group fed with 3.0 ml kg^{-1} of *A. absinthium* L. and the positive control group were observed to be the most effective.

Table 4. Prevalence and intensity of infections after administration of nanoemulsified *A. absinthium* L. essential oil

	Intensity of infection	Number of survived fish	Number of infected fish	Prevalence (%)
1.0 ml kg^{-1}	++	44	30	68.18±4.57[b]
3.0 ml kg^{-1}	+/-	56	6	8.92±0.70[c]
Positive control	+	53	4	7.54±3.84[c]
Negative control	++	34	28	82.35±0.79[a]

*Different letters in the same column are statistically significant (p<0.05)

Discussion

In this study, 58 different components were obtained in the chemical composition of the extract of *A. absinthium* and they are rich in monoterpene components which, sabinol (42.22%), thujone (2.19%), d- isothujone (3.97%). Terpenes interacts with the lipids in the cell wall, increase the permeability of the membrane. Naturally, disruption of the physicochemical structure causes in proton movement and electron flow and therefore transport in the cell and coagulation of the cell content (Erdoğan and Everest, 2013). In this research, *A. absinthium* was effective on *Spironucleus*. The findings from this research are similar to Moon et al. (2006), Oriakpono et al. (2012), Puk et al. (2014)' s results were supported. It has been understood that *Artemisia* species are an alternative for the protection of the aquatic ecosystem and sustainable aquaculture production and can contribute to organic production. It has been determined that higher doses are more effective than lower doses. It has been observed that Artemisia group herbal products and has no harmful effects on fish. In our research, the effective doses of the ethanol extract of *A. absinthium* L., was found for the treatment of fish pathogenic *Spironucleus* infections and it was determined that the long period (21 days) was more effective than the short period (7 days) in the treatment against the parasite ($p < 0.05$). It has been determined that nanoemulsified *A. absinthium* L. essential oil, especially the 3.0 ml kg^{-1} group, were effective on *Spironucleus* sp. parasite similar to the positive control. In future studies, should be conducted on sectoral field practices for the treatment of *Spironucleus* infections and disease prevention strategies should be developed by giving importance to prophylactic studies.

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EVALUATION OF VARIOUS CHEMICAL AND PHYSICAL COW MILK COMPONENTS FROM DIFFERENT LOCATIONS IN KOSOVO

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Abstract

Cow's milk's physicochemical composition is a key factor in determining its compatibility for different dairy products and its overall nutritional worth. This summary provides a comprehensive overview of the significant physicochemical elements that influence the quality of cow's milk, including acidity, fat, density, lactose, dry matter, proteins, water added, freezing point, and mineral matter. A total of 26 samples of cow milk from six different municipalities in Kosovo were gathered and tested. On the other hand, no samples of fresh cow's milk from any location were discovered to have any additional water or antibiotic residue. The results of the investigation demonstrated that the fresh milk produced by cows in these regions meets the requirements for this product, and that the milk producers also employ the proper methods for handling milk and upholding farm hygiene standards.

Key words: Fresh milk quality, Milk properties, Dairy farming, Kosovo localities

CANINE TRANSMISSIBLE VENEREAL TUMORS (STICKER TUMOR)

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ABSTRACT

Transmissible venereal tumor (TVT) in dogs, also known as infectious sarcoma, venereal granuloma, transmissible lymphosarcoma, or Sticker tumor, is a benign reticulo-endothelial tumor that primarily affects the external genitalia and occasionally manifests with internal metastases organs of the abdominal cavity. Transmissible venereal tumor is a common canine tumor that affects both sexes. It is observed in dogs that have uncontrolled sexual activity with an incidence ranging from 2–43% (G Purohit. Canine Transmissible Venereal Tumor: A Review. The Internet Journal of Veterinary Medicine. 2008 Volume 6 Number 1).

Diagnosing the stage of the disease also determines the method of treatment. According to domestic and foreign practices, among the most routine measures of this pathology remains surgical intervention accompanied by therapeutic medication. The tumor is often self-limited and vincristine sulfate is currently considered the most effective therapy.

Transmissible venereal tumor is a very worrying pathology in the world but also in our country. It is usually observed in dogs that are in close contact with each other, or in stray and wild dogs that exhibit unrestricted sexual activity (Cangul, 2003). The age most affected by transmissible venereal tumor in dogs ranges from 2-5 years. Although there are no reports on the possibility of the influence of viruses in the development of transmissible venereal tumors in dogs, a study reported the presence of the canine papilloma virus in neoplastic lesions and suggested further studies on this fact (Diaz 2019).

Keywords: tumor, venereal, infectious sarcoma, malignant tumor, Vincristine, chemotherapy.

INTRODUCTION

Tumors are classified as uncontrolled cell growth in various tissues. Neoplasia as a phenomenon is defined as the abnormal growth of cellular masses. These pathologies are recently in the center of attention after the increased incidence in pets. In dogs, venereal tumors are more widespread and among the most frequent pathologies. Establishing the diagnosis and successful treatment are the focus of any treatment regimen. According to practices inside and outside the country, among the most routine measures of this pathology remains surgical intervention, accompanied by therapeutic medications. Thus, the determination of the appropriate surgical techniques and the further study of this disease is the focus of many scientific researches. Since the tumor can be located in different tissues, the clinical signs can be according to the nature of the position where it is located. In most cases, it affects the external genitalia, rarely in depth. The role of the veterinarian in determining the course of the disease is crucial. He must take all measures to carry out a successful treatment, from therapeutic treatment to appropriate surgical interventions. He should also follow the case after therapy to avoid relapses or spread of the tumor. Determining new less invasive methods to treat this pathology and that do not affect the normal continuity of life after treatment are in focus recently. The fact that this tumor is transmitted in the venereal way results in the wide spread of this disease. Attention should be paid to the act of copulation and sexual behavior that can play a role in the path and pathogenesis of the disease without forgetting the human influence in cases of uncontrolled copulations. The focus of scientific research remains the most efficient treatment of the disease, contributing in all possible ways. Choosing the right method is also the focus of allusions and scientific debates that are commented on in various conferences.

RESULTS AND THEIR DISCUSSION

This study is based on 12 clinical cases of venereal transmissible tumors of dogs that were treated at the Veterinary Clinic for Small Animals in Tirana as well as at the Paw Clinic in Elbasan during the period March 2022 - June 2023.

The vast majority of clinical cases with transmissible venereal tumors come from stray dogs. The cases coincide with the beginning of spring during estrus when uncontrolled matings occur, typically in stray dogs.

Damage to the mucous membranes of the genital organs favors transmission (Vermooten, 1987). Transmissible venereal tumors may develop slowly or may be aggressive with metastases to the skin and subcutaneous tissue, lymph nodes, eyes, tonsils, liver, spleen, oral mucosa, pituitary gland, peritoneum, brain, and bone marrow (Moulton, 1978).,)

Clinical signs vary depending on the location of the tumors. Dogs with tumor localization in the genital organs clinically manifest significant hemorrhage. In men, the lesions are usually located cranially in the glans penis or in the bulbus glandis. Tumor masses are often seen at the base of the penis and may be associated with phimosis. The clinic can be confused with urethritis, cystitis or prostatitis. Regional lymph node involvement is common in men with large tumors.

In female dogs, tumors can be located in the back of the vagina, protruding from the vulva and often causing deformation of the perineal region. Considerable hemorrhage can be observed, which leads to a pronounced state of anemia if the pathology continues for a long period of time. Hemorrhage can be mistaken for a skin condition by inexperienced owners or veterinarians. Rarely, transmissible venereal tumor can be localized in the uterus (Aprea et al., 1994).

The final diagnosis is based on physical examination and typical cytological findings of Transmissible Venereal Tumor.

For the treatment of this pathology, several treatments have been applied, including surgery, radiotherapy, immunotherapy, and chemotherapy. Surgery is widely used for the treatment of small, localized transmissible venereal tumors, although the recurrence of pathology can be as high as 50-68% in cases of large invasive tumors (Rogers, 1997; Wir et al., 1987).. Contamination of the tumor formation is also a source of recurrence (Boscos and Ververidis, 2004). Methods to prevent recurrence after surgery recommend surgical removal of the tumor formation accompanied by cauterization, application of cryosurgery or chemotherapy after surgical removal.

The use of Vincristine as chemotherapy has proven to be the most effective and practical therapy. Vincristine is administered weekly at a dose of 0.5 to 0.7 mg/m2 of body surface or 0.025 mg/kg, IV (Boscos and Ververidis, 2004). The healing of the lesions is gradual, although it is particularly visible and significant at the beginning of the treatment. Complete recovery occurs in more than 90% of treated cases. A cure rate approaching 100% (Boscos and Ververidis, 2004) is achieved in cases where the pathology is treated from the initial stages of diagnosis, especially in cases with a duration of less than 1 year, and independent of the presence or not of metastases (Boscos et al., 2004).

Chemotherapy with Vincristine is associated with quite pronounced side effects. Cytostatic agents, such as vincristine, may cause myelosuppression and gastrointestinal effects associated with leukopenia and vomiting. Paresis has also been described as a side effect due to peripheral neuropathy (Calvet et al., 1982; Withrow and Mc Ewn, 1996).

In conclusion, we can emphasize that transmissible venereal tumor is the most widespread neoplasia of the external genital organs in male and female dogs. Diagnosis is based on findings, clinical manifestation and cytological findings. The weekly intravenous use of vincristine has been confirmed as the most effective and practical therapy. Further experimental studies that will be carried out in larger groups of the dog population are necessary to treat this rather difficult and widespread pathology in our country.

