



the **20th** INTERNATIONAL CONFERENCE
**LIFE SCIENCES FOR
SUSTAINABLE DEVELOPMENT**

23rd - 24th September 2021, Cluj-Napoca, Romania

BOOK OF ABSTRACTS

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IMPRESSUM

University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca

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Ministry of Education

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Organize

THE 20th INTERNATIONAL CONFERENCE

”LIFE SCIENCES FOR SUSTAINABLE DEVELOPMENT”

23rd – 24th of September 2021

Cluj-Napoca, Romania

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WELCOME MESSAGE

We are pleased to welcome you to the 20th International Conference "Life Sciences for Sustainable Development", Romania to share our scientific performance and progress during this special scientific event.

The University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, classified in the first category of "advanced research" universities of Romania, place also confirmed by the European University Association (EUA). The University becomes nowadays one of the most prestigious academic institutions from Romania.

The 20th International Conference "Life Sciences for Sustainable Development" is a dynamic forum of exchanges for scientific experiences, innovative ideas and concepts, future prospects in agriculture, plant and animal science, food science and technology, biotechnology, veterinary medicine, as well in other interdisciplinary and transdisciplinary areas.

The th International Conference "Life Sciences for Sustainable Development" includes invited conferences, presented by known international and national personalities, oral and poster presentations, where recent advanced scientific and technical results can be seen, especially now, in the context of the new European Research Program "Horizon 2020" and of the national Research – Technological Development and Innovation Program, related to Life Sciences.

The conference programme will consist of ten main sessions:

1. Agriculture
2. Environmental Protection
3. Food Science and Technology
4. Horticulture and Forestry
5. Economics and Rural Development
6. Animal Science
7. Biotechnology
8. Veterinary Medicine - Fundamental and preclinical sciences
9. Veterinary Medicine - Clinical sciences
10. Geodesy, Geomatics and Property Valuation

The participants registered to our conference have the opportunity not only to present their results, published as summary in the "Book of Abstracts" but also to publish in extenso their contributions. The oral presentations, after a previous peer review process, can be published in the journal Bulletin of UASVM-CN – Agriculture, Horticulture, Animal Science-Biotechnology, Veterinary Medicine and Food Science and Technology.

"Book of Abstracts" contain abstracts submitted by participants from different countries. We wish to thank all participants and organizers for making this virtual meeting possible.

With best wishes,

Prof. Cornel CĂTOI, PhD
Rector

Prof. Dan C. VODNAR, PhD
Vice-rector for Research

ANNOTATION

**The abstracts and contact information are submitted by the main authors.
Each author explicitly confirms that the abstract meets the ethical standards for authors
and coauthors.**

CONFERENCE PROGRAMME

Thursday, 23 rd September 2021		
08:30 -09:00	Registration of participants	Aula Magna “Mihai Șerban”, UASMV Cluj-Napoca
09:00-09:10	Opening ceremony - https://meet.google.com/pmu-dfee-fjo Rector, Cornel CĂTOI Vice-Rector, Dan C. VODNAR	Aula Magna “Mihai Șerban”, UASMV Cluj-Napoca
09:10-11:40	Plenary Session - https://meet.google.com/pmu-dfee-fjo Chairpersons : Sanda ANDREI, Mirela CORDEA, Sonia SOCACI, Cristian COROIAN, Mignon SANDOR	Aula Magna “Mihai Șerban”, UASMV Cluj-Napoca
09:10-09:40	SOIL BIODIVERSITY DRIVE SUSTAINABILITY IN SOIL SYSTEMS	Martin POTTHOFF, Germany
09:40-10:10	MULTIPARENTAL POPULATIONS FOR PLANT BREEDING: DEVELOPMENT OF THE FIRST MAGIC POPULATION OF EGGPLANT AND GWAS FOR ANTHOCYANIN PIGMENTATION	Jaime PROHENS, Spain
10:10-10:40	ZOONOTIC BARTONELLA INFECTIONS IN DOMESTIC AND WILD CARNIVORES FROM EUROPE AND ASIA	Grazia GRECO, Italy
10:40-11:10	FUNCTIONAL FOOD COMPOUNDS – ONLY IN RAW PLANT MATERIAL? REACTIVITY AND STABILITY OF BIOACTIVE METABOLITES ALONG THE WHOLE VALUE ADDED CHAIN	Sascha ROHN, Germany
11:10-11:40	PAVING THE WAY TO MARKER-ASSISTED SELECTION IN APICULTURE	Dirk De GRAAF, Belgium
11:40 –12:00	Break	
12:00-13:30	Doctor Honoris Causa Award Ceremony https://meet.google.com/pmu-dfee-fjo Prof.dr. Gilles Dupré Prof. Dr. Dirk C. de Graaf	Aula Magna “Mihai Șerban”, UASMV Cluj-Napoca
13:30 –14:30	Lunch – Biodiversity Research Center	
15:00-19:00	Oral Sessions (sessions I-X) - For more details, please see the program	
Friday, 24 th September 2021		
09:00-13:00	Poster Presentation and Evaluation Oral Sessions (sessions I-X) For more details, please see the program	
13:00-13:30	Break	
13:30 –13:40	Closing ceremony and Best Poster Awards- https://meet.google.com/pmu-dfee-fjo	Aula Magna “Mihai Șerban”, UASMV Cluj-Napoca
13:40 –14:30	Lunch – Biodiversity Research Center	

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ORAL PRESENTATIONS

SESSION 1: AGRICULTURE

SOIL BIODIVERSITY DRIVE SUSTAINABILITY IN SOIL SYSTEMS

Martin POTTHOFF*

*Centre of Biodiversity and Sustainable Land Use,
University Georg-August Göttingen, Germany*

*Corresponding author, e-mail: Martin.Potthoff@zentr.uni-goettingen.de

Introduction: Soil biodiversity is deteriorating due to an on-going intensification of agriculture, climate change and food production supporting measures of the European Common Agricultural Policy (CAP). Ecosystem services (ES) from soil are mostly driven by soil biota and contribute to food security, climate change mitigation, water retention and plant biomass. Healthy soils also help to prevent erosion, desertification, and landslides and to stabilize crop yields. However, soil biota related processes, functions and services are often overseen apart from an ecological perspective.

Aims: This talk will discuss how to value soil biodiversity not only in an ecological sense.

Materials and Methods: The discussion is based on activities and results of the European Biodiversa-SoilMan-project.

Results: The provision of ES by soil biota is a result of their impact on soil processes in interaction with soil conditions and soil management practices of the farmers like tillage or crop rotations, and the frequency and intensity of management actions. Soil fauna are particularly keys in regulating soil processes, as all soil ecologists know. Mostly, on-farm decisions, farming system evaluations and agricultural policy (eg. CAP) do not account for soil biota related services. For example: with respect to biocontrol of soil-borne pests, the earthworm species *Lumbricus terrestris* is known to play an important role in repressing toxigenic phytopathogens, like *Fusarium culmorum* and its mycotoxin deoxynivalenol (DON). We use such relationships to conceptualize and highlight how farmers' management practices influence soil ecosystem services in the context of sustainable farming.

Conclusion: A deeper understanding and a wider transformation of soil biological impacts is needed in the development of sustainable farming systems.

Keywords: ecosystem services, management practices, soil functions, ecosystem engineers.

MODELLING THE GREENHOUSE GAS IMPLICATIONS OF CONVERTING FOOD PRODUCTION IN ENGLAND AND WALES TO ORGANIC METHODS

Laurence SMITH¹

¹*University of Reading, School of Agriculture, Policy and Development*

*Corresponding author, e-mail: l.g.smith@reading.ac.uk

Introduction: Although organic farming can provide numerous benefits from a sustainability perspective, the greenhouse gas impacts of a widespread conversion are still uncertain.

Aims: The study aim of present study was to assess the effects of conversion to organic agriculture on greenhouse gas emission.

Materials and Methods: An assessment of a 100% shift to organic management within England and Wales was therefore applied, using linear programming and Life Cycle Assessment. The study built on earlier work by including estimates of the emissions associated with additional land requirements, and the offset that could be achieved through soil carbon sequestration in organic systems.

Results: The results from the modelling revealed major reductions in productivity under an organic scenario, in particular for wheat, barley, oilseed rape, pork, eggs and poultry meat whereas the production of potatoes, oats, minor cereals and ruminant meat increased. Results from the environmental assessment revealed reduced greenhouse gas emissions under organic management, despite increased emissions per tonne for some products such as carrots, potatoes, poultry meat and eggs.

Conclusion: When land use change impacts were included, the greenhouse gas savings that could be achieved through the widespread adoption of organic practices were offset, leading to worse performance overall. Enhanced soil carbon sequestration could offset only a small part of the overseas emissions under the 100% organic scenario.

Keywords: greenhouse gases, LCA, organic farming

IDENTIFICATION OF SOME RESISTANT RB GENES TO *PHYTOPHTHORA INFESTANS*

**Ioana Virginia BERINDEAN¹, Maria ȘTEFAN^{2*}, Bogdan BARTA¹, Ionuț RACZ¹,
Andreea Daniela ONA¹, and Leon MUNTEAN¹**

¹University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.

²National Institute of Research-Development for Potato and Sugar Beet, Brașov, Romania.

*Corresponding author, e-mail: maria.stefan@potato.ro

Introduction: Potato late blight caused by the pathogen *Phytophthora infestans* is the most devastating potato disease in the world (Hijmans et al, 2000). RB gene (*Rpi-blb1*) derived from the species *S. bulbocastanum* (Van der Vossen et al, 2003), is native from Mexico, the center of diversity for *P. infestans*. It is considered that gene may have different molecular mechanism for fighting with late blight than R genes from *S. demissum* (Erika Balasz et al. 2011).

Aims: Taking into account the much research in the molecular field which is based on identification of genes involved in late blight resistance, we aiming identification of the *Rpi-blb1* gene in the potato late blight using specific primers.

Materials and Methods: We tested different potato genotypes, from NIRDPSB, Brașov, which contained variety, hybrids and genotypes, by using 3 primers of RB genes for homologues from *S. bulbocastanum*.

Results: Only two primers: 517/1519 F/R and 1521/518 F/R were able to amplify sequences specific to the RB gene, because these primers were designed based on the *Rpi-blb1* homologous sequences.

Conclusion: We demonstrated that all these fragments amplified can be considered conserved sequences from *S. bulbocastanum* and represent alleles homologous to the RB gene, suggesting their ubiquitous distribution in the genome of the *Solanum* spp.

Keywords: *P. infestans*, *S. bulbocastanum*, RB gene

References

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FROM SOIL RESOURCE CONSERVATION TO SUSTAINABLE AGRICULTURE - AN INTERNATIONAL PHILATELIC PERSPECTIVE

Bogdan-Vasile CIORUȚA^{1,2*} and Mirela COMAN^{2,3}

¹Doctoral School SAI, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Calea Mănăştur 3-5, 400372, Cluj-Napoca (Romania)

²Office of Informatics, North University Center of Baia Mare - Technical University of Cluj-Napoca, Victor Babeş 62A, 430083, Baia Mare (Romania)

³Faculty of Engineering, North University Center of Baia Mare - Technical University of Cluj-Napoca, Victor Babeş 62A, 430083, Baia Mare (Romania)

*Corresponding author, e-mail: bogdan-vasile.cioruta@usamvcluj.ro

Introduction: The concerns about soil protection have existed for a long time, but until 1927, when the first World Congress of Soil Science took place, they did not materialize visibly internationally. Besides, in 2015, the United Nations decided that it must take a stand in this regard, so 2015 was designated the International Year of Soils. This initiative has grown, so that even some of the postal administrations have decided to participate actively, issuing a series of philatelic effects following United Nations policy.

Aims: The present study proposes an analysis of the respective parts, in an attempt to illustrate another perspective on soil protection and sustainable agriculture approach.

Materials and Methods: The indexing, processing, analysis, description, and dissemination of philatelic materials were done through the prism of the postal administration sites, and through the sites with dedicated philatelic content (such as Colnect[®], Delcampe[®], HipStamp[®], PicClick[®], StampWorld[®], etc).

Results: The results obtained as a philographic summum showed that there were special concerns aimed at promoting soil protection and the International Year of Soils. Moreover, these concerns have materialized both as stamps and first-day covers, as maximum postcards and circulations, with thematic philately supporting the humanitarian cause of soil protection, in particular, and sustainable agriculture, in general.

Conclusion: The results of the project are expected to have an important visual impact on people from Europe, specialists in sustainable agriculture, ecologists, and environmentalists.

Keywords: soil protection timeline, International Year of Soils, philately, sustainable agriculture.

HIGHLIGHTING THE STRUCTURES AND PATTERNS OF FUNGAL COLONIZATION IN THE SPECIES *FESTUCA RUBRA*

Larisa CORCOZ¹, Roxana VIDICAN² and Vlad Stoian^{2*}

¹Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine
of Cluj- Napoca, Romania

*Corresponding author, e-mail: roxana.vidican@usamvcluj.ro

Introduction: Grasslands are the most dynamic ecosystems are characterized by a high biodiversity both above-ground and underground. The biggest problem in these ecosystems is oligotrophy. The phenomenon affects the stability and resilience of these ecosystems, increasing the impact of biological processes. The symbiotic relationship between plants and mycorrhizas is a natural option with a great impact on maintaining the high natural value of ecosystems.

Aims: This article aims rating colonization *Festuca rubra*, dominant in a mountain grassland ecosystem. The objectives are: i) identification of the mechanism of mycorrhizal colonization; ii) the presence of structures in the root cortex; iii) colonization pattern and morphotypes.

Materials and Methods: Roots were cleared and stained with ink for the detection of mycorrhizas in roots. All root samples were analysed with optical microscope for the detection of mycorrhizal structures.

Results: Among the dominant species in the grasslands of Romania, the species *Festuca rubra* is an exponent of adaptability to a wide variety of environmental conditions, this species occupies large areas in grassland ecosystems. The results obtained highlight a main mycorrhizal pattern as well as specific subcategories. Both types of arbuscules were identified: *Arum* and *Paris*. The results obtained highlight a main mycorrhizal pattern as well as specific subcategories. Vesicles are structures with a constant lack of consistency, which indicates their fluctuating nature.

Conclusion: The mycorrhizal symbiotic process is a complex biological mechanism, governed by a multitude of factors. The mycorrhizal pattern of *Festuca rubra* as the dominant species in the pratol ecosystem may be the first step towards a more detailed understanding of the fungal strategy as well as the increased importance in the stability of the pratol ecosystem.

Keywords: arbuscules, grassland ecosystem, hyphae, spores, vesicles.

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RENATURATING POLLUTED CITY OF BAIJA MARE

Loredana CRIȘAN¹, Roxana VIDICAN, Anca PLEȘA, Tania MIHĂIESCU,
Adriana MOREA

¹ Faculty of Agriculture, The University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

*Corresponding author, e-mail: anca.plesa@usamvcluj.ro

Introduction: Environmental contamination with toxic metals has become a global problem, affecting crops, soil biomass and fertility, contributing to their bioaccumulation in the food chain (Gratao *et al.*, 2005). Nature-based solutions for sustainable urbanisation rely in large part on natural areas and features in and around cities to perform essential ecosystem services. They provide multiple strategic opportunity areas, which can be categorised under three main interconnected challenges and trends (European Commission, 2015).

Aims: Reducing soil pollution in Baia Mare, renaturalizing the city and improving urban-rural ecological connectivity through phytoremediation techniques.

Materials and Methods: Adopt circular and cascading solutions for the capitalization of wood raw material resources (energy, materials) and the creation of new savings.

Results: Soil work performed at the optimum time favourably influences its structural condition, while repeating and performing at an inappropriate moisture content causes damage to the structure. The soil works create favourable conditions for the accumulation and retention of large amounts of water in the soil in dry regions, and in wetter areas both accumulation and deep drainage, to avoid excess moisture in the arable layer.

Conclusion: Sustainable spatial development through a long-term strategy (2050+) for the economic capitalization of remedied sites below the threshold of less sensitive uses.

Keywords: circular economy, heavy metal, phytoremediation, renaturing

References

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doi:10.2777/479582.

SOIL MICROBIAL FUNCTIONAL DIVERSITY ASSESSMENT IN SOILS WITH DIFFERENT MANAGEMENT PRACTICES

Dumitrița DASCĂLU¹, Roxana VIDICAN¹, Adrian GLIGA¹, Mignon ȘANDOR¹

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania*

*Corresponding author, e-mail: dumitrita.dascalu@usamvcluj.ro

Introduction: Soil management practices have a strong impact on physical, chemical and biological properties of agricultural soils. Minimum tillage is increasingly used by farmers due to different benefits, including positive effects on soil biological activity. Clear evidence of these benefits are still under questions and studies to confirm this hypothesis are required in order to keep agricultural soils healthy and fertile.

Aim: The main objective of our study was to measure soil microbial catabolic activity in agricultural soils under conventional tillage (ploughing) and minimum tillage (unploughing soil with low-till).

Materials and methods: Fifteen points were selected for sampling and soil samples were taken during spring from fields where wheat was grown. MicroResp multi-SIR technique (Campbell et al. 2003) was used to measure the soil microbial catabolic activity. Soil samples were preincubated for 3 days at room temperature and 15% soil water content then loaded into the deep-well plates and incubated for six hours at 25°C with 15 different carbon sources (30 mg g⁻¹ soil H₂O concentration) in a closed system which includes also a detection microtitre plate with a colorimetric CO₂ trap. The color changes in the detection plate was measured at the beginning (T0) and after 6 hours of incubation (T6) at 570 nm. The difference in absorption between T1 and T0 was converted in C-CO₂ (μg·g⁻¹soil·h⁻¹) released from each carbon source used.

Results: If we consider the mean of microbial catabolic activity measured for all organic sources the results indicate higher values in conventional management fields compared with minimum tillage fields. If we consider values of catabolic activity for single organic sources the results indicate that malic acid, fructose and glucose give higher respiration in conventional tillage fields while α-ketoglutaric and citric acid registered higher values in conventional fields.

Conclusion: The obtained results indicate that tillage practices could have an influence on soil catabolic activity and could be able to direct the metabolic activity of different microbial functional groups in arable soils.

Keywords: conventional tillage, diversity, metabolic activity, minimum tillage

Acknowledgement: This work was supported by UEFISCDI, project number 94/2016.

EARLY BLIGHT (*ALTERNARIA* SP.) DISEASE ON FIVE TYPES OF TOMATO GENOTYPES

Antonia FLOREA^{1*}, Carmen PUIA^{*2}

^{1,2} University of Agricultural Science and Veterinary Medicine, University of Cluj-Napoca, Romanian

^{1*}Corresponding author, e-mail: antonia-luminita.florea@usamvcluj.ro

^{2*}Corresponding author, e-mail: carmen.puia@usamvcluj.ro

Introduction: Tomato is one of the most appreciated vegetables both in Romania and European Union. The production of tomatoes, in 2020, was approximately 16.7 thousand tons, of which 9.8 thousand tons for processing and 6.8 thousand tons for fresh consumption. The total cultivated area was 92.210 thousand ha in 2020. In Romania the total surface of tomato crop was 23.5 thousand hectares (European Union, 2021). One of the main diseases of the tomato crop is early blight caused by *Alternaria* species such as: *Alternaria solani*, *Alternaria alternata*, *Alternaria arborescens*, *Alternaria tomatophila* and *Alternaria tomato* (Lawrence et al., 2018). Tomato early blight can cause losses up to 78% (Gannibal et al., 2014). In addition to crop losses, there is also a decrease in the quality of tomato production due to the presence of mycotoxins in the plant and fruit.

Aims: This paper aim is to test the behaviour of 5 tomato genotypes in field conditions and greenhouse to the attack of the *Alternaria* sp.

Material and Methods: We use 5 genotypes of tomato such as: cherry, red fruit, yellow fruit, long fruit and pear fruit, to observe the behaviour to *Alternaria* infections. The technique of artificial infection was used both in the greenhouse and field.

Results and conclusions: Following the research, it can be seen the importance of resistant varieties to specified attacks of the *Alternaria* sp. and the behaviour of the pathogen in different culture conditions.

Keywords: *Alternaria*, early blight. tomato, production,

References

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*European Comision, 2021, The tomato market in the EU: Vol. 1: Production statistics (https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/overviews/market-observatories/fruit-and-vegetables/tomatoes-statistics_en)

STUDY REGARDING THE BEHAVIOR OF SOYBEAN VARIETIES ON THE *TETRANYCHUS URTICAE* KOCH AND *PERONOSPORA MANSHURICA* (NAUMOV) SYDOW ATTACK, IN EDS COJOCNA CONDITIONS

FLORIAN Teodora¹, VIDICAN Roxana¹, HORTĂ Adi¹, PLEȘA Anca¹,
SUCIU Loredana^{1*}

¹ Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania

*Corresponding author, e-mail: loredana.suciu@usamvcluj.ro

Introduction: Soybeans are of particular economic importance due to its many uses, soybeans having a high nutritional value, with multiple uses in human nutrition, animal feed and as a raw material in industry. At the same time, soybean is a host plant for a large number of pests and diseases that can reduce quantity and quality of yield. This paper presents a study on the behavior of soybean varieties to attack pests and pathogens in ecological cultivation conditions.

Materials and Methods: The experimental field was located in Cojocna commune, Cluj county, and 10 soybean varieties were taken in the study: Albenga, Betina, Cristina, Es-Director, Onix, Perla, Silvia, Sinema, S-Pallador and Wendy Pzo.

Results: The frequency of attack of *Tetranychus urticae* Koch and the degree of attack of *Peronospora manshurica* were determined. Following the study, we can say that in the conditions of 2020, at SDE Cojocna, the most sensitive variety to manna attack was Perla and the most resistant Es-Director and Silvia, with these varieties registering the lowest degree of attack (0.02%).

Conclusion: Regarding the red spider attack, the most sensitive was the Albenga variety with very significant differences compared to the average, and among the most resistant were the Cristina, S-Pallador, Wendy Pzo, Silvia, Sinema and Onix varieties.

Keywords: soybeans, varieties, *Tetranychus urticae*, *Peronospora manshurica*

References

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FOODLEVERS – RESEARCH PROJECT FOR SUSTAINABLE AND ORGANIC FOOD SYSTEMS

Adrian GLIGA^{1*}, Mignon SANDOR¹, Mugurel JITEA², Dumitrița DASCĂLU¹

¹ *Environment and Plant Protection Department, University of Agricultural Sciences and Veterinary Medicine, Romania*

² *Economic Sciences Department, University of Agricultural Sciences and Veterinary Medicine, Romania*

*Corresponding author, e-mail: adrian.gliga@usamvcluj.ro

Introduction: Sustainability transitions are complex processes. In addition, many sustainability interventions focus on “highly tangible, but essentially weak, leverage points” (Abson et al. 2017), thus they do not address key problems. Based on the framework of leverage points for sustainability interventions, propose a research agenda based on three realms of “deep leverage” to address in sustainability transitions, such as those required to transition towards resource-efficient, circular and zero-waste food systems: firstly reconnecting people to nature, secondly restructuring institutions and thirdly rethinking how knowledge is created and used.

Aims: This project aims to analyse different forms of organic and sustainable food systems (FS) in different geographical and institutional contexts to understand how different layers of efficiency can contribute to improved natural and human resource use efficiency.

Materials and Methods: FOODLEVERS applies a multi-disciplinary and multi-stakeholder approach to analyse innovative and mainstream case studies of organic and sustainable FS from cradle to cradle.

Results: Increasing knowledge of sustainable food systems and supply chain: the project will increase knowledge of sustainable and organic farming systems, including agroforestry systems and the related food supply chains. In particular, FOODLEVERS will investigate how such systems contribute to a better use of resources from farm-to-fork and are able to enhance the delivery of ecosystem services such as carbon sequestration, biodiversity conservation, welfare and wellbeing, soil fertility improvement but also other benefits like reducing the impact of food waste, improve food security, food waste reduction and efficient use of renewable, sustainably produced resources.

Conclusion: Analysis of different value chains and scenario building leads to recommendations for farmers and chain actors to organise innovations that minimise trade-offs between stages from production to waste, recycling and identify new value chains.

Keywords: FOODLEVERS, research project, organic, sustainable, food system

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***PHYLLOPERTHA HORTICOLA* LINNÉ PEST IN BLUEBERRY PLANTATIONS IN THE MĂRIȘEL AREA (CLUJ COUNTY)**

Ionuț-Bogdan HULUJAN¹, Teodora FLORIAN^{1*}, Horia BUNESCU¹

¹ Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author, e-mail: ionut-bogdan.hulujan@usamvcluj.ro

Introduction: *Phyllopertha horticola* Linné (Coleoptera: Scarabaeidae) is one of the most common phytophagous beetles in Central Europe (Pernfuss et al., 2005). The species is reported from plains to mountains (Milne, 1964). The greatest damage is caused by larvae, which feed on plant roots, especially from natural grasslands (Keller and Schweizer, 2007). Strong attacks are also reported on the lawn, strongly affecting its aesthetic value.

Aims: The blueberry growers from the Mărișel area reported in 2020 the presence in the plantation of a new beetle that attacks the blueberry flowers and leaves. The identification of the species was made in the Discipline of Entomology at UASVM Cluj-Napoca, finding that it is the garden chafer, *Phyllopertha horticola* Linné. In 2021, the plants attacked by the garden beetle, *Phyllopertha horticola* Linné, were monitored in the blueberry plantation in the Mărișel area, Cluj County.

Materials and Methods: The studies were carried out in a blueberry plantation with an area of 2.5 ha, located in Mărișel commune (Cluj County) for two blueberry varieties. The Bluecrop variety was planted in 2012 and the Elliot variety was planted in 2011. For monitoring the garden chafer, *Phyllopertha horticola* Linné, three rows were randomly selected in each plot with intervals of 20 plants/row. Each plant was analyzed individually and the number of adults reported on the plant was noted. The observations were made between June and July 2021.

Results: In the Elliot variety, the share of plants reported with adults of *Phyllopertha horticola* Linné was between 50% and 60%, the average being 55%. Regarding the maximum number of adults / plant, it was between 6 specimens (at interval 1) and 9 adults/plant (at interval 2). In the Bluecrop variety, the share of plants with adults of the monitored species was between 10% and 45%, with an average per variety of 25%. The maximum number of adults on a plant was between 2 and 4 specimens.

Conclusion: In the blueberry plantations from the Mărișel area (Cluj County), the garden chafer, *Phyllopertha horticola* Linné (Coleoptera: Scarabaeidae), was reported for the first time, with a 55% share of attacked plants for the Elliot variety and 25% for Bluecrop and the maximum number of adults/plant was 9 specimens for the Elliot variety and 4 specimens for the Bluecrop variety.

Keywords: blueberry, pest, *Phyllopertha horticola* Linné

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STUDIES REGARDING THE ATTACK OF SOME INVASIVE SPECIES ON TREES AND SHRUBS FROM LANDSCAPE ARRANGEMENTS IN CLUJ-NAPOCA MUNICIPALITY

Iuliu ILEA¹, Ionuț Bogdan HULUJAN¹, Teodora FLORIAN^{1*}, Ion OLTEAN¹

¹ Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author, e-mail: teodora.florian@usamvcluj.ro

Introduction: Species of ornamental trees and shrubs are frequently attacked by invasive species recently introduced in Romania. Of these, the species are widespread: *Metcalfa pruinosa* Say. (Hemiptera: Flatidae), *Corythucha ciliata* Say. (Hemiptera: Tingidae) and *Corythucha arcuata* Say. (Hemiptera: Tingidae) originating in the USA (Gocan et al., 2010; Tatu and Tăușan, 2011; Tomescu et al., 2018). All are polyphagous species. The attack is manifested in the leaves causing damage to the aesthetic value of the attacked plants. *Corythucha ciliata* Say. it also produces skin inflammations in humans as a result of stings.

Aims: The three species of hemiptera were also reported in Cluj-Napoca. In the period 2020-2021, the species of trees and shrubs attacked by these species were identified and the frequency and intensity of the attack were established.

Materials and Methods: The studies were carried out in the spaces see and on the street alignments in Cluj-Napoca. Observations were made on all plant species to determine the frequency of the attacked leaves.

Results: *Metcalfa pruinosa* Say. was reported on most plants, and the most attacked plants were: *Ligustrum vulgare*, *Fraxinus excelsior*, *Robinia pseudoacacia*, *Aesculus hippocastanum*, *Acer platanoides*, *Buxus sempervirens*, *Thuja occidentalis*. The sycamore lace bug, *Corythucha ciliata* Say., was reported especially on: *Platanus orientalis*, *Platanus acerifolia*, *Fraxinus* sp., *Morus alba*. The oak lace bug, *Corythucha arcuata* Say. was reported by species: *Quercus robur*, *Quercus petraea*, *Quercus cerris*, *Quercus frainetto* and *Quercus pubescens*.

Conclusion: The aesthetic value of the trees and shrubs in the Cluj landscaping is strongly affected by the invasive species *Metcalfa pruinosa*, *Corythucha ciliata*. and *Corythucha arcuate*.

Keywords: *Corythucha arcuata* Say., *Corythucha ciliata* Say., *Metcalfa pruinosa* Say.

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BAYESIAN RIDGE ALGORITHM FOR BRIX PREDICTION IN INDUSTRIAL TOMATO

Christoforos- Nikitas KASIMATIS^{1,2}, Evangelos PSOMAKELIS^{3,4}, Nikolaos KATSENIOS², Eleni PAPATHEODOROU⁵, Dimitris APOSTOLOU¹, Ioanna KAKABOUKI⁶, Ioannis ROUSSIS⁶, Antonios MAVROEIDIS⁶ and Aspasia EFTHIMIADOU^{2,*}

¹ Department of Informatics, University of Piraeus, Karaoli & Dimitriou 80, Piraeus, 18534, Greece

² Department of Soil Science of Athens, Institute of Soil and Water Resources, Hellenic Agricultural Organization-Demeter, Sofokli Venizelou 1, Lycovrissi, 14123 Attica, Greece

³ School of Electrical and Computer Engineering, National Technical University of Athens, 15780 Athens, Greece

⁴ Department of Informatics and Telematics, Harokopio University of Athens, 17778 Athens, Greece

⁵ KYKNOS S.A. Greek Canning Company, Pyrgos, Savalia, 27200, Greece

⁶ Department of Crop Science, Laboratory of Agronomy, 75 Iera Odos Street, 118 55 Athens, Greece

*Corresponding author email: sissyefthimiadou@gmail.com

Introduction: Tomato (*Solanum lycopersicum* L.) is considered as one of the most significant vegetables worldwide, having a variety of benefits (Kakabouki et al., 2021). Improvements in technology has made Machine Learning algorithms widely known and used in agriculture as they can be used for the eradication of features from the data (You et al., 2017).

Aims: The aim of this study was to implement a DSS aiming at predicting °Brix of industrial tomato based on a various data, using Days After Planting metric as the time interval.