CONCLUSIONS

➢ Transmissible venereal tumor in dogs represents a fairly frequent pathology in our country and around the world.

➢ Anamnesis and clinical signs supported by laboratory diagnosis are sufficient for determining the diagnosis, except in cases where this disease has atypical manifestations.

➢ In most cases, transmissible venereal tumor is curable and the most successful technique is surgical treatment accompanied by the use of vinkistrin at a dose of 0.025 mg/kg with 4 sessions once a week.

➢ Source of spread are stray dogs that serve as a reservoir.

RECOMMENDATIONS

❖ After detecting abnormal bleeding or other clinical signs, a specialized clinical examination of the dog by a veterinarian should be performed.

❖ Contact with unknown or stray dogs should be avoided as much as possible.

❖ Clinical checks should be performed before scheduled pairings

❖ To organize national campaigns for the sterilization of stray dogs and their treatment, which would lead to a decrease in cases of the disease

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MAEDI-VISNA AND CAPRINE ARTHRITIS ENCEPHALITIS IN SHEEP AND GOATS IN KORÇA REGION

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Abstract

Lentiviruses infect small ruminants and cause two major diseases: Maedi - Visna and Caprine Arthritis Encephalitis. In this study, 91 of 413 adult sheep and goats from the Korça region tested positive. Furthermore, 11 of the 25 small ruminant herds have at least one positive animal. In sheep, the apparent herd prevalence was 44.0% (95% CI: 29-59%), 38.6 (95% CI: 18.6, 55.1), and 66.7% (95% CI: 43.1, 90.2). In positive goat herds, the average apparent prevalence rate ranged from 20% to 82.9% (95% CI: 12% - 89.2%), while in sheep positive herds it ranged from 23.1% to 57.1% (95% CI: 11.7 -70.4). There was a positive link between seroprevalence rate and animal species, with goats testing positive in ELISA at an odd 2.36 (OR 95% CI: 1.48, 3.76) higher rate than sheep. Other risk factors, such as farm size, indoor versus outdoor rearing, and close farm biosecurity, may influence disease transmission between and within herds of small ruminant animals.

Keywords: Lentiviruses, Maedi - Visna, Caprine Arthritis Encephalitis, small ruminant, seroprevalence, risk.

A MODEL FOR PRACTICAL ASSESSMENT OF NUTRITIONAL STATUS OF COWS IN DAIRY FARMS IN ALBANIA.[i]

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The aim of the study is to apply a model for practical assessment of the nutritional status of the dairy herd on farms that keep almost no zootechnical documentation. It is based on the quantitative method of farm survey with questionnaires in combination with direct assessment of different indicators (e.g. feed quality, health status, etc.) by the researcher or professionals on the farm. The study was conducted on 26 dairy farms in the lowlands of the country.

According to this model, nutritional status on the dairy farm was assessed using information collected for the following indicators: (i) general information about the farm; (ii) nutrition and food quality indicators; (iii) general performance data; and (iv) herd disease incidence data.

We consider this model for studying nutritional status on farms that have no or only a very modest database as a practical model that can be successfully used directly on the farm by zootechnical advisors, veterinarians, technicians as well as by the farmers themselves after sufficient training.

Keywords: Dairy cows; nutritional status; practical assessment;

IMPACT OF SOCIAL MEDIA ON EATING BEHAVIOURS AMONG STUDENTS OF AGRICULTURAL UNIVERSITY OF TIRANA

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Abstract. The internet era in Albania has seen substantial changes in how consumers seek out information about products or services. In particular, among young people food consumption behaviorus are strongly affected by the widespread availability of social media (Facebook, Instagram, etc) and the internet's outstanding volume and rate of dissemination. In this context, the phenomena of social media influencers (SMI) results in a valuable impact as they can gather a sizable following and act as a resource for their followers. This work aimed to evaluate the impact of social media use on eating behaviours of students of the Agricultural University of Tirana (AUT), enrolled in study programmes of the Faculty of Biotechnology and Food (FBF). 100 students' responses to a structured online survey were gathered, collecting data on their demographic details, dietary habits and social media use. The majority of participants were female (86%), while 14 % of them were male. In terms of age range, 70 % of the respondents were between the ages of 20 and 22. Among social media, Instagram was indicated as the one that mostly (63%) affect food choices, while 35% of participants were not influenced by any social platform. Regarding SMI, 36 % of participants stated that they have never tried a diet promoted by a SMI, while 58% and 6% indicated they have occasionally and very frequently attempted, respectively. Social media use may have a negative impact on eating behaviours of university students, which seems prone to follow food choices promoted online.

Key words: students, eating behaviours, social media, diet, impact.

Introduction. The Albanian media echosystem has experienced considerable changes as a result of the Internet's advent. In the last decades, in the country, the information actors and platforms have multiplied, leading to different ways in which information is produced, consumed, and transmitted [1]. Social media, in addition to traditional media, has been playing a greater role in the public information process, impacting consequently audience's behaviours. In comparison to traditional media, social media results more dynamic and considered a two-way form of communication where users may interact with one another and share their experiences [2]. Social networks such as Facebook, Instagram, Linkedin, Twitter etc, are among social media that have grown the most and have been crucial even for professionals and social media influencers (SMI) in Albania [1]. According to Vukatana et al.,2022 except for LinkedIn, all social media platforms have the highest usage rates among young people, at over 70%. Facebook was the first social media used among older generation, while in young people resulted the fourth most frequently used. This is primarily due to the fact that Instagram has overtaken Facebook in terms of usage among the younger generation, which has decreased over the past several years [3]. SMIs are still viewed as purely marketing tools in Albania, and there is a lack of evidence regarding their impact in different aspects of social life. Young people in Albania spend more than three hours a day on social media, as reported by Myzeqari, 2023.They are more likely to follow SMIs based on the content they share with them. To our best knowledge, no studies are available in literature on the effect of social media use in food consumption behaviours of Albanian young people. In the light of this, this study aimed to evaluate the impact of social media use on eating behaviours of students of the Agricultural University of Tirana (AUT).

Material and methods. To obtain information regarding eating habits in students, a survey design was used. Using Google Forms, a self-designed, organized questionnaire was produced. The study's data were gathered through convenience sampling. The participants were students of the Faculty of Biotechnology and Food (FBF) of the Agricultural University of Tirana, enrolled in different study programmes of bachelor and master degrees. The questionnaire's completion instructions were provided. The feasibility and validity of the questionnaire were examined through a pilot study including 10% of the study population. The questionnaire was appropriately modified in light of the input received.100 students between the ages of 18 and 46 completed the questionnaire. To give participants adequate time to complete the questionnaire and minimize sampling error, the study was conducted over a two-month period.

Results and Discussion. The majority of the participants were female (86%), while 14 % of them were male. In terms of age range, 70 % of the respondents were between the ages of 20 and 22, followed by 25 % between the ages of 23 and 33 and 5% between 35 and 46. Even though studies have shown that people's wellbeing declines with age, older individuals are among those who use social media the most. Compared to males, female's well-being is mostly affected [5].

The respondents were mainly (38 %) students enrolled in the bachelor degree in Food Sciences and Human Nutrition, followed by students of master degree in Food and Human Nutrition and Food Technology (13 % respectively). Among social media, Instagram was indicated as the one that mostly (63%) affect food choices, while 35% of participants were not influenced by any social platform.

As reported in Figure 1, 40 % of students claimed they follow social media influencers, compared to 26% who said they don't. 34% of respondents said they were not interested in following SMIs. Concerning information about trying a diet recommended

by SMIs, 36 % of participants stated that they have never tried a diet promoted by a SMI, while 58% and 6% indicated they have occasionally and very frequently attempted, respectively.
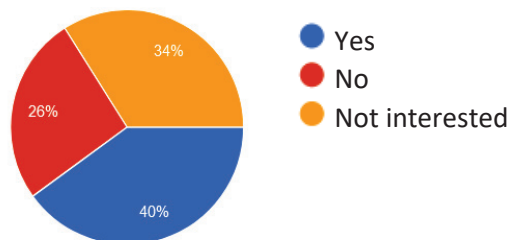

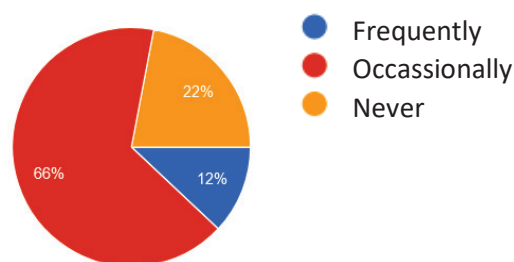Figure 1. Pie chart displaying interest in SMIs

Figure 2. Pie chart displaying frequency of purchasing food promoted by a social media influencer.

According to the survey results (Figure 2) 66 % of participants admit they occasionally purchase food promoted by a social media influencer, while 22% do not do. Literature reports different frameworks in this regard according to different countries' social media networks usage, while in Albania research in SMIs is still of little relevance [4,6].