Materials and Methods: The weather data used were extracted from National Observatory of Athens and Hellenic National Meteorological Service. To calculate the total soluble solids (°Brix), KERN Digital Refractometer was used. For the pH measurement we used ORION 188 ion analyser. The color of the tomato product was measured using Minolta Colorimeter.

Results: The predicted and the actual °Brix are not identical but both follow the same motif. This means that total soluble solids will be higher in the predicted day. The closer the score is to zero the more accurate the prediction is. The scores are less than 0.075 in all the experiments.

Conclusion: Data from previous years used as an input to the Bayesian Ridge model to make a suggestion.

Keywords: Bayesian Ridge , Decision Support Systems, , Tomato

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EFFECT OF VARIOUS NUTRITIONAL RESOURCES ON PHYTOCHEMICAL TRAITS OF SOME RICE VARIETIES UNDER DROUGHT STRESS CONDITIONS

Jaber MEHDINIYA AFRA^{*1}, Yousef NIKNEJAD¹, Hormoz Fallah AMOLI¹,
Davood BARARI TARI¹

¹*Departement of Agronomy, Ayatollah Amoli Branch, Islamic Azad University, Amol, Iran*

^{*}Corresponding author, e-mail: afra.mahdiniya@gmail.com

Introduction: Rice is the most important agricultural crop in the world after wheat and affects the nutrition of more than half of the world population significantly. Drought stress is the main environmental restricting factor for rice growth in the rice cultivation regions. Osmotic regulation is one of the effective mechanisms that happens in plants once they encounter with drought to maintain the cellular turgor.

Aims: This research verifies the effects of the organic fertilizers along with the chemical ones on the resistive effect of rice cultivars relative to the drought stress through some of the phytochemical factors.

Materials and Methods: In this equation, (0.612), AC and AS are the control and sample absorbant values, respectively. The calculated numbers are the percentages of free radicals inhibition in the methanolic extract. The total phenol content was measured using the Folin Ciocalteu Reagent (FCR) method. The Relative Water Content (RWC) of the leaves was calculated by equation 1 in terms of percentage in two plant growth stages, including; the initiation of the tillering and retransition stage.

Results: The maximum paddy seed yield was obtained in the non-stress condition using humic acid in the cultivars of shirodi and local Tarom. The maximum proline content was obtained in the drought stress condition in the retransition growth stage using the conventional fertilizer in local Tarom cultivar. Maximum free radical scavenging and phenol content was obtained in drought stress conditions applied in the remobilization phase using humic acid in local Tarom rice. The overall results of the research suggested that humic acid increases the resistance of rice cultivars against drought due to the reduction of oxidative damage compared to the other fertilizer resources, and enhanced the paddy seed yield by affecting the phytochemical process.

Conclusion: Drought stress led to creating oxidative stress the second year more than the first year in rice cultivars. Hence, humic acid spraying could compensate for damage caused by drought stress by increasing osmotic regulators such as proline and relative water content at a higher level compared to other fertilizer sources, and reduce the permeability of cell membranes. Humic acid compared to other nutritional systems at higher levels led to increasing antioxidants such as phenol, as well as increased free radical scavenging in local Tarom cultivar compared to the Shirodi rice, which caused plants protection against drought stress.

Keywords: *Azolla*, Chemical fertilizers, Humic acid, Rice cutivars

HIGHLIGHTING STRUCTURES AND PATTERNS OF COLONIZATION THE SPECIES *ZEAMAYS*

Victoria Carmen POP MOLDOVAN¹, Roxana VIDICAN² and Vlad STOIAN^{2*}

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca*

*Corresponding author, e-mail: roxana.vidican@usamvcluj.ro

Introduction: Agriculture is one of the key economic activities designed to provide food for a growing population. Agricultural activities have disrupted the quality of the environment, especially the soil, through the use of chemical fertilizers. It is expected that 21st century agriculture will try to reduce the amount of fertilizers by using microorganisms, in this category arbuscular mycorrhizas representing a complex set of benefits for plants and ecosystem services.

Aim: The purpose of this paper is to identify the pattern of mycorrhizal colonization but also the structures present in the roots of *Zeamays*.

Objectives: The objectives of the research are: i) are mycorrhizae natively present in the corn root and have a constant presence from the first stages of plant development? and ii) what kind of colonization pattern is characteristic of these roots?

Results: Maize has prominent fasciculate roots, and due to its intense branching capacity provides increased biological support for the establishment of mycorrhizal symbionts. Following the research, most of the fungal structures were highlighted, the most prominent being the arbuscules followed by the vesicles. Arum-type arbuscules were mostly observed, Paris-type shrubs being less common in this species. The vesicles have a low frequency in the root cortex. They are present only in the early stages of plant development, and with the development of the plant occurs the supply flow due to mycorrhization.

Conclusion: Vesicular-arbuscular mycorrhizae are present in the root of the *Zeamays* plant with a constant presence, without major fluctuations. Mycorrhizal structures form a specific colonization pattern.

Keywords: agricultural microbiome, arbuscules, maize, roots, vesicles.

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SUSTAINABLE MANAGEMENT AND CONSERVATION OF BIODIVERSITY IN VINEYARDS

Mignon SANDOR^{1*}, Dumitrița DASCALU¹, Daniela POPESCU¹, Adrian GLIGA¹,
Stela CASONI¹, Bianca DUMEA¹

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca*

*Corresponding author: sandor.mignon@usamvcluj.ro

Introduction: Biodiversity is considered a driving force for the delivery of important ecosystem services in agriculture such as soil fertility and natural pest control. Viticulture is among the most pesticide-dependent land use types in Europe and therefore ecological intensification of viticulture agroecosystems is urgently asked.

Aim: The objective of this work was to present how a European project that aims to study the ecosystem services provided by biodiversity in different wine-growing areas from Europe was implemented in Romania. Chosen study cases and protocols development was presented.

Materials and methods: A network of 26 vineyard sites has been created in the hilly area of Podișul Târnavelor in order to study above- and below-ground biodiversity (plants, soil biota, spiders, insects and birds) with respect to taxonomic and functional diversity and conservation value. Different ecosystem services supported by these communities was assessed with respect to provisioning (grape quality and yield), regulating (pest control, nutrient cycling) and supporting ecosystem services (soil conservation). The effects of local and landscape-scale land-use decisions on multiple ecosystem services such as pest control, soil fertility, carbon sequestration and nature conservation value was used to develop and validate a model for analyzing trade-offs and synergies between biodiversity and ecosystem services under different ecological, economic and market conditions.

Results: At this time, only some preliminary results are available. For the Romanian sites soil functional microbial diversity measured as community level physiological profile, indicates a higher metabolic activity in vineyards where conventional tillage was applied compared with conservative tillage practice. The use of chemicals on row area can affect soil biological activity near of roots area. No significant differences was reported for earthworms and collembolan population in conventional vineyards compared to conservative managed vineyards.

Conclusion: Changes of vineyard management from conventional to a more conservative way of production can be beneficial for biodiversity and related ecosystem services.

Keywords: vineyard, conservative management, biodiversity

MICROBIAL ECOSYSTEM SERVICES IN AGRICULTURAL SOILS – A SHORT REVIEW

Vlad STOIAN¹ and Roxana VIDICAN^{1*}

¹ *Faculty of Agriculture, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca, Romania*

*Corresponding author, e-mail: roxana.vidican@usamvcluj.ro

Introduction: Microbial communities present in agro-ecosystems are diverse assemblages of species, involved in all nutrient fluxes. Past and current agricultural practices have shaped these communities, making them sensitive to cultivated plants. Based on microbial activities, crop rotation implies both short-time successions in the dimension of microbial groups and the resilience of communities.

Aims: The main objective of the paper is to identify the potential ecosystem services provided by microbial groups and communities, in relation to agronomical practices and their pressure. The level of influence related to climate is analysed from an amplifier perspective.

Materials and Methods: The study is constructed on the analysis of international researches and the correlations were established between agronomic pressors and climatic conditions.

Results: Based on researches on microbial communities and activities in agricultural soils, performed especially during the last decades, a large variety of ecosystem services were identified. Nitrogen and Carbon are the main interest cycles for agronomy, due to their involvement in plant growth and development and the transformation of soil organic matter, respectively. The magnitude of transformation suffered by microbial groups are related to agronomical practices and climate changes.

Conclusion: Soil microbial communities are responsible for the stability and performance of agro-ecosystems, in a constant change due to agronomical inputs. This relation is essential in the mitigation of the effect of current climate changes.

Keywords: soil microorganism, functional groups, sustainability, microbial evolution

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A NEW MODERN SCIENTIFIC ORGANIZATION CONCEPT FOR THE OVER 100 YEARS OLD AGRO-BOTANICAL GARDEN IN CLUJ-NAPOCA

Andrei STOIE¹

¹ UASVM, Cluj-Napoca, Romania

*Corresponding author, e-mail: andrei.stoie@usamvcluj.ro

Introduction: The Agro-Botanical Garden in Cluj-Napoca was founded in 1903 in the immediate vicinity of the thick walls of the old monastery ruins in the UASVM campus. Therefore, it is probably the oldest botanical garden in Romania that has permanently operated as a botanical garden in the same location for so much time. The total area of the Agro-Botanical Garden increased spectacularly in 2007, with the inclusion in its perimeter of a large neighbouring area upstream of the initial main garden nucleus. Consequently, a new modern concept of organization became imperative.

Aims: The most modern achievements in the field of botany were taken into account to conceive a new modern scientific organization concept, according to which the entire botanical garden was radically reorganized in the period 2009-2019.

Materials and Methods: As a starting point, the old scientific organization plan was used. Then all sectors and subsectors defined in the new scientific concept were completely relocated using aerial images, GPS measurements, locations of old trees, etc. Modern scientific achievements have been also considered, such as molecular phylogenies, the link between megaherbivore grazing and the great biodiversity of grasslands in Europe, etc.

Results: Four thematic sectors have been defined that combine harmoniously into a coherent scientific concept. The sectors were named as follows: Biological Systematics, Plant Ecology, Ornamental Species, Biodiversity. These sectors have been subdivided into numerous subsectors, each with a specific scientific theme. All species populating these sectors and subsectors were included in a digital database (also uploaded on BGCI PlantSearch) and international IPEN codes were assigned for each sample.

Conclusion: In the new modern scientific organization concept of the Agro-Botanical Garden, the radical reorganization was achieved by incorporating the latest knowledge in the field of botany.

Keywords: botanical garden, sectors, scientific concept

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SMART CROPPING IOT-BASED SOLUTIONS - A SHIFT TOWARDS SUSTAINABLE AGRICULTURE WITHIN EUROPEAN UNION

Agata TABOR

Department of Marketing, Cracow University of Economics, Poland

*Corresponding author, e-mail: agatatabor12@gmail.com

Introduction: The agriculture industry is expected to become much more important due to the projected significant increase in global food demand. Meeting this demand requires a smart approach that also supports the European Union's goal of improving both the quality and quantity of agricultural production. Modernizing agriculture is one of the main aspects of the EU's agricultural shift towards sustainability. Smart agricultural methods based on the Internet of Things (IoT) enable real-time data collection and support more efficient and accurate decision-making.

Aims: The main aim of this paper is to present the current state of IoT-based solutions in smart farming within the European Union. This includes a review concerning ongoing projects and advances. The work focuses on presenting the results of EU initiatives such as IoF2020 and DEMETER - their challenges and the potential they hold to address the current issues.

Materials and Methods: The work is based on materials provided by the European Commission on sustainability strategies for the agricultural industry. It includes an overview of projects funded by the European Union to support IoT-based applications designed to improve agriculture. The method used in the paper is the case study method.

Results: The implementation of IoT-based solutions as part of the EU's approach to the transition to smart agriculture is clearly considered as beneficial. Their potential is recognized in the EU, resulting in co-funding of projects such as IoF2020 and the ongoing DEMETER product. The already completed IoF2020 project has proven that the implementation of IoT-based applications has played a key role not only in a more sustainable use of resources, but also in increasing productivity and its quality. The ongoing DEMETER initiative aims to enable optimal resource management in the EU agri-food industry.

Conclusion: In this research work, the extensive potential of IoT-based solutions in smart agriculture is proved. The challenges of IoT cannot be overlooked to truly achieve their full potential. The commitment of the European Union to make the agricultural industry more sustainable by supporting data-driven approaches is presented.

Keywords: IoT, smart agriculture, smart farming, sustainable agriculture, technology

AGROCLIM – OPEN INNOVATION IN AGRICULTURE

**Sorin POP¹, Sorin Daniel VÂTCĂ^{*2}, Csaba HORVATH³, Valentina Ancuța STOIAN²,
Adina CROITORU³,**

¹ *Indeco Soft, Baia Mare, Romania*

² *Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj Napoca*

³ *Faculty of Geography, Babes Bolyai University, Cluj Napoca, Romania*

^{*}Corresponding author, e-mail: sorin.vatca@usamvcluj.ro

Introduction: Smart communities are those communities where the administration, the business community and the citizens understand the potential of technology and make the decision to use it for improving the urban life and contribute to a meaningful regional development. Earth observation data, obtained from airborne platforms like satellites or drones, contribute significantly to the inventory, monitoring and assessment of agricultural resources. The automation process in agriculture can transform the agricultural field from a manual and static one to an intelligent and dynamic one, leading to an increased productivity, with a reduced involvement from the farmer.

Aims: The study aim is to contribute to this smart technological development with a new innovative platform that combines all climate parameters essential for maize and wheat growth. The platform will overlap the favourability maps based of the most important indicators for obtain the favourability different degree in order to help the farmers and stakeholders to plan their crop rotation.

Materials and Methods: Within the AGROCLIMRO project, innovation consists in combining earth observation data with ground truth and advanced agronomic knowledge, within a platform under development, designed to support farmers in the adoption and use of winter wheat and maize hybrids. This suitability was set depending on weather and climate conditions, to maximize productivity and reduce the associated risks because of incompatible varieties for growth with the existing soil-precipitation-temperature conditions.

Results: The platform, developed using open technologies, allows the visualization of the favourability of agricultural crops starting from historical data, the historical records of precipitation and also information about soil favourability class for this two crops.

Conclusion: Algorithms for determining the most favourable conditions are being developed. The platform, compatible with Open Geospatial Consortium standards, will provide open, public access for farmers to identify all the degrees of favourability conditions for their area, to a sensible resolution of 1 km² for the first time.

Keywords: climate favourability conditions, maize, wheat

SESSION 2: ENVIRONMENTAL PROTECTION

GLOBAL WARMING, CLIMATE CHANGE, GLOBAL CHANGE, CLIMATE EMERGENCY AND... GLOBAL WEIRDING!

José Ramón ARÉVALO*

Faculty of Biology, University La Laguna, Tenerife, Spain

*Corresponding author, e-mail: jarevalo@ull.edu.es

Introduction: The apocalyptic predictions about the future of the planet are not new, since the first developed human civilizations were advocates to such prophecies. I will be starting at the historical period selecting just a group of them:

- The millenialist Pope Silvestre II, predicted the end of the Jesus Christ era in the change of the millennium... obviously, nothing happens.
- Most recently, in the XX century, the predictions were more abundant, but among the funniest ones are the predictions of the Club of Rome as well as the predictions of one of his leaders, Paul Ehrlich... They all predicted global cooling, complete food depletion, wars, depletion of all sources of energy, famines, diseases, etc... None of these predictions became true, but the most interesting thing about all of this is that the Club of Rome still exists, and continues to make flawed predictions leaving their reputation close to zero.
- The Kyoto Summit 1997, COP15, COPE17, COP21, COP25 and so on, where thousands of politicians, intellectuals and maybe researcher meet to analyze climate and make predictions. Among the most popular ones: temperature increases at a rate of 0.5°C per decade, the end of ice in Greenland, many children will never see to snow, the ocean raise will cover several islands in the pacific (this one even caused a ridiculous climate refugee in France)

Aim: to provide a picture of global concerns, from global warming to climate emergency.

Results: Well, after this short list, the situation changes dramatically with the arrival of a real problem for the planet, the pandemic of COVID19 that basically took the life of more than 4.5 million of people and required the immolation of the economy of several countries with economic crisis without precedent in the last decades. It is true that it is very likely it will take decades to recover from this.

Conclusion: Well, now, the biggest threat to human rights and liberties has been proposed by a group of researchers and published in the journal NATURE: “COVID lockdowns are key to begin ‘personal carbon allowances’: ‘Restrictions on individuals...that were unthinkable only 1 year before’ have us ‘more prepared to accept tracking & limitations’ to ‘achieve a safer climate’. So, this was the final idea, and that means that the only prediction that was accomplished was the one that George Orwell predicted in his book: 1984.

Keywords: COVID19, future, planet, rights

THE RELATIONSHIP BETWEEN HEIGHT AND CHLOROPHYLL CONTENT IN *Phaseolus vulgaris* L. GROWN UNDER RED-AND BLUE-LIGHT CONDITIONS

Claudia BALINT¹, Antonia ODAGIU*¹, Bianca MOLDOVAN¹, Petru BURDUHOS¹,
Ioan BRAȘOVEAN¹, Vasile IVANCIUC¹

¹Faculty of Agriculture, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: Due to the growth of the population but also to the excessive pollution of the environment, the use of artificial light in agricultural greenhouses can be seen as an innovative technique. The LED lighting systems are used because has small size, durability, long lifetime, cool emitting temperature and can substitute with success the light from the sun.

Aims: The objective of our study was to investigate the relationship between height and chlorophyll content from plants (*Phaseolus vulgaris* L.) on experimental conditions with red and blue light emitting diodes (LEDs).

Materials and Methods: The biological material used in experiment consist in common bean (*Phaseolus vulgaris* L.) variety seeds, collected from the area of Transylvania, Cluj County. In order to supply the light treatment conditions, 4 identical chambers were used with selective absorption spectra for plants mainly gathered between 400 nm and 720 nm. The experimental observations (plant height, chlorophyll content), were recorded after 10, and 15 from seeding.

Results: Between the height of the plants and the chlorophyll content at 10 days after sowing in red light conditions, a weak to medium positive correlation was reported ($R = 0.324$), with a high representativeness equal to 10.5%. For plants grown in blue light conditions, a weak to medium positive correlation was reported ($R = 0.316$), with a low representativeness equal to 9.9%. At 15 days after sowing, between the height of the plants and the chlorophyll content in conditions of combined red and blue light, a medium positive correlation was reported ($R = 0.670$), with a high representativeness equal to 20.4%.

Conclusion: The results from experiment show that blue and red light exposure could have a real potential of improving *Phaseolus vulgaris* L. growing process and chlorophyll content, in first 15 days of development.

Keywords: artificial light, chlorophyll content, *Phaseolus vulgaris* L., plant height.

PHYTOSANITARY SOLUTIONS FOR THE CONTROL OF THE MAIN DISEASES IN SUGAR BEET IN CONTEXT OF CLIMATE CHANGES. A REVIEW

Letiția Adriana BOCOȘ¹, Antonia ODAGIU*¹, Bianca MOLDOVAN¹,
Cristian IEDERAN¹

¹*Faculty of Agriculture, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca*

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: During the growing season sugar beet requires careful care; the land area cultivated with sugar beet must be clean of weeds, in a proper phytosanitary condition, this crop being affected by many diseases and pests. In general, sugar beet is known as a plant susceptible to a significant number of diseases caused by various pathogens, which requires for agricultural practice the need to know in depth both the symptoms of each disease and the most effective prevention measures. Fall and rot of seedlings is caused by a group of soil fungi (*Pythium* spp., *Phoma betae* Fr., *Aphanomyces* spp. *Fusarium* spp., *Rhizoctonia solani*). The action of the above mentioned pathogens depends at great extent on the climatic conditions.

Aims: The aim of this study is to emphasize the results of a theoretical study concerning the phytosanitary solutions for the control of the main diseases in sugar beet in context of climate changes.

Materials and Methods: The methodology of the study consists in consulting databases on internet and speciality books from different sources, including e-books.

Results: Fighting diseases and pests is a very beneficial measure in order to obtain significant harvests. Most of the pathogens attack the foliar apparatus, which can be extremely dangerous in the first period, because it can have the effect of losing the crop, and in the second period of vegetation it can influence the accumulation of sugar. The factors that influence the sugar beet culture can be of two types, namely: - controllable (technological factors) - uncontrollable (ecological factors).

Conclusion: Considering the fact that the purpose of plant protection is to keep crops healthy and free of weeds, as one of the main premises of the manifestation of the protection capacity, we can conclude that the objective must be achieved in conditions where the production increase is higher value, than the cost of the measures applied.

Keywords: crop, fungi, pathogen, prevention measures.

QUANTITATIVE ESTIMATION OF NUTRIENTS FROM BERRIES

Daniela BURDUHOS¹, Antonia ODAGIU^{1*}, Claudia BALINT¹,
Sorina DÂRJAN², Daniela BORDEA¹

¹Faculty of Agriculture, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca

²Department of Transversal Competences, University of Agricultural Sciences
and Veterinary Medicine Cluj-Napoca

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: The quantitative estimation of the nutrients from plants is often identified using Weende scheme. Thus it may be applied to the quantitative estimation of the nutrient content of berries. The laboratory samples, after being prepared, are dried in an oven at 60 ° C. After drying, the samples are ground using laboratory mills. Those parts that cannot be ground are crushed in a mortar. This laboratory operation must be performed very carefully, so as not to miss anything in the sample. Otherwise there is a risk of erroneous results.

Aims: Our study aims to emphasize the results of quantitative estimation of nutrients from five species of berries.

Materials and Methods: The samples of berries used in the study consist of the species: *Rubus idaeus* L., *Ribes nigrum* L., *Vaccinium vitis-idaea* L., *Vaccinium myrtillus* L. and *Rubus fruticosus* L. These were harvested from various regions belonging to the mountainous area of Cluj County. The plant material was dehydrated and stored properly in vials for crude chemical analysis.

Results: The highest dry matter content (17,24%) was identified in *Ribes nigrum* L., while the lowest (12,40%) in *Vaccinium vitis-idaea* L. The highest protein content (1,50%) was identified in *Rubus fruticosus* L., while the lowest (0,66%) in *Vaccinium vitis-idaea* L.

Conclusion: Concerning to the content of non-nitrogenous extractive substances, it is found that the largest differences (equal to -11.96% and -9.02%) are reported between currants and blackberries (the content being higher in cranberries compared to currants) and, respectively between raspberries and currants (content in non-nitrogenous extractive substances being higher than currants compared to raspberries).

Keywords: dry matter, non-nitrogenous extractive substances, protein, Weende scheme.

TESTING THE ANTI-ALTERNARIOSIS EFFECT OF AQUEOUS EXTRACT OF *Allium cepa* L. IN POTATO

Tatiana CĂTUNA (PETRAR)¹, Antonia ODAGIU*¹, Claudia BALINT¹, Sorina DÂRJAN², Daniela BORDEA¹

¹Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca

²Department of Transversal Competences, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: The potato, one of the most important vegetable crops in Romania, faces the same problems related to the sustainable management of phytosanitary protection. Based on these premises, it is increasingly necessary to identify unconventional solutions for antifungal and anti-bactericidal treatments applied to potato cultivation.

Aims: The present study aims to emphasize the effect of aqueous extract of *Allium cepa* L. in fight against alternariosis in potato.

Materials and Methods: The experiment carried out in 2020 has an organization according to a two-factor scheme, with three repetitions, according to an experimental scheme implemented according to the randomized block method. The placement of the plots is done differently for the three repetitions, for each of the varieties studied, respectively Redsec and Roclas, depending on the control and the experimental variants corresponding to the treatments experienced against the fungus *Alternaria solani* Sorauer.

Results: For the Redsec potato variety, the best results are obtained with unconventional treatments performed with aqueous solutions 3.3% *Allium cepa* L. (7.72%) and 2.2% *Allium cepa* L. (8.28%). In the Roclas potato variety, the best results are obtained with unconventional treatments performed with aqueous solutions 3.3% *Allium cepa* L. (10.54%) and 2.2% *Allium cepa* L. (11.09%).

Conclusion: In the Redsec variety, the interaction between the degree of attack of the fungus, temperature and humidity is of low and medium intensity, with the lowest value for the treatment with 3.3% aqueous solution *Allium cepa* L. In the Roclas variety, the interaction is of low intensity and average, with the highest values for the experimental variant treated with 2.2% aqueous solution *Allium cepa* L.

Keywords: attack degree, phytosanitary treatment, solution, variety.

TESTING SOLUTIONS TO FIGHT AGAINST GRAY ROT AND POWDERY MILDEW IN VINEYARDS LOCATED IN HUNEDOARA COUNTY

Octav CISMAȘU, Antonia ODAGIU*, Claudia BALINT, Petru BURDUHOS

*Faculty of Agriculture, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca*

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: The vineyards are characterized by cultivated varieties, climate, soil and management practices and in all areas some pests and some diseases constantly impede grape production and thus require certain management specifications. Pests and diseases have an impact on grape production both in terms of quantity and quality, and can also endanger the longevity of vineyards. Grape varieties have low to high susceptibility to various fungal diseases, resulting in significant production costs and economic losses.

Aims: The aim of this study to emphasize the efficacy of solutions identified in order to fight against the attack of *Botryotinia fuckeliana* (de Bary) Whetzel (1945) and *Uncinula necator* (Schwein.) Burrill on two different vine varieties.

Materials and Methods: The experiments took place in 2019 - 2020, in a private wine farm, located in the area adjacent to the city of Geoagiu (45 ° 55'12"N, 23 ° 12'0"E), Hunedoara County. The biological material used in the present study is represented by the Fetească regală and Fetească albă vine varieties. Two treatment patterns were applied.

Results: Over the whole experimental period, 2019 - 2020, it is found that the highest means of attack degrees are recorded for the pathogen of gray rot, *Botryotinia fuckeliana* (by Bary) Whetzel (1945), respectively 32.07% for the control variant ; 12.41% for experimental variant I and 16.48% for experimental variant II. The lowest averages are recorded in the case of the attack *Uncinula necator* (Schwein.) Burrill, a pathogen that produces powdery mildew (6% for the control variant; 1.46% for the experimental variant I and 2.92% for the experimental variant II).

Conclusion: By the experimental period, the phytosanitary treatment scheme has a superior efficacy, obtaining the lowest averages of the degrees of attack, both for each pathogen studied and for the total degree of attack (23.18%). The highest average of the total attack degree equal to 60.78% is registered in the control variant, while in the experimental variant II an average of the total degree of attack is obtained, lower, equal to 32.78%, but superior the average reported for Experimental Variant II.

Keywords: attack degree, diseases, experimental variants.

THE INFLUENCE OF ELEVATED CARBON DIOXIDE ON PLANTS PHOTOSYNTHESIS AND SECONDARY METABOLITES

Lucian COPOLOVICI^{1,2*}, Cristian MOISA², Andreea LUPITU², Ionela CIUREL²,
Virgiliu CIUTINA¹, Dana COPOLOVICI^{1,2}

¹Faculty of Food Engineering, Tourism and Environmental Protection
"Aurel Vlaicu" University, Romania

²Institute of Technical and Natural Sciences Research-Development-Innovation
of "Aurel Vlaicu" University, Romania

*Corresponding author, e-mail: lucian.copolovici@uav.ro

Introduction: Global CO₂ concentration has risen more than ever in the last 20 years, from 385 ppm in 2010 to 419 ppm in July 2021. For plants, the high concentration of CO₂ is, on the one hand, beneficial because it leads to an increase in the assimilation rate of carbon dioxide, which reasons an increase in biomass production. Thus, plants grow faster at high concentrations of CO₂. On the other hand, the different metabolic cycles are disturbed by higher carbon dioxide uptake (Dusenge *et al.*, 2019).

Aims: We studied the influence of elevated carbon dioxide (800 and 1200 ppm) on plants from the Brassicaceae family (*Brassica oleracea*, var. *italica*, *Brassica rapa*, *Brassica napus*, *Raphanus raphanistrum*). We hypothesize that photosynthesis parameters and volatile organic compound emissions are changing for plants to grow at elevated carbon dioxide.

Materials and Methods: The control plants have been grown at actual CO₂ concentration – 400 ppm, while the priming plants have been raised at elevated carbon dioxide (800 and 1200 ppm). The foliage photosynthetic characteristics (net assimilation rate, stomatal conductance to water vapor) using gas-exchange techniques have been determined for both control and treated plants. Volatile organic compounds (oxygenated pathway products by the action of lipoxygenase – LOX and monoterpenes) have been monitored using gas chromatography.

Results: The emission of different volatile organic compounds is increasing for plants grow under elevated carbon dioxide. Even more, the effect of carbon dioxide on plants assimilation rates and stomatal conductance has been significant.

Conclusion: In the present research work, we demonstrated that elevated carbon dioxide could influence the photosynthetic apparatus and disturbed the secondary metabolites cycles.

Keywords: elevated carbon dioxide, photosynthesis, secondary metabolites

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USEFUL TECHNOLOGIES FOR IDENTIFICATION OF CARBON FOOTPRINT

Liana MIHUȚ (POP)¹, Antonia ODAGIU^{*1}, Sergiu MIHUȚ¹, Cristian MĂLINAȘ¹

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca*

^{*}Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: Environmental protection has now become a major concern, especially as a result of the significant negative consequences of the economic development promoted since the industrial revolution. Greenhouse Gas (GHG) emissions have a significant negative impact on climate change and lead to an increase in the carbon footprint. The name LIDAR is an acronym for the description of the technology, its full name being "Light Detection and Ranging" broadly translated as "distance measurement by photo detection".

Aims: In our study we aimed to emphasize a useful technology, which could allow us to calculate the carbon footprint, even for large areas.

Materials and Methods: In the present study, the topographic LIDAR technology was used. It has 4 main components that are used together to perform the measurements: laser scanner, laser module, first surface mirror, inertial measurement system and processing module.

Results: In order to maintain a higher standard and to comply with the aeronautical legislation in force and to ensure the replicability of the study, the working methodology is divided into several stages: approval, automatic flight planning, data collection and processing and established test sections within the chosen areas. Function of domain of application LiDAR technology may be divided in: topographic, biometric, and DIAL.

Conclusion: Following the registration and export of data, the data of interest were obtained and highlighted at the experimental site, respectively Moldovenești commune, Cluj County, for 19 sites, represented graphically, with transects between 4800 m, rapeseed crop (*Brassica napus*) and 315 m, sugar beet (*Beta vulgaris*). Total transects were obtained for soybeans (*Glycine max*) and alfalfa (*Medicago sativa*).

Keywords: LiDAR, soybeans, stages, sugar beet.