Regarding impact of social media content on eating behaviours (Figure 3) 34% of students declared that even though they don't feel hungry, they occasionally or never eat food/plate of foods watched on social media. 30 % of participants admit they occasionally snack when browsing social media and realize how much they eat, while 20 % never do that (Figure 4). Similar percentages of participants declare that occasionally (29.3 %) and never (30,3%) eat more, driven by food/dishes seen in social media (Figure 5).
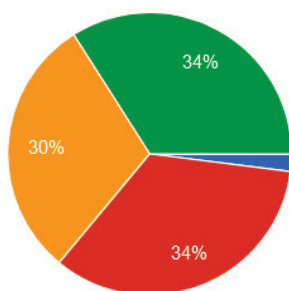

Figure 3. Pie chart displaying frequency of consumption of food seen in social made although not feeling hungry
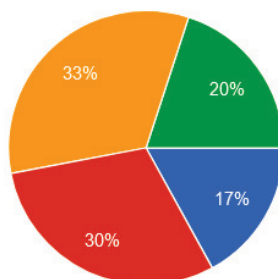

Figure 4. Pie chart displaying frequency of snacking when browsing social media
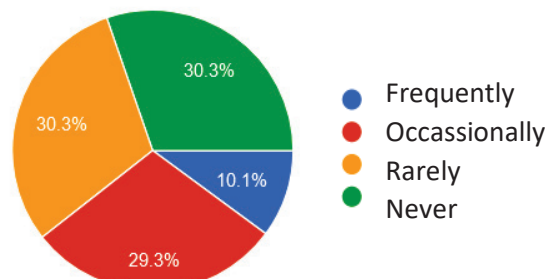

Figure 5. Pie chart displaying frequency of consumption foods driven by social media

In conclusion, most of our study participants appeared to be more susceptible to believing erroneous or deceptive information spread by social media influencers, while they seemed less influenced in their eating attitudes by social media usage and contents. This trend is most likely due to the controversy between social media addiction as young people and knowledge in the field of human nutrition as students of FBF.

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BEHAVIORAL CHANGES TO IMPROVE HYGIENE, SANITATION AND WATER TREATMENT PRACTICES INCREASE ACCESS TO SAFE WATER

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Abstract

The purpose of the study was to investigate behavior modification techniques for hygiene and clean water. The Clean Water System (SWS) improves access to clean water by assisting individuals in treating and maintaining health safety in their homes, medical facilities, educational institutions, and other settings. SWS consists of three steps: the treatment of household water, safe water storage, and behavioral adjustments to better hygiene, sanitation, and methods for treating water and food. The study consisted of data from the assessment of physicochemical and microbiological water parameters in numerous towns in Albania in 2021. The results from water samples indicated that the levels in 58 measurements were within acceptable limits for the research of microbiological markers such Escherichia coli (E. coli) and Enterococci. After using the restroom, 26% of those interviewed wash their hands. This significant fact has been shown to be underappreciated, necessitating the need to improve the quality of health education and spread healthy behaviors in order to prevent the onset of illnesses. The results revealed a correlation between diarrheal illness exposure and sanitary and infrastructural improvements as well as handwashing compliance. The study discovered that the development and use of a number of interventions in the water supply, sanitation, and hygiene system resulted in achieving the standards established for pollution detection techniques and changes in water quality, bringing an immediate impact on the population's health.

Keywords: Safe Water System, pathogens, health education level.

Introduction

The Safe Water System (SWS) improves access to safe water by helping people treat and maintain water safety for health in their homes, offices, schools, and other locations. SWS entails three steps: the treatment of household water, the secure storage of treated water, and behavior change in order to enhance hygiene, sanitation, and actions for managing water and food.
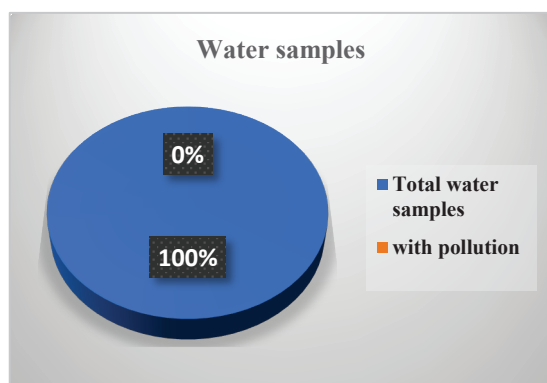
Subjects and Methods

In school environments, water quality monitoring has been done on a microbiological and physicochemical level. Students took part in surveys and interviews. The study contained information from the assessment of physicochemical and microbiological water characteristics in schools in a few Albanian cities in 2021. Using water samples, 58 microbiological markers were examined, including enterococci and Escherichia coli (E. coli), and the results provided an explanation. Interviews and surveys were conducted with 142 students. The data processing tools utilized were Excel and SPSS.

Results and Discussion

In 2021, the study examined water indicators related to physicochemical processes and microorganisms in schools in a few Albanian cities. Escherichia coli (E. coli) and enterococci levels were found to be within the acceptable ranges in the 58 microbiological indicator measures, according to the results of water samples [1]. 26 percent of those surveyed said they wash their hands after using the restroom. This crucial fact, which underscores the demand for increased health education and the encouragement of healthy behaviors to prevent the onset of illnesses, is not given enough attention[3,4,5]. Promoting healthy behaviors and health education are crucial for reducing the development of illnesses.

A higher standard of health education is required, alongside the promotion of healthy habits, in order to curb the spread of illnesses within educational institutions. The results revealed an association between exposure to diarrhoea-causing microbes and improvements in infrastructure and sanitation, as well as a disdain for handwashing habits [2].

The creation and use of a variety of water supply, sanitation, and hygiene system interventions may fulfill the criteria for the assessment of pollution detection methods and water quality changes for an immediate impact on public health.

Water samples

0%

100%

- Total water samples
- with pollution

Questionnaires: wash hands

26 %

74%

- They do not wash their hands after using the toilet
- wash their hands after using the toilet

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MASTITIS CAUSATIVE AGENTS ISOLATED IN SMALL RUMINANT'S FARMS IN KORÇA DISTRICT, ALBANIA

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Abstract

Mastitis is a prevalent and costly disease in small ruminants that occurs worldwide. The disease causes reduced milk production, condemnation of milk due to antibiotic residues, veterinary costs and occasional deaths. Mastitis has an important zoonotic potential which is associated with shedding of bacteria and the toxins in the milk. During 2023, 40 small cattle farms were monitored in the district of Korça, from which were identified 27 cases of mastitis (24 subclinical and 3 clinical cases). Milk samples were collected from affected quarters of the udder and were used to identify the causative agents of mastitis. From the laboratory analysis were detected 11 strains of *Staphylococcus aureus* (40.7%), 6 strains of *Escherichia coli* (22.2%), 3 cases of *Enterobacter* spp. (11.1%), 1 strain of *Staphylococcus pseudintermedius* (3.7%), 1 strain of *Pseudomonas aeruginosa* (3.7%) and 5 cases of fungal agents causing mastitis (18.5%). Subclinical mastitis often goes undetected and has the greatest economic impact because of long-term effects on milk yield. Failure to treat subclinical mastitis may result in chronic inflammation and has a good potential to not respond to antibiotic treatment. Prevention of mastitis must include clean and comfortable conditions for the livestock, good hygiene, and implementing proper milking and sanitation practices.

Keywords: small ruminants, mastitis, causative agents, Korça

Introduction

Mastitis is an inflammation or infection of the mammary gland, or udder, that may affect cows, sheep and goats. The main cause of mastitis is the physical injury or stress that can lead bacteria to invade the mammary gland (1). The main important bacterial strains that cause mastitis in small ruminants are *Streptococcus* spp., *Staphylococcus* spp., *Pasteurella* spp., and *E. coli* (1),(3). Mastitis can be classified into two different types: clinical and subclinical. The prevalence of clinical mastitis is generally lower than 5% (1), meanwhile the subclinical mastitis in small ruminant's averages 5–30% (4). The disease causes reduced milk production, veterinary costs and occasional deaths (9) (1). The risk of mastitis increases greatly in dirty environments (1). To prevent this disease, it is important to maintain a clean environment and to screen the situation periodically. There is limited information available on the cases of mastitis in animal farms of Albania. However, a study (7) conducted in the livestock complex of Tirana, Albania, reported a prevalence of subclinical mastitis in dairy cows of 37.68%, with 20.8% caused by Staphylococcus aureus and 4.2% caused by other bacteria. The main purpose of this study was to identify the most frequent bacterial agents circulating in the small ruminant's farms in Korça district.

Material and Methods

The present study was undertaken to monitor and identify the clinical and subclinical cases of mastitis and the main causative agents of this infection. It was focused in Korça district, in 40 different small ruminant farms during April-June 2022. In total, were examined 120 milk samples. The samples were taken from both animal showing clinical signs and healthy ones. After the sampling, they were transported to the laboratory in cooling boxes and undergone to bacterial analysis to identify the causative agents. The analysis were performed according to ISO standards at the Food Safety and Veterinary Institute.