RESEARCH CONCERNING THE INFLUENCE OF THE PLANT MORPHOLOGY AND APPLIED TECHNOLOGY ON MAIZE YIELD

Daniel PĂCURAR¹, Antonia ODAGIU*¹, Petru BURDUHOS¹, Ioan BRAȘOVEAN¹

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca*

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: In the maize cultivation technology, very important factors were taken into account for obtaining high productivity: crop location, precursor plant, sowing method, sowing date, sowing depth, crop maintenance work, special work, harvesting, drying and production conditioning.

Aims: The aim of our study is to emphasize the influence of the plant morphology and applied technology on maize yield. The quantitative and qualitative indices of yields in maize, in conditions of unconventional culture, are emphasized.

Materials and Methods: In order to study the influence of plant morphology and applied technology on corn productivity, the initiated research was continued. In the maize cultivation technology, very important factors were taken into account for obtaining high productivity: crop location, precursor plant, sowing method, sowing date, sowing depth, crop maintenance work, special work, harvesting, drying and production conditioning.

Results: For the weight of the cob with grains there is an average equal to 179.90 cobs, and for the weight of the grains/cobs, the average of 147.96 g. For the average weight of the grains and the hectolitre mass, averages equal to 32 g and 363 kg/hL, respectively, are recorded. Regarding the moisture content of the grains, it is noted that an average of 12.30% is reported.

Conclusion: Positive correlations are recorded between the weight of the cob with grains and grains, the length and diameter of the cob, the diameter of the cob and the rachis, the average weight of the grains and the hectoliter mass. Negative correlations are recorded between the number of rows and the number of cobs/row, the average weight of the cob with grains and the average weight of the grains and the average moisture of the grains, the average weight of the grains hectoliter mass and the average weight of the cob with grains and the hectoliter mass.

Keywords: cobs, quantitative and qualitative indices.

TESTING THE EFFICACY OF LAVENDER AND ROSEMARY EXTRACTS IN FIGHT AGAINST LATE BLIGHT IN TOMATOES

Roxana SABO¹, Antonia ODAGIU*¹, Ioan BRAȘOVEAN¹, Cristian IEDERAN¹

¹Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: Tomato is one of the most important vegetables grown due to its nutritional value, having an important role in the daily diet of the population, being a very healthy food. Globally, about 4,848,000 ha are cultivated with tomatoes that ensure a production of 182,301,395 tons, of which about 10% is produced in the EU. The largest areas cultivated with tomatoes were, in 2017 in Asia, about 54% of the total followed by Africa, which accounted for 27% of global areas.

Aims: Our study aims to emphasize the influence of the efficacy of lavender and rosemary extracts in fight against late blight in tomatoes, expressed as attack degrees, but also as evolution of number of flowers, fruits and leaves.

Materials and Methods: The experiments were implemented in the USAMV Cluj-Napoca greenhouse. The biological material consists of tomatoes (*Lycopersicon esculentum* Mill.) And herbs lavender (*Lavandula angustifolia* Mill.), and rosemary (*Rosmarinus officinalis* L.). *Phytophthora infestans* (Mont.) De Bary attack monitoring activities were carried out in the greenhouse, and their attack levels were recorded weekly.

Results: The number of leaves was between 4 (control) and 16 (lavender extract), the number of flowers between 1 (control, conventional treatments, lavender extract) and 6 (rosemary extract), and the number of fruits between 1 (control, conventional treatment, rosemary extract) and 2 (conventional treatment, lavender extract, rosemary extract). The attack degrees are within 40%-60% for control, 12-15% for conventional treatment, 18%-29% for treatment with lavender extract and 25%-33% for treatment with rosemary extract.

Conclusion: The lowest attack degrees are reported in conditions of conventional treatment, followed by administration of lavender extract and rosemary extract. Best plant development expressed in number of leaves, flowers and fruits, is reported in variants unconventionally treated with lavender and rosemary extracts, but in terms of fruits, the conventional treatment also led to best results (2 fruits/tomato plant).

Keywords: attack degree, flower, fruit, leaf.

STUDY UPON THE EFFICACY OF PRECISION AGRICULTURE IN BARLEY CULTURE

Ciprian TRIPON¹, Antonia ODAGIU*¹, Cristian MĂLINAȘ¹, Ioan BRAȘOVEAN¹

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca*

*Corresponding author, e-mail: antonia.odagiu@usamvcluj.ro

Introduction: Currently, a wide variety of mechatronic systems are implemented in precision agriculture. Mechatronic systems are also often used to monitor the sub-processes involved in a complex agricultural system, while each sub-process corresponds to a subsystem. The subsystems involved are often interconnected via IoT (Internet of Things). The Internet concept of objects refers to a series of elements, which are the components of a network of sensors, elements, etc.

Aims: The aim of this study to emphasize the capacity of precision agriculture, meaning drone efficiency, to assist the agronomists to establish the best nitrogen ratio fertilization in 13 barley varieties, in order to obtain high yields of best quality.

Materials and Methods: Our research was developed in 2020, on the Western Plain, Benecu de Jos, Timiș County. An experimental plot of land, measuring 5.40 ha, was organized. In order to obtain detailed recommendations on nitrogen fertilization, the plot was divided into five subplots. 13 varieties of barley were used, which were given different phytosanitary treatments. During the development of the barley crop, the specific conditions characteristic of it were registered.

Results: According to our study, where the main inputs (fertilizers) are administered taking into account the data from the drones, the best results concerning barley productions and protein contents are reported, for both traits, in barley fertilized varieties Kangoo, and Focus sc101 – 12e. Concerning, grains humidity, the highest value is reported in Kangoo variety, and the lowest in Amadora barley variety, while the highest productivity is reported in Sunshine barley variety.

Conclusion: The results of our study show the effectiveness of drones in assessing the fertilization needs of a barley crop, using NDVI "drone technology".

Keywords: drone technology, input, IoT, variety.

SESSION 3: FOOD SCIENCE AND TECHNOLOGY

FUNCTIONAL FOOD COMPOUNDS – ONLY IN RAW PLANT MATERIAL? REACTIVITY AND STABILITY OF BIOACTIVE METABOLITES ALONG THE WHOLE VALUE ADDED CHAIN

Sascha ROHN*

Institute of Food Technology and Food Chemistry, Technische Universität Berlin, Germany

*Corresponding author, e-mail: rohn@tu-berlin.de

Besides the main nutrients such as proteins, lipids, carbohydrates, minerals, vitamins and water there are many other substances that are consumed with plant-based food. These substances result from the secondary metabolism of fruits and vegetables. Although they are non-nutritive they exert several physiological properties and are often called bioactive compounds.

Several thousand compounds belong to the group of secondary plant metabolites, most of them resulting from different chemical classes (e.g. alkaloids, cyanogenic glycosides, glucosinolates, phenolic compounds, terpenes and other compounds such as phytic acid or oxalic acid).

While there was already a lot of research on the physiological, partly toxicological properties of a number of these secondary plant metabolites, knowledge on chemical changes of these compounds during harvesting, storage and food processing is still insufficient. Besides a degradation of these compounds, reactions with the other nutrients cannot be excluded.

Keywords: bioactive compounds, food processing, degradation and reaction products

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PILLARS OF FOOD SCIENCE IN GASTRONOMY-RECENT APPROACHES

Zeynep TACER-CABA^{1*}

*¹Department of Gastronomy and Culinary Arts, Bahcesehir University,
Ihlamur Yildiz Caddesi No:8 Gayrettepe 34353 Besiktas, Istanbul, Turkey*

**Corresponding author, e-mail: zeynep.tacercaba@sad.bau.edu.tr*

In history, although cooking has emerged much earlier than food science, food is the main common raw material for disciplines of food science and gastronomy. Gastronomy uses appropriate techniques for consistency and reproducibility at required quantities for perfect combinations of creativity and arts in kitchens. Food science, on the other hand, ensures the safety, in addition to health, shelf-life and quality of the food products for the community. Although starting from the 17th century, there were some pioneering initiatives for linking cooking and science; it was not until the late seventies-early eighties of the 20th century that science found solid applications to cooking, especially in the creative or modernist cuisine. However, studies on novel culinary trials have been based on trial errors mainly, where the food science has not fully pioneered.

In the last decade, innovative chefs of new generation had a keen interest in the findings of food science to create innovations in their plates. Starting from the introduction of the concept of “molecular gastronomy”, the increasing holistic and transdisciplinary approaches to food and gastronomy have been evident. Moreover, new advances in science and cooking with the ongoing academization of gastronomic studies initiated many regulated studies for professional cooks. Particular areas of food science such as physical characterization of raw materials, quality assessment, heat transfer, diffusion and mass transfer, novel technologies such as spray-drying, cryogenic processes, etc., and sensory science have attracted attention as basic concepts, by significant applications in the kitchens by cooks and chefs, too.

The present study aimed to explore the relationship between gastronomy and food science, focusing on the main cornerstones, concepts and findings; to develop a better understanding of the novel trends associated with gastronomy and food science.

Keywords: Culinary arts, food science, gastronomy

MATHEMATICAL MODEL OF SOLID-STATE YEAST AND FUNGI FERMENTATION OF WHEAT BRAN FOR ANTIOXIDANTS PRODUCTION

Lavinia Florina CĂLINOIU^{1,2}, Amalia-Silvia NEMES², Francisc-Vasile DULF³, Eva DULF⁴, Ioana Delia POP⁵, Floricuta RANGA¹ and Dan Cristian VODNAR^{1,2*}

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

² Institut of Life Sciences, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

³ Faculty of Agriculture, Department of Environmental and Plant Protection, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

⁴ Department of Automation, Faculty of Automation and Computer Science, Technical University of Cluj-Napoca, Memorandumului Str. 28, 400014 Cluj-Napoca, Romania

⁵ Department of Exact Sciences, Horticulture Faculty, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

*Corresponding author, e-mail: dan.vodnar@usamvcluj.ro

Introduction: Cereals' wastage rate is at 30% (286 million tonnes) from the total production, whereas wheat bran is the most abundant¹, having great nutritional and bioactive properties, but perceived as waste, and therefore discarded.

Aims: In the present study, bioprocessing with two microbial strains including yeast (*S. fibuligera*) and filamentous fungus (*A. niger*) was optimized via mathematical model for antioxidants fortification of wheat bran.

Materials and Methods: The ultrasound-assisted methanolic extracts were analysed via analytical and biological assays. Statistical analyses were performed with IBM SPSS Statistics 19. The response surface method was used for evaluating various operating conditions and determining the optimal parameters for the solid-state fermentation process in antioxidants production.

Results: Mathematical model for both strains highlighted as main predictors for antioxidant activity the phenolic compounds, such as vanillic acid, apigenin-glucoside, vanillin, ferulic acid, and the fermentation time.

Conclusion: The mathematical model in bioprocess is an emergent tool for optimization and validation, supporting the technological transfer from academia to market.

Keywords: bioactive compounds, bioprocess, optimization

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NUTRACEUTICALS SCIENCE: BIOACTIVE COMPOUNDS, FOOD AND DATABASE

Alessandra DURAZZO*

CREA – Research Centre for Food and Nutrition, Via Ardeatina 546, 00178, Rome, Italy

*Corresponding author, e-mail: alessandra.durazzo@crea.gov.it

Beside the nutritional function, the components of the diet have potential beneficial properties: this has led to an increase in the perception of foods as functional and nutraceutical.

Generally, studies examining the relationship between diet and health have led to a growing interest in all the biologically active components found alongside the nutrients in foods. At the same time new nutrient characteristics are considered and the boundary between nutrients and bioactive compounds is explored.

Bioactive compounds are defined as compounds that occur in nature and are part of the food chain. They have the ability to interact with one or more components of the living tissue, by showing an effect on human health. The combined and concerted action of nutrient components and biologically active compounds is flagged as indicator of a "possible beneficial role" for health. The use and applications of bioactive components cover a large range of fields, in particular nutraceuticals ones.

In this context, the need of bioactive compounds categorization as well as the implementation of specific and dedicated databases is emerging, based on both analytical and collected data, and is carried out through a harmonized and standardized approach.

Databases, also called electronic databases, represent a system to collect any data, information and documentation specially organized for rapid search and retrieval by a computer. Databases are tools structured to facilitate the storage, retrieval, modification, and deletion of data in conjunction with various data-processing operations.

Food composition database and dedicated databases can serve as open source and represent an update source of information and tools towards health, i.e. in epidemiological research and clinical practice, in development dietary recommendations, in nutritional education and in labeling.

The seminar aims to give indications on the procedures for developing a database dedicated to bioactive molecules. The main lines for the development of a dataset dedicated to a target compound or a class of compounds will be defined. Examples of datasets of particular functional compounds, will be described and an overview of the main harmonized databases at European and/or international level will be outlined.

Keywords: bioactive compounds, database, functional, nutraceutical

VALORIZATION OF AGRI-FOOD WASTE PRODUCTION AND MANAGEMENT: CHALLENGES AND OPPORTUNITIES OF GREEN ECONOMY AND BIOREFINERY

Massimo LUCARINI*

CREA-Research Centre for Food and Nutrition, Via Ardeatina 546, 00178, Rome, Italy

**Corresponding author, e-mail: Massimo.lucarini@crea.gov.it*

Nowadays, the recovery of these substances from agri-food waste represents a great challenge. The residues produced by the various supply chains are characterized by a high intrinsic value given the content of bioactive molecules which, properly extracted and purified, could be reintroduced in different production cycles. The development and innovation of technologies for the recovery of molecules of nutritional/nutraceutical interest from by-products and waste of agri-food and industrial production chains has the dual objective of recovering otherwise unused or underused valuable components and favoring the development of targeted innovative supply chains to the strengthening of the local/circular economy.

With the growing demand for energy, increasing greenhouse gas emissions and the depletion of fossil fuels, biomass emerges as a key renewable energy source to overcome humanity's current and future needs. To maximize the use of biomass and to minimize waste and emissions associated with the conversion of bioenergy products, the concept of biorefinery has been applied to efficiently and sustainably produce value-added compounds and increase the eco-compatibility of the agri-food system.

The seminar will illustrate the problems associated with the use and enhancement of agro-food biomass, highlighting, with some case studies, how scientific research plays a key role in the ecological transition of society through a multidisciplinary and integrated approach.

Keywords: bioactive molecules, circular economy, waste

EVALUATION OF RECENT NANO-DELIVERY SYSTEMS FOR CITRUS ESSENTIAL OILS AND BIOACTIVE COMPOUNDS

Ioana OPREA (TRANDAFIR)¹, Zorița Maria DIACONEASA¹, Sonia Ancuța SOCACI^{1*} and Cristina COMAN^{1*}

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: sonia.socaci@usamvcluj.ro, cristina.coman@usamvcluj.ro

Introduction: Citrus essential oils have important economic value due to the numerous health promoting benefits and their potential in food preservation. The acute problem concerning essential oils in general is their sensibility to temperature, light and pH changes. Nano-delivery systems gained lots of attention in past years research due to their impressive properties like cellular internalization, possibility of controlled release and improvement of bioactive compound properties. Recent encapsulation techniques for citrus essential oils are focused on nano-delivery systems, and progress in this area can lead to alternative healthcare possibilities, smart food packaging and innovative food preservation methods.

Aims: This study aimed to review citrus essential oils encapsulation techniques from last 10 years, in order to establish the advantages and the drawbacks of the methods in terms of efficiency in antibacterial activity.

Materials and Methods: The tools used in this research were Scopus and Web of Science databases.

Results: Nano-delivery systems compatible for citrus essential oil encapsulation are categorized in two major classes: lipid-based nanocarriers and polymeric-based nanocarriers. Lipid-based nano-carriers used for citrus essential oils encapsulation can be divided into nano-emulsions, liposomes, solid-lipid nanoparticles and self-nano-emulsifying drug delivery systems. The polymeric nanoparticles, can differ by the polymer used in the process or by the method used for the encapsulation process.

Conclusion: In the studied literature, the nano-emulsions are the most widely used nano-carriers for citrus essential oils. One of the strongest points of nano-emulsions is the possibility of process industrialization.

Keywords: delivery-systems, essential oils, nanocarriers, nano-emulsions,

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APPLICATION OF ANALYTICAL METHODS FOR THE COMPREHENSIVE ANALYSIS OF OLEOGELS AND THEIR APPLICATION IN FOODS

Andreea PUȘCAȘ¹, Vlad MUREȘAN^{*1} and Sevastița MUSTE¹

¹*Department of Food Engineering, Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 400372 Cluj-Napoca, Romania*

^{*}Corresponding author, e-mail: vlad.muresan@usamvcluj.ro

Introduction: Legislative limitations, consumer concerns, and environmental considerations drove innovations in fat-containing food products. Oleogelation is a novel method used for replacing controversial fats. Different edible oleogels were formulated and were used in spreads, bakeries, confectioneries, dairy and meat products. Research has produced reformulated food products with similar technological and rheological properties as the reference products. Numerous analytical methods have been conducted on oleogels, their classification being proposed based on the utility of the results. This describes the oleogel building units, the network formation, the quality of the resulting oleogel or its suitability as a food ingredient.

Aims: The conclusions drawn for some classes of oleogels and their application in food products were revisited to encourage innovative research approaches and eliminate the reluctance of food processors and consumers towards the utilization of oleogels as functional ingredients.

Conclusion: Despite the promising results, there are still no available commercial oleogel containing food products. The chemical characterization of the oleogels is resumed to the determination of the constituent fatty acids and bioactive components, the oxidation state and the oil binding capacity. Their formation can be determined by macroscopy or by the critical gelation concentration. The potential for edible application is assessed by textural analysis, the solid fat content, colorimetry, sensory analysis and digestibility tests. Researchers should further exploit the impact of processing parameters over the oleogels, their usage and the nutritional benefits should be promoted to increase the consumers' acceptance and the consumption of oleogel containing food products.

Keywords: oleogels, analysis, foods.

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STUDY OF GADOLINIUM TOXICITY ON *STEVIA REBAUDIANA*

Florina Violeta SCURTU¹, Doina CLAPA¹, Ștefania IANCU², Floricuța RANGA³, Ioana OPREA³, Sonia Ancuța SOCACI³, Loredana Florina LEOPOLD³ and Cristina COMAN^{3*}

¹ Life Sciences Institute, University of Agricultural Sciences and Veterinary Medicine, Romania

² Faculty of Physics, Babes-Bolyai University, Romania

³ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Romania

*Corresponding author, e-mail: cristina.coman@usamvcluj.ro

Introduction: Gadolinium-based contrast agents are extensively used in medical diagnosis. Since their approval in 1980's, they have become indispensable for diagnostic imaging and are currently being used in 33-50% of the magnetic resonance imaging investigations. Apart from their tremendous contribution in disease diagnostic, there are several issues related to their use. After administration, they are excreted unmetabolized and a significant amount is present in hospital effluents and, consequently, in wastewaters. Gd presence in tap water and tap water-based beverages such as Coca-Cola from fast-food franchises in big cities in Germany has been documented (Schmidt, 2019).

Aims: The aim was to assess the toxicity of Gd on *Stevia rebaudiana* grown *in vitro*, in terms of plant growth, morphology and variations of chlorophylls, carotenoids, soluble vitamins.

Materials and Methods: The measurements were carried out using high performance liquid chromatography (HPLC).

Results: The results showed that the plant length was unaffected by Gd exposure, while the root length and biomass showed statistically relevant increases. The concentrations of chlorophyll A and B, lutein, zeaxanthin, and beta-carotene increased up to 0.1 mM Gd doses, while for the highest exposures of 1 mM, the levels of all investigated analytes were significantly decreased compared to controls.

Conclusion: Such effects on the levels of antioxidant molecules can be related to the plant's stress response. More in depth information on this issue is still under investigation.

Keywords: carotenoids, chlorophylls, gadobutrol, plant growth

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MICROBIOLOGICAL RISK IN MEAT REPRESENTED BY *LISTERIA MONOCYTOGENES*

Mihaela BABII¹, Valentin NECULA², Romolica MIHAIU³, Sorin DAN^{4*} and
Marian MIHAIU⁴

^{1,4} USAMV of Cluj-Napoca

² University Transilvania of Braşov

³ University Babeş – Bolyai of Cluj-Napoca

*Corresponding author, e-mail: sorindan@usamvcluj.ro

Introduction: This research paper draws attention to the microbiological risk represented by *Listeria monocytogenes* in meat destined for public consumption concerning the time of detection and identification. The speed of detection of pathogen germs has a decisive impact on the prophylaxis and prevention measurements regarding the introduction for consumption of contaminated meat.

Aims: This study is a strong argument that aims to unveil the advantages of rapid diagnosis methods in meat microbiology, according to the standardized and classical methods.

Materials and Methods: The analyzed matrix is raw meat – a staple for the food industry. There were five different meat samples, each consisting of five other units. For each unit were used groups of negative and positive control. The samples were analyzed on three contamination levels. The conducted methods were: Horizontal method for detecting and identifying *Listeria monocytogenes* according to ISO 11290, used in parallel with a rapid diagnosis method in line with the CE Regulation nr 2073/2005, (R).

Results: The fast detection of the bacteria was completed in 48 hours from the beginning of work with samples, whereas the classical method needed 96 hours. A fast result can also be obtained from biochemical confirmations through the alternative method compared to the classical one.

Conclusion: The results prove that the research used an alternative method representing the rapid solution in meat microbiology but is in line with the classical one. The advantage of the rapidity of the analysis benefits both the food industry operator and especially the final consumer.

Keywords: classical, detection, microbiological, rapid, risk

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DIAGNOSTIC EFFICIENCY OF A RAPID ALTERNATIVE METHOD FOR THE DETECTION OF FOOD-BORNE *SALMONELLA SPP.*

Valentin NECULA¹, Mihaela BABII^{2*}, Beatrice GÎLEA³, Romolica MIHAIU⁴, Sorin DAN⁵ and Marian MIHAIU⁵

¹ University Transylvania of Braşov

^{2, 5}USAMV of Cluj-Napoca

³Bimoreieux representative

⁴University Babeş – Bolyai of Cluj-Napoca

*Corresponding author, e-mail: mihaela.babii@usamvcluj.ro

Introduction: The study reflects the effectiveness of a rapid immunoassay system for the detection of food-borne *Salmonella*, using SPT test (*Salmonella* Phage Technology). The Vidas method operates with SPT solid phase receptacles containing a protein extracted from the tail of the bacteriophage that binds to *Salmonella* antigens and forms a florescent complex identified by the Vidas system.

Aims: This method's accuracy and short analytical period make it eligible to be chosen in the present study to streamline the testing of this pathogen commonly encountered in food-borne infections. It is well known that *Salmonella spp.* has similar biochemical and antigenic features with *Cyrobacter sp.*, thus, they can be easily confused using culture media.

Materials and methods: The matrix used for the study is minced meat, contaminated with reference strains *Salmonella typhimurium* ATCC 14028 and *Citrobacter freundii* ATCC 43864, using two levels of contamination.

Results: From 20 samples tested, all of them were detected positive by the alternative method, for both contamination levels, compared to the reference method SREN ISO 6579-1/2017, by which 20 positive samples were detected for the medium level of contamination, and only 15 out of 20 for the low level of contamination of 10 UFC/g.

Conclusion: The higher efficiency of the alternative method is observed for low levels of contamination; at the same time, the method reduces the analytical time to 18 hours for a negative result, compared to 3 days required for the reference method, making it the method of choice for processors that need accurate results in a short period.

Keywords: alternative, contamination, detection, method, rapid

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HYDROLATES FOR FOOD AND HEALTH APPLICATIONS

Dana Maria COPOLOVICI^{1,2*}, Cristian MOISA², Andreea LUPITU²,
Silvia Elena MOT³ and Lucian COPOLOVICI^{1,2}

¹*Faculty of Food Engineering, Tourism and Environmental Protection
"Aurel Vlaicu" University of Arad, Romania*

²*Institute of Technical and Natural Sciences Research-Development-Innovation
of "Aurel Vlaicu" University of Arad, Romania*

³*Biomedical Sciences Doctoral School, University of Oradea, Romania*

*Corresponding author, e-mail: dana.copolovici@uav.ro

Introduction: Hydrolates or hydrosols are generated during essential oils obtained from aromatic plants, mainly through distillation. Hydrolates were used in traditional medicine as refreshing drinks and flavourings (D'Amato, 2018), and have been recently noticed for their antimicrobial activity (Marino, 2020; Šilha, 2020), both in vitro and in food matrices, against pathogenic and spoilage microorganisms, including bacteria and fungi. Their antagonistic activity could be due to their chemical composition, being mainly constituted of phenolic compounds, which can interfere with microbial membranes, cell walls, or with the action of some microbial enzymes (D'Amato, 2018).

Aims: We studied the chemical composition of several hydrolates obtained by hydrodistillation (e.g. *estragon*). We hypothesize that these by-products could behave as antioxidants.

Materials and Methods: The aerial part plants were used in a hydrodistillation system and both essential oils and hydrolates were obtained. Their chemical composition was determined by GC-MS and their antioxidant capacity by diverse assays (DPPH, ABTS assays).

Results: The chemical composition of the products obtained in the study are very similar, the hydrolates presenting a more modest concentration of the main components of the corresponding essential oils and a modest antioxidant activity.

Conclusion: We demonstrated that hydrolates could be used in the food industry.

Keywords: antioxidants, chemical composition, essential oils, hydrolates.

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PHYTOCHEMICAL SCREENING OF GLYCOSILATED AND ACYLATED PHENOLIC COMPOUNDS FROM EDIBLE SOURCES AND THEIR ANTIOXIDANT ACTIVITY

Daria Teodora POP¹, Georgiana DRETCANU¹, Bianca ENARU¹, Zorita DIACONEASA^{1,*}

¹*Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania*

*Corresponding author, e-mail: zorita.sconta@usamvcluj.ro

Introduction: Plants have clearly made their marks throughout human history. Thousands of years before discovering the antibiotics, different extracts and tinctures obtained from vegetal sources served as remedies against infections or sickness.

In the last decades, phytochemistry has been an extensively explored field. Based on the very well-known therapeutic potential, plants have become an interesting area of research worldwide. Phenolic compounds, mainly anthocyanins have been widely studied for their antioxidant potential as natural ingredients for food industry and also as preventive treatment.

Aims: In this study, phenolic compounds, from 6 vegetal sources (chokeberry, purple carrot, purple potatoes, purple corn cob, red grapes and sweet violet, were systematically identified and characterized by LC-MS analysis.

Materials and Methods: LC analysis was performed on an Agilent 1200 system (Chelmsford, MA, USA). The mass spectrometric data were obtained using a single quadrupole 6110 mass spectrometers (Agilent Technologies, Chelmsford, MA, USA) equipped with an ESI+ probe.

Results: All samples screened, were found to contain high number of phenolic compounds; the number of anthocyanins varied from 10 in chokeberry, purple carrot, purple potatoes to 18 compounds in sweet violet. Moreover, sweet violet was found to have the highest amount of cyanidin-3-glucoside (1260 mg/100 g sample) while hydroxybenzoic acid was found in highest amount in sweet violet (140 mg/100 g sample). In all of the samples analyzed the identified compounds were mainly glycosylated or acylated.

Conclusion: This work presents complete LC profiles and MS spectrometric data, obtained for the most consumed sources of phenolics daily and is the start to our new study for phenolics bioavailability and degradation *in vitro*.

Keywords: LC-MS, phenolic compounds, natural sources

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THERANOSTIC MICROCAPSULES FOR LOCAL RESVERATROL DELIVERY AND ITS POTENTIAL LASER RELEASE IN RETINA CELLS

Roxana POP¹, Madalina NISTOR¹, Daria STOIA², Raluca BORLAN², Andreea CAMPU², Adela PINTEA¹, Monica FOCŞAN², Dumitrița RUGINĂ¹

¹ *University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Mănăştur St., 400372 Cluj-Napoca, Romania*

² *Nanobiophotonics and Laser Microspectroscopy Center, Interdisciplinary Research Institute in Bio-Nano-Sciences, Treboniu Laurean Street 42, Cluj-Napoca 400271, Romania*

*Corresponding author, e-mail: dumitrita.rugina@usamvcluj.ro

Introduction. Diabetic retinopathy (DR) is one of the most severe ocular complications that cause the damage of retina. The medications currently used to minimize the consequences of DR are orally administered drugs, intraocular injections with anti-VEGF agents or corticosteroids associated with laser photocoagulation. Unfortunately, the current medications are characterized by a sum of inconvenient secondary effects that affect the patient, therefore a lot of efforts are done in order to reduce or eliminate them.

Aim. A novel model of microcapsule able to carry resveratrol (RSV) inside the core and anisotropic gold bipyramidal-shaped nanoparticles (AuBPs) between polymeric layers, that it was created for local resveratrol delivery and its potential laser - release inside human retina epithelial D407 cells.

Material and Methods. Briefly, on a CaCO₃ template having inside RSV and by the Layer-by-Layer (LbL) self-assembly technique, the alternative polymers such as the negative poly(styrene-sulfonate) (PSS) and the positive polyethyleneimine (PEI) were added. Furthermore, AuBPs – as effective intrinsic photothermal agents, were efficiently grafted in between polymers layers. Finally, on the surface of each microcapsule, the fluorescein fluorophore was attached.

Results. Thus, microcapsules with final dimensions of about 3-5 µm were obtained, according to the dynamic light scattering analysis. The fluorescence HPLC analysis revealed that RSV was loaded with a high efficiency about 90% inside the microcapsules. The capability of AuBPs to operate as effective photo-response agents by generating heat under NIR laser exposure was firstly evaluated in solution. The real-time temperature profiles as well as infrared thermographic maps were recorded with an infrared thermal imaging camera. The RSV release under NIR laser excitation was evaluated via fluorescence spectroscopy.

Despite of their sizes they were successfully internalized inside human retina pigmented epithelial D407 cells after 24h of treatment. The internalization events and localization were monitored by fluorescence microscopy due to their last layer decorated with fluorescein.

Conclusions and future aspects. Based on the data obtained, the microcapsules could be implemented as a potential self-reporting intraocular RSV delivery vehicle in a combined therapy for the management of diabetic retinopathy.

Keywords: resveratrol, gold nanoparticles, polymeric microcapsules

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SENSORIAL IMPACT OF ACTIVE COATINGS AND FILMS IN FOOD QUALITY

Mihaela-Ştefana PĂŞCUŢĂ¹ and Dan-Cristian VODNAR^{1,2*}

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania;

² Institute of Life Science, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania;

* Corresponding author, e-mail: dan.vodnar@usamvcluj.ro

Introduction: Active packaging is developing as new technology to preserve food. Despite its commercial availability, this strategy is far from being completely developed (Özdoğan and Sun, 2021). Sensory attributes (color, odor, taste, and texture) of food products are the first observed by consumers (Ross, 2021). Sensory evaluation is crucial to determine the quality of packaged food, as it is perceived through the senses of sight, smell, touch, taste, and hearing. Although both instrumental and human sensory evaluation is currently available, the use of panelists is the most effective method for predicting human perception concerning the quality of packaged food (Sun and Lu, 2021).