Results and Discussion

Overall 120 milk samples analysed, in 40 different farms, were identified 3 clinical (suspected from the clinical signs) and 24 subclinical cases. In total from 120 sample analyzed, 27 cases (22.5%) of mastitis were identified. Milk samples from suspected cases were collected from affected quarters of the udder and were used to identify the causative agents of mastitis. From the laboratory analysis were detected 11 strains of *Staphylococcus aureus* (40.7%), 6 strains of *Escherichia coli* (22.2%), 3 cases of *Enterobacter* spp. (11.1%), 1 strain of *Staphylococcus pseudintermedius* (3.7%), 1 strain of *Pseudomonas aeruginosa* (3.7%) and 5 cases of fungal agents causing mastitis (18.5%). The prevalence of mastitis in our study confirms the results mentioned in other studies, noting the average range of subclinical mastitis is 5-30% (4) (1).
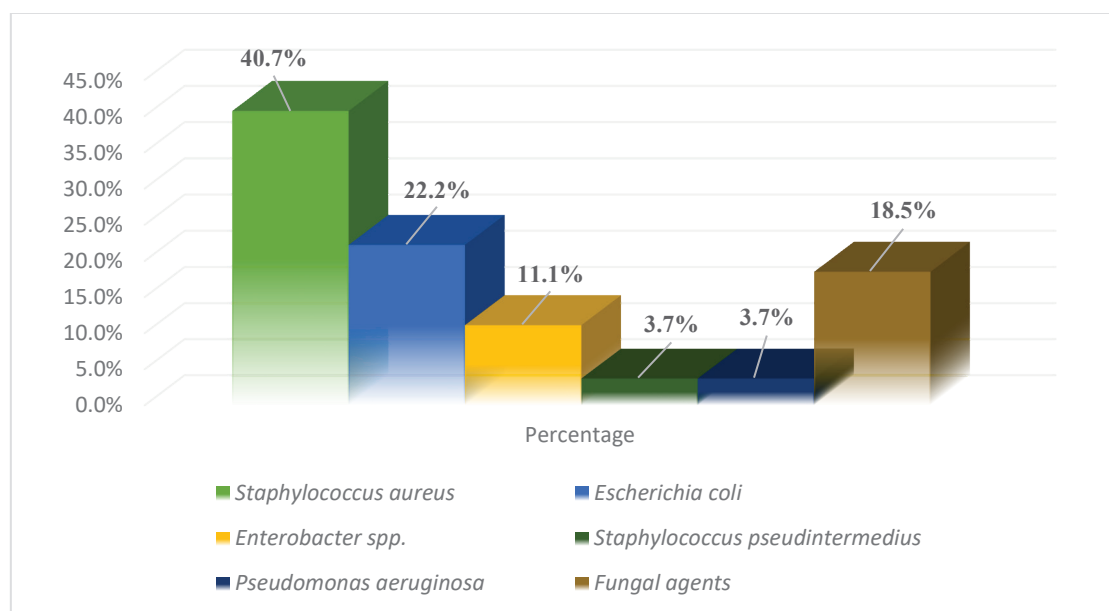
Figure 1. Main causative agent of mastitis in small ruminant farms of Korça district

The most important agents identified in our study were *Staphylococcus aureus, Escherichia coli* and fungal agents. Failure to treat subclinical mastitis may result in chronic inflammation that may respond to antibiotic treatment. Prevention of mastitis must include clean and comfortable conditions for the livestock, good hygiene, and implementing proper milking and sanitation practices (6) (1). By monitoring the current situation in the farms it is possible to minimize the infection and to find the best antibiotic treatment in order to prevent not only the chronical cases but also to prevent the antimicrobial resistance of the bacterial or fungal agents. Therefore, it is important for small ruminant producers to take steps to identify, treat, control, and prevent mastitis in their animals to maintain animal health and farm profitability.

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SENSORY ANALYSIS OF WHITE, MILK AND DARK CHOCOLATE

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Sensory properties of chocolate are considered to be among the most important parameters when defining general chocolate quality. In this research white chocolate, caramel chocolate with bubbles, milk chocolate, milk chocolate with hazelnuts and dark chocolate were tested. Respondents participated were in range from 10 to 82 years. Questionnaires distributed to all respondents contained tests for acceptability, softness, color, taste, smell, chewiness, texture, crispness. According to their senses the set target tasks were answered.

The results presented of sensory analysis of five different types of chocolates shown that people of different ages, experience the flavors of chocolate in different ways. Milk chocolate and hazelnut chocolate were liked a lot, white chocolate and bubble caramel chocolate were liked, and dark chocolate were not liked. In terms of texture, white and caramel chocolate were declared as soft and pleasant to chew, and dark chocolate as extremely hard and unpleasant to chew.

Key words: sensory evaluation, chocolates, questionnaire

SAFETY AND QUALITY OF MOST CONSUMED MEAT PRODUCTS IN TIRANA'S MARKET

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Abstract

Consumption requirements for meat are influenced by urbanization as well as by consumer spending habits and willingness in metropolitan areas vs. rural ones. Different methods and options for processing meat and producing diverse byproducts have been discovered to satisfy the expanding demand. Muscle and fat tissue are the main ingredients utilized in the technological process of meat processing. Additional ingredients could be used and therefore be categorized as food supplements or additives. The present study was carried out on 10 different products (cured meat and raw-cooked meat products, most consumed in Tirana's market) in terms of their safety and quality using a variety of criteria (raw materials, ingredients, additives, physical chemical characteristics, etc.). The microbiological and nitrite content analyses, which are the most significant ones, showed that the study's randomly selected samples were safe for consumption. The microbiological load of the analyzed samples was less than 10 cells, as expected given that the products were thermally treated. Additionally, with values in the range of 1-3.25 mg/100 g of product, the nitrite concentration was far lower than the limit allowed by the national food legislation (15–20 mg/100 g).

Key words: safety, quality, meat products, nitrite content, physical-chemical characterization.

Introduction

The meat processing industry has particular importance both from a research point of view, related to the continuous improvement of ingredients and quality, and from a practical point of view, related to the possibility of increasing production within the standards provided [1]. In the past decades, the meat processing industry in general, has continuously increased the range and variety of production through all the country. Especially in recent years, the focus is on new ingredients, by-products with added protein values, as well as additives of plant origin, finding new ways to increase production and diversity, without reducing the quality [2],[3]. The meat processing industry in Albania had its beginnings in 1966, but after the economic and political transformations of the 1990s, this industry, after the temporary interruption of its activity, that later restarted with small medium enterprises (SMEs) that mainly dominated the domestic market. Today there is a wide range of meat products, which according to their processing are classified into boiled (fresh), semi-smoked and only smoked sausages, as well as a number of other semi-cured products, fermented meat products, etc. ,[4]. This growth has certainly been accompanied by significant improvements in the investments made, the expansion of meat by-products production technology, the improvement of technology, the development of marketing in terms of packaging and labeling of products and their trading conditions[5], [6]. The problems dominating in Albanians meat market are related to the lack of knowledge of the legal basis and, in particular, the use of poor quality raw materials or ingredients exceeding the limit allowed by the national food legislation [7].

Material and methods

Ten meat items (Table 1), five were imported and five made in Albania, were used in this study from the Tirana's market. For statistical analysis, for each product three parallels were analyzed.

Table 1: Meat products analyzed (I: imported products, A: Albanian products)

| Nr.	Product	Analysis
1 2 3 4 5 6 7 8 9 10	Prosciutto cotto (I) Salame milanese (I) Speak Campilio (I) Salame picacnte (I) Prisciutto crudo (I) Sousage (A) Sallam Popullor (A) Kremviçe (A) Salame Turist (A) Salame piccante (A)	• Organoleptic characterization and total microbial load • Determination of total proteins and fat content, pH • Determination of humidity and , salt content • Determination on nitrite content

Results and discussions

The aroma, distinctive color, and consistency of all samples analyzed in this study were within the range of typical characteristics and quality indicators according to the organoleptic characterization. Additionally, there was no microbial contamination in the exanimated samples (<10 cells), which is associated to the preservation of the aforementioned characteristics.

Due to the manufacturing procedure and long maturity time, prosciutto crudo has the lowest moisture content (5.26%). Because water is added during the technology process in the form of ice, prosciutto cotto has a higher percentage of moisture (72.17%) than the salam popullor (traditional salame), sausages, kremvice and tourist salami (31.06%- 57.7%) (Figure 1). Because high fat tissue content, salame milano (50.2%) and salame piccante (44.66%) have a reduced moisture content, compared to taditional salame piccante with 54.7% moisture content. All samples analyzed were in accordance with food regulations, which states that water should make up no more than 60% of the mixture, except of prosciutto cotto.

By lowering water activity values (raising the content of components lowers water activity values), salting is one of the earliest ways still used to extend the shelf life of meat and other items. Salt in cooperation with muscle water helps to open the ellipsoidal structures of proteins. Additionally, the red pigment myoglobin ($Fe2+$) remains intact when salted meat with nitrite is heated. The maximum allowed salt content is 3%. NaCl content in the samples analyzed varies from 1.06%- 2.26% (Figure 1).

Acoording to food legislation fat tissue content in meat products should vary between 15%-30% except prosciutto crudo or speak were it can go up to 35%. All the samples analyzed are in accordance with food legislation and their fat tissue content varies from 21%-33.2%. Due to their technological processes, prosciutto crudo, cotto, and sreak have the highest fat content, respectively 27.05%, 32% and 33.2% (Figure 1).

Figure 1: Bar chart displaying moisture content, salt content and fat tissue content of 10 meat products.
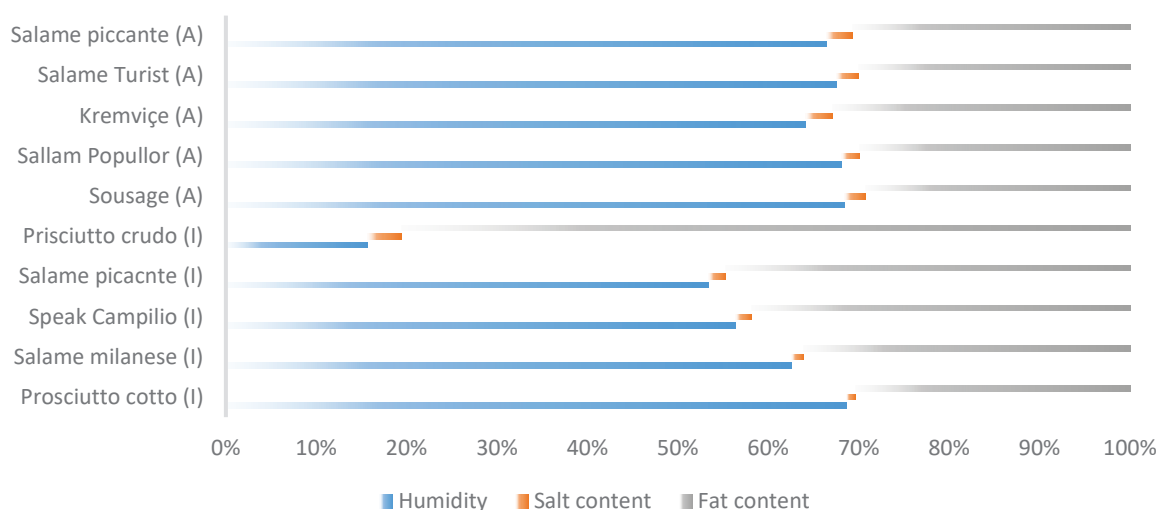
The range of the pH scale measured in our sample were 5.2 to 6.3. An optimal pH level for various types of meat products is close to 6, a value that indicates that products have undergone proper processing and storage and are no microbial contamination (Figure 2).

By interacting with the meat's natural red pigment, the additional nitrites can create a heat resistant red pigment, the red color characteristic for meat products. In reference to food legislation, nitrites should not be present in meat products greater than 15-20 mg/100g. Our analyzed samples show a nitrite content not higher than 3.91 mg/100gr product. We can observe from the bar chart (Figure 2) that the sallam popullor (traditional product) contains the most nitrites overall. In this product, only 20% muscle is used, thus the natural red pigment content is minimal. In this case itrite is added to preserve the product's vibrant red color.
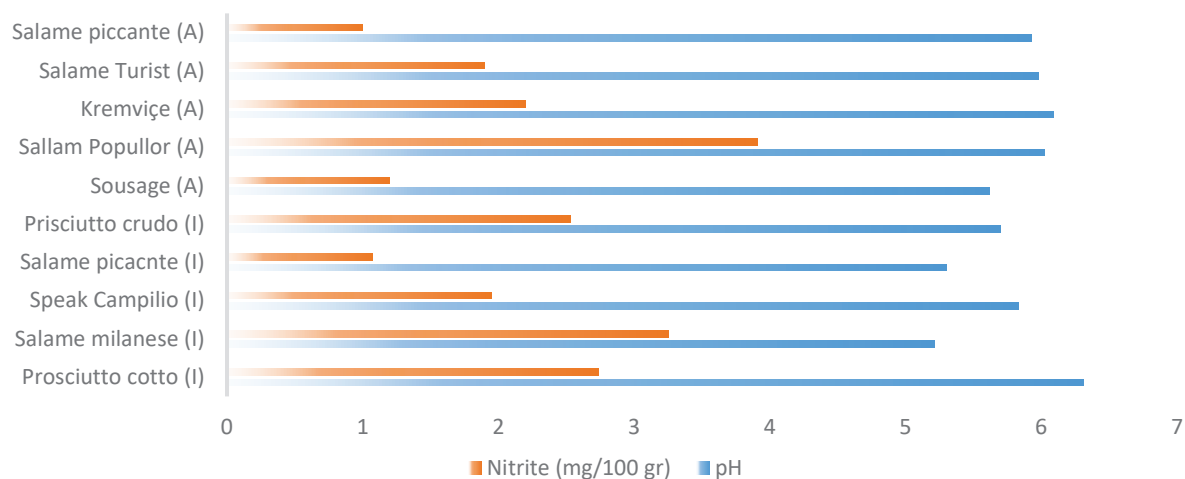
Figure 2: Bar chart displaying pH values and nitrite content of 10 meat products

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ASSESSMENT OF MILK QUALITY THROUGH THE DETERMINATION OF PHYSICOCHEMICAL AND MICROBIOLOGICAL PARAMETERS

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Abstract. Milk, a complex liquid, serves as a vital source of essential nutrients crucial for children's growth and development. Ensuring the quality of milk, from production to processing, is of paramount significance due to its extensive consumption and its incorporation into a diverse array of products. This research delves into the comprehensive examination of raw cow's milk from a food science perspective, encompassing chemical, physical, and microbiological aspects, along with the associated technological considerations. The study encompassed the analysis of ten milk samples, all sourced from the Pristina region. Eight of these samples were directly obtained from local farmers, while the remaining two were procured from various marketplaces. Employing advanced analytical techniques and adhering to relevant ISO standards, the investigation was conducted using state-of-the-art Bactoscan and Milkoscan devices. The primary objective of this paper is to assess the quality of raw cow's milk by evaluating fundamental physicochemical and microbiological parameters. These parameters include Colony-Forming Units (CFU), Isoelectric pH (IBC), fat content, protein content, solids-not-fat (SNF), total solids (TS), lactose content, freezing point, acidity, among others. The results of this study are instrumental in not only guaranteeing the nutritional value of milk but also in supporting the broader applications of milk in various products, thereby contributing to the overall quality and safety of the dairy industry.

Keywords: Milk quality, Physicochemical parameters, Microbiological parameters, Raw cow's milk, Quality assessment

OCCURRENCE OF HISTAMINE IN FISH IN TIRANA MARKET

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Abstract.

Scombroid syndrome is an acute poisoning caused by the consumption of fish products containing high levels of histamine and is considered among the most common foodborne illnesses. Histamine fish poisoning is quite common and occur in consequence of microbial decarboxylase whose activity begin early in the post-mortem but are triggered in consequence of abuse in the shelf life of fish products. The aim of this study was to determine the level of histamine in fifty fish samples. Respectively, 25 samples of sardines (*Clupeidae*) and 25 mackerel (*Engraulidae*) destined for human consumption in the market of Tirana. were randomly sampled in the period May-June 2023. Histamine concentration was assessed using the HistaStrip™ test, which is a convenient technology used for the rapid visual detection of histamine in fishery products. according to the international quality standard ISO 9001, with a detection limit of 15-25 ppm. The results of analytical testing proved that no sample was in the values of 25 ppm, 27 samples were in the values of 25-50 ppm, 22 samples in the values of 50-70 ppm and only 1 sardine sample in the values of +100 ppm. The results show that only one product out of 50 had histamine values above the limit of eligibility (M).

Key Words. histamine, histidine decarboxylase, fish poisoning, shelf life.

Introduction.

Amines are low molecular weight organic nitrogenous compounds, involved in important physiological processes. They can be classified into natural (produced by the body itself) and biogenic (microbial). In food they are found mainly due to decarboxylation of amino acids by microbial contaminants. Food with an high content of biogenic amines may be toxic and its ingestion involves a risk to human health [5], [13].

Sources of danger for the formation of histamine in foods depends on three fundamental factors: the free histidine content, the presence of bacteria capable of synthesizing histidine decarboxylase, the conditions to allow the growth of bacteria and active enzymes (temperature, pH, carbohydrates, NaCl).

In -Europe the only biogenic amine for which limits for food safety are set is histamine, which plays an important role as a mediator and neurotransmitter in living organisms, but causes food poisoning, called histaminosis, when ingested in high quantities with foods. This foodborne illness, also known as "scombroid food poisoning" [6] because historically associated with the consumption of fish from the *Scombridae* and *Scomberesocidae* families has the highest incidence (48% of the total) among those related to the consumption of fish products.

Cooking, freezing and canning do not destroy histamine after it has formed. Fresh fish products are therefore at risk (even if stored under vacuum or in a protective atmosphere) e frozen belonging to the species indicated above.

The high concentration of this biogenic amine is in fact linked to thermal abuse in the production and storage phases of fish products and also to conservation for prolonged periods, with proliferation of microorganisms capable of converting free histidine into histamine [7]. Another important factor connected to the high level of histamine is the high concentration of free histidine, present in some fish species, mainly belonging to the *Scombridae* and *Scomberesocidae* families, but also *Clupeidae, Engraulidae, Carangidae, Coryfenidae, Pomatomidae*, which can be exploited by histidine decarboxylase bacteria for the production of histamine [15], [9], [4]. These bacteria are present in the skin, gills, intestine and muscle tissue and are normally considered part of the fish microflora. It is therefore essential to control the entire fish supply chain, in particular for those products most at risk of high histamine concentrations.

For this purpose, the European Union has set limits on the histamine content in fish products (EC Reg. 2073/05), equal to 100 mg of histamine per 1 kg of fish product obtained from fish species associated with a high content of histidine and 200 mg of histamine on 1 kg of fishery products that have undergone an enzymatic maturation treatment in brine, obtained from fish species associated with a high histidine content. The strict legislative provisions regarding the histamine content in these foods have meant that in recent years numerous analytical techniques have been developed for the determination of this biogenic amine, such as gas chromatography (GC) and thin layer chromatography (TLC) methods, high performance thin layer chromatography (HPTLC), colorimetric analysis, enzymatic analysis, enzyme immunoassay, flow injection analysis (FIA) and capillary electrophoresis (CE), which are among the tests indicated in the FDA guidelines [1] and fluorimetric analysis and high performance liquid chromatography (HPLC), which are the official control methods in the EU [3], [10], [12], [9], [14]. However, most of the methods currently present require high-cost equipment and reagents, as well as specific staff training.