Materials and methods: Bibliographic research

Aims: The review is focused on recent advances in determining the impacts of active coatings and films on sensory food quality, in order to scale up the production of active coatings and films from the laboratory to the industrial scale. Sensory evaluation using human senses was critically debated for giving an overview of sensory attributes of packaged foods.

Results: Active coatings and biofilms can preserve or even improve the sensory quality of food due to antioxidant and antimicrobial activity, which delays the multiplication of microorganisms and oxidative reactions. Active compounds such as essential oils could change the sensory attributes immediately after application, but over time, they increase efficiency in maintaining sensory quality, compared to unpackaged foods. Nanotechnology has a higher potential for improving food quality compared to direct addition of active compounds in packaging matrices.

Conclusion: Active coatings and films represent a good strategy to maintain or even improve the sensory quality of food products.

Keywords: active packaging, nanotechnology, panelist, sensory attributes, sensory quality

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INVESTIGATION OF THE ENDEMIC *ASTRAGALUS EXSCAPUS* SSP. *TRANSSILVANICUS* PHISICO-CHEMICAL AND BIOLOGICAL COMPOSITION

Katalin SZABO¹, Elemer SIMON², Anita Rodica VARVARA² and Dan Cristian VODNAR^{1,2*}

¹ Institute of Life Sciences, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3–5, 400372 Cluj–Napoca, Romania

² Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3–5, 400372 Cluj–Napoca, Romania

*Corresponding author, e-mail: dan.vodnar@usamvcluj.ro

Introduction: Nowadays, the plant-derived bioactive molecules gained substantial interest in preventing or treating different non-communicable diseases. Numerous studies on phenolic compounds, flavonoids, carotenoids, and other natural metabolites indicate their health benefits in epidemiologic, clinical, and experimental trials. In the context of antibiotic resistance, and increasing world population, the urgent need to find novel and natural molecules for pharmaceutical applications is prompting the research in underexplored environments.

Astragalus exscapus is a relict species of the late Pleistocene steppe flora, a little-known plant from the Fabaceae family. The subspecies *transsilvanicus* is even lesser-known because of its special habitat rarity, however, there is a great similitude between the root system of *A. exscapus* ssp. *transsilvanicus* and *A. membranaceus*, a notorious medicinal plant originated in China.

Aim: The study aimed to investigate the physical-chemical attributes of the plant and extract the bioactive molecules from the roots of *A. exscapus* ssp. *Transsilvanicus*, more precisely, isoflavonoids like calycosin-7-O- β -D-glucoside, formononetin, calycosin, to identify and quantify the composition of the extracts by HPLC, and to test their antimicrobial activities.

Materials and Methods: Ash, dry weight, total protein content, total lipids content were determined with classic methods and ethanol:water (70:30, v/v) was used as solvent, assisted by ultrasound treatment, to extract isoflavonoids. Further, the extracts were examined by FT-IR and HPLC. Methanolic, ethanolic and water extracts were subjected to antimicrobial testing on *S. aureus*, *E. coli*, *P. aeruginosa*, *S. typhimurium*, *C. albicans*, and *C. parapsylosis* to determine the minimum inhibitory concentration (MIC).

Results: The results confirmed the hypothesis that *A. exscapus* roots contain predominantly calycosin-7-O- β -D-glucoside from the isoflavonoids class. The methanolic and ethanolic extracts showed moderate antimicrobial activities on *S. aureus* strain with a MIC of 6.25 mg/mL and 3.12 mg/mL, respectively.

Conclusion: These results suggest that *A. exscapus* has potential health benefits and further examination is needed to explore antioxidant and antiproliferative capacities.

Keywords: calycosin-7-O- β -D-glucoside, isoflavonoids, minimum inhibitory concentration, *S. aureus*

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PRINCIPLES TO OBTAIN DIGITALLY DESIGNED NOURISHMENT THROUGH 3D PRINTING

Rodica-Anita VARVARA¹, Katalin SZABO^{1,2} and Dan Cristian VODNAR^{1,2,*}

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3-5, 400372 Cluj-Napoca, România; varvara.anita@yahoo.com

² Institute of Life Sciences, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3-5, 400372 Cluj-Napoca, România; katalin.szabo@usamvcluj.ro

*Correspondence: dan.vodnar@usamvcluj.ro

Introduction: Three-dimensional printing (3DP) technology gained significance in the fields of medicine, engineering, food industry and gastronomy. 3D food printing (3DFP) has the main objective of tailored food manufacturing, both in terms of sensory properties and nutritional content. Additionally, global challenges like food waste reduction could be addressed through this technology by improving process parameters, and by sustainable use of ingredients, including incorporation of recovered nutrients from agro-industrial by-products in printed nourishment.

Aims: The aim of the present review is to highlight the implementation of 3DFP in personalized nutrition, considering the technology applied, the texture and structure of the final product, and the integrated constituents like binding/coloring agents and fortifying ingredients, to reach general acceptance of the consumer. Personalized 3DFP refers to special dietary necessities and can be promising to prevent different non-communicable diseases through improved functional food products, containing bioactive compounds like proteins, antioxidants, phytonutrients, and/or probiotics.

Conclusion: 3DFP is an expanding area of gastronomy with very diverse possibilities to branch out much further, from personalized nutritional care to tailored food products. The critical factors influencing consumer's acceptance over novel food formulations are related to the food aspect (color, shape), sensory properties (flavor, texture), nutritional composition (macro and microelements) and production costs.

Keywords: 3D food printing, binding agents, by-products, coloring agents, fortifying constituents, personalized nutrition.

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WASTE VALORIZATION AND ENZYMES PRODUCTION VIA SOLID-STATE FERMENTATION USED FOR LACTIC ACID PRODUCTION

Gheorghe-Adrian MARTĂU¹, Peter UNGER³, Roland SCHNEIDER³, Joachim VENUS³, Dan Cristian VODNAR^{1,2*} and José Pablo LÓPEZ-GÓMEZ^{3*}

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania

² Institute of Life Sciences, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania

³ Leibniz Institute for Agricultural Engineering and Bioeconomy, Max-Eyth-Allee 100, Potsdam, Germany

*Corresponding authors, e-mails: dan.vodnar@usamvcluj.ro and plopezgomez@atb-potsdam.de

Introduction: Municipal solid waste (MSW) production is expected to increase by more than 70% until 2050 from 2010 million tons in 2016. The rate of industrial waste generation is approximately 18 times higher than MSW produced in 2017 and is predicted to increase constantly in the next decade (Kaza and Yao, 2018). Enzymatic hydrolysis requires mild process conditions, is highly specific, and does not generate undesired products, making it attractive for wastes hydrolysis. On the contrary, the manufacturing of enzymes is an expensive process. Solid-state fermentation (SsF) is a green process for enzyme production because it has a low cost, high yield, and can use agro-industrial by-products.

Aims: The study aimed at (I) the use of a fungus specialized in enzymes production *via* SsF and wheat bran (WB) as a substrate; (II) the fermented substrate rich in enzymes obtained was used in the hydrolysis of MSW to increase sugars; (III) sugars rich hydrolysates were used as a substrate for lactic acid (LA) fermentation.

Materials and Methods: The experiments were conducted using *Aspergillus awamori* and *Bacillus coagulans*. The total reduction sugar, enzymatic activity, pH value and analytical tests were performed for the samples taken.

Results: Cellulase and glucoamylase activities were 73.63 ± 5.47 FPU/g_{ds} and 107.10 ± 2.63 U/g_{db} after 7 days and 5 days of SsF. During hydrolysis, glucose increased considerably with a final value of 19.77 ± 1.56 g/L. Subsequently, hydrolysates were fermented by *B. coagulans*, increasing the LA by 15.59 g/L.

Conclusion: The data reported in this study provides an example of how SsF and hydrolyses technologies can be combined to valorize WB and MSW.

Keywords: hydrolysis, lactic acid, solid-state fermentation, wheat bran

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THE CONSUMERS PREFERENCES REGARDING THE FRUITS AND VEGETABLES MARKET IN FARM TO FORK STRATEGY CONTEXT

Diana CREȚU^{1,2}, Ruxandra-Eugenia POP^{1*}, Eduard DUMITRU^{1,2} and Alexandra - Marina MANOLACHE^{1,2}

¹ Research Institute for Agriculture Economy and Rural Development, Romania

² University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

*Corresponding author, e-mail: pop.ruxandra@iceadr.ro

Introduction: One of the main objectives included in *From farm to fork strategy is to build the food chain that works for consumers, producers, climate and the environment*. To reach this objective, one of the measures implies promoting sustainable food consumption and facilitating the shift to healthy, sustainable diets (Farm to Fork Strategy Plan 2020, Ion, 2017). Thus, it is desirable the increase fruits and vegetables consumption. According to the data provided by the National Institute of Statistics, in Romania, the consumption of vegetables and fruits remains low, although positive changes can be noted in recent years. For example, in 2019, 170 kg of vegetables and vegetable products and 111 kg of fruits and fruit products were consumed annually by a person (INSSE database).

Aims: The purpose of the research is to determine the preferences of the Romanian consumer of fruits and vegetables, both for fresh fruits and vegetables and for the agri-food products obtained from the fruits and vegetables processing.

Materials and Methods: To outline an overview of the existing demand on the fruits and vegetable market and to determine the Romanian fruits and vegetables consumers profile, quantitative research was conducted. The SPSS program was used to interpret the obtained data.

Results: This paper presents the main results of the quantitative research regarding the preferences identified in Romania's fruits and vegetables market.

Conclusion: We can briefly outline the consumer profile of vegetables and fruits, important both for the economic agents and the decision and policymakers.

Keywords: consumers behaviour, fruits and vegetables, From farm to fork, quantitative research

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EFFECT OF FROZEN STORAGE AND VISCOELASTIC PROPERTIES OF DOUGH FERMENTED WITH SELECTIVE CULTURES

Bernadette-Emoke TELEKY¹, Gheorghe Adrian MARTĂU^{1,2}, Laura MITREA¹, Katalin SZABO¹, Lavinia-Florina CĂLINOIU^{1,2}, Amalia NEMEȘ^{1,2}, Mihaela PĂȘCUTĂ², Diana PLĂMADĂ², Floricuța RANGA², Ioana Delia POP³, and Dan Cristian VODNAR^{1,2*}

¹*Institute of Life Sciences, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania;*

²*Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania;*

³*Department of Exact Sciences, Horticulture Faculty, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania;*

*Correspondence: dan.vodnar@usamvcluj.ro

Introduction: Sourdough in bread manufacturing comprises a constant network of protein matrices where every cell is appropriated, enabling the viscoelasticity required for high-quality bread production. Baker's yeast and lactic acid bacteria are specially used for dough leavening during fermentation and provide an increased malleability, elasticity, bread volume, preservation, and are good flavoring agents.

Aims: The current study analyzed the effect of wheat flour (WF) enriched with soy flour (SF), during 72 hours of fermentation, with selective cultures and the impact of frozen storage on the obtained sourdoughs.

Materials and Methods: Three sourdough formulations were developed with 100% WF, 95% WF+5%SF, and 90%WF+10% SF. These were subjected to fermentation with single and co-cultures of *Lactobacillus florum* (Lf) and *Saccharomyces cerevisiae* (Sc). The viability, pH, organic acid and secondary metabolite production, and rheological properties (before and after frozen storage) were evaluated through the fermentation process.

Results: The selected cultures presented enhanced growth dynamics during fermentation, and a decreased acidification rate was also observed. Through fermentation, carbohydrates decreased, and organic acid production was increased. In addition, Sc produced ethanol, and in single cultures with both microorganisms, erythritol (important polyol) was also identified in low amounts.

Conclusion: SF addition improved sourdough's functional properties and positively affected the viscoelastic behavior before and after frozen storage.

Keywords: *frozen dough; Saccharomyces cerevisiae; Lactobacillus florum; rheological property; organic acids*

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SUSTAINABLE STRATEGIES: A STEM ENTREPRENEURIAL APPROACH ON FOOD SCIENCE AND TECHNOLOGY

Andrei BORȘA^{1*}, Anca Corina FĂRCAȘ¹, Sonia Ancuța SOCACI¹, Liana-Claudia SALANȚĂ¹, Ionut Calin CAZAN² and Ovidiu-Aurel GHIUȚĂ³

¹ Faculty of Food Science and Technologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Business, Babes-Bolyai University, Cluj-Napoca, Romania

³ Faculty of Food Engineering, Ștefan cel Mare University of Suceava, Romania

*Corresponding author, e-mail: andrei.borsa@usamvcluj.ro

Introduction: STEM education integrates into the curriculum teaching of science, technology, engineering, and mathematics. The disciplines that support STEM education are important because they provide students with basic scientific knowledge and specialised skills, especially for those who will work in engineering and in all economic branches that require innovation and technological progress in an ever more growing focus on sustainable development economy.

Materials and Methods: The specifics of STEM teaching style, the skills and competencies required for entrepreneurship and food science and technology were reviewed and correlated. Examples of sustainable waste and by-products valorisation technologies and their shortcomings were presented and analysed.

Results: STEM teachings are important because they make a significant contribution to the form of actionable skills (critical and creative thinking, problem-solving, risk mitigation, failure and uncertainty management, decision making and willingness to experiment), which are closely related to the future of the labour market because they do not depend on the acquisition of knowledge and the formation of specialised skills.

Additionally, emerging technologies require lab-scale pilot plants to prove the integrated efficiency and entrepreneurs to scale them up as businesses, which basically demand that academia adapt and collaborate with the government and economic partners.

Conclusion: Soon, more and more focused on technology and circular economy, STEM education, entrepreneurship and food science and technology will have to harmonise with each other to set the innovation in motion.

Keywords: entrepreneurship; food science; STEM; waste

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BIOTECHNOLOGICAL PROCESSES SIMULATING THE NATURAL FERMENTATION PROCESS OF BEE BREAD

Daniel Gabriel BARTA¹, Rodica MĂRGĂOAN² and Dan Cristian VODNAR^{1*}

¹*Department of Food Science, University of Agricultural Sciences and Veterinary Medicine, Mănăştur 3-5, 400372 Cluj-Napoca, Romania.*

²*Advanced Horticultural Research Institute of Transylvania, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania.*

*Corresponding author, e-mail: dan.vodnar@usamvcluj.ro

Recent progress in functional foods and nutraceuticals highlighted the beneficial impact of bioactive molecules on human health and longevity. As a result of the fermentation process, an increasing interest is developed in bee products. Bee bread or ambrosia is a different product for consumption by humans and bees, resulting from bee pollen's lactic fermentation in the honeycombs, being also a rich source of polyphenols, nutrients (vitamins and proteins), fatty acids and minerals. Bee bread conservation is related to the bacteria metabolites, mainly produced by *Pseudomonas spp*, *Lactobacillus spp*, and *Saccharomyces spp*, which give lactic acid bacteria the ability to outperform other microbial groups. The fermentation process, as a consequence of enzymatic transformations, increases the content of new compounds. When the fermentation process is completed, the significant content of lactic acid and other metabolites prevents the actions of damage caused by various pathogens that could influence the quality of bee bread.

Over the last few years, there has been an increase in the development of bee pollen fermentation processes as an alternative to nutritional and functional supplements. As a consequence of enzymatic changes, the fermentation process enhances bee bread components and preserves them against loss of characteristics. In this context, the present review aims to describe the current biotechnological progress that has been made in the production of bee bread rich in beneficial components derived from bee pollen fermentation. The use of the chosen starters improved the bioavailability and digestibility of minerals and bioactive substances naturally found in bee pollen.

Keywords: bee bread, bee pollen, solid-state fermentation, lactic acid bacteria, natural product

Acknowledgement: This work was supported by the National Research, Development and Innovations Programme for 2015-2020-PNII, developed with the support of UEFISCDI (Projects No. PN-III-P1-1.2-PCCDI-2017-0056 (2PCCDI) and PN-III-P1-1.1-TE-2019-0067 (TE 55/2020)).

THE PRODUCTION OF ORGANIC ACIDS BY MEANS OF OLEAGINOUS YEAST STRAINS FROM AGRO-INDUSTRIAL-DERIVED SUBSTRATES

Laura MITREA¹, Alexandru RUSU², Francisc-Vasile DULF³, and Dan-Cristian VODNAR^{1*}

¹ Faculty of Food Science and Technology, Life Science Institute, University of Agricultural Sciences and Veterinary Medicine, Cluj Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania;

² CENCIRA Agrofood Research and Innovation Centre, 6/66 Ion Mester Street, 400650 Cluj-Napoca, Romania;

³ Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania;

* Corresponding author, e-mail: dan.vodnar@usamvcluj.ro

Introduction: Organic acids such as citric and succinic acids are well-known bulk chemicals with food industry applicability produced in massive quantities worldwide and obtained particularly using microbial fermentations. Both citric and succinic acids can be obtained in large amounts by specific strains from industrial wastes, like crude glycerol that results from biofuels manufacturing. Most *Yarrowia* and *Candida* species grow efficiently on glucidic and fat substrates and, at the same time, biosynthesize valuable organic acids like citric and succinic acids.

Aims: The present work aims to assess the ability of *Yarrowia lipolytica* to use agro-industrial wastes like used cooking oil as the main nutrient source in the production of citric and succinic acids.

Materials and methods: The experimental work consisted of used cooking oil fermentation at lab scale bioreactor, at a constant temperature, rotations, and pH. The yeast cells' viability, substrate consumption, and organic acids production were monitored throughout the experiment.

Results: The adaptation capacity and the growth of *Y. lipolytica* cells in media containing used cooking oil were noticeable. Important results concerning the microbial bioconversion of used cooking oil into citric and succinic acids were registered.

Conclusion: Agro-industrial wastes such as waste cooking oil derived from the food sector represent a valuable source of nutrients for yeast strains like *Y. lipolytica*, which can further bio-synthesize important chemical compounds such as citric, and succinic acids.

Keywords: organic acids, fermentation, lipidic wastes, oleaginous strains

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SESSION 4 and 10: HORTICULTURE, FORESTRY AND GEODESY

MULTIPARENTAL POPULATIONS FOR PLANT BREEDING: DEVELOPMENT OF THE FIRST MAGIC POPULATION OF EGGPLANT AND GWAS FOR ANTHOCYANIN PIGMENTATION

Andrea ARRONES¹, Giulio MANGINO¹, Pietro GRAMAZIO², Mariola PLAZAS²,
Santiago VILANOVA¹ and Jaime PROHENS^{1*}

¹ COMAV, Universitat Politècnica de València, Spain

² IBMCP, Consejo Superior de Investigaciones Científicas-Universitat Politècnica de València, Spain

*Corresponding author, e-mail: jprohens@btc.upv.es

Introduction: Multiparental populations (MPs) are powerful tools for genome-wide association studies (GWAS) in plants. One of the most useful MPs is the multi-parent advanced generation inter-cross (MAGIC) ones, which are sets of recombinant inbred lines (RILs) involving multiple intercrossed parents. So far, no MAGIC populations have been developed in eggplant (*Solanum melongena*), one of the major vegetable crops.

Aims: Here we describe the development of the first MAGIC population in eggplant and its utility to identify genomic regions and candidate genes involved in the anthocyanin pigmentation of the vegetative tissues and fruits.

Material and Methods: We intercrossed eight parents consisting of seven cultivated accessions of eggplant and one *S. incanum* accession using a funnel approach and selfed them for three generations. The S3 MAGIC population was phenotyped for anthocyanin pigmentation in vegetative tissues (PV), fruit epidermis (FV), and for the presence of anthocyanin under the calyx (PUC) and genotyped using the eggplant 5k probes Single Primer Enrichment Technology (SPET) platform.

Results: The 7,724 SNPs in the eggplant MAGIC population (420 S3 individuals) revealed low residual heterozygosity (6.9%) and no genetic structure. However, an unbalanced representation of founder genomes was detected, suggesting cryptic selection of specific genomes. GWAS analysis allowed the association of several genomic regions involved in the traits studied and the identification of two MYB genes and a *COPI* gene as candidate genes, respectively, for anthocyanin pigmentation (PV and FV) and for the PUC phenotype.

Conclusion: In our study, we have developed the first eggplant MAGIC population, allowing its analysis for the identification of genomic regions and candidate genes associated with anthocyanin pigmentation in eggplant. This represents another proof of the great potential of MPs for genetic analysis and breeding in crop plants.

Keywords: anthocyanins, candidate genes, genome-wide association, *Solanum melongena*, SNPs

EFFECT OF UREASE AND NITRIFICATION INHIBITORS IN DURUM WHEAT CROP ON YIELD AND QUALITY (*Triticum turgidum* L. subsp. *durum*)

Dimitrios BILALIS^{1*}, Antigolena FOLINA¹, Ioanna KAKABOUKI¹, Antonios MAVROEIDIS¹, Stella KARYDOGIANNI¹, Varvara KOUNELI¹, Ioannis ROUSSIS¹, Aspasia EFTHIMIADOU², Nikolaos KATSENIOS² and Vasilis TSOUKANAS³

¹ Department of Crop Science, Laboratory of Agronomy, 75 Iera Odos Street, 118 55 Athens, Greece

² Department of Soil Science of Athens, Institute of Soil and Water Resources, Hellenic Agricultural Organization—Demeter, Greece

³ EuroChem Hellas, 249 Mesogion Street, 154 51 Athens, Greece

*Corresponding author, e-mail: bilalis@aua.gr

Introduction: Conventional agricultural has a significant role in climate change. For this reason, farmers choose more innovative practices such as fertilizers inhibitors (Folina *et al.*, 2021). Durum wheat (*Triticum turgidum* L. subsp. *durum*) is the most cultivated winter crop in the Mediterranean basin (Pampana & Mariotti, 2021).

Aims: The scope of this study is to determine the improvement of the fertilizer yield by adding nitrification (DMPSA) and urease (NBPT) inhibitors in urea in durum wheat crop.

Materials and Methods: Meridiano variety was evaluated for one growing periods through 2019–2020 under two basic fertilization (20-20-0 and 12-40-0 (+10S +Zn)). The experiments were designed according to split-plot design, 2 main plots (basic fertilization) and 7 subplots (top fertilization). The top fertilization were the various urea combination treatments (urea, urea + urease inhibitors thiophosphoric-triamide (NBPT) (UI), urea + nitrogen inhibitors 3,4-dimethylpyrazole succinic (DMPSA)) and control. Nitrogen markers, such as nitrogen use efficiency (NUE), nitrogen harvest index and nitrogen agronomic efficiency (NAE) were used to evaluate nitrogen release.

Results: The length of the inflorescences was over 20 cm for all fertilizations. Regarding basic fertilization, larger inflorescences were recorded with 12-40-0 (+10S +Zn). The grain protein content and nitrogen was higher by 1-2% under basic basic fertilization 20-20-0.

Conclusion: Grain and biomass production were increased with both fertilizers inhibitors (NBPT and DMPSA). Between two inhibitors, urease inhibitor (NBPT) yielded higher than DMPSA.

Keywords: durum wheat, DMPSA, NAE, NBPT, nitrogen management, NUE

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BIOTECHNOLOGY FOR THE CONSERVATION OF CRITICALLY ENDANGERED PLANT SPECIES: THE EXAMPLE OF *Abies nebrodensis*, A RELICT CONIFER OF SICILY

Maurizio LAMBARDI

IBE-Institute for the BioEconomy, National Research Council (CNR), Florence, Italy

*Corresponding author, e-mail: maurizio.lambardi@ibe.cnr.it

Introduction: The Madonie Fir (*Abies nebrodensis*) is a critically endangered endemic conifer of Sicily, Italy. The relic population consists of only 30 adult trees, located in the “Parco delle Madonie” (North-Central part of Sicily), spread in an area between 1400 and 1650 meters a.s.l. It is considered as Critically Endangered by the International Union for Conservation of Nature (IUCN), due to: (i) dramatic genetic erosion, (ii) poor natural regeneration, (iii) location in superficial and rocky soil, (iv) soil erosion, and (v) grazing of wild herbivores and uncontrolled cattle. For the above, in order to develop concrete actions to save the Madonie Fir from extinction, an EU LIFE project was initiated in the 2019 (LIFE4FIR, 2019) with the participation of the CNR of Italy (IPSP and IBE Institutes), the Universities of Palermo and Seville, the public bodies ‘Ente Parco delle Madonie’ and Sicily Region (Project Coordinator, Roberto Danti).

Aims: The main aim of the LIFE4FIR project is to improve the conservation status of *A. nebrodensis* by: (i) protecting the residual population, (ii) increasing the genetic diversity of the offspring, (iii) implementing a reforestation plan to restore the dynamic structure of the population, and (iv) implementing innovative strategies for the long-term ex situ conservation of organs and tissues in seed-bank and in cryobank. We report here of the preliminary results, obtained after 2 years, with the latter action of the project.

Results: The conservation of plant biodiversity in seed-banks is the classic approach for maintaining the germplasm of species characterized by gamic propagation. As for conifers, the seed represents an important and valid germplasm conservation system. However, the large presence of empty seeds, together with normal seeds, is a major problem for many conifers. Hence, in the frame of LIFE4FIR, an X-ray investigation protocol was developed to separate the full seeds from the empty seeds; this will soon allow to start implementing the seed-bank with only full and germinable seeds. Cryopreservation refers to the preservation of plant organs and tissues at the ultra-low temperature of liquid nitrogen (-196°C). Effective protocols for the cryopreservation of pollen, seeds and excised embryos of *A. nebrodensis* have been already developed, while problems are arising in the induction of embryogenic callus lines from immature embryos of this fir.

Conclusion: The strategy developed with the Madonie Fir conservation project will pave the way for similar initiatives for other critically endangered conifer species.

Keywords: *Abies nebrodensis*, cryopreservation, cryo-banks, endangered conifers, seed-banks

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MAINTAINING THE QUALITY OF MINIMALLY-PROCESSED HORTICULTURAL COMMODITIES USING SOME NATURAL TREATMENTS

Samar SHAARAWI

Fruit Handling Research Department, Horticulture Research Institute, (ARC), Egypt

*Corresponding author, e-mail: sshaarawi@hotmail.com

Introduction: Fresh-cut fruits and vegetables are a relatively new and rapidly developing segment of the fresh produce industry, and the demand is continuously increasing, being the convenience factor and health promoting benefits associated with their consumption the main reasons for such an increment (Sanchís *et al.*, 2015). Improperly preparing, packaging and handling fresh-cut produce may compromise overall quality and decrease consumer acceptability (Beaulieu and Gorny, 2002). Therefore, proper treatments are essential for maintenance of such quality (Gorny *et al.*, 2002). The common method of application of calcium compounds, such as calcium chloride (CaCl_2), is effective in maintaining the flesh firmness of fresh-cut fruit products. Calcium lactate (Ca-lactate) extends shelf-life through inhibiting loss of firmness and preventing browning. Salicylic acid (SA) exhibits a high potential in controlling post-harvest losses of horticultural crops (Asghari and Aghdam, 2010). Chitosan proved to be an effective treatment in post-harvest, and showed high activity as an antifungal agent and extension of shelf life for fresh commodities.

Aims: The aim of these studies was to evaluate the effect of some safe treatments on the quality of some minimally-processed horticultural crops.

Materials and Methods: Treatments were carried out by dipping the fresh-cut fruit and vegetables either in CaCl_2 , Ca-lactate, SA, or coating by chitosan, after which they were placed in a suitable clean plastic container and then kept in cold storage at the temperature of $5\pm 1^\circ\text{C}$. Assessment was carried out at 3 day intervals to evaluate the changes in the physical and chemical quality attributes.

Results: CaCl_2 , Ca-lactate, SA and chitosan treatments maintained a general good quality and appearance up to 12 days of storage at $5\pm 1^\circ\text{C}$, with no visible decays and off-flavor development. In particular chitosan and SA maintained less microbial load compared to other treatments and control.

Conclusion: Treatments with safe and natural substances showed the potential maintenance of quality, extension of shelf life and storage period of some horticultural fresh-cut crops.

Keywords: CaCl_2 , Ca-lactate, chitosan, fresh cut, horticultural produces, salicylic acid

THE FUTURE OF ESP CLASSES BEYOND THE PANDEMIC CONTEXT AS SEEN BY THE STUDENTS OF AGRICULTURAL SCIENCES

Carmen-Narcisa ALBERT

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania*

Corresponding author, e-mail: narcisa.albert@usamvcluj.ro

Introduction: The topic of English for Specific Purposes has been dealt with by researchers all over the world, generating a comprehensive specialized literature. However, the insertion of educational technology and educational online environment is a relatively new concept. The present article explores the main aspects of an effective and flexible online ESP learning process during the 2019-2020 academic year within the split frame generated by the pandemic context.

Aims: This study aims at setting the educational environment frame for the future of ESP classes beyond the pandemic context, from the point of view of the freshmen of Agricultural Sciences, specializing in Landscaping, Horticulture, Forestry, Engineering and Management in the Industry of Tourism, Engineering and Management of the Public Food System and Agro-tourism and Engineering and Management of Agricultural Business.

Materials and Methods: An online questionnaire of 51 items was answered by 23 students; its structure was underlined by aspects such as content and skill-related tasks, usefulness, accessibility, motivation, engagement, educational environment, media, teacher-support and assessment.

Results: The use of specialization-related materials is positively adjusted towards the online ESP classes, whereas frequency usage of skill-related tasks shows more balanced values between on-site and online ESP classes. The online environment is better suited to listening comprehension and writing tasks, while the on-site, to reading comprehension tasks. Identically distributed options are assigned to on-site&on-line in the case of attendance. In terms of schedule flexibility, the online medium is the more manageable of the two. If the combination of online exercises, specialized sites, online apps and platforms is clearly the norm for the online ESP classes, on-site assessment is evaluated as being more accurate.

Conclusion: Although the students' answers are relatively balanced, the majority agreed that the online environment is the most suitable frame for the future ESP classes.

Keywords: effectiveness, flexibility, on-site&online ESP

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VARIETIES' RESPONSE OF VEGETABLE COWPEA TO MECHANICAL INOCULATION OF COWPEA APHID-BORNE MOSAIC VIRUS (CABMV) IN BURKINA FASO

Antoine BARRO^{1*}, Joseph NANAMA², Zinmanké COULIBALY² and Zakaria DIENI³,
Mirela CORDEA⁴

¹*UFR, Applied and Technological Sciences, University of Dédougou, Burkina*

²*UFR, Life and Earth Sciences, Joseph Ki- Zerbo University, Burkina Faso*

³*Institute of Environment and Agricultural Research, BP 476, Ouagadougou/Kamboinsé, Burkina Faso*

⁴*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj Napoca, 3-5 Mănăştur Street, Cluj-Napoca, Romania*

*Corresponding author, e-mail: antoine.barro@yahoo.fr; mcordea@usamvcluj.ro

Introduction: Vegetable cowpea is eaten mainly fresh, in the form of young, immature pods, tender and sweet like the common bean (Coulibaly, 2019). However, like cowpea with seeds, vegetable cowpea experience yield losses due to the mosaic disease transmitted by aphids (Nanama, 2019).