Based on the fact that all operators in the food sector of fishery products (fishermen, wholesalers, transporters, retailers and processors) have the obligation to protect fish products from microbial contamination and to strictly respect the optimal storage temperatures for the products of fishing, the purpose of this study was to determine the possible presence of histamine in samples of sardines and mackerel intended for human consumption in the Tirana market, using The HistaStrip™ test kit , based on a colorimetric enzyme analysis to quickly detect histamine

Material and Methods.

To carry out the study, 25 samples of sardines (*Clupeidae)* and 25 mackerel (*Engraulidae*) were taken at the fish market in the Tirana city, randomly in the period May-June 2023. The samples were immediately placed in cooling conditions and transported in the Animal Products Control Laboratory - FMV. where their testing was also performed.

The HistaStrip™ test kit used in this study is a suitable technology for the rapid visual detection of histamine in fishery products. This kit is manufactured according to the international quality standard ISO 9001. The method is based on a colorimetric enzyme analysis to quickly detect histamine, it is a fast and highly reproducible procedure, convenient that takes a few minutes. It is preceded by a simple aqueous extraction and the limit of detection for seafood is 15-25 ppm [2].

The HistaStrip™ test strips contain a pad embedded with enzyme that reacts specifically with histamine to chemically reduce a dye indicator, producing a color change for easy visual interpretation of results. When the strips are dipped in to samples containing histamine, the pad rapidly changes from white to a color designating the histamine concentration present in the food or drink. Detection capabilities using the strips are well below global Maximum Residue Limits (MRL).The self-contained, visual test enables easy testing in and out of the laboratory [2].
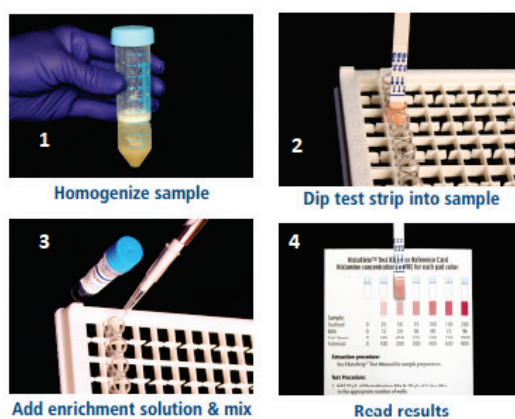

Figure 1. Testing scheme through Histastrip ᵀᴹ Kit

The color change of the strip is then visually compared to a reference color card to determine the amount of histamine present in a sample. The HistaStrip™ can also provide full quantitative results using the QuickSTAR™ Strip Reader, enabling us to determine the exact levels of histamine in the sample and easily save the data to a computer and quality assurance system.

Results and Discussion.

After evaluating the colorimetric changes in the C and T lines of the test strip, and evaluating them for the degree of positivity / negativity, with the Table of references, our results proved the presence of histamine at a value of +100 ppm, only in one sardine sample.

The results of analytical testing proved that no sample was in the values of 25 ppm, 27 samples were in the values of 25-50 ppm, 22 samples in the values of 50-70 ppm and only 1 sardine sample in the values of +100 ppm.

The HistaStrip test kit used, as described by the manufacturer, and also evaluated in other studies [8], proved to be a very comfortable, fast test and with a simple protocol designed with minimal required equipment, number of solvents organic and without complicated steps of heating and pre-processing the samples for testing. Our results were semi-quantitative.

Due to the fact that the production of histamine in fish can be the result of the development of bacterial strains common to the intestinal flora, but bacterial contamination can also occur after fishing, maximum care must be taken at all stages of food production and of course also in the stages of storage, distribution and administration. The application of GMP (Good Manufacturing Practice) after catching fish is widely recommended in many studies [3], as it can significantly prevent the formation of histamine, especially if it aims to maintain the cold chain. After cooling, the fish must be kept strictly at a temperature close to the freezing point or better frozen until consumption. This requires necessarily equipping fish shops with refrigerators and cold counters, a fact which showed that in some retail in Tirana, this requirement is not met.

Even the thawing of fish, even if it is frozen and optimally preserved, is considered a dangerous stage, if it is carried out at room temperature in kitchens, usually high enough. The implementation of traceability even for fishing products should be

carried out based on standard operating procedures with the provision of data from every link of the chain starting from the catch of fish to the points of sale, thus giving security to the consumer.

Therefore, the control authorities should pay more attention to the control for the prevention of bacterial contamination and the control of the quality of fish during all phases of fishing, storage, transport, handling, distribution and administration.

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EVALUATION OF ADDITIVE CONTENTS IN SOME ALBANIAN WINES

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Abstract

The use of additives in the oenological industry is a very widespread practice. It improves taste, aroma, clarity, color and consistency of wine. The presence of additives in wine is evaluated with simple laboratory and instrumental methods that verify the level of use and their type. The purpose of this study is to determine the substances and additive quantities that have been used in some Albanian wines and their comparison according to EU directives: 94/35/EC; 94/36/EC; 95/2/EC and the General Standard for Food additives (GFSA). Wine samples were taken from 3 medium production and artisanal wineries in protected agricultural areas. In each winery, 3 samples of the same variety were taken at the same aging stage. The samples were analyzed by standard spectrophotometric/UV-VIS and physico-chemical methods. The results showed a low level of volatile acidity in 0.5g./l acetic acid, total sulfur dioxide (SO_2) was almost 2 times higher than the standard, free SO_2 2.5 times higher. The dry extract in the three wine samples averaged the corresponding values of 24.92g/l, 28.20g/l and 31.58 g/l. Although samples are from the same variety, same year and aging conditions, showed alterations, which indicate the addition of thickeners or hydrocolloids added to create viscosity, or body in wine. This can be harmful to human health. Furthermore the low value of anthocyanin and the high value of total polyphenols indicate addition of coloring matter.

Keywords: additives, winemaking, oenological, artisanal production.

Introduction.

The use of additives in the oenological industry is a very widespread practice, they improve the taste, aroma, clarity, color and consistency of the wine. Wine itself has natural preservatives such as alcohol, tannins, organic acids, etc., but others are also needed and it is the International Organization of Vine and Wine (OIV)[1] that defines their use for stabilizing and preserving cider and wine, as well as additives for storage and stabilization: sulfur dioxide, dimethyl dicarbonate, potassium metabisulfite, potassium sorbate, tartaric acid, acetaldehyde, aluminum silicates, distilled alcohol, calcium carbonate, citric acid, copper sulfate, sulfuric acid formed, etc. Allowed sulfur additives for wine are sulfur dioxide (E220), potassium bisulfite (E228) and potassium metabisulfite (E224) [2]. SO_2 is produced in small amounts (between 12 and 64 mg/l) by yeast during fermentation [3], depending on the wine environment and is higher in very clear musts [4]. About 2% exists as free dissolved gas in summer, with most of it occurring as bisulfite ions [5]. Sulfur dioxide is an antimicrobial in acidic environments, with broad-spectrum antimicrobial activity: about 1.5 mg/l concentration of molecular sulfur dioxide is sufficient to inhibit most spoilage yeasts and bacteria [6]. Inhibits lactic acid bacteria and inhibits the growth of non-Saccharomyces yeasts,[4]. Acetaldehyde binds faster to SO_2, potassium or sodium metabisulphite give about 57% and 67% respectively of free SO_2 when dissolved, so 1 kg of metabisulphite will produce about 570 g of sulfur dioxide [2]. Sorbic acid is a short chain fatty acid used as a preservative has little effect on lactic or acetic bacteria and is relatively ineffective against Zygosaccharomyces bailli [7]. It enhances the antimicrobial effects of sulfur dioxide, but has a low threshold value (135 mg/l), and some tasters perceive it at 50 mg/l, so it should be used with caution. At pH 3.1, 150 mg/l is adequate for antimicrobial action, while at pH 3.5, the effective dose is more than 200 mg/l [8]. It has no antioxidant action. Dimethyl dicarbonate, a preservative mainly used in non-alcoholic wines, has an inhibitory effect, added to red wine (12% a.a.; pH ~ 3.50) inoculated with cultured yeasts and bacterial populations at the maximum legally permitted dose: 200 mg /l, showed to be an efficient preservative against low yeast contamination [9]. The combination of potassium metabisulfite (1 mg/l SO_2) with DMDC (100 mg/l) acted on yeasts at 106 cfu/ml but did not completely eliminate S. cerevisiae [9], is highly corrosive, insoluble in water [7]. DMDC can be used to partially replace and help reduce SO_2 doses [10], with the advantage that it does not generate off-flavors or flavors in wine [11], even at the maximum dose, of 200 mg/L, authorized by the OIV [12]. It acts quickly after dosing, has a short duration of action, unlike SO_2, which acts progressively and the action is sustained [13]. Ascorbic acid (Vitamin C) is an antioxidant, it works by rapidly removing molecular oxygen from juice or wine, the reaction between ascorbic acid and oxygen occurs almost 1700 times faster than between sulfur dioxide (SO_2) and O_2 [14]. It is found in grapes in amounts up to 50 mg/l and oxidizes rapidly during grape picking and pressing, but can be added to cider or wine by the winemaker, maximum legal addition is 150 mg/l [8]. It serves to help preserve delicate aromas and prevent spoilage, has no antimicrobial action, can reduce oxidized phenols "quinones" to phenols, but the byproducts of this reaction are dehydroascorbic acid and H_2O_2, the latter being an oxidizing agent strongly [6]. It has the ability to catalyze the oxidation of SO_2 and should only be used where wines already have low SO_2 levels (less than 100 mg/l). It should not be used as an alternative to SO_2. [15]. It is usually recommended that ascorbic acid be used only in conjunction with free SO_2, which with H_2O_2 forms H_2SO_4 (sulfuric acid) [15]. As noted, the use of additives is inevitable in wine production, but the selected type must always conform to the standard and EU directive and the General Standard for Food additives (GFSA). This study provides information on the determination of the content of additives used in the wine of some Albanian wineries, even with simple methods, to help producers choose the right type and dose of the additive and consumers to choose the right wine.