Aims: Since its discovery, this virus has been the subject of several studies which have focused mainly on dry-seeded cowpeas, but few have focused on the conditions of resistance and adaptation of vegetable cowpea varieties to CABMV. This study aims to improve yields through the development of green cowpea varieties resistant to CABMV.

Material and Methods: The study focused on ten varieties of vegetable cowpea, carried out in a greenhouse at the Kamboinsé research station using a randomized complete block design with three replications, all inoculated with CABMV. The data collection concerned resistance parameters.

Results: Mechanical inoculation made it possible to observe various symptoms of CABMV, thus highlighting the existence of variability within the varieties tested. Strong correlations were observed between several variables. Thus the varieties of green cowpea IT85F-2089-5, UG-CP-8, IT85F-2805-5 and Telma were identified as resistant, because belonging to the low severity classes and having a low value of area under the disease progress curve. On the other hand, the varieties RW-CP-5, UG-CP-6, IT83S-911, Climbing baguette cowpea possessing a high severity class were judged to be susceptible.

Conclusion: These resistant varieties will thus be able to contribute to the improvement of production and the protection of cowpea resources in Burkina.

Keywords: CABMV, mechanical inoculation, response, vegetable cowpea

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BENEFICIAL INSECTS FOR BIOLOGICAL PEST CONTROL IN GREENHOUSE CANNABIS PRODUCTION

Gerasimos GRAMMENOS¹, Antonios MAVROEIDIS¹, Ioannis ROUSSIS¹, Ioanna KAKABOUKI¹, Alexandros TATARIDAS¹, Dimitrios BILALIS¹ and Varvara KOUNELI^{1*}

¹ Department of Crop Science, Laboratory of Agronomy, Agricultural University of Athens, Greece

*Corresponding author, e-mail: kounelivarvara@gmail.com

Introduction: Recent legislation changes have increased the interest regarding cannabis (*Cannabis sativa*) production in Greece (Folina *et al.*, 2019). Nowadays, it is a common practice to cultivate cannabis in greenhouses (Kalinowski *et al.*, 2020). Pest management in greenhouse cannabis cultivations includes the use of beneficial insects (Quarles, 2018), yet it is crucial to quantify their efficiency.

Aims: The aim of this present study was to quantify the efficiency of beneficial insects as a main method of pest management in greenhouse cannabis production.

Materials and Methods: Cannabis plants were grown in five different greenhouses, under non-optimal conditions. Beneficial insects were released only in one greenhouse in order to control pests. Measurements included the visual estimation of infestation, the recording of pest species and populations, and the comparison of infestations and yields amongst greenhouses.

Results: Our results indicate that beneficial insects could control pest populations up to 100%. Even though the environmental conditions were not optimal and consecutive pest infestations were observed throughout the duration of our study, the beneficial insects successfully managed the pest populations. Yields were also significantly affected by the presence of the beneficial insects.

Conclusion: Beneficial insects are an exceptional alternative for pest management in greenhouse cannabis production.

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Keywords: beneficial insects, *Cannabis sativa*, greenhouse, pest management

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MICROPROPAGATION OF ORNAMENTAL GESNERIACEAE SPECIES AND GENETIC UNIFORMITY ASSESSMENT OF *IN VITRO* PLANTS USING SCOT MARKERS

Monica HÂRȚA¹ and Doina CLAPA^{2*}

¹ Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

² Institute of Advanced Horticulture Research of Transylvania, University of Agricultural Sciences

*Corresponding author, e-mail: doina.clapa@usamvcluj.ro

Introduction: As a modern method of large-scale plant propagation, tissue culture has been widely used for rapid multiplication of ornamental species (Rout *et al.*, 2006). Moreover, molecular markers, such as Start codon targeted (SCoT) were used successfully to verify the genetic uniformity of regenerated plants with the mother plants. Gesneriaceae are cultivated worldwide as potted plants, and *Sinningia speciosa*, *Kohleria hirsuta*, *Streptocarpus x hybridus* and *Streptocarpus* sect. *Saintpaulia ionanthus* are recognized as having colourful and showy flowers.

Aims: The aims of this study were to determine the influences of PGR (plant growth regulators) and species upon in vitro proliferation of plantlets and to evaluate the genetic fidelity of micropropagated plants with the mother plants after the 6th subculture.

Materials and Methods: The plant material was represented by four commercial hybrid varieties of Gesneriaceae. The shoot induction was successfully achieved on Murashige and Skoog (MS) media supplemented with 0.2 mg/L indole-3-acetic acid (IAA) and 0.5 mg/L benzylaminopurine (BAP). In proliferation stage, the effects of two combinations of PGR's (V1-0.2 mg/L⁻¹ IAA + 0.2 mg/L⁻¹ BAP and V2-0.2 mg L⁻¹ NAA + 1 mg L⁻¹ BAP) on shoot number and length were examined for each species. After the 6th in vitro subculture the regenerated shoots for all of the four analyzed Gesneriads species were individually divided and were rooted on ½ MS without hormones. The regenerated plantlets were subjected to acclimatization process and then hardened in greenhouse conditions.

Results: The results of this study confirm the hypothesis that in vitro plant regeneration depends on the experimental factors, among which the species and/or analysed genotype play a key role. The generated PCR-Scot profiles for the selected in vitro-raised plants and mother plants were similar for each analysed species, which indicates the true-to-type nature of the progenies.

Conclusion: The effects of PGR on the direct shoot organogenesis of the shoots in Gesneriaceae was species dependent. The Scot molecular markers were able to demonstrate the genetic uniformity of regenerated plants with the mother plant.

Keywords: acclimatization, genetic fidelity, gesneriads, *in vitro* culture, rooting

STUDIES ON THE DYNAMICS OF *LEUCOPTERA MALIFOLIELLA* COSTA POPULATION IN CHERRY ORCHARDS IN CLUJ COUNTY

Ioana-Florina HULUJAN¹, Ionuț Bogdan HULUJAN², Teodora FLORIAN², Viorel MITRE¹, Orsolya BORSAI^{1*} and Ion OLTEAN²

¹ Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

² Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author, e-mail: orsolya.borsai@usamvcluj.ro

Introduction: *Leucoptera malifoliella* Costa is a polyphagous species, with its host plants belonging to the Rosaceae family (Béguinot, 2017). The attack of this moth is produced by the larvae which create solitary, circular, blisterlike mines in leaves consuming the mesophyll leading to early leaf drop and decreased fruit quality and yield (Gilligan *et al.*, 2014).

Aims: In 2019, the occurrence of *Leucoptera malifoliella* Costa species was reported for the first time in cherry plantations in Cluj County. Since 2021, their life cycle and population density have been surveyed by using sexually attractive pheromone traps.

Materials and Methods: The studies were carried out in the cherry orchard from Steluța farm where in May, 20 pheromone traps (with AtraSCIT pheromone) were placed across the orchard. To establish the biological cycle of the moth, the date of occurrence of each stage of pest development was followed.

Results: Adults of the hibernating generation flew from the second decade of May until the last decade of June. The maximum flight curve was reached about two weeks after the start of the flight. With the 20 traps, 1855 adults were captured. The minimum number of targeted pests in a trap was 48, while the maximum number was 149, and the average number per trap was 92.7 adults. In the first generation, oviposition, incubation, and larval development were spread over a period of 45 days, and the first pupae of the species were reported on the 22th June. The flight of first-generation adults began in the first days of July and lasted until the second decade of August.

Conclusion: *L. malifoliella* Costa was first observed in cherries in Cluj County. The sexually attractive pheromone traps had a good attractivity and selectivity, and they can be used for population monitoring and/or control actions by mass targeting of males.

Keywords: cherry, *Leucoptera malifoliella*, monitoring pheromones

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STUDIES ON THE FREQUENCY OF ATTACK PRODUCED BY *OBOLODIPLOSIS ROBINIAE* HALDEMAN IN BLACK LOCUST TREES FROM LANDSCAPED SPACES OF CLUJ-NAPOCA

Iuliu ILEA¹, Ionuț Bogdan HULUJAN¹, Teodora FLORIAN*¹ and Ion OLTEAN¹

¹Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author, e-mail: teodora.florian@usamvcluj.ro

Introduction: *Obolodiplosis robiniae* Haldeman (Diptera: Cecidomyiidae) is a monophagous species, the host plants being species of the genus *Robinia*. The gall midge is native to North America and in Europe it was first detected in Italy, in 2003, from where it spread to all European countries (Duso *et al.*, 2005). In Romania it was reported in 2007 (Bálint *et al.*, 2010). The attack of this species is produced by the larval stage and manifests itself at foliage level. After hatching, the endophytic and gregarious larvae cause changes in the structure of the parenchyma that led to the appearance of characteristic galls located at the edge of the leaflet and rolled towards its inferior side.

Aims: *Obolodiplosis robiniae* Haldeman was reported in Cluj-Napoca in 2019. In 2021, steps have been taken to monitor the frequency of attacked black locust leaves, as well as to establish the number of galls reported on a leaflet and the number of larvae in a gall.

Materials and Methods: The studies were carried out in two locations in Cluj-Napoca: on the black locust from the Simion Bărnuțiu Central Park and on the black locust from some street alignments. The frequency of the attacked leaves was evaluated. To determine the number of galls on a leaflet and the number of larvae/gall, 50 attacked leaves were randomly collected from each location and they were analyzed in the laboratory. The observations were made between June 20 and July 10, 2021.

Results: In the case of the black locust trees from the Central Park, the frequency of attacked leaves was 15% and in the case of those from the alignments, 7%. On the 50 attacked leaves taken from the Simion Bărnuțiu Central Park, there were 932 leaflets, of which 40% with galls and the leaves collected from the alignment trees had 1010 leaflets, of which 19.2% with galls. The number of galls/leaflets was between 1 and 5 in the Simion Bărnuțiu Central Park and in alignments between 1 and 4 galls. In both locations, most of the leaflets were with a single gall. The maximum number of larvae/gall was 5 on the leaflets collected from the the Simion Bărnuțiu Central Park and 3 larvae on the leaflets collected from the street alignments.

Conclusion: Black locust trees from the Cluj-Napoca landscaping are attacked by the invasive species *Obolodiplosis robiniae* Haldeman. The frequency of the attacked leaves, depending on the location, is between 7% and 15%.

Keywords: black locust, monitoring, *Obolodiplosis robiniae*

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IDENTIFICATION OF WAX PEPPER ECOTYPES (*C. annuum* L.) IMPROVED FOR ADAPTATION TO ORGANIC FARMING AND ANTIOXIDANT CONTENT

Marisa JIMÉNEZ*¹, Iván Ilich MORALES¹, Ana ADALID¹, Estela MORENO¹,
Ana María FITA¹ and Adrián RODRÍGUEZ*¹

¹*Institute for the Preservation and Improvement of Valencian Agrobiodiversity (COMAV), Polytechnic
University of Valencia, Spain*

*Corresponding author, e-mail: majipe1@posgrado.upv.es

Introduction: The effects of climate change on agriculture has boosted the development of sustainable farming systems. In addition, Spain is the world's fourth organic producer, being necessary to exploit the genotype x environment interaction to identify material adapted to low input farming. In the Spanish market, peppers are one of the most economically important vegetables, there is also a huge variability in varietal types and colours, and it is an important source of bioactive compounds such as vitamin C and flavonoids. In this regard, the pimienta blanco (i.e. wax pepper type) from the area of Alicante is a landrace with high potential for its evaluation and production under organic farming (OF) and to diversify the choice of consumers.

Aims: In the frame of a collaboration between the UPV-COMAV and the Farmers Cooperative Agrícola Villena, an initiative aimed at recovering the pimienta blanco de Villena has been developed since 2018. The content of bioactive compounds was evaluated at two different harvest times during 2019, August and September.

Materials and Methods: three local ecotypes of white pepper and several commercial and external control of wax peppers were grown under OF in Villena. Then, their contents of vitamin C, sugars and flavonoids were quantified using High Pressure Liquid Chromatography (HPLC). The obtained data was statistically analysed by ANOVA analysis.

Results: HPLC analysis showed an important variability between materials in their biochemical profile. ANOVA analysis showed a significant effect for the factors Variety, Month and their interaction in most of the analysed compounds (except for glucose, DHA and quercetin).

Conclusion: In the present research work, we determined that pimienta blanco de Villena has the potential to be improved for antioxidants or sugar content through OF.

Keywords: flavonoids, organic farming, sugars, vitamin C

Acknowledgment: This work has been financed by the project Agroecological Treasure of Villena: Obtaining Improved Local Varieties with Added Value of Carrot, Pepper and Cherry Adapted to Ecological Production in the Territory of Villena (AGCOOP_A/2018/015).

BAYESIAN RIDGE ALGORITHM FOR BRIX PREDICTION IN INDUSTRIAL TOMATO

Christoforos- Nikitas KASIMATIS^{1,2}, Evangelos PSOMAKELIS^{3,4}, Nikolaos KATSENIOS², Eleni PAPTAEODOROU⁵, Ioanna KAKABOUKI⁶, Ioannis ROUSSIS⁶, Antonios MAVROEIDIS⁶, Dimitris APOSTOLOU¹ and Aspasia EFTHIMIADOU^{2,*}

¹ Department of Informatics, University of Piraeus, Karaoli & Dimitriou 80, Piraeus, 18534, Greece

² Department of Soil Science of Athens, Institute of Soil and Water Resources, Hellenic Agricultural Organization-Demeter, Sofokli Venizelou 1, Lycovrissi, 14123 Attica, Greece

³ School of Electrical and Computer Engineering, National Technical University of Athens, 15780 Athens, Greece

⁴ Department of Informatics and Telematics, Harokopio University of Athens, 17778 Athens, Greece

⁵ KYKNOS S.A. Greek Canning Company, Pyrgos, Savalia, 27200, Greece

⁶ Department of Crop Science, Laboratory of Agronomy, 75 Iera Odos Street, 118 55 Athens, Greece

*Corresponding author, e-mail: sissyefthimiadou@gmail.com

Introduction: Tomato (*Solanum lycopersicum* L.) is considered as one of the most significant vegetables worldwide, having a variety of benefits (Kakabouki *et al.*, 2021). Improvements in technology has made Machine Learning algorithms widely known and used in agriculture as they can be used for the eradication of features from the data (You *et al.*, 2017).

Aims: The aim of this study was to implement a DSS aiming at predicting °Brix of industrial tomato based on a various data, using Days After Planting metric as the time interval.

Materials and Methods: The weather data used were extracted from National Observatory of Athens and Hellenic National Meteorological Service. To calculate the total soluble solids (°Brix), KERN Digital Refractometer was used. For the pH measurement we used ORION 188 ion analyser. The color of the tomato product was measured using Minolta Colorimeter.

Results: The predicted and the actual °Brix are not identical but both follow the same motif. This means that total soluble solids will be higher in the predicted day. The closer the score is to zero the more accurate the prediction is. The scores are less than 0.075 in all the experiments.

Conclusion: Data from previous years used as an input to the Bayesian Ridge model to make a suggestion.

Keywords: Bayesian Ridge, Decision Support Systems, tomato

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DO GREENHOUSE COVER MATERIALS AFFECT CANNABIS PERFORMANCE?

Antonios MAVROEIDIS^{1*}, Dimitrios BILALIS¹, Ioannis ROUSSIS¹, Ioanna KAKABOUKI¹, Antigolena FOLINA¹, Panayiota PAPASTYLIANOU¹ and Alekos STEFANOPOYLOS²

¹Department of Crop Science, Laboratory of Agronomy, Agricultural University of Athens, Greece

² Plastika Kritis S.A., Iraklion, Greece

*Corresponding author, e-mail: antoniosmauroeidis@gmail.com

Introduction: A major cannabis compound, cannabidiol (CBD), has been found to potentially benefit health (Kalinowski *et al.*, 2020). Due to the therapeutic properties of CBD, a heightened interest has been reported recently, regarding cannabis (Kalinowski *et al.*, 2020). In our days, greenhouse cannabis production is a common practise (Kalinowski *et al.*, 2020), thus it is essential to investigate the effects of the greenhouse types and materials on the yield and on the CBD content of cannabis plants.

Aims: The aim of the present study was to evaluate the effect of the different environmental conditions within the greenhouses on the performance, yield, and CBD content of the plants.

Materials and Methods: In our study, cannabis plants were grown in 5 greenhouses (GH1, GH2, GH3, GH4, and GH5). Each greenhouse was built with different cover materials (films), with different properties (Total Light Transmission/TLT, Diffusion/D, and UV Transmission/UVT). Measurements included plant height, PAR (Photosynthetic Active Radiation), SPAD (Soil Plant Analysis Development), Interior Light, soil and leaf temperature, number of buds, their weight, length, and CBD content, bud compact index, and the yield.

Results: The best results were reported in GH1. Two films were used for the construction of GH1, one on the interior and one on the exterior of the greenhouse. The TLT, D, and UV of the interior film were >91%, 18%, and >70% (respectively), while the respective ones of the exterior film were >91%, 18±2%, and >60%. Even though plant height and SPAD values reported in GH1 were lower in comparison to the other greenhouses, the overall performance of cannabis was better in GH1, while CBD yield was increased by 76%.

Conclusion: The environmental conditions within GH1 resulted in increased bud weight, favoured the biosynthesis of CBD, and ensured adequate yields, thus the films used on GH1 are suitable for cannabis greenhouse production.

Keywords: *Cannabis sativa*, CBD, greenhouse

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GERMPLASM CONSERVATION OF SOME SOLANACEOUS VEGETABLES USING SYNTHETIC SEED TECHNOLOGY AND CRYOPRESERVATION. A REVIEW

Ioana-Cătălina NICOLAE^{1,2}, Adrian PETICILĂ¹, Oana VENAT^{1,2*}, Costel VÎNĂTORU³ and Dorel HOZA¹

¹ Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

² Research Center for Studies of Food and Agricultural Products Quality, University of Agronomic Sciences and Veterinary Medicine, Bucharest, Romania

³ Vegetal Genetic Resource Bank – for Vegetables, Floriculture, Aromatic and Medicinal Plants Buzău, Romania

*Corresponding author, e-mail: oana.venat@qlab.usamv.ro

Introduction: The conservation of plant genetic resources is essential for food security, especially nowadays, when the risk of extinction and genetic erosion is accelerated by climate change. Besides climate change, crop uniformization, deforestation, intensive farming and pollution also put a risk on the loss of genetic resources. Because *in situ* and *ex situ* conservation technologies that requires plants to be in open field exposes the plant genetic resources to climate accidents and to the attack of various pests and diseases, *in vitro* conservation techniques prove to be valuable solutions for plant germplasm conservation.

Aims: The aim of the present study is to explain the importance of *in vitro* conservation techniques and present an overview of research that was done on conservation of several economically important Solanaceous vegetables species.

Materials and Methods: Several research and review articles, doctorate thesis on *in vitro* conservation techniques applied to Solanaceous vegetables crops, such as *Solanum tuberosum*, *Solanum melongena* and *Lycopersicon esculentum* were studied in order to appreciate how the techniques may be applied to this species.

Results: Not all species, even members of same botanical family, have the same response to *in vitro* conservation techniques. Because of this reason, no protocols can be standardized for the production of synthetic seeds and storage using cryopreservation techniques.

Conclusions: Cryopreservation has been proven to be a better solution for long term storage of plant tissues, compared to synthetic seeds, as it can preserve the tissues for longer periods of time and it does not expose the plant genetic material to somaclonal variations.

Keywords: biodiversity conservation, cryopreservation, germplasm, micropropagation, synthetic seed

INFLUENCE OF NITROGEN FERTILIZATION ON ROOT GROWTH DYNAMICS AND YIELD OF CHIA (*SALVIA HISPANICA* L.) IN GREENHOUSE POTS

Ioannis ROUSSIS^{1*}, Antonios MAVROEIDIS¹, Ioanna KAKABOUKI¹, Aspasia EFTHIMIADOU², Nikolaos KATSENIOS² and Dimitrios BILALIS¹

¹ Laboratory of Agronomy, Faculty of Crop Science, School of Plant Sciences, Agricultural University of Athens, Greece

² Department of Soil Science of Athens, Institute of Soil and Water Resources, Hellenic Agricultural Organization—Demeter, Greece

*Corresponding author, e-mail: iroussis01@gmail.com

Introduction: Chia (*Salvia hispanica* L.) is an ancient Central American crop that has recently been promoted as a functional food and known as a source of omega-3 fatty acids and nutraceuticals. Roots play a pivotal role in supplying water, nutrients, and hormones and giving mechanical support to crop plants. In addition, the use of nitrogen fertilizers can promote root growth by increasing soil nitrogen availability and enhancing crop performance as well as nitrogen use efficiency.

Aims: Limited data are available regarding the influence of nitrogen fertilization on root growth dynamics and growth performance of chia. Therefore, this study aims to evaluate the effect of different nitrogen rates on the development of the root system and productivity of chia plant.

Materials and Methods: A greenhouse pot experiment was set up in Western Greece, in the region of Agrinio, in April 2015. The experiment followed a completely randomized design (CRD), with six treatments, different rates of applied nitrogen (0, 25, 50, 75, 100 and 125 kg ha⁻¹ equivalent to 0, 134, 268, 402, 536 and 670 mg nitrogen pot⁻¹).

Results: The results of this study showed that root length density (RLD) and root mass density (RMD) increased with increased rate of applied nitrogen and the highest values (1.297 cm cm⁻³ and 1.178 mg cm⁻³, respectively) were found after the application of 670 mg nitrogen pot⁻¹ at 100 days after treatment (DAT). Plant height (106.06 cm) and leaf area per plant (883.14 cm²) were significantly affected by the highest rate of nitrogen. Additionally, dry matter and seed yield per plant were clearly affected by fertilization, with highest values (27.57 g and 4.20 g, respectively) obtained in plants treated with 670 mg nitrogen pot⁻¹.

Conclusion: The findings of the present study imply that the different rates of nitrogen fertilization influenced the development of root system, as well as the agronomic characteristics of chia plant. In conclusion, increasing the levels of applied nitrogen up to 125 kg N ha⁻¹ improves root development and therefore the yields of chia.

Keywords: chia, nitrogen fertilization, root length density, root mass density, yield

"IN-VITRO" EXPERIMENTS ON THE INFLUENCE OF HEAVY METALS ON SOIL ENZYME ACTIVITIES AND SOIL HEALTH

Klaus SCHALLER* and Karl-Hermann OSTERFELD

Department of Applied Biology. Geisenheim University, Germany

*Corresponding author, e-mail: klaus.schaller@gs-hm.de

Introduction: Soil quality/soil health is the phenomenon that has been developed to evaluate the factors effecting soil functionality. The terms are mainly used in connection with sustainable use of soil resources in terms of enhanced agricultural productivity, environmental quality and human health. The rapid development of agricultural production systems needed also a lot of organic wastes from different sources to improve soils as substitutes for manure and composts. These surrogates carry a lot of materials which are normally not part of normal agro-ecosystems mainly heavy metals. They can have adverse effects on the proper functioning of soil systems.

Aims: Taking into account that the productivity and fertility of soils should be kept for future generations of farmers and also consumers who also will have henceforth a need for high quality food. Therefore it is necessary to investigate the reaction of soils towards inputs which may be harmful for its internal foodweb and functioning.

Materials and Methods: Soil samples of the Ap horizon (0-20 cm) of a typical loess derived Mollisol were air dried, crushed and sieved (<2 mm). In subsamples enzyme activities (EA) were determined according to established methods (1): phosphatases, dehydrogenase, protease and glucosidases. Reaction of enzymes against increasing amounts of Cu, Cd, Mn and Zn was tested.

Results: Cu is used as an biocide with increasing amounts in special cultures. In the range of 0-11 ppm is no influence on EA. Between 11-110 ppm is a significant decrease which further decreases in the range 110-1100 ppm. Cd shows a similar inhibition characteristic like Cu. 35 ppm Cd seems to be a threshold value. Dehydrogenase reacts very sensitive on Cu applications. In the range > 50 ppm Cu is a steady decline in its activity. May be DHase can be used as an indicator for copper pollution.

In contrast, Zn and Mn have no effect on EA in the range 0-20 and 0-16 ppm respectively. Within higher concentration ranges both heavy metals begin to stimulate the EA. Most effective is Mn. Testing phosphatase activity with higher concentration of HPO_4^- in the test medium shows the characteristic substrate inhibition.

Conclusion: In the present research work, it can be demonstrated that increasing heavy metal loads in soils can inhibit enzyme activities, which are responsible for nutrient cycling. From the results threshold values can be deduced to save soils from adverse effects of heavy metals. In addition, these information's may help to induce a higher awareness in agriculture and also the public to reduce heavy metal inputs in arable soils.

Keywords: dehydrogenase, glucosidases, heavy metals, phosphatases, protease, soil

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ABIOTIC STRESS RESISTANCE OF THREE TOMATO LANDRACES FROM SALINE ZONES OF BIHOR COUNTY

Lia SERBAN (MLADIN)^{1,2}, Oana SICORA², Tunde JAKO², Imre VASS³,
Mirela Irina CORDEA^{1*} and Cosmin SICORA²

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

²*Biological Research Centre Jibou, Romania*

³*Institute of Plant Biology, Biological Research Center of HAS, Szeged, Hungary*

*Corresponding author, e-mail: mcordea@usamvcluj.ro

Introduction: A major constraint to global food production is the selection of crops that are better adapted to resource limited environments and soil conditions (Fiorani and Schurr, 2013). The genotypes grown under various environmental conditions will exhibit a phenotypic plasticity that is particularly big under extreme conditions such as frost, drought and salinity (Tester M., Langridge, 2010). In the past decades the research in this field was focused on the study of the effect of the abiotic stress on the plants and on the elucidation of signalling pathways that governs the appropriate and coordinated response to abiotic stress.

Aims: The purpose of this study is to identify some tolerant tomatoes landraces to salt and drought stress from saline zones of Bihor County, in North-Western Romania.

Materials and Methods: Two types of abiotic stress, salt and drought stress and its combination were applied on early stage of plant development. For comparison, the same treatment was applied to a standard tomato cultivar. Chlorophyll fluorescence of the studied plants was monitored using a PAM fluorimeter. Calculated chlorophyll fluorescence parameters (Fv/Fm, Y(II), ETR) were used for determining the photosynthetic efficiency. Leaf area and water consumption were compared under normal and experimental salt and drought set up conditions.

Results: Comparing the control with the stressed plants to salt and drought (0,2% and 0,3% salt and 20% water supply), the plants had a smaller leaf area and a reduced water consumption. Also, the root density was affected. However, the photosynthetic efficiency was less affected on the stressed landraces, indicating that the plants are resistant/tolerant to drought and saline stress.

Conclusion: In the present research work, we demonstrated that, two of the studied tomato landraces were more resistant to salt and drought stress. Considering this, these landraces could be used for initiation of a breeding program for obtaining new genotypes more tolerant to salinity that could be able to offer stable production.

Keywords: Bihor County, drought stress, salt stress, tomato landraces

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THE INFLUENCE OF ELECTRIC FIELD AND NUCLEAR RADIATION ON SPRUCE SEED GERMINATION (*Picea abies*)

Steluța M. SÎNGEORZAN, Ioan PĂCURAR, Liviu HOLONEC, Carmen N. ALBERT
and Alina M. TRUȚA*

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca,
3-5 Mănăștur St., 400372, Romania

*Corresponding author, e-mail: alina_vilcan@yahoo.com

Introduction: The spruce (*Picea abies* (L). Karst. is one of the most important tree species in Central and Northern Europe due to its high ecological malleability and economic utility (Schmidt-Vogt, 1977; Jansen, 2017).

Aims: This study focuses on assessing the spruce seed germination process under the influence of electrical energy, nuclear radiation, Ancu Dinca energy devices and various types of soil (peat, peat and humus, pearl stone and sterile in different combinations).

Materials and Methods: Three germination methods were used in order to observe spruce seeds germination potential under laboratory conditions. In the case of the first method, the seeds were subjected to the action of an electric field equal to $E=266\text{V/m}$, the exposure time being of 15, 35 and, respectively 60 minutes. In the case of the second method, the seeds were exposed to the action of nuclear radiation for 31, 46, 62 and 186 minutes. In the case of the third method, special nursery trays were used, with different soil types; they were each divided in two parts – one part was watered with energized water (Ancu Dinca energy devices) while for the other part tap water was used.

Results: The best results for seed germination under the influence of electrical energy were obtained when applying 10V for 35 minutes. When influenced by nuclear radiation (gamma radiation), the options V1 (1 Gy) and V4 (6 Gy) revealed better results as compared to the control option. In the case of the importance of soil type combined with tap water, the highest number of germinated seeds was registered for peat and pearl stone, as well as for peat and humus. When energized water was used, the best germination results were rendered by the combination of peat and pearl stone and pearl stone alone.

Conclusion: The methods employed in this study have had a major impact on germination processes and their usage will lead to higher positive values of spruce saplings taking roots and specific growth.

Keywords: electrical energy, energy, germination, nuclear radiation, soil types

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ASSESSING THE ACCURACY OF REMOTE SENSING IMAGERY FOR ORCHARDS IDENTIFICATION FROM CLUJ-NAPOCA AREA

Florica MATEI^{1*}, Ioana POP¹, Tudor SĂLĂGEAN¹, Jutka DEAK¹, Diana FICIOR¹,
Ioan LUPUȚ¹, Silvia CHIOREAN¹, Elemer ȘUBA¹ and Mircea NAP^{1,2}

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania*

²*Faculty of Geodesy, Technical University of Civil Engineering Bucharest, 122-124 Lacul Tei Blvd.,
2nd District, 020396, Bucharest, Romania*

*Corresponding author, e-mail: faldea@usamvcluj.ro

Introduction: Remote sensing is one of the most often technique used in the latest years to obtain information and perform analyzes in the field of precision horticulture. Earth Observation System through Landviewer, among other imaging services, provides a powerful tool for identifying the Earth's land cover. The question arising from here is which the accuracy of the land cover identification is (Foody, 2002).

Aims: The aim of this paper consist in obtaining thematic maps that identifies different types of land cover, and particularly the area covered by orchards, in an accurate manner, and assessing the accuracy.

Materials and Methods: The studied area is of approximately 773 km² and consists in the hilly area in the surroundings of Cluj-Napoca. Raw date were obtained from Landast5 TM (July 1991, and July 2007), with a 30m resolution and from Sentinel 2 A2L (July 2019 and July 2021) with a 10meters resolution. Most of the analysis were performed using ArcGIS software

Results: An effective decisions are based on accurate thematic maps or at least on maps with known accuracy. Using the error matrix the producers 'and users' accuracy are compared. The proper choice of the samples as a number and as geographical position allow to assess the accuracy of orchard identification and theirs spatio-temporal evolution.