Material (or Subjects) and Methods: The purpose of this study is to determine the substances and additive quantities that have been used in some Albanian wines and their comparison according to EU directives: 94/35/EC; 94/36/EC; 95/2/EC and the GFSA. Wine samples were taken from 3 medium production and artisanal wineries in protected

agricultural areas. In each winery, 3 samples of the same variety were taken at the same aging stage. The samples were analyzed by physico-chemical methods: OIV-MA-F1-05 Total acidity, OIV-MA-AS313-02 Volatile acidity, OIV-MA-AS323-04A1 Free sulphur dioxide, OIV-MA-AS323-04A2 Total sulphur dioxide, OIV-MA-AS2-03A Total dry matter, OIV-MA-AS312-01 Alcoholic strength by volume and standard spectrophotometric/UV-VIS for Polyphenols, color index and intensity.

Results and Discussion: The samples were taken representatively, immediately after they were opened, they were subjected to the determination of: Alcohol percentage, Total acidity, total and free SO2, Extract, Polyphenols, color index and intensity.

Table 1. Evaluation of the physico-chemical indicators of the analyzed samples

	Total acidity (g/l)	Volatile acidity (g./l)	Total SO_2 (mg/L)	Free SO_2 (mg/L)	Dry extract (gr/l)	Alcohol percentage (%vol a.a)
M 1	4.95 ±0.7	0.5±0.3	268.8±0.5	67.2±0.2	24.92 ±0.01	13.2 ±0.5
M 2	4.35±0.5	0.5±0.3	337.9±0.4	67.2±0.3	28.20±0.02	13.7 ±0.4
M 3	5.47 ±0.6	0.5±0.3	334.0±0.5	67.2±0.3	31.58±0.01	12.7 ±0.5

It is observed that the amount of volatile acidity is 0.5 g./l acetic acid, while the rate is 1.2 g/l, this indicates the absence of aerobic oxidation, i.e. a stable product, also the total SO2 content is high in all samples according to the standard should not be higher than 198.2 mg/l, Samples M2 and M3 have values almost 2 times higher than the standard, while free SO_2 all present at the same level, which is clearly 2.5 times higher than standard 25 mg/L this indicates excessive and uncontrolled use of SO_2, from this we can say that the tendency to increase the dosages of additives in wine such as tartaric acid and SO_2 to improve the stability of the product over time is not justified as these substances outside the norms are harmful to human health because they increase toxicity. The dry extract in the three wine samples averaged the corresponding values of 24.92g/l, 28.20g/l and 31.58 g/l. Although samples are from the same variety, same year and aging conditions, showed alterations, which indicate the addition of thickeners or hydrocolloids added to create viscosity, or body in wine. This is harmful to human health as some of these substances have been assessed as carcinogenic and indicate fake products, so they should not be marketed. high extract values indicate additional substances in these products because otherwise the extract value would be affected by proteins or salts which would spoil the wine during storage.

Table 2. Evaluation of the color indicators of the analyzed samples

	Polyphenol index	Color intensity	The tonality of the color	Color index
M 1	9.8±1.7	2.592±0.5	0.965±0.08	1.008±0.01
M 2	11.6±0.7	3.881±0.02	0.833±0.003	1.193±0.004
M 3	8.6±2.4	2.302±0.01	0.78±0.001	1.281±0.002

The index of polyphenols and color is distinguished to be higher in M2 and lower in M3, a small difference margin is observed, but the color tone is obviously higher in M1, which is accompanied by a lower color index. The anthocyanin content values are very low, more than half of the normal values for these grape varieties, so although the color index has turned out to be good, the influence of anthocyanins on it is very small. It is clear that these products have added coloring matter and indicate an unnatural product, with additional substances, but the coloring matter must be determined because it can affect the toxicity of the wine product.

Conclusions: The study showed that the wine samples taken from the same wine with the same aging time and conditions but from different producers turned out to be different. What stands out is the high rate of total and free SO2, which indicates misuse of this additive for the production and storage of wine. Total acidity values are slightly above the norm even though volatile acidity is low. The tendency to increase the dosages of additive substances in wine such as tartaric acid and SO2 to improve the stability of the product over time is not justified since these substances outside the permitted rates are harmful to human health because they increase the acidity in the digestive tract but also in the respiratory system, the brain and can cause serious damage to human health. The content of the extract in the three samples at the same stage of aging showed high differences that lead to the judgment of the use of hydrocolloid substances in the wine product to create viscosities or body in the wine, which is not allowed by the GFSA standard. High extract values indicate additional substances in these products because otherwise the extract value would be affected by proteins or salts which would spoil the wine during storage. It is shown that low values of anthocyanins do not affect the color index, although the index of polyphenols was acceptable. This shows that in these products there are added coloring matter, because the main colorants are anthocyanins in the wines taken in the study. In this perspective, we say that the samples taken in the study have added additives to increase their expressed quality. This study can serve as a practical application to show how to detect substances added to wine products even with simple methods, to protect the consumer's health from dangerous diseases that may come from their consumption and to create reliability in the export of Albanian products.

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CUTANEUS NEOPLASIA IN CATS

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Abstract

Skin is the most common anatomical region for the occurrence of tumors in felines. However, the skin tumors in domestic cats can reach 41 to 56% of the total number of tumors in this species.

The aims of this study were to report the occurrence of feline cutaneous tumors carried out at Faculty of Veterinary Medicine, Agricultural University of Tirana, Albania. We find out characteristics, frequency and kind of the skin tumors, depending of breed, age, and sex in cat.

For masses arising within the skin for which histopathology had been performed, the diagnosis was recorded together with the breed, age, sex and neuter status of the cat. The most affected of breeds are Angora with most affected age is over 10 years old. The female are more predisposing. Neoplastic masses have dimensions from 1 – 5 cm.

Biopsy is appropriate in cases where prior knowledge of tumor histology/ grade would not alter the surgical approach.

Our aim is to create a skin cancer surveillance system and to identify through it epidemiological cases of cutaneus tumors in cat.

Keywords: cutaneous, neoplasia, histopathology, cats

OUR FOOD OF TOMORROW IN THE CONTEXT OF SUSTAINABLE FOOD SYSTEMS AND NUTRITION: DRAWING PARALLELS BETWEEN ALBANIA AND AUSTRIA

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Abstract

Providing enough, safe and affordable food is an important societal goal. Climate change, immigration, the European conflict, and extensive inflation are some of the most pressing contemporary crises directly affecting the food chain's ability to achieve its established goal. This, together with the fact that current animal-based food systems (AFS) are commonly held responsible for about 19-29% of anthropogenic greenhouse gas emissions, raises the question of whether we can produce enough food or whether we will need to adapt our food systems and nutrition in the future. By analysing the current food production systems, supply levels, food waste, and nutritional status, the main aim of this study was to draw parallels between Albania and Austria, focusing on AFS, especially milk and meat from grasslands. As an example, with more than 400k ha in Albania and 1.2 million ha permanent grasslands in Austria both countries have similar advantages in producing milk and meat from grassland. Yet, whereas milk production in Austria has permanently increased, the opposite trend is obvious in Albania in the recent years, leaving much room for optimization. The contribution highlights the importance of changing consumer behaviour, making use of all local food resources, and concludes with a reference to the need for crisis-resistant food systems in both countries.

Key words: food safety, grassland, healthy diet, alternative food.

Introduction

The agricultural production utilises all available national agricultural resources to generate food for a dynamically changing population. Based on the availability of agricultural resources, tradition and other technological opportunities, countries have established and refined their food producing systems, aiming to make use the best of their agricultural resources, and so supplying their population with nutritious, safe and affordable food, both of plant and of animal origin. During the last years, several new criteria have emerged for food production evaluation, mainly driven from the consumer preferences. For example, certain quality labels have emerged for locally, organically and environment-friendly/sustainably produced food. For animal-based food systems (AFS), animal health and welfare issues have received greater importance recently. In terms of food production, Albania and Austria have certain similarities, especially taking into account the relatively small country size (1:3) and population (1:4), limited cropland area (417k vs, 1.3 mil. ha), largest part of country consisting of either forested or permanent mountainous grasslands, as well as a wealth of water resources. Albania uses the major part (53%) of its arable land for the cultivation of forages, which are used for feeding ruminants, mainly 261k cattle (INSTAT, 2022). However, neither meat nor the milk needs of the country are entirely met by its AFS (MoARD, 2021). Albania's plant-based food systems (PFS) are mainly based on the production and processing of cereal grains, legumes (white beans), and vegetables/melons (INSTAT, 2022). In Austria, the PFS is mainly based on production of cereals (57% of the country's cropland) and potatoes, meeting almost entirely its national needs; however, not for vegetables, oilseeds, rice, and fruits (FMAFRWM, 2022). With its 1.9 mil cattle, 2.7 mil pigs, and the poultry production, the Austrian AFS meets or exceeds most of the needs in milk, meat and eggs for its 9.1 mil. national population (FMAFRWM, 2022).

The recent crises (pandemic, war in Europe, inflation, energy, immigration) and especially the climate change rightly raise the question whether our food systems will be able to produce enough food in the future or whether we need to change our eating behaviour, especially since the AFS are estimated to contribute about 19-29% in emissions of anthropogenic greenhouse gas (GHG) emissions (Shabir et al., 2023). On the other hand, the AFS are a guarantor for the supply of the population with healthy and nutrient-rich food. Even in developed countries like Austria, the malnutrition is an overseen problem. In one hand, there is an increase of the adiposity rates and high consumption of the "free sugars". On the other hand, the deficiencies in micronutrients such as calcium, iodine and vitamins are relatively high in the country (ANR, 2017). Other relevant data from national nutrition report also indicate that milk and dairy products are insufficiently consumed, while meat consumption is still too high (ANR, 2017), indicating misbalances in the eating behaviour, too. Per capita milk consumption in 2020 in Albania

was 297.9 kga (FAOSTAT, 2021) and the supply level through domestic milk production was around 95.4% (MoARD, 2021). In Albania, there is no detailed data about the nutrition level of the population, but the meat consumption seems to be relatively high (39,1 kg/capita and year on 2020) (FAOSTAT, 2021), too. According to ANR (2017), an increased intake of milk and dairy products could improve the supply of micronutrients of the population such as calcium, iodine, and a number of other micronutrients.

The sustainability of the AFS can be increased when milk and meat are produced by the use of local permanent grasslands, without the use of external fertilizers, pesticides, fossil energy and while avoiding the competition with arable farming. Also, in the feeding of ruminants, a number of regionally available co-products from food and bioethanol industry can be integrated very well, contributing in the production of more sustainable food of animal origin. Thus, ruminants can play an important role in transforming such biomass into high-quality food in a sustainable way in both countries. Production and consumption of locally grown products has a smaller climatic footprint and has a positive social impact in the rural areas. However, it is important to highlight that the way of operating the livestock production sector, which has significantly improved in the last few decades, has a direct influence on the level and efficiency as well as sustainability and reduction of environmental and climatic footprint of the AFS. Here there are still big differences between Albania and Austria. Also, differences exist in the prioritisation of the use of the cropland as well as in the yield of the main crops between the two countries (Figure 1).
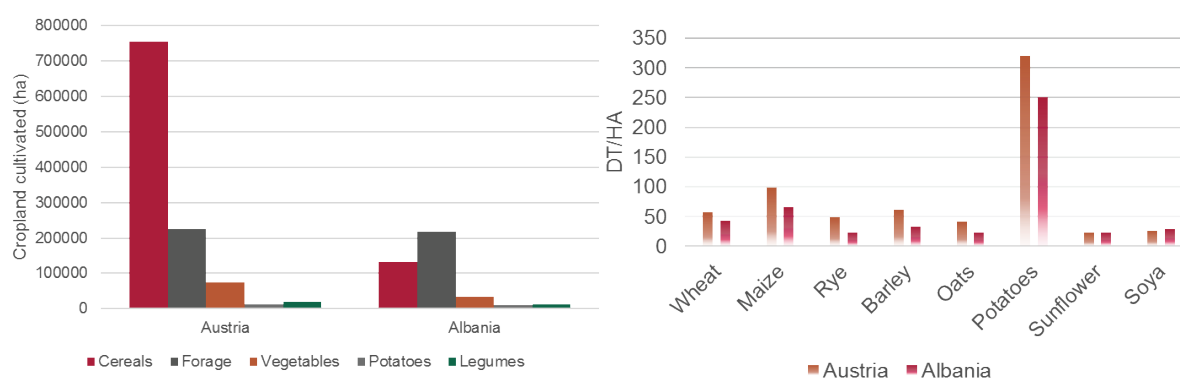

Figure 1. Differences in the use of cropland (left) and the yields (right) of main crops between Austria and Albania on 2022 (Sources: Ministry of Agriculture and Rural Development (MoARD) and Federal Ministry of Agriculture, Forestry, Regions, and Water Management (FMAFRWM)).

This paper aims provide an overview of the current situation of the food production in Austria and Albania. By analysing the current food production systems, supply levels, food waste, and nutritional status, the goal of this article was to draw parallels between Albania and Austria, focusing on AFS, especially milk and meat from grasslands.

Situation of food production in Albania

In Albania, detailed data about the level of food supply are unfortunately rare. However, statistical data released from annual reports of the Ministry of Agriculture and Rural Development (MoARD) indicate that Albania's food production systems are mainly directed to the production of meat and milk from ruminants, taking into account that around 218k ha from a total of 417k ha arable land in the country is used for fresh forage production (MoARD, 2022). Other 133k ha are used for grain production (mainly wheat), whereas other important food crops cultivated in Albania are vegetables and melons (34k ha) and white beans (13k ha).

Besides more than 50% of the arable land being used for fresh forage production (mainly used to feed 261k cattle), Albania possesses around 286k ha summer and 135k ha winter permanent grasslands, which are commonly used for pasturing over 2 mil sheep and goats. Yet, their numbers of sheep and goats have continuously decreased from 2018 to 2022 and level of production is rather low (63 kg for sheep and 129 kg for goats; Figure 2), leading to a decreased level of milk. The same is true for the number of cattle and dairy cows, which has also decreased, leading to a drastic decrease of meat production (from 1,1 mil tonnes live weight in 2018 to around 400k tonnes in 2022) and milk production (from around 900k tonnes in 2018 to 800k tonnes raw milk in 2022). This has obviously led to concomitant increase of the imports for both meat and milk into Albania (MoARD, 2021; FAOSTAT, 2021).

The decrease of milk and meat production in Albania is also because of the low productivity, lack of technologies in feed processing, feeding, breeding, housing, and other important husbandry practices, and obviously the lack of trained manpower, as well as the low level of technical support and crediting of this sector. The low production yields lead not only to an insufficient supply of the population with food, low efficiency of production, this increases also the amount of environmental

and climate footprint per unit of animal food produced or consumed. In addition, because of increasing imports, this will also lead to a greater dependency, less crisis-resistant food production systems and greater environmental and climate footprints of the food production. Furthermore, there is a lack of reliable data about the level of food waste in Albania. This lack of knowledge suggests that there is a need for a better analysis and reporting of the level of nutrient supply of the population, the level of nutrients produced in the country and the waste of food resources. This information will help in developing strategies for optimisation of the supply or reduction of the wastes.

Figure 2. Differences in the number of livestock animals (left, top), yield for animal (left, bottom) and the total amount of milk produced (right) in 2022 between Austria and Albania. (Sources: Ministry of Agriculture and Rural Development (MoARD) and Federal Ministry of Agriculture, Forestry, Regions, and Water Management (FMAFRWM)).

Situation of food production in Austria

The Austrian food systems are mainly based on the production and ensuring a high level of supply for main animal-derived foods such as meat, milk, eggs, as well as cereals and potatoes (exceeding 100% of the population needs). Among meat, pork is the mainly meat consumed in Austria (around 30 kg per capita and year). Because of rather unsuitable production conditions, Austria cannot produce enough fish, several vegetables and fruits as well as rice (FMAFRWM, 2022), which are largely imported. In Austria, the number of animals has also been constantly decreased, and in 2022 there were approximately 540k dairy cows, 400k sheep and 90k goats (Figure 2), producing more than 4 million tonnes of raw milk annually (20% or organic quality), yet with an annual increase of around 2.5%. An optimized feed technology, feeding, pasture managements, and improved husbandry technologies have played a major role in the improvement of the level of production in Austria. Feedstuffs used for cattle feeding are mainly produced locally with around 50% of the dry matter in the ration coming from grass products (grass silage, hay, fresh grass), and around 20% from corn silage. Permanent grassland in Austria has constantly been reduced is now around 1.2 mil ha, being used for production of preserved forages and pasturing. Indeed, Austrian cattle production makes use of this permanent grassland, taking into account that only approximately 200k ha of the cropland is used for the production of forages, a surface which is similar to the crop land used in Albania for forage production (Figure 1). Thanks to an increasing level of production, the production efficiency has increased too, leading to a decreased GHG per unit of food produced.

Immediate challenges to be solved

Food waste is unfortunately still far too high in many countries. Although for Albania no data exist, for Austria for example around 1 million tons of food is annually discarded (Obersteiner and Luck, 2020). In terms of enhancing the sustainability of food production, there is an urgent need for developing a clear strategy to decrease the food waste involving all actors of the food chain, consumers, and the relevant policy makers and researchers. Conversely, climate change with its associated weather extremes such as prolonged droughts, heat and floods as well as rising atmospheric CO_2 concentrations directly affect the production of feed or food. Not only can drought and heat reduce yields, but rising temperatures can increase susceptibility to disease and exposure of plants to hazards, such as fungal toxins (Penagos-Tabares, 2019). Research results from plant food production (Mayer et al., 2022; Zhu et al., 2018) already suggest, although not always beyond doubt, that nutrient

concentrations in plants may be reduced, while yields should tend to increase, challenging the food production and nutrition of the population directly. Taking into account that this concern is expected to grow in the coming years, there is a need for an immediate food systems-wide research to deal with this risk in an efficient way.

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