Conclusion: Nowadays the imagery obtained from remote sensing are commonly used to analyse the Earth surface. Thematic maps obtained using geographical information system are very powerful tools in this type of analysis, but the most important step is to insure the assessing the accuracy of the thematic maps.

Keywords: GIS, remote sensing, thematic map accuracy

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A GIS STUDY ABOUT FOREST MANAGEMENT IN STRÂMBU BÂIUȚ

Mircea Emil NAP^{1,2}, Diana FICIOR¹, Tudor SĂLĂGEAN^{1*}, Ioana Delia POP¹, Florica MATEI¹, Iulia COROIAN¹, Jutka DEAK¹, Silvia CHIOREAN¹, Elemer-Emanuel ȘUBA¹

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Mănăștur St., 400372, Cluj-Napoca, Romania*

²*Faculty of Geodesy, Technical University of Civil Engineering Bucharest, 122-124 Lacul Tei Blvd., 2nd District, 020396, Bucharest, Romania*

*Corresponding author, e-mail: tudor.salagean@usamvcluj.ro

Introduction: Forests have a major role in preserving an environment, suitable for human life, being a very important and renewable natural resources. Because of the multiple interests of forest users, a wider range of up-to-date information is being requested in community of forestry. The study describes a geographic information system (GIS) research, based on information about a protected forest area.

Aims: The aim of this paper is to develop a management plan that lays the foundations for a long-term management of natural resources, both in favor of humans, and nature, to promote the values of biodiversity in this protected natural area, involving as much as possible the communities in the area.

Materials and Methods: GIS can be used not only to edit and display maps, but also to enhance work quality. These enhancements include an exploration of information from different types of maps, recognizing potentially problematic areas, facilitating informative public hearing, and presenting major area features. GIS has been recently applied to numerous fields, including forestry. Most GIS research works on land-use planning and forest management, relates to the establishment of databases, the expansion of mathematical models to incorporate the capabilities of spatial analyses.

Results: The results of this study reveal several features including: classification of plots by altitude, slope, exhibition, consistency of the tree, dominant species, accesibility of the plots, and identifying the areas where the snow lasts the longest.

Conclusion: GIS tehnology provides users easier acces to various informations about forest features and to visualize them through the maps. The management of this database facilitates the implementation of methods of conservation of protected forests.

Keywords: Biodiversity, GIS, Protected Area

POPULATION ANALYSIS USING GIS SOFTWARE TOOLS – CASE STUDY OF ROMANIA

Diana FICIOR¹, Tudor SĂLĂGEAN^{1*}, Ioana Delia POP¹, Florica MATEI¹, Iulia COROIAN¹, Mircea Emil NAP^{1,2}, Jutka DEAK¹, Silvia CHIOREAN¹, Elemer-Emanuel ȘUBA¹

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Mănăștur St., 400372, Cluj-Napoca, Romania*

²*Faculty of Geodesy, Technical University of Civil Engineering Bucharest, 122-124 Lacul Tei Blvd., 2nd District, 020396, Bucharest, Romania*

*Corresponding author, e-mail: tudor.salagean@usamvcluj.ro

Introduction: Population management is difficult and complex due to its dynamic and complexity. When we talk about demography, we talk about human population in a defined geographic area, meaning, demography is a spatial science. Geographic Information System (GIS) is a modern tool used in many fields, to manage attribute data and spatial data, including population management.

Aims: The aim of this study is to present the size of population for each county and urban/rural area on two different years: 2012 and 2020, and the estimation of population growth until the year of 2050.

Materials and Methods: Used for processing spatial data, ArcGIS package from ESRI, allows spatial and geostatistical analysis, mathematical calculations and the visualizations of data. Modern cartography is using GIS technologies to create maps in a more easy and flexible way. GIS can use the existing analog maps after digitizing them. Using GIS, specialists can create maps at any scale, centered on any location and showing any selected information. ArcGIS tools permit to visualize, query and overlay the data bases related to the maps.

Results: Using ArcGIS applications we determined the counties which present an increasing of population, and those presenting a decreasing of population, as well as the evolution of population in urban and rural area. In order to determine which counties are affected more by the population decline, we calculated the growth rate using the three major demographic variables: Birth, Death and Migration.

Conclusion: In conclusion, we can say that, the population in Romania has decreased in the past 8 years and is going to decrease even more in the next 30 years. This happened due to the low birth rate and high emigration rate.

Keywords: GIS, demography, statistical methods

RESEARCH ON HOW TO IMPLEMENT THE SYSTEMATIC CADASTRE WITHIN MEDIAS MUNICIPALITY, SIBIU COUNTY

Sergiu-Bogdan POP¹, Nicolae POP^{1*}, Marius MILUȚ² and Gabriel BĂDESCU²

¹ Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

² Faculty of Agriculture, University of Craiova, Romania

*Corresponding author, e-mail: nicolae.pop@usamvcluj.ro

Introduction: The paper aims to conduct a research, in order to analyze how to systematically register properties in the integrated system of cadastre and land book of buildings on the territory of three cadastral sectors belonging to the administrative-territorial unit Medias, Sibiu County.

Aims: The objective of the work is represented by the accomplishment of the systematic cadastral works in the analyzed area.

Materials and Methods: The instrument used to carry out the geodetic and topographic works necessary to carry out this project is the Leica TC (R) 407 total station, which is part of the TPS400 range.

The verification of the support network was performed both from a planimetric point of view by the method of conditioned measurements and altimetrically by trigonometric leveling at long distances. Two new points were included, the compensation of their coordinates was made by the method of indirect measurements.

Results: In the present paper, the real estate fund cadastre was made, the evidence and the systematic inventory were made, from a quantitative, qualitative and legal point of view of the 56 buildings from the 3 cadastral sectors afferent to the studied administrative-territorial unit.

Conclusion: Following the work, it is found that the method of registration in the Land Book through the Systematic Cadastre is an efficient solution and an alternative to the Sporadic Cadastre addressed at national level that facilitates field work, time and allows the determination of land areas in cadastral sectors. with better accuracy.

Keywords: immobile, cadastral sector, systematic cadastre, support network, Land Registry

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SESSION 5: ECONOMICS AND RURAL DEVELOPMENT

SUSTAINABLE MANAGEMENT THROUGH DIVERSIFICATION IN AGRIBUSINESS

Maya IVANOVA^{1*} and Gergana SLAVOVA²

¹*Department of Hospitality and Tourism, Varna University of Management, Bulgaria; Zangador Research Institute, Varna*

²*Department of Agricultural Economics, University of Economics-Varna, Bulgaria*

*Corresponding author, e-mail: maya.ivanova@vumk.eu

Introduction: Diversification as a main strategic tool contributes to risk avoidance in a highly specialized agricultural farm where everything depends on environmental factors that are almost out of direct control (e.g. natural disasters, climate conditions, crop and diseases, etc.). The balanced management of natural resources, as well as collaboration between local communities additionally contribute to achieving social, economic and environmental benefits for those regions, thus leading to long-term sustainable development.

Aims: Current study explores how diversification has influenced the management and growth of agrarian companies in the North-Eastern region of Bulgaria. Additionally, the research reveals the effects and impacts of non-agrarian activities on the sustainable development of the farms and the region as a whole.

Materials and Methods: The study adopted a qualitative approach – 10 semi-structured interviews were conducted with managers and owners of agrarian companies, who have initiated diverse non-agrarian activities. Participation was entirely voluntary and anonymous. All interviews were implemented face-to-face in the period August-October 2020. Content analysis and thematic analysis were used to process the data and outline the main findings and implications.

Results: The qualitative research has identified numerous positive outcomes from the application of non-agrarian activities, leading to more sustainable development of the farms. Improved competitiveness, economic efficiency, economies of scale and integration of innovations are among the most cited benefits stemming from diversification. Moreover, respondents shared that going beyond the regular framework contributed to their personal development, especially for the elaboration of entrepreneurial skills, strategic planning and leadership competencies. Diversification revived the local economy by increasing employment, economic growth, improved cooperation among farms and overall multiplier effect on the region.

Conclusion: Non-agrarian activities present great opportunities for the farms to diversify and reduce risk. Besides, direct and indirect effects from diversification contribute to better performance of all stakeholders and long-term sustainable development of the region.

Keywords: diversification, agribusiness, sustainable development, non-agrarian activities

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ALKALOID PRODUCTION IN CELL CULTURES OF *CATHARANTHUS ROSEUS* ELICITED WITH CYCLODEXTRINS AND JASMONATE

Felix H. ARION*

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: felixarion@usamvcluj.ro

Introduction: With Food Loss & Waste (FLW) broadly estimated at 30% of total food production, and with little to no progress on its reduction achieved in recent years, it is clear that any initiative targeting significant impact in this sector must address the main lock-in effects embedded in the current organisation and operation of the food system.

Aims: The project has set the ambitious target of playing a key role in the transition of current food systems towards halving Food Loss & Waste (FLW) by 2030 and reaching near-zero FLW by 2050.

Materials and Methods: The project is about to be implemented by a consortium of 46 entities from 15 European countries, which, for 48 months, will implement the Horizon 2020 ZeroW project ("Systemic Innovations Towards a Zero Food Waste Supply Chain"), within the call for projects "Research and innovation in support of the European Green Agreement", Call: H2020-LC-GD-2020, Topic: LC-GD-6-1-2020.

Results: Project provides significant impacts through the demonstration of innovations in nine real-life food chains, by employing a systemic innovation approach, to effectively address the multidimensional issue of FLW. This involves: (i) pre-identifying systemic innovations, that incorporate multiple interlinked dimensions (process, organisational, strategy, marketing, product, technological, governance, etc.), which are tested and demonstrated; (ii) steering the evolution of innovations towards higher levels of systemic readiness and impact, using a Living Lab co-creation and multi-actor collective learning approach; (iii) enhancing the Living Lab actors' innovation advancement capability with shared resources facilitating new ways and means of cooperating and co-developing innovations; (iv) developing context-specific trajectories for the systemic innovations (from ideation to scaling-up and commercialisation) leading to the provision of currently missing end products and services that align with consumer attitudes, food actor needs and policy trends.

Conclusion: Starting from the current situation, the project establishes a clear 'FLW impact trajectory', from demonstrator results (2025), scaled up to meet the F2F 2030 goals, and steered through a 'just transition pathway' towards a near-zero FLW in 2050.

Keywords: systemic innovation, data spaces, data-driven applications, policy recommendations, just transition, food system transformation

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RISK MANAGEMENT MECHANISMS AT THE LEVEL OF SMALL AND MEDIUM SIZE ENTERPRISES IN ROMANIA

Edith Andreea BARDUCZ*¹ and Ionel Mugurel JITEA¹

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania*

*Corresponding author, e-mail: edith-andreea.barducz@usamvcluj.ro

Introduction: As small and medium enterprises (SMEs) are the backbone of the European economy and the business-to-business (B2B) sector depends on the products and services they produce and provide, it is crucial to identify the factors that ensure their resilience (Smit and Watkins, 2012). Risk management at the SME level is a topic that deserves further attention because at present SMEs don't put enough effort to identify, assess and monitor risks (Corvini *et al.*, 2021). Agriculture is one of the most vulnerable sector because it depends a lot on climatic conditions that can be very changing. The European Commission has given significant importance to this issue by managing to identify the most common types of risk and their management measures.

Aims: It can be said that the risks in the field of agriculture are increasingly diverse. The aim of the paper is to identify the main categories of risks at the level of small and medium enterprises from rural areas in the EU and in the world. It also identifies the main important risk mechanisms to support the resilience of SMEs.

Materials and Methods: The information was collected through systematic review research. The research material is represented by the scientific publications published in the scientific databases as Science Direct or Scopus after 1990. The paper uses secondary statistic data about SMEs from the north-western Romanian development region (NUTS2) to evaluate their resilience.

Results: The types of risks identified at the level of SMEs are: business, financial, hazard, strategic, operational, supply chain, IT, development, human resources and management, environmental, and reputational risks. The most significant categories of risk in agriculture are price, production and income risk. Risk management should start at farm level, where farmers should have different strategies to stabilize their incomes.

Conclusion: At present, risk management in SMEs due to inadequate human and financial resources is unconventional, quite intuitive, fragmented, pragmatic and often implemented in a reactive manner because SMEs owners or managers are ignorant about the risks facing their enterprise.

Keywords: rural SMEs, risk, risk management

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SUCCESS FACTORS IN THE DEVELOPMENT OF AGRICULTURAL COOPERATIVES IN ROMANIA

Florin-Grigore BURZO* and Mugurel Ionel JITEA

*Faculty of Horticulture, University of Agricultural Science and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: florin-grigore.burzo@usamvcluj.ro

Introduction: The association of local rural producers can bring important positive outcomes for local communities like the integration of low-income people into the positive socio-economic activities (Wilson and Hoyt, 2011). Also, it can provide for small-size farmers economies of scale and the development of market power comparable to that of their trading partners (Valentinov, 2007). However, in Romania, like in other post socialist societies, farmers tend to be reluctant to join such associative structures (Woltz *et al.*, 2020).

Aims: The paper aims to review the literature about the association structures in Romania and in the EU. The main objective is to identify the main important success factors of such agricultural structures.

Materials and Methods: The information was collected through systematic review research in the scientific databases as Science Direct or Scopus. Primary statistical data were collected from the North-West Development Region of Romania. One case-study was selected from Bistrita Nasaud county.

Results: The results indicate that the main barriers for agricultural cooperatives development are: history of cooperatives during communism regime; lack of trust; poor funding; and current national legislation and bureaucracy. The main success factors are represented by the capacity to mobilise and attract members throughout the comparative advantages.

Conclusion: The current state of cooperatives in Romania and the difficult process of their development indicates that there is a need for new incentive measures and a more efficient management of the success and failure factors that influence their dynamics.

Keywords: cooperative, small farms, management, success

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SUSTAINABLE SOLUTIONS FOR LIMITATION OF FOOD WASTE FROM HORTICULTURE CROPS

Marian BUTU¹, Alina BUTU^{*1} and Steliana RODINO¹

¹National Institute of Research and Development for Biological Sciences, Spl. Independentei 296,
District 6, Bucharest, Romania

*Corresponding author, e-mail: alina_butu@yahoo.com

Introduction: Fruits and vegetables play an important role in human nutrition due to their vitamins, minerals, antioxidants and fiber contents being a priorities of consumers' buying options. The major problem with the preservation of fruits and vegetables is their short shelf life due to their high moisture content which leads to rapid deterioration and decomposition of these products and their undesirable appearance.

Aims: Sustainable package and covering solutions for fruits and vegetables represent a key issue to be solved for fresh consumption because, in general, under normal conditions, the fruits and vegetables dry quickly, with loss of rigidity. This paper presents research on products for food waste reduction from horticulture crops.

Materials and Methods: Ag, Zn and Cu nanoparticles were obtained by green synthesis with plant extracts. The vegetal material used was oak bark (*Quercus robur*) and the aerial parts of the parsley (*Petroselinum crispum*). Antimicrobial activity of the colloidal solutions was tested by disc diffusion method. Furthermore, the solutions were embedded in a nanocomposite biofilm for testing its protective action on vegetables.

Results: Active formulas can be applied to minimize damage to fruits and vegetables. For example, the use of biopolymer nanocomposites, of nanoparticles obtained by mediated synthesis of plant and / or microbial extracts lead to the improvement of the physico-chemical and microbiological properties of fresh fruits and vegetables and, implicitly, to the extension of their shelf life. Best results were obtained when using AgNPs solutions synthesised in *P. crispum* and ZnNPs Synthesised in *Q. robur*.

Conclusion: The use of plant based products as antimicrobials can help prevent damage to fresh fruits and vegetables and extend their shelf life.

Keywords: food waste, innovation, bioeconomy, sustainable production

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POTENTIALLY CERTIFIED AGRI-FOOD PRODUCTS IN ROMANIA NORTH-WEST AREA

Cristina CHIFOR* and Felix H. ARION

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: cristina.chifor@usamvcluj.ro

Introduction: The European Union statistics show that almost 3.400 names of agri-food products such as agricultural products and food, also covering fishery aquaculture products; wines, spirit drinks, and aromatised wine products- are being protected under the EU quality schemes. This paper aims to study one particular certification namely TSG (source: <https://ec.europa.eu>)

Aims: The main purpose of this paper is to identify the specific food products which can have the potentiality to be TSG certified amongst the N-W area. According to national statistics data in the N-W area we can find around 265 agricultural cooperatives.

Materials and Methods: In order to conduct this research, the data had been performed by using the “document analysis” which is a method of data collection. Document analysis is a form of qualitative research, in this case we use as a analyse tool the following sources: national public records, European Union statistics.

Results: Based on both collected data (National Public Records and European Union statistics) it was manage to identify the main agri-food products category that has been certified as a TSG in other European countries. In Romania the certified process is still ongoing, the agri-food sector in the N-W area annually develops products with high potentially to be certified.

Conclusion: In the present research the main advantages for TSG certified agri-food products were being presented. Some of the advantages mentioned were: to reach a fair competition for farmers and producers and to safeguard the integrity of the internal market.

Keywords: agri-food products, regional development, traditional speciality guaranteed.

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THE ROLE OF CLUSTERS IN BUILDING COMPETITIVENESS

Diana-Cosmina CHIFOR* and Felix H. ARION

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: diana.chifor@usamvcluj.ro

Introduction: Initially, clusters focused on creating a framework for cooperation between different actors from the same geographical concentration (Porter, 2009). Over time, the definition of clusters has expanded to include complex roles as a key player in the process of innovation or building competitiveness. The main objective of this paper is to identify the extent to which clusters are a factor in increasing competitiveness. It was taken as a geographical area of reference, South Africa.

Aims: The European cluster development model was the reference guide in presenting it as a feasible type of cooperation. The same steps have been taken to find the interest of South African's economic actors in establishing a reliable partnership.

Materials and Methods: It was necessary to identify the framework of cooperation between economic actors in South Africa. The research was carried out through an in-depth bibliographic study on national policies and legislation also on how they establish partnerships or trade relations. The second step focused on finding actors interested in being part of a partnership built on a European model.

Results: It could be observed that the economic actors from South Africa have created cooperative relations in a naturally informal way. Moreover, relations are based on the complementarity of the fields in which they operate. Based on a market study conducted by the Transylvanian Furniture Cluster, it was possible to observe the increased interest of economic actors in South Africa for cooperation in a formalized form that would provide them the appropriate development framework.

Conclusion: The first steps have been taken towards establishing a framework for cooperation. The next steps to be followed are part of a complex plan for setting up and operating a cluster based on the European model.

Keywords: clusters, competitiveness, cooperation

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THE ROMANIAN SOCIOLOGICAL MONOGRAPHIC SCHOOL

Mihai CUCERZAN*

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine,
3-5 Mănăştur Street, Cluj-Napoca, 400372, Cluj, Romania;*

*Corresponding author, e-mail: cvmihai@yahoo.com

Introduction: A new stage in the sociological research of the Romanian village is marked by the activity of the Monographic School from Bucharest (1921-1948). Among his "school" were Dimitrie Gusti (mentor), H. H. Stahl, Th. Herseni, A. Galopenția, M. Vulcănescu, Oct. Neamțu etc. D. Gusti's theory and method envisages the investigation of the village through "frames" (cosmological, biological, psychological and historical) and "manifestations" (economic, spiritual, judicial and political-administrative) together with the "law of sociological parallelism".

Aims: The aim of this article consists of an analysis of the activity of the monographic school of Bucharest, one of the most important European sociological schools of that period.

Materials and Methods: To achieve the objectives of this article, the method used was the analysis of the documents done in the past and who treated this subject. Document analysis is a fundamental source of social research in social sciences and, thus, in rural sociology.

Results: The sociological monograph method follows an integral study of social units (family, people, neighborhoods, household, mill, sheepfold, pub, school, church), of social relations (relations between neighbors, friends, enemies, ages and sexes) and social processes (the process of urbanization, individualization, socialization, centralization) and trends in social evolution." The "sociological monograph" was the target of extensive field research in villages in different parts of the country.

Conclusion: In conclusion, it can be said that the Monographic School in Bucharest made important contributions to the systematic knowledge of the Romanian village remaining as a model of Romanian - and European sociology of the countryside.

Keywords: monographic school, monography, rural, village.

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LEVERAGE DEVELOPMENT POINTS FOR THE TYPICAL FAMILY FARMS SPECIALISED IN CEREAL PRODUCTION FROM TRANSYLVANIA

Iulia Sorina DAN^{1*}, Adrian GLIGA², Mignon SANDOR² and Ionel Mugurel JITEA¹

¹ Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

² Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

*Corresponding author, e-mail: dan_iulia.sorina@yahoo.com

Introduction: Value chain analysis provides a rational and systematic framework for describing and evaluating the roles and relationships of people and organisations that exist in complex and dynamic systems and networks. This includes understanding the flows of materials and commodities and value-adding activities between the different parts of the value chains (Irvine, 2015).

Aims: The paper aims to identify the value chain actors for a family farm specialised in cereal production. It also the points where it can be developed to increase its overall economic sustainability.

Materials and Methods: A bibliographic study identified the main important results and application of the VCA method in European agriculture. The data used in the analysis was collected by observations and semi structured interviews.

Results: The case-study family farm has its headquarters in Bistrita-Nasaud county. It uses 50 ha of arable land mainly with cereals (wheat, triticale, oats and corn). The value chain of the farm is a simple one, with few actors: 5 main input suppliers and 3 intermediaries. After calculating the product's profit margins, it was observed that for half of the products, the profit margin is higher in the case of intermediaries, which is not beneficial to the farm.

Conclusion: Through this analysis, several levers were discovered: specialisation; vertical integration and the conglomerate diversification strategy. It can be concluded that the economic environment at the farm level is a favourable, that would increase its economic sustainability.

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Keywords: small farms, modernization, value chain analysis.

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RESEARCH ON ADAPTING CLUSTER STRATEGIES IN ROMANIA'S NORTHWESTERN REGION FOR EXCELLENCE IN CLUSTER MANAGEMENT

Florina DEIAC and Felix Horațiu ARION*

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: felixarion@usamvcluj.ro

Introduction: Clusters are tools of regional, national, and European policies to contribute to the ongoing process of development of some nations, according to national and international best practice models for clusters. Romania's northwestern region, is notable for its high-level clusters at both the national and international levels. As a result, the region has four gold medals, two silver medals, and three bronze medals to its credit.

Aims: The main objective of the research is to identify the relevant indicators for adapting the strategies of clusters in the NW region of Romania for the excellence of cluster management.

Materials and Methods: As the materials used, research included European clusters, analysis of European Union cluster policies, the study of tools that support the development of clusters, and Gold audit reports for Transylvanian Furniture Cluster, iTech Transylvania Cluster, AgroTransylvania Cluster and TREC Transylvania Energy Cluster. As research methods, analyzes were performed using the European Cluster Collaboration Platform (ECCP) and European Secretariat for Cluster Analysis (ESCA) data.

Results: The following characteristics are shared by certified clusters with the highest European distinction: a formal strategy, a specific strategy that addresses internationalization, innovation, research, development, and know-how, services targeted primarily at members, international and transnational cooperation with several countries, and national and international funding support programs. As indicated by the faster dynamics of financial metrics such as turnover, exports, innovation, the number of firms, and the number of jobs, national clusters have shown to be beneficial in coagulating industrial and regional ecosystems.

Conclusion: Cluster management excellence is the most basic tool for assessing a cluster's performance because it encompasses all factors required for the cluster's sustainability (cluster maturity, cluster structure, typology, governance and cooperation, financing, strategy, objectives and services, but also achievements).

Keywords: European policy, innovative clusters, management, region, strategy

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VISITORS MOTIVATION TO PARTICIPATE IN ADVENTURE TOURISM. A CASE STUDY OF THE ROMANIAN NATIONAL AND NATURAL PARKS

Diana E. DUMITRAS, Valentin C. MIHAI, Ionel M. JITEA, Delia DONICI and
Iulia C. MURESAN^{1*}

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca,
Romania*

*Corresponding author, e-mail: iulia.muresan@usamvcluj.ro

Introduction: National and natural parks represent perfect places for adventure tourism due to the experiences offered in unique landscapes. As an increase in demand may often lead to increased congestion with negative and sometimes irreversible effects on nature (Eagles and McCool, 2004, Huddart and Stott, 2020), it is mandatory to adopt management actions that assure balance between the needs of parks users and the conservation needs of the park. Thus, more attention is needed to research on visitors' motives.

Aims: To reveal the main motives that drive visitors to choose practicing adventure tourism in the Romanian national and natural parks as key factors in management planning.

Materials and Methods: Factor analysis was used to determine the motives of visiting the Romanian national and natural parks for adventure tourism. Data were collected using an online questionnaire applied to practitioners of adventure tourism.

Results: The analysis revealed five dimensions of motivation for tourists who choose to visit the Romanian national and natural parks for adventure tourism: nature experience and health, nature learning, leisure and recreation, photography, loyalty. The importance of each of these dimensions is discussed in relation with the visitors' socio-demographic profile.

Conclusion: Even though it is difficult to find answers to questions such as 'How to manage the park activities in an optimum manner to respond to all types of visitors', the current research proves by the findings that revealing and understanding the current motives of all type of visitors play a significant role in the sustainability of national and natural parks.

Keywords: visitors, parks, motives, behaviour

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THE IMPORTANCE OF CERTIFICATION WITH PDO AND PGI QUALITY SCHEMES: A CRITICAL ANALYSIS OF THE ROMANIAN BEEKEEPING SECTOR

Alexandra-Ioana GLOGOVETAN and Cristina Bianca POCOL*

Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine of Cluj Napoca, Romania

*Corresponding author, e-mail: cristina.pocol@usamvcluj.ro

Introduction: The Ministry of Agriculture and Rural Development defines quality schemes as "a way of recognizing the quality of agri-food products that have a sensory characteristic influenced by the geographical area" (MARD, 2021). The advantages of honey protection with the PDO and PGI quality schemes lead to the increase of the added value of Romanian honey and the increase of the consumers' credibility regarding the honey quality (MARD, 2021).

Aims: Considering that 72% of EU beekeepers are members of an association, the aim of the present study was to identify patterns within Romanian beekeepers who joined an association and to evaluate their knowledge and perceptions about honey certification with PDO and PGI quality schemes.

Materials and Methods: The research was based on a questionnaire survey, which was distributed online in Romania, during 2020-2021. The final sample consists of 433 Romanian beekeepers, out of which 59.4% are members of an association and over 15% own over 150 hives, being included in the category of professional beekeepers.

Results: The results showed that most beekeepers participating in the study recognize PDO (59%) and PGI (67,1%) logos, and some have tried to associate with other beekeepers to obtain certain quality certifications. At the same time, a correlation was identified between beekeepers who accessed support measures to increase the economic efficiency of the apiary (making business plans in this regard) and those associated with the purpose of obtaining quality certification for honey.

Conclusion: We confirmed the need to improve consultation and information sessions for beekeepers to understand the importance of honey certification with PDO and PGI quality schemes to increase their competitiveness.

Acknowledgments: The study was conducted under a project entitled «Développement durable de l'apiculture: enjeux économiques, écologiques, de développement rural et de santé publique», 2019–2021, financed by "L'Agence Universitaire de la Francophonie en Europe Centrale et Orientale".

Keywords: association, beekeepers, PDO, PGI, quality certification

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ATTITUDES TOWARDS ENTREPRENEURSHIP: A CASE OF ROMANIA

Garofița L. ILIEȘ*, Iulia C. MUREȘAN and Felix H. ARION

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: garofita.ilies@usamvcluj.ro

Introduction: Previous studies pointed out that the main factor for entrepreneurship are economic, social, behavioral, psychological or motivational (Shane and Vanketaraman, 2000; Mueller and Dato-on, 2013). Entrepreneurship education has been considered one of the key instruments to increase the entrepreneurial attitudes of both potential and nascent entrepreneurs. (Liñán *et al.*, 2011)

Aims: The aim of the current study is to identify the entrepreneurial intentions among residents of Romania.

Materials and Methods: To achieve the purpose of the study an on-line survey was conducted from march until June 2021. The survey was based on questionnaire consisted in 11 parts. The questionnaire was developed based on the model present by Francisco Liñán, 2011. Data collected are divided into 3 main categories: entrepreneurship intention, entrepreneurial knowledge and entrepreneurial relationship. In total a number of 247 questionnaires were collected. The data were analyzed using descriptive statistics and inferential statistics.

Results: This study reveal influence of the entrepreneurial knowledge, personal attitude and behaviour of entrepreneurs across Romania. Over 60% of respondents are aware that their own business may have direct implications on leisure and implicitly holidays.

Conclusion: Entrepreneurship has expanded during the last years, and there is a need to clarify which factors play the most influential role that influence the personal decision to start-up a business.

Keywords: entrepreneurship behaviour, entrepreneurship intention, entrepreneurial knowledge

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HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT OF THE PERIPHERAL RURAL AREAS. INSIGHTS FROM ROMANIA

Ionel Mugurel JITEA*

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: mjitea@usamvcluj.ro

Introduction: Higher Education Institutions (HEIs) are essential agents in providing future leaders that can successfully meet the United Nations Sustainable Development Goals (SDGs) (Žalėnienė and Pereira, 2021). In the last decade, they mainly focused on environmental issues and to a less extent in providing a clear changes in education curriculum (Sanchez-Carrillo *et al.*, 2021). Moreover, little is known about how the HEIs curriculum respond to the sustainability needs of the peripheral rural areas. They are regions where farming is difficult due to natural conditions or biodiversity management.

Aims: The paper aims to evaluate how the Romanian HEIs curriculum responds to the SDGs and to the needs of the practitioners coming from the peripheral rural areas.

Materials and Methods: The Romanian HEIs curriculum (bachelor and master) was assessed using a systematic review of the on-line sources (institutional websites; curriculum description etc). The review evaluates how the institutions integrated two SDGs: 1. Decent work and economic growth and 2. Life on Land. It also identify specific developed skills using common definitions extracted from Korn Ferry (2017).

Results: The learning activities promoted by the current curriculum only partially sustain the development of the appropriate skills needed in the peripheral rural areas. Skills like organization, cooperation, negotiation, teaching or multiculturalism are mostly missing. On the other hand, employers need graduates that can properly master interaction between land use, environment, and economy-specific for peripheral rural areas.

Conclusion: Important practical skills like self-direction, co-operation, negotiation, practical knowledge, project management or multiculturalism are mostly missing in the Romanian HEI.

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Keywords: Higher Education Institutions; Life Sciences; Skills; Sustainability.

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USING A LIFE CYCLE ASSESSMENT APPROACH TO APPLY THE CIRCULAR ECONOMY PRINCIPLES TO VINEYARDS IN RURAL AREAS

Eniko KOVACS^{1,2}, Maria-Alexandra HOAGHIA², Lacrimioara SENILA²,
Cecilia ROMAN² and Diana E. DUMITRAS^{1*}

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania.*

²*INCDO-INOE 2000, Research Institute for Analytical Instrumentation,
Cluj-Napoca, Romania*

*Corresponding authors, e-mail: ddumitras@usamvcluj.ro

Introduction: Agricultural activities, particularly viticulture, produce large amounts of biomass waste, which is an important renewable energy source that could help the EU meet its climate targets for 2030 (32% of the total energy consumption). Converting biomass waste into value-added products is in line with the concept of circular economy. In this sense, it is essential to determine the environmental sustainability of biofuels produced from vine shoot waste. Life cycle assessment (LCA) is a tool that can be used to evaluate the environmental impacts of biomass to bioenergy conversion technologies.

Aims: The purpose of this study is to evaluate, using a life cycle assessment approach, the potential environmental impacts and benefits of biofuels production from vine shoot waste in order to provide information to support future decision making regarding the fate of viticultural biomass waste.

Materials and Methods: The methodology followed the principles and the framework of a LCA, as presented in the ISO 14040 and 14044 standards. According to these standards, a LCA consists of four phases: (I) goal and scope definition; (II) life cycle inventory; (III) life cycle impact assessment and (IV) interpretation of results.

Results: The results include the outputs obtained by using the SimaPro software and show the impact on water, air and soil environmental factors generated by the biofuels production technologies, including the main resources and processes involved and the contribution of each to the impact category generated.

Conclusion: The study showed that the conversion of vine shoot waste into value added products offer environmental benefits. Besides, rural areas with large vineyards could help satisfy their domestic needs for heating and create a sustainable, resource-efficient and circular process. Further research can be extended to perform an economic analysis of the production of biofuels from vine shoot waste.

Keywords: LCA, sustainability, agricultural biomass, bioenergy

A BRIEF REVIEW OF FARMERS ATTITUDE TOWARDS DIGITALIZATION IN AGRICULTURE

Daniel LAZĂR and Diana E. DUMITRAS*

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania*

*Corresponding authors, e-mail: ddumitras@usamvcluj.ro

Introduction: Digital innovations can replace the mechanization of processes in agriculture and make a significant contribution by responding to economic, environmental and social challenges, at the same time, can increase the attitude towards digitization in a positive way across Europe (Kernecker *et al.*, 2019).

Aims: The aim of this research is to understand farmers' attitude towards digitalization in agriculture based on research performed by scholars in various European countries.

Materials and Methods: Bibliographic approach was chosen to investigate and understand farmers' perception and attitude towards digitalization in agriculture. The current research refers only to up-to-date literature.

Results: Results are discussed in terms of the knowledge, perception and attitude of farmers concerning the digitalization, as well as the barriers and factors that influence the digitalization in agriculture.

Conclusion: At farm level, smart farming is a concept of resource management, which allows the use of modern technologies with the main purpose of increasing the quantity and quality of agricultural production obtained.

Keywords: rural development, intelligence, smart farming, technology

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VIEWS ON ASSESSING THE SUSTAINABILITY OF LOCAL AGRI-FOOD CHAINS

Corina A. MARES and Diana E. DUMITRAS*

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania*

*Corresponding author, e-mail: ddumitras@usamvcluj.ro

Introduction: Ensuring the sustainability of the local agri-food chain, enabling financial security for the supplier (producer) as well as food safety for the consumer, identifying the factors that drive the activity of the chain and the barriers to the efficiency and effectiveness of a product flow from supplier to customer are ongoing challenges within the European Union for all parties involved in this process.

Aims: To understand the barriers and enabling factors concerning the sustainability of a local agri-food chain and provide a comprehensive image of the assessment tools that proved to be efficient.

Materials and Methods: A bibliographic approach was carried out focusing on studies and research projects which address this subject. The time span is from 2010 to 2020. A narrative synthesis was used to synthesize the findings.

Results: Based on the analysis carried out, it was found that sets of indicators were developed, such as economic, social, environmental, health and ethical, that made the evaluation of the sustainability of the local agri-food chain possible. Key issues related to their potential applicability on other local agri-food chains are discussed based on findings.

Conclusion: There is an increasing interest in sustainability practices in local agri-food chains. Besides elements such as the consumer willingness to pay, food quality and safety, consumption habits and respect for local traditions, the sustainability of the local agri-food chain is particularly important for the elaboration of the most effective marketing strategies for the valorisation of local agri-food products.

Keywords: market challenges, sustainability, local food

CONTRIBUTION ON THE INTEGRATION OF ECOSYSTEM'S ACTORS NEEDS

Diana MICLE* and Felix ARION

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: diana.micle@usamvcluj.ro

Introduction: Digitalization is a very important aspect and a key value to the innovation of the agricultural sector. It is very important to boost the technology adoption rate in order to stay competitive and ensure that the agrifood value chain develops resilience in front of the market changes and with a final goal in mind to increase food security.

Aims: Taking into account the former research, the goal will be to split the main objective into smaller actionable objectives, and take into account the most important steps that need to be taken in order to achieve the final goal. The major goal is to establish a framework for how the internationalisation plan will be implemented based on the skills and experience of each TRACK partner. The selected SMEs will be assisted in internationalizing their agrifood business plans. The SMEs will be coached in the process of improving their internationalisation skills. The consortium's relevant mentoring tools and methods are chosen based on the WP2 task analysis. The selected SMEs' agrifood business plans were examined in order to determine the firms' needs for internationalization.

Materials and Methods: In the following study we will find the best materials to determine which will be the best method for the SMEs selection protocol.

Results: The combined results of the study will bring to our attention the best ways that we can use to boost the agriculture ecosystem. First by mapping it's needs and afterwards by mapping our core strengths and weaknesses to figure out the best way that we can have a maximum impact on the domain. AgroTransilvania Cluster, will help SMEs to get personalized assistance in internationalizing their activities. The nine selected potential ICT SMEs will be able to utilize the same technique on their own for future internationalisation procedures.

Conclusion: The purpose of this document is to frame the work done in TRACK, which is led by the AgroTransilvania Cluster. The selected SMEs received assistance in internationalizing their agrifood business plans, based on the initial road map included in the TRACK consortium's methodology and the spotted teams' competences of the TRACK consortium's partners. An individual road map for each selected SMEs' business internationalization plan was created.

Keywords: digitalization, agri-food, smes, technology

RESIDENTS' PERCEPTIONS TOWARDS SUSTAINABLE RURAL TOURISM DEVELOPMENT

Iulia Cristina MURESAN*, Felix H. ARION, Garofița ILIEȘ, Daniel I. CHICIUDEAN
and Camelia OROIAN

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: iulia.muresan@usamvcluj.ro

Introduction: Sustainable tourism development involves economic benefits, assuring the integrity of socio-cultural aspects of the destination and environment protection (Eckert and Pechlaner, 2019). At the same time in rural area the tourism represents a development alternative, assuring employment opportunities for women and young people. However sustainable tourism development cannot occur without support of local residents.

Aims: The main aim of the paper was to analyse the residents perceptions towards tourism development from 14 territorial administrative units (13 rural and 1 urban). Secondary objectives of the study involved the analysis of current demand and supply in the research area.

Materials and Methods: For the purpose of the research a survey based on questionnaire was conducted. A total number of 286 questionnaires were applied. The questionnaire used consisted in four main parts: (I) in the first part general data regarding the attractiveness of the area were collected; (ii) the second part consisted on 49 items related to sustainable tourism development; (iii) the third part consisted in socio-demographic data. Descriptive statistics and principal component analysis was conducted to analyse the data.

Results: The results indicated that more than 35% of the residents agree that tourism development lead to the rural economy diversification, while more than 45% agree that price of proprieties in the area increased once that tourism developed. Even if the tourism activity increased during the last years in the research area the residents do not agree that the general infrastructure was improved, this being one of the main aspect that people from research are complaining about.

Conclusion: Local residents support tourism development in the research area. A local strategy should be implemented in order to develop sustainable tourism products.

Keywords: sustainable tourism development, rural area, locals perception

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ASSESSING THE RESULTS OF COMMUNITY-LED LOCAL DEVELOPMENT PROGRAM IN ROMANIA

Alexandru OLAR* and Mugurel Ionel JITEA

*Faculty of Horticulture, University of Agricultural Science and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: alexandru.olar@usamvcluj.ro

Introduction: LEADER is a rural development method based on a participative approach, which was tailored in 1991 as both an alternative and a complement to the traditional Common Agricultural Policy (CAP) aids. One of the most important objectives of the method is to reduce the differences between rural and urban areas, by building on local knowledge and potential.

Aims: The aim of the present paper is to verify whether or not LEADER stays true to those objectives, or it became a local-developed copy of the national and regional rural development programs.

Materials and Methods: The research was conducted on the 31 Local Action Groups (LAGs) from the North-West Development Region of Romania (2014-2020 programming period), using Principal Component Analysis and Hierarchical Cluster Analysis. Two types of data were collected. Indicators of performance were collected and used to assess the success of the method, while data such as the age of LAGs, number of partners and territorial characteristics were used to explain these results.

Results: The results point towards the presence of an un-equal distribution of LEADER support in favour of the most urbanized and developed areas, suggesting that the success of the method is highly dependent on the availability of private investment and on the experience and resources of Local Action Groups. Thus, LEADER fails to serve as an alternative and complementary solution to the more traditional CAP aids.

Conclusion: The situation raises questions regarding the method's capacity to create resilient rural areas and calls for a serious rethinking of the LEADER delivery approach.

Keywords: local development strategy; jobs; demographic decline; disadvantaged rural areas.

HIGHBUSH BLUEBERRY: CURRENT RESEARCH TRENDS IN MANAGEMENT AND SUPPLY CHAIN

Bogdan PUIU^{1*} and Marioara ILEA

*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

*Corresponding author, e-mail: bogdan.puiu@usamvcluj.ro

Introduction: Blueberry is a fruit belonging to the group of "superfoods" due to its antioxidant

benefits, and one of the fruits with the greatest growth in demand in the international and national market (Asănică, 2018). In 2016, the total area cultivated with blueberries in Europe was 10,388 ha, in South America 20,404 ha, Asia 16,161 ha, and North America 61,072 ha. Top 10 countries in blueberry production (million tons): USA (270), Chile (125), Canada (73), Spain (30), China (28), Argentina (18), Poland (16), Peru (16), Mexico (15), Morocco (12) (Brazelton and Young, 2017).

Aims: The aim of present review is to highlight the current research directions in assessing the supply chain and the management part of blueberry production.

Materials and Methods: A semi-systematic review method was used for this paper (Snyder, 2019). The database selected is Web of Science Core Collection. A number of three series of advanced search is conducted. In each series has been used the logical condition operators (AND, OR). As part of the search strategy, the keywords were searched for by certain tags, such as title, filed or Wos category.

Results: For a better visualization, the results were organized as a table. Following the analysis performed on all the scientific papers, it was observed that the methods used were both qualitative and quantitative, and in some cases both variants were present. The main research topics were: supply chain management, consumer perception, plantation management, as well as general issues regarding the situation of blueberry cultivation.

Conclusion: Overall, the research focus has shifted to topics related to the supply chain, consumer preferences and the workforce. For supply chain research, the main method that has been used was the interview. According to the obtained results, the researchers conducted in Romania were focused on presenting the situation of blueberry cultivation, mainly according to the area occupied and the production. Another research direction focuses on economic efficiency and sustainability.

Keywords: blueberry, consumers, rural development, supply chain

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MASTER+NW

Maria VAC¹, Marius SABAU², Ileana ANDREICA², Lucica ARMANCA²,
Valentin MIHAI², Raoul ROMAN³ and Calin VAC^{2*}

¹*Babes-Bolyai University, Cluj-Napoca, Romania*

²*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania;*

³*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania;*

* Corresponding author, e-mail: calin.vac@usamvcluj.ro

Introduction: The economic and social crisis due to the Covid-19 pandemic has changed a number of functional economic paradigms and its continuation with a new pandemic wave will certainly fundamentally change the attitude of business actors. The flexibility and adaptability of Romanian entrepreneurs to the real needs of the business environment tend to zero, and their reactions are delayed, weak and predictable.

Aims: This article aims to investigate an innovative way to restart the Romanian private economy, by rewriting economic and social paradigms to encourage the entrepreneurship, using the principle "all by ourselves".

Materials and Methods: Our analysis proposes the use of an innovative business concept, based on the creation of a self-sustaining, circular, indigenous and immune economic environment to external factors, based on the resources we have in abundance, but we are not able to capitalize properly. We called this concept MASTER+NW.

Results: Our study reveals that domestic production and consumption of domestic production should be encouraged, domestic services should be properly appreciated and consumed, own resources (material, human, financial and informational) should be used efficiently, thus creating an independent and self-sustaining (at least partially) economic and social microclimate. In this way, it would encourage entrepreneurship, innovation, creation and capitalization of new local products, would make full use of human resources (reducing unemployment) and would ensure an internal and circular circuit of money in the economy.

Conclusion: In the short term, such an approach would help entrepreneurs overcome crisis periods, consolidate their revenues and retain their employees. In the medium and long term, these benefits could create the premises for a sustainable development of the regional, or even national, business environment, stimulating domestic production, ie economic growth based on investment and domestic consumption, and not just on consumption.

Keywords: MASTER+NW, business opportunity, entrepreneurship, circular economy

THE IMPACT OF CORRUPTION ON HEALTH OUTCOMES – EMPIRICAL EVIDENCE ON EU-27

Viorela-Ligia VĂIDEAN^{1*}, Ionuț-Constantin CUCEU¹ and Decebal-Remus
FLORESCU²

¹ Faculty of Economics and Business Administration, “Babeș-Bolyai” University, Romania

² Faculty of Political, Administrative and Communication Sciences, “Babeș-Bolyai” University,
Romania

*Corresponding author, e-mail: viorela.vaidean@econ.ubbcluj.ro

Introduction: In a world threatened by increasing perceived corruption, its effects upon the health of nations have been scarcely studied, in spite of the tremendous importance sustained health has held on the European agenda.

Aims: The purpose of this presentation is to determine the impact of corruption upon health outcomes within an environmental performant and urbanised setting.

Materials and Methods: The determinants of health outcomes measured as wellbeing, life expectancy and under-5 children mortality rate are estimated on a panel data set covering the 2005-2020 time interval for the EU-27 member states.

Results: The resulting econometric models validate the significance of corruption, environmental performance and urbanisation upon health outcomes: subjectively perceived corruption hampers the development of nations' health while a clean environment with an increasing tendency of urbanisation has a positive impact upon the health outcomes of European nations.

Conclusion: In the present research work, we demonstrated that corruption has a negative impact upon health, controlling for various variables, further drawing important policy implications for improving the health status of European nations.

Acknowledgement: This work is supported by a grant of the Romanian Ministry of Education and Research, CNCS—UEFISCDI, project number PN-III-P4-ID-PCE-2020-2174, titled “Intelligent analysis and prediction of the economic and financial crime in a cyber-dominated and interconnected business world”.

Keywords: Corruption, environmental performance, health outcomes

SESSION 6: ANIMAL SCIENCE

APICULTURE

Dirk DE GRAAF^{1*}

¹ *Faculty of Sciences, Ghent University, Belgium*

* Corresponding author, e-mail: Dirk.deGraaf@UGent.be

Abstract. In this lecture I report on our recent achievements in the field of marker-assisted selection (MAS) and put this putative future approach of selection in a broader context. The complexity of apiculture and the multifactorial cause of colony losses makes a solution so long in coming. However, we are at a pivotal point where beekeeping will be redrawn with more respect for the biology of the insect and the implementation of advanced technologies. MAS can be part of this and the foundation for this is now being laid. We have discovered the genome variants associated with the key trait of resilience of honey bees to *Varroa*-mite infestation, i.e. suppressed mite reproduction. Hybrid *Varroa*-resistant/*Varroa*-sensitive bee colonies were made by 2 subsequent crossings. For the first time a whole exome sequencing approach was used in combination with elastic net regression-analysis for finding the associated single nucleotide polymorphisms (SNPs). This revealed a set of 6 risk variants or SNPs and 2 protective ones. This 8 variants-model predicted 88% of the initial phenotypes correctly. A high-throughput lab test was developed for rapid screening of the honey bee population for desired genetic profile. We are now trying to tackle some remaining challenges of MAS, one of which is the expansion of the focus to other traits related to the bees' resilience to pathogens, their behavior and productivity.

COPA COGECA: THE HOME OF EUROPEAN FARMERS

António Luís Mendonça Tavares

¹ *Chairman of the COPA-COGECA Working Group for Pork and pig meat*

* Corresponding author, e-mail: porquinhovoador@gmail.com

Abstract. COPA-COGECA is one of the largest and most active organizations in Brussels for the past 60 years. It reunites 22 million European farmers and family members and 22,000 European agricultural cooperatives. It also covers 25 agricultural sectors and has 45 Working Parties, which deal with market and policy developments.

The mission of COPA-COGECA is to ensure a viable, innovative, competitive EU agriculture and agri-food sector guaranteeing food security to half a billion people throughout Europe. It's main objective is to promote European farmers and agri-cooperatives views to influence EU decision-making process and public opinion.

At this moment, the main objective of COPA-COGECA is to promote a more sustainable, environment-friendly agriculture with better animal welfare, without jeopardizing the continuity of farmers and livestock producers.

MULTI-ACTOR FARM HEALTH ACTION PLAN DEVELOPMENT IN ROMANIAN DAIRY FARMS

Stelian BARAITAREANU^{1*}, Livia VIDU¹

¹ University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

* Corresponding author, e-mail: stelian.baraitareanu@gmail.com

Introduction: Disseminating Innovative Solutions for Antibiotic Resistance Management (DISARM) thematic network (see: <https://disarmproject.eu/>) promoted the best innovative solutions to reduce the need for antibiotics in animals. Innovative models of the Multi-Actor Farm Health Plans (MAFHP) have been designed by DISARM team for dairy, sheep, swine, and broiler farms and several countries have begun using the MAFHP. The interest in the MAFHP development in Romanian dairy farms was also manifested in Romania.

Aims: The design of the MAFHP in Romanian dairy farms by using the DISARM Project model.

Materials and Methods: Six dairy farms of different sizes were selected for the development of MAFHP. The farm biosecurity was scored by using Biocheck.UGent™ system (<https://biocheck.ugent.be/en/questionnaires/dairy-cattle-11/start-questionnaire?language=en>). The system allows for benchmarking of dairy farms and herd-specific advice for biosecurity improvements (Damiaans *et al.*, 2020). The Multi-Actor Farm Health Teams (MAFHT) for diagnosing the dairy farms' main points of improvement were organized in each farm. MAFHTs bring together the owner or manager of the farm, the farm veterinarian, and one or two agricultural consultants. MAFHP used the planning-do-check-adjust cycle.

Results: In correlation with the Biocheck.UGent™ results, specific situations were personalised in all six MAFHPs. In each farm were determined and listed goals and points of improvement. Each goal was specific, measurable, acceptable, realistic, and time-specific. The action had a project owner and an implementer, and clear deadlines.

Conclusion: All MAFHTs identified farm practices to reduce bacterial disease and the need to use antibiotics and all six MAFHPs received positive feedback.

Acknowledgements: DISARM has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 817591.

Keywords: AMR, best practices, dairy farm innovation, multi-actor farm health teams.

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REVIEW: GUIDELINES AND DIRECTIONS FOR SLAUGHTERING FISH TO ENSURE THE WELFARE AND QUALITY OF THE PRODUCT

Anca BOARU, Dănuț STRUȚI and Bogdan GEORGESCU*

Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania, EU

* Corresponding author, e-mail: georgescu.bogdan63@yahoo.com

Introduction: Harvesting and capitalizing on fish, economically speaking, represents the most important step, regardless of the species, production environment or growth system. Several harvesting techniques and methods are being used, some of them significantly influencing the quality of the product. The studies and the hands on experience have shown that the harvesting techniques and methods especially influence the characteristics of the fish while the stress has an influence on the quality of the meat. The basic principles of slaughter are similar for all animal species, and it refers to quick loss of consciousness without producing any stress, followed by death, evaluated by the loss of brain function without regaining consciousness (EFSA, 2009). In the recommendations regarding the assurance of the well being for sacrificing of the farmed fish, developed by the World Organisation for Animal Health (OIE) in the year 2019, it is mentioned that the fish need to be stunned before getting killed, and the stunning method needs to assure immediate and irreversible loss of consciousness. The following mechanical methods are recommended for this purpose: percussive stunning (manual or by using special equipment), brain puncture (Ike jime), shooting (for bigger fish) and electric stunning (in water or on land).

Aims: The stress and the influence it has upon the quality of the fish. Slaughter methods used by sport fishermen. Slaughter methods agreed by international organisms for the assurance of the well being of the fish and obtaining a quality product.

Materials and Methods: In the organism of the fish a series of biochemical processes take place as a result of the stress factor, which are being observed, agglomeration and restriction of space. The paper analyzes the specialized bibliographic materials and scientific papers that have addressed this topic.

Results: Maintaining freshness of fish represents a problem of prevention of the enzymatic activities which happen in the organism through diverse techniques which refer to stunning, slaughter, cooling, freezing, processing, getting ready to be cooked. Brain puncture or Ike-jime is one of the more humane ways of slaughter of fish, which also maintains the quality of the meat. The principle it works by is the following: the less a fish suffers before, during and after slaughter, the better the quality of the meat is (Michelin Guide).

Conclusion: Depending on the country and species of fish, there are a series of stunning and slaughter methods agreed by the OIE which are implemented or are about to be implemented.

Keywords: Ike-jime, fish, harvest, stress.

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MORPHOMETRIC MODIFICATIONS OF THREE CYPRINID SPECIES CONSERVED IN FORMALDEHYDE

Daniel COCAN¹, Radu Dan MANCAȘ¹, Radu CONSTANTINESCU¹, George MUNTEAN¹, Vioara MIREȘAN¹, Paul UIUIU¹, Călin LAȚIU^{1*}, Tudor PĂPUC^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

* Corresponding authors, e-mail: tudor.papuc@usamvcluj.ro, calin.latiu@usamvcluj.ro

Introduction: Although formaldehyde is widely used for ichthyological material preservation, a lack of information regarding its effects on the morphometry of the material was observed.

Aims: The aim of the paper is to present the morphological changes produced by the conservation of three species of cyprinids.

Materials and Methods: The conservation of the three species, spiralin (*Alburnoides bipunctatus*), Eurasian minnow (*Phoxinus phoxinus*) and common bleak (*Alburnus alburnus*) was done with formaldehyde. 40 individuals of each species were captured using angling techniques. The spiralin was captured from the Mureș river catchment, the minnows from the Someș river catchment, and the bleak from the lake number 3 of the “3 Lacuri” Complex, Câmpia Turzii. The captured specimens were transported to the Laboratory of Physiology of Aquatic Organisms, Faculty of Animal Science and Biotechnology, UASVM Cluj-Napoca. Morphometric measurements were conducted immediately after collection and before conservation, seven days after conservation, and thirty days after conservation.

Results: Some changes of the morphometric characters were observed, but with the overall preservation of the body shape. After seven days of conservation, a rehydration of the biological material extracted from the aquatic environment was observed. After thirty days, a reduction of the values of the morphological characters was observed, due to the osmosis processes.

Conclusion: Even though changes of morphological characters do occur, the body format of the three species is relatively similar, due to the same intensity of these changes throughout the whole body.

Keywords: Fish samples, morphology, preservation.

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LENGTH-WEIGHT RELATIONSHIP AND BIODIVERSITY INDICES OF FISH SPECIES IN FLOODED AREAS OF THE DANUBE DELTA IN THE SPRING SEASON

Daniel COCAN¹, Paul UIUIU^{1*}, Călin LAȚIU^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding authors, e-mail: calin.latiu@usamvcluj.ro; paul.uiuiu@usamvcluj.ro

Introduction: Every spring, the water level in the Danube Delta increases due to heavy rainfall and melting snow throughout the Danube basin and tributaries (Cocan and Mireșan, 2018). Thus, flooded areas abundant in submerged vegetation, which are dry in other seasons, appear. This is a beneficial fact, ensuring all the necessary conditions for the reproduction of most fish species in the Danube Delta (Oțel, 2007).

Aims: Our research aimed to inventory the fish species from flooded areas of the Danube Delta, during the spring season.

Materials and Methods: The fish species from these flooded areas were inventoried in the spring of 2018. The inventory areas were as follows: Canalul 36 (Chilia Arm), Tataru Canal (Chilia Arm), Ligheanca Lake, Mila 23 (Sulina Arm), Roșu Lake, Sf. Gheorghe (Sf. Gheorghe Arm), Erenciuc Canal (Sf. Gheorghe Arm), Perivolovca Canal (Sf. Gheorghe Arm). Each captured specimen was photographed, weighed, and measured. Length-weight ratios and Fulton condition factor were calculated for all fish species, and subsequently, biodiversity indices were calculated.

Results: A total of 462 fish of the following species were caught: *Rhodeus amarus*, *Blicca bjoerkna*, *Alburnus alburnus*, *Rutilus rutilus*, *Pseudorasbora parva*, *Gasterosteus aculeatus*, *Pungitius platygaster*, *Perccottus glenii*, *Ballerus sapa*, *Neogobius melanostomus*, *Misgurnus fossilis*, *Cobitis elongatoides*, *Carassius gibelio*, *Tinca tinca*, *Babka gymnotrachelus*, *Knipowitschia caucasica*, *Neogobius fluviatilis*, *Ponticola eurycephalus*, *Proterorhinus marmoratus*, *Scardinius erythrophthalmus*, *Vimba vimba*, *Perca fluviatilis*, and *Ponticola kessleri*.

Conclusion: The analysis of the obtained results in terms of fish species during the inventory of the flooded areas of the Danube Delta, emphasizes that there is great fish diversity, including in the invasive species.

Keywords: Allometry, fish species, morphometry, protected areas.

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METHODS OF IMPROVING REPRODUCTIVE PARAMETERS IN SHEEP AND THE MAIN MAJOR GENES ASSOCIATED WITH PROLIFICACY (A REVIEW)

Alexandru Marius DEAC¹, Adriana Sebastiană MUSCĂ¹, Marius Gavril AIPĂȚIOAIE^{1,2}, Viorica COȘIER¹, Marius ZĂHAN^{1*}

¹ Faculty of Animal Sciences and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

² Agricultural Research and Development Station Turda, Romania

* Corresponding author, e-mail: mzahan@usamvcluj.ro

Introduction: Farm profitability is heavily influenced by reproductive capacity. Fertility, prolificacy, and fecundity are all indicators of reproductive efficiency. Because most sheep breeds are monotocous, improving fecundity is a serious concern. Romanian indigenous rustic sheep breeds (Turcana and Tsigai) are low-prolific, producing a single lamb in most cases and twin lambs on rare occasions, equivalent to Mouflon wild sheep (Garel et al., 2005).

Aims: This review aims to study genes and the genetic means of improving sheep reproduction parameters. Different mutations in genes of the transforming growth factor- β (TGF β) superfamily have been shown to affect reproduction indices in sheep. As a result, molecular genetics and marker-assisted selection (MAS) are essential in improving reproduction efficiency. If these mutations are not present in the population, introgression of the beneficial mutations to indigenous breeds is possible. All mutations increase ovulation rate in heterozygous individuals, but depending on the nature of the mutation present within the breed, some of these can cause sterility in homozygous ewes, making them to fail in developing ovaries and follicles optimally. Studying fecundity genes is important in order to increase production efficiency and stabilizing optimal litter sizes. In this way, we can obtain knowledge about infertility and genetic disorders associated with reproduction function. Because within-breed selection has been considered relatively inefficient, due to the low heritability of the trait, crossbreeding of native breeds with prolific breeds has been the major means of genetically improving prolificacy.

Conclusion: Increasing litter size can grow profitability in lamb production, but we have to be careful when focusing on increasing the number of lambs because the optimal litter size differs between production systems, breeds, environment conditions, nutrient availability, and obtaining excessive litter sizes (>3 LB/L) under extensive management conditions, will lead to a high incidence of lamb mortality. Different studies based on whole-genome sequencing (WGS), which are called genome-wide association studies (GWAS), and also proteomic studies, transcriptome analysis, and mitochondrial DNA analysis have revealed further genetic variation with medium or minor effects on reproduction.

Keywords: Fecundity, genes, prolificacy, reproduction parameters, sheep.

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ASSESSING THE WELFARE OF BROILER CHICKENS GROW ON TWO TYPES OF BEDDING

Cristina HEGEDUS¹, Simona PAȘCALĂU*, Luisa ANDRONIE* and Ancuța ROTARU¹

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding authors, e-mail: simona.pascalau@usamvcluj.ro, luisa.andronie@usamvcluj.ro

Introduction: Optimal performance in terms of broiler growth rate focuses on monitoring and controlling microclimate parameters: temperature, relative humidity, ventilation, ammonia and carbon dioxide levels (Barnwell *et al.*, 2002). Permanent bedding must have a good absorption of moisture from manure (Soliman *et al.*, 2017), otherwise it becomes alkaline by increasing the amount of ammonia causing hockburn and foot necrosis (Appleby *et al.*, 2004).

Aims: Monitoring of microclimate parameters and the interdependence relations between them in broiler breeding halls, from the Cobb 500 hybrid, growth system on straw bedding, respectively straw¹/₄+sawdust mixture, and the effects of bedding on the prevalence of contact pododermatitis in broiler chickens was performed. Daily water consumption/head dependent on water acidification was also monitored.

Materials and Methods: The parameters that affect both the health status of the chicks and the welfare conditions were daily monitored in the endowment of the farms. The parameters followed were: temperature, humidity, air quality depending on the amount of existing pollutants, carbon dioxide (CO₂) and ammonia (NH₃), water consumption, bedding quality, temperature, pH, relationships between parameters using. SPSS software was used for statistics.

Results: The pH of the bedding has lower values in the case of the straw ¹/₄+ sawdust mixture by turning the bedding 2-3 times a week. The temperature value at bedding level is lower in the case of that of straw compared to the mixture of straw ¹/₄+ sawdust (29.69±2.38⁰C-26.35±2.64⁰C), which entails significant differences (*P<0.05). Between the quality of the bedding in terms of pH and the amount of ammonia monitored at the level of the halls, there is an extremely close negative relationship: (-0.83 ppm NH₃)- (-0.83 ppm NH₃), straw bedding and (-0.96 ppm NH₃)-(-0.96 ppm NH₃) straw ¹/₄+ sawdust mixture bedding. The percentage of ammonia burns given by the quality of the bedding is below 10%, which denotes a good quality, with the specification that the higher percentage of burns is found in the series maintained on the bedding mixture of straw ¹/₄+ with sawdust (6-5%) compared to (5-3.4%) straw bedding. The amount of water consumed/head is not influenced by the quality of the water in terms of acidic pH. Consumption starts from 0.014 l/head on the first day and reaches 0.35 l / head on day 40.

Conclusion: Each breeding unit should have a system of regular monitoring of contact pododermatitis, as it is an indicator of bedding quality and even air quality. Access to welfare subsidies in broiler farms and not only positively influences their quality of life.

Keywords: Bedding, broiler chickens, microclimate, water, welfare.

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CONTEMPORARY WATER BUFFALO FARM SIZE IN ROMANIA AND ACTUALIZED MILK YIELDS

Eugen Claudiu JURCO¹, Grigore ONACIU¹, Alex CUIBUS^{1*} Lucian CUIBUS² and
Doru POP³

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and
Veterinary Medicine of Cluj-Napoca, Romania

² Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca, Romania

³ The Educational and Experimental Centre of the University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca, Cojocna Farm, Romania

* Corresponding author, e-mail: alex.cuibus@usamvcluj.ro

Introduction: Since 1989 water buffalo numbers in Romania have dropped significantly. This happened because of multiple factors that contributed to the slow disappearance of the buffalo. In 1989, records showed a population of approximate 210.000 (2), while 2020 estimations report just 14.000 buffalos (1). In the past, buffalo played an essential role in the economy of many peasant homesteads. Contemporary buffalo farms have not evolved much regarding size. With the exception of two large farms in Braşov County, and a few others, the vast majority of farms exploit an average of 1.6 head, extremely low, as derived from data obtained via the Association of buffalo breeders in Transylvania. Actual milk yields and reproductive traits need to be analysed, as work is needed for improvement.

Aims: Present study aims to showcase the dramatically reduced population as well as farm size along with the contemporary buffalo milk yields recorded.

Materials and Methods: Data was obtained from the mentioned association, their Zalău office, regarding buffalo registered for control in farms from across the country but most in Transylvania. The information was analysed and conclusions derived.

Results: Most rearing facilities have been indicated as homesteads with very few animals. The 126 units have been grouped in farm sizes of 1-2, 3-4 and over 5 animals. Production data have higher values in units with over 5 buffalo, but low, overall.

Conclusion: Thus, it is shown that extra support is needed for conserving, and expanding the numbers of buffalo reared. Also, production levels are still low, the need for improvement thru selection and genetic research is high.

Keywords: Actual production info, bubaline, homesteads.

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PIG CARCASS QUALITY EVOLUTION IN ROMANIA: A REVIEW

Ioan I. LADOȘI¹, Mihai VIȘAN², Paula Călianu² and Daniela LADOȘI^{2*}

¹ *Faculty of Animal Sciences and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania*

² *Romanian Carcass Classification Commission, Bucharest, Romania*

* Corresponding author, e-mail: daniela.ladosi@usamvcluj.ro

Introduction: Romanian Carcass Classification Commission (RCCC) was established in 2004 and started to deliver data to the similar EU body in 2007. Thus, it became the official partner for delivering carcass quality information to the European Commission while following in full its legal requirements. RCCC is the NGO belonging to private stakeholders in the meat chain (farmers, slaughterhouses, processors and traders) which guarantees the neutrality and objectivity of carcass quality assessment according to EUROP system legally binding rules.

Aims: Taking into account the importance of an independent assessment of the slaughter pig quality for the entire food chain for - farmers, processors, traders and the final consumer - the analysis of the carcass quality evolution in Romania it is important for future benchmarking and trend assessments as well. Our approach is intended to reveal correlations between pig carcass quality evolution and the developments in pig farming system – housing, feeding, genetics and management -, processing infrastructure and consumer demands.

Materials and Methods: Current review is based on the public data and information developed in time by the RCCC, along with the analysis of the developments in stake holders dynamics, mostly linked to technology advances in farming and slaughtering facilities.

Results: Pig carcass quality in Romania improved substantially since measurements in slaughterhouse officially started in 2004. The carcass classification system incentivised farmers to invest heavily in technology, genetics, feeding, animal welfare and management in order to produce efficiently leaner pork and increase revenues. This positive outcome was transferred afterwards to slaughter units as well, as customer demand for higher quality pork has increased significantly over the years. This demand influenced then traders, including the large retail by increasing orders for Romanian produced high quality pig meat.

Conclusion: Current review is demonstrating the importance of the existence and functionality of a professional organization measuring the quality of carcass in slaughtered pigs and its impact on the meat chain as a whole, both for it's stakeholders and consumers. It is showing as well the positive evolution of the carcass quality produced in Romania, highlighting the main factors involved and expected trends.

Keywords: Carcass quality, meat chain, pigs.

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BIOMETRIC ASPECTS OF THE MONKEY GOBY (*Neogobius fluviatilis*, Pallas 1814) FROM THE SOMEȘ RIVER CATCHMENT

George-Cătălin MUNTEAN¹, Călin LAȚIU¹, Paul UIUIU¹, Radu CONSTANTINESCU¹, Vioara MIREȘAN¹, Tudor PĂPUC^{1*}, Daniel COCAN^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding authors, e-mail: tudor.papuc@usamvcluj.ro, daniel.cocan@usamvcluj.ro

Introduction: The monkey goby (*Neogobius fluviatilis*) is a species present in the ichthyofauna of Romania, which naturally inhabits the seaside area, the mouths of the Danube, the Danube and danubian tributaries lower sections. The species currently expands its range across the European continent, and it is now inhabiting new aquatic environments, including the Someș river catchment, in the Transylvania region of Romania (Cocan *et al.*, 2014).

Aims: The purpose of this study is to analyse the biometric aspects regarding the *Neogobius fluviatilis* populations from the Someș river catchment.

Materials and Methods: Specimens of *Neogobius fluviatilis* were collected from 10 locations situated on the main course of the Someș river and from a lake built on a small river from the Someș catchment, the Țaga lake. The collected specimens were preserved, and morphometric analysis was conducted in the laboratory and the following biometric aspects were analysed: length classes distribution and the length-weight relationships, such as the Fulton condition factor (K) and the allometric growth.

Results: The biometric aspects analysis of the collected specimens provided valuable information regarding the expanse of the monkey goby (*Neogobius fluviatilis*) in the Someș river catchment and shows how the species is adapting to this new hydrogeographic range.

Conclusion: In the present research work, we managed to obtain important information regarding the biometric aspects of the monkey goby (*Neogobius fluviatilis*) population from the Someș river catchment.

Keywords: Ichthyology, morphometry, *Neogobius fluviatilis*.

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PRELIMINARY STUDY ABOUT GUT MICROBIOTA OF *APIS MELLIFERA* SPECIES

Claudia PAȘCA^{1*} and Daniel Severus DEZMIREAN¹

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding author, e-mail: claudia.pasca@usamvcluj.ro

Introduction: In the context of Colony Collapse Disorder (CCD) worldwide, honey bee gut microbiota provides several advantages to the host, such as promoting the digestion of food, essential nutrients, the degradation of toxic components, pathogen defense, and the regulation of development, behavior and immunity of honey bees (Moran *et al.*, 2003; Dong *et al.*, 2019). According to the 16S rDNA analysis of the community in the gut microbiota of honeybees, researchers found that there are mainly 8 to 10 phylotypes of bacteria, including *Snodgrassella alvi*, *Gilliamella apicola*, *Lactobacillus* spp., *Bifidobacterium* spp., *Frischella perrara*, *Bartonella apis*, *Parasaccharibacter apium*, *Commensalibacter* spp. (Wu *et al.*, 2020). Several studies described the gut microbiota of honey bees and evaluated their ability to inhibit *in vitro* and *in vivo* growth of *P. larvae* and *N. ceranae*. Regarding *N. ceranae* infection, the bacterial mixture reduced the spore number in infected honey bees and tended to reduce bee mortality (Alberoni *et al.*, 2016; El Khoury *et al.*, 2018). Paxton (2020) showed that the gut microbiome of honey bees reduces viral load with the help of *Snodgrassella alvi*, improving host defense against vectored viruses, such as those produced by *Varroa destructor* mite. In our study (Pașca *et al.*, 2021) we demonstrated that honey can be a source for growing the be probiotic bacteria provided by the gut microbiota of honey bees and we found that raw honey contains probiotic bacteria such as *Bacillus mycoides*, *Bacillus thuringiensis*, *Bacillus amyloliquefaciens*, *Bacillus subtilis*, and *Bacillus velezensis*.

Conclusion: The present study showed an overview regarding the gut microbiota of *Apis mellifera* species and is part of the extended study entitled: The nosemosis prevention and honeybee's colonies development using a probiotic product.

Keywords: Bee pathogens, honey bees, natural antibiotics, probiotic bacteria.

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STUDY REGARDING THE SHEEP MILK QUALITY AS A RAW MATERIAL TO OBTAIN THE CHEESE ASSORTMENT FROM VINȚE FARM

Camelia RĂDUCU¹, Simona PAȘCALĂU¹ Vioara MIREȘAN¹ Dana PUSTA² Daniel COCAN¹ Radu CONSTANTINESCU¹ Mirela CADAR¹ Paul UIUIU¹ Călin LAȚIU¹ Cristian Ovidiu COROIAN¹ Aurelia COROIAN¹ Petru VINȚE¹ and Andrada IHUȚ^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj- Napoca, Romania

* Corresponding author, e-mail: ihut.andrada@usamvcluj.ro

Introduction: Sheep's milk has a high nutritional value, being an important source of fatty acids, calcium, magnesium, phosphorus, iron, etc., which contribute to the body's health (Flis and Molik, 2021). In addition to the use of raw milk, the main use of sheep's milk is the production of traditional cheeses obtained by small farmers or regional cheese producers (Gonzales-Barron *et al.*, 2017). But the quality of the obtained cheeses depends on the raw material, respectively milk which has to be free of pathogenic microorganisms.

Aims: This study aims to highlight the importance of the quality of the raw milk to obtain high-quality cheeses.

Materials and Methods: The milk and cheese samples were collected from Țurcană sheep breed raised in Vințe farm. The physico-chemical analyzes were performed for 5 samples of both milk and cheese in the laboratory of the industrialization and technology of the animal products within the Faculty of the Animal Science and Biotechnology.

Results: The physico-chemical analysis of milk was: fat $8,98 \pm 0,18\%$, proteins $5,08 \pm 0,16\%$, density $1,0345 \pm 0,01$, acidity $17,20 \pm 0,97\%$ and for the cheese: water $45,20 \pm 0,74\%$, dry matter (D. M.) $54,80 \pm 0,74\%$, fat $51,93 \pm 2,05\%$ reported to D. M., salt $5,63 \pm 0,31\%$ and acidity $272,60 \pm 11,82\%$.

Conclusion: The quality of the raw material milk and the nutritional value of the brined sheep cheese from the Vințe farm are superior. The values obtained fall within STAS 6343-81 of 2000. The pleasant taste of cheese is due to the used brine.

Keywords: Cheese, density, fat, milk preparations, proteins.

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MEAT QUALITY OF TRADITIONALLY SMOKED ARCTIC CHARR, *SALVELINUS ALPINUS* (LINNAEUS, 1758) TROUT FROM TRECĂTOAREA URSULUI SALMONID FARM

Alexandru SAVA¹, Paul UIUIU¹, Camelia RADUCU¹, Daniel COCAN¹, Radu
CONSTANTINESCU¹, Călin LAȚIU¹, Aurelia COROIAN¹, Andrada IHUȚ¹,
Vioara MIREȘAN^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca, 3-5 Mănăstur Street, 400372, Cluj-Napoca, Romania

*Corresponding author, e-mail: vmiresan@yahoo.com

Introduction: The consumption of fish meat in Romania is on an upward trend, therefore, for the diversification of the products offered to the market, fish are also sold in preserved form, either by salting or by smoking, despite fresh or chilled form. Among all the products of animal origin, fish meat is a delicious food source, for which the preferences and tastes of consumers have been and are constantly growing. Due to its high biological, fat, and mineral protein content, and its suitability for a wide variety of culinary preparations, fish meat is highly appreciated (Iurca and Răducu, 2005).

Aims: We evaluated the meat quality and salt concentration of traditionally smoked Arctic charr trout, throughout the entire technological flow of conservation by smoking (fresh meat, salted meat, desalted meat, smoked meat).

Materials and Methods: The biological material used in this study originated from Trecătoare Ursului trout farm, Râșnov city, Brașov County and it was represented by Arctic charr trout (*Salvelinus alpinus*). The specimens used in the experiment were clinically healthy. The analyses determined were: the content in water (Water%), dry matter (SU%), fat (Gb%), protein (Pb%), non-nitrogenous extractive substances (SEN%), and mineral substances (Ash%).

Results: The analyses determined were made throughout the entire technological flow related to traditional smoking conservation procedures (fresh, salted, desalted, and smoked meat). Significant differences were noticed between all smoking stages both in chemical composition and salt concentration during the entire technological flow.

Conclusion: We recommend and propose at the same time the continuation of studies in this field, especially regarding the composition of the smoke and its influence on the quality of the finished products (wood essences, aromatic hydrocarbons, etc.) with direct implications on the food safety for human consumption.

Keywords: Arctic charr, fish meat, smoked trout, traditional smoking.

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DYNAMICS OF CHICKEN BROILERS PERFORMANCE DUE TO PARTIAL DIETARY SUBSTITUTION OF SOYBEAN MEAL BY OTHER PROTEIN CONCENTRATED FEEDSTUFFS

Daniel SIMEANU¹, Cristina Gabriela RADU-RUSU^{1*}, Cristina SIMEANU¹,
Răzvan Mihail RADU-RUSU¹

¹ Faculty of Food and Animal Sciences, Iasi University of Life Sciences, Romania

* Corresponding author, e-mail: cradurusu@uaiasi.ro

Introduction: Many animals originated feedstuffs were used in broilers feeding. Nowadays, the main protein rich raw matters consist in soy-originated products, such as soybean meal and full-fat soy. Full fat soy is a polyvalent ingredient, but there could occur some issues in nutrients uptake in the gut. Digital tools are used to nutritionally and cost-effectively optimise the broilers diets by interchanging the proportion of protein concentrated feedstuffs.

Aims: Investigation of technological performance and economic efficiency of broilers, due to soybean meal replacement by another protein concentrated feedstuffs of vegetal origin.

Materials and Methods: 450 ROSS 308 broilers (3 groups x 150 capita), 42 days old. Standard diet (corn-soybean meal) used as control (SBM group) and 2 experimental groups fed with diets optimised using linear programming, by partial substitution of soybean meal by full fat soy (FFS group) or by sunflower meal (SFM group), in order to decrease feed cost and to provide same nutritional quality. Reasoning criteria: final live weight (FLW), feed intake (FI), feed conversion ratio (FCR). Data analysis descriptive statistics and ANOVA Single factor.

Results: FLW: 2.82 kg in SBM vs. 2.87 kg in FFS (+1.77%) and 2.76 kg in SFM (-2.17%); FI: higher in SFM (4.64 kg) vs. FFS (4.70 kg) and SBM kg (4.64 kg). FCR (kg feed/kg gain): 1.67 in control (SBM), 1.66 in FFS (0.6% improved) and 1.70 in SFM (1.8 % depreciated).

Conclusion: Partial replacement of soybean meal in broilers diet improved FLW and FCR, while economically, the revenue was 4.11% improved, compared to control, while the usage of sunflower meal (SFM) induced worst performance and economical results decreased by 3.26%.

Keywords: Chicken broiler, full-fat soymeal, performance, soybean meal, sunflower meal.

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A STUDY ON THE INFLUENCE OF WILLOW LEAF MEAL ON THE FATTENING PERFORMANCES OF YOUNG SHEEP

Mihai ŞUTEU¹, Roxana Maria CHIRA¹, Ion CĂLIN², Sorin Octavian VOIA³ and Stelian Vasile DĂRĂBAN^{1*}

¹ Faculty of Animal Husbandry and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Animal Productions Engineering and Management, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

³ Faculty of Bioengineering Animal Resources, Banat's University of Agricultural Sciences and Veterinary Medicine from Timișoara, Romania

* Corresponding author, e-mail: stelian.daraban@usamvcluj.ro

Introduction: Studies have shown that daily administration of an alcoholic willow leaf extract has a positive impact on average daily gain (ADG) and parasitic infestation in fattening lambs (Cedillo *et al.*, 2014; Salem *et al.*, 2011).

Aims: As daily oral administration of any substance is not feasible in farm conditions, we set out to investigate whether the inclusion of willow leaf meal has similar effects.

Materials and Methods: 20 weaned Țurcană lambs were randomly assigned (1:1) to receive, *ad libitum*, a standard fattening diet (control group), or the same ration supplemented with 5% willow leaf meal (experimental group), for one month. Fattening traits and parasitic infestation data were recorded weekly.

Results: Overall, the ADG was 172g in the group receiving willow leaf meal and 201g in the control group ($P > 0.05$). Faecal egg counts were similar across groups at all sampling timepoints.

Conclusion: The addition of willow leaf meal did not influence meat production traits, nor parasitic infestation. Up to 5% of the ration of fattening young sheep can be replaced with willow leaf meal, without any negative consequences.

Keywords: Phytoadditive, sheep, willow leaf meal.

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MORPHOMETRIC DIFFERENCES AND SLAUGHTER YIELD OF RAINBOW TROUT *ONCORHYNCHUS MYKISS* (WALBAUM, 1792) FROM THREE DIFFERENT GROWTH SYSTEMS

Paul UIUIU¹, Radu CONSTANTINESCU¹, Tudor PĂPUC¹, Sergiu TODIREANU¹,
Alexandru SAVA¹, Andrada IHUȚ¹, Vioara MIREȘAN¹, Călin LAȚIU^{1*},
Daniel COCAN^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca, Romania

* Corresponding authors, e-mail: calin.latiu@usamvcluj.ro; daniel.cocan@usamvcluj.ro

Introduction: The main objective of salmonid farming is to produce a maximum number of marketable aquatic organisms, in a given volume of water, in the shortest possible time and with the lowest possible production costs, but with the fact that the units responsible for the growth of salmonids, must meet the minimum conditions to ensure their welfare. Also, is important to acquire fish products with a high commercial value, as well as obtaining dietary foods, with a low-fat intake, high in vitamins and oligominerals (Iurca and Răducu, 2005).

Aims: Our research aimed to highlight the morphometric differences and the slaughter yield between rainbow trout fishes from three different growth systems.

Materials and Methods: The biological material used in this study was from three different growth systems (raceway, intensive and recirculating systems). For the phenotypic characterization of the species, 11 measurements were performed (Mc, Lt, Ls, Lc, H, h, Ac, P, p, lc, Lpc), and based on them, body format indices were calculated (K, Ip, Ig, IK, Ic1, Ic2). For slaughter yield, 13 measurements were performed (initial and evisceration weight, liver, spleen, pancreas, intestine, stomach and pyloric appendix, fins, gills, head, bones, flesh, and skin).

Results: Body weight values (Mc) ranged from 399.1g to 196g. The values recorded for the total length (Lt) show us that the highest value was 29.5 cm and the lowest 26.2 cm. We also find a low coefficient of variability, that demonstrates a low or medium variability, in the case of other measurements such as standard length (Ls) 4.5%, commercial length (Lc) 7.2%, high height (H) 10.1%, low height (h) 7.1%, body depth (Ac) 10.2%, large perimeter (P) 25.2%, small perimeter (p) 9.2%, the length of the head (lc) 6.1, and the length of the caudal peduncle (Lpc) 5.5%. The average values for the weight of the meat were 56.1%, liver (1.2%), spleen (0.1%), pancreas (1.43%), intestine (1.7%), stomach + pyloric appendix (7.7 %), fins (1.5%), gills (2.7%), head (7.8%), bones (5%), and skin (14.6%).

Conclusion: Significant differences between all husbandry systems of rainbow trout were noticed. The values obtained fall within the limits cited by the current literature.

Keywords: Aquatic organisms, body weight, dietary foods, raceway, salmonid farming.

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SESSION 7: BIOTECHNOLOGY

SUSTAINABLE SOLUTIONS FOR LIMITATION OF FOOD WASTE FROM HORTICULTURE CROPS

Marian BUTU¹, Alina BUTU¹, Steliana RODINO¹

¹ National Institute of Research and Development for Biological Sciences, Spl. Independentei 296, District 6, Bucharest, Romania

* Corresponding author, e-mail: alina_butu@yahoo.com

Introduction: Fruits and vegetables play an important role in human nutrition due to their vitamins, minerals, antioxidants and fibre contents being a priorities of consumers' buying options. The major problem with the preservation of fruits and vegetables is their short shelf life due to their high moisture content which leads to rapid deterioration and decomposition of these products and their undesirable appearance.

Aims: Sustainable package and covering solutions for fruits and vegetables represent a key issue to be solved for fresh consumption because, in general, under normal conditions, the fruits and vegetables dry quickly, with loss of rigidity. This paper presents research on products for food waste reduction from horticulture crops.

Materials and Methods: Ag, Zn and Cu nanoparticles were obtained by green synthesis with plant extracts. The vegetal material used was oak bark (*Quercus robur*) and the aerial parts of the parsley (*Petroselinum crispum*). Antimicrobial activity of the colloidal solutions was tested by disc diffusion method. Furthermore, the solutions were embedded in a nanocomposite biofilm for testing its protective action on vegetables.

Results: Active formulas can be applied to minimize damage to fruits and vegetables. For example, the use of biopolymer nanocomposites, of nanoparticles obtained by mediated synthesis of plant and / or microbial extracts lead to the improvement of the physico-chemical and microbiological properties of fresh fruits and vegetables and, implicitly, to the extension of their shelf life. Best results were obtained when using AgNPs solutions synthesised in *P. crispum* and ZnNPs Sythesised in *Q. robur*.

Conclusion: The use of plant based products as antimicrobials can help prevent damage to fresh fruits and vegetables and extend their shelf life.

Keywords: Bioeconomy, food waste, innovation, sustainable production.

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USE OF ESSENTIAL OILS AS BIOACTIVE IN EDIBLE COATING WITH PROTECTIVE ACTIVITY ON FRUIT

Adriana Dalila CRISTE¹, Adriana Cristina URCAN^{1*}, Emanuel MUREȘAN, Denisa Alexandra LUPAȘ¹

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine, 3-5 Mănăștur Street, Cluj-Napoca, Romania

* Corresponding author, e-mail: adriana.urcan@usamvcluj.ro

Introduction: Edible coatings have been used for many years in the food industry to protect fruits from oxidation. Different coating materials are used for edible coatings, such as hydrocolloids, waxes, proteins (Salehi, 2020).

Aims: The aim of this research was to use aloe vera and chitosan solutions to obtain bioactive edible coatings for apples and strawberries, based on different essential oils with protective activity.

Materials and Methods: Determination of total polyphenols, total flavonoids and antioxidant activity of the fruits before and after coating was measured by spectrophotometric methods using 96-well plates (Urcan *et al.*, 2021).

Results: The highest content of total polyphenols was observed in strawberry sample coated with chitosan solution and ravintsara essential oil, namely 27.91 mg GAE/g. Regarding the flavonoids content, the highest value was identified in strawberry sample covered with chitosan solution and tea tree essential oil with a value of 9.94±0.05 mg QE/g. The antioxidant activity was improved by the edible coating, the best antioxidant activity was observed for strawberry samples covered with chitosan solution and lemon essential oil which had an antioxidant value equal to 2.85±0.12 mmol Trolox /g and the strawberry sample covered with chitosan and lemongrass essential oil which had an antioxidant value of 2.85±0.20 mmol Trolox /g.

Conclusion: According to this study, the used edible coating led to an increase in bioactive compounds and antioxidant activity of fruits which underscores the potential of these products.

Keywords: Antioxidant, bioactive proprieties, edible coatings, essential oil.

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MONITORING THE CAROTENOIDS EXTRACTION PROCESS FROM CRUSTACEAN SHELL WASTE USING A PORTABLE RAMAN SYSTEM

Fran NEKVAPIL^{1,2,3,*}, Andrea BUNEA⁴, Alexander BUNGE³ and
Simona CINTĂ PINZARU^{1,2}

¹ Faculty of Physics, Babeş-Bolyai University, Kogalniceanu1, RO-400084 Cluj-Napoca, Romania

² IRDI of Applied Natural Sciences, Babeş-Bolyai University, RO-400084 Cluj-Napoca, Romania

³ National Institute for Research and Development of Isotopic and Molecular Technologies, 67-103 Donat, RO-400293 Cluj-Napoca, România

⁴ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine, Calea Mănăştur 3-5, 400372, Cluj-Napoca, Romania

* Corresponding author, e-mail: fran.nekvapil@ubbcluj.ro

Introduction: Worldwide captures of crustaceans is increasing every year (FAO, 2018). This consequently leads to increasing amount of shell waste rich in carotenoids, thus a valuable resource for Blue bioeconomy (Nekvapil et al., 2019), although mainly chitin is exploited.

Aims: to develop a Resonance Raman spectroscopy-based method for real-time monitoring of carotenoid extraction dynamics from crustacean shells waste.

Materials and Methods: Carotenoid extraction was done in static conditions using acetone and ethanol, respectively, as solvents. A portable Raman system from B&W Tek was used, equipped with 532 nm laser and a flexible optical fiber probe head, allowing measurements of dissolved carotenoid signal directly through the glass wall of the extraction container.

Results: The carotenoid marker Raman band around 1515 cm^{-1} , changed its intensity relative to the solvent marker band with the overall increasing trend, measured in 30 minute intervals until 7 hours of extraction. HPLC proved that an astaxanthin isomer is the principal carotenoid present in the respective extracts. Conformation change was presumably due to the extraction procedure.

Conclusion: The experiment showed that the resonance Raman with portable instrument is sensitive enough for carotenoid extraction monitoring in real-time, directly in extraction vessel; being feasible for upscaling for relevant industrial exploitation.

Keywords: Carotenoids, crustacean shell waste, fiber optic probe, portable Raman system, Raman spectroscopy.

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COMPARATIVE STUDY OF THE BIOACTIVE COMPOUNDS OF SOME KOMBUCHA VARIETIES, IN DIFFERENT STAGES OF ACETIC FERMENTATION

Emanuel-Andrei MUREȘAN¹, Adriana URCAN¹ and Adriana CRISTE¹

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding author, e-mail: emanuel-andrei.muresan@usamvcluj.ro

Introduction: Kombucha tea is gaining more and more attention from consumers around the world. In addition to the probiotics and antioxidant activity that characterizes it, Kombucha conquers by taste and authenticity, offering consumers an alternative to carbonated juices.

Aims: We wanted to obtain some comparative values of some Kombucha tea varieties in this study. They differ in the composition of the raw material, the tea used, being used for the preparation of both black tea and green tea, each of this teas combined with a series of fruits or plants.

Conclusions: The study highlights the differences from a biochemical point of view in the assortments taken in the analysis, but also the fact that the technique used by the manufacturer to prepare tea, benefits the storage and recovery of bioactive compounds from the raw material (tea) in the final products.

Keywords: Antioxidant activity, bioactive compounds, *Kombucha* tea varieties.

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SESSION 8: VETERINARY MEDICINE - FUNDAMENTAL AND PRECLINICAL SCIENCES

ZOONOTIC *BARTONELLA* INFECTIONS IN DOMESTIC AND WILD CARNIVORES FROM EUROPE AND ASIA

Grazia GRECO¹, Maria TEMPESTA¹, Aya A.K. ZAREA^{1,2}

¹Department of Veterinary Medicine, University of Bari Aldo Moro, Valenzano, Bari, Italy

²Department of Microbiology and Immunology, National Research Centre, Cairo, Egypt

*Corresponding author, e-mail: grazia.greco@uniba.it

Introduction: Bartonellosis is a zoonotic disease with worldwide distribution that may affect a large number of mammal species, including humans. Disease manifestations in human patients include from self-limiting lymphadenopathy and fever (cat scratch disease) to persistent endocarditis, proliferative vasculitis, ocular manifestation and neuropathy. Domestic (including cats and dogs) and wild (including foxes and wolves) carnivores serve as reservoirs for different zoonotic *Bartonella* species and subspecies, with many vectors such as fleas, lice and potentially other hematophagous arthropods.

Although domestic and possibly wild carnivores may develop similar disease manifestations as human patients, the asymptomatic course with persistent bacteremia is the most frequent outcome of the infection often posing threats for owners, nature lovers or veterinary healthcare workers in endemic areas.

Materials and Methods: materials, methods and results were described in the cited references (1-3).

Conclusion: This note, by providing an update on zoonotic *Bartonella* infections in cats, dogs and wildlife from European and Asian countries, stresses the importance of domestic animal and wildlife disease surveillance as a useful and complementary component of human disease surveillance.

Keywords: *Bartonella*, dogs, Eurasian wolf; red fox; zoonosis.

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THREE NEW CASES OF 64,XY DSD SEX REVERSAL MARES DETECTED USING SNP-ARRAY SCREENING METHODOLOGIES

Sebastián DEMYDA PEYRÁS^{1,2}, Gabriel ANAYA³ and Miguel MORENO MILLAN^{3*}

¹*Departamento de Producción Animal, Facultad de Ciencias Veterinarias, Universidad Nacional de La Plata, Argentina*

²*Consejo Nacional de Investigaciones Científicas y Tecnológicas (CONICET), La Plata, Argentina*

³*Departamento de Genética, Facultad de Veterinaria, Universidad de Córdoba, Spain*

*Corresponding author, e-mail: ge1momim@uco.es

Introduction: Horses have an increased rate of chromosomal abnormalities associated with the sex pair detected in comparison with the rest of the livestock species[1]. However, its detection using conventional cytogenetic methodologies is difficult. More recently, molecular approaches which can detect this kind of chromosomal abnormalities were developed [2].

Aims: To validate an SNP-array-based methodology able to screen and detect chromosomal abnormalities in horses.

Materials and Methods: During the last two years, we applied an SNP-array-based methodology able to screen and detect sexual disorders in horses by analyzing DNA samples in more than 400 individuals, as a part of the Asociación Nacional de Criadores de Caballo Pura Raza Español screening program. The studies were performed based on DNA extracted from white blood cells.

Results: Results showed the presence of three new cases of 64, XY DSD individuals (sex reversal mares), depicted by normal LRR and BAF values in all the autosomes and the pseudoautosomal region of the ECAX, but showing a reduction of 50% in the LRR ratio and BAF values compatibles with hemizygous markers (values were close to 0 or 1) in the rest of the X chromosome. The three animals were further analyzed. As a result, two of the then were shown a normal mare phenotype externally, but with gonadal dysgenesis depicted by the presence of small and non-active ovaries and a hypoplastic and small uterus. The third individual was a normal mare externally, but it was not available for internal phenotyping. In addition, all three animals showed a deletion in the SRY gene, located in the ECAY, producing of sex reversion in mares.

Conclusion: SNP array-based screening methodologies are an interesting tool to detect chromosomal abnormalities in horses with a high degree of certainty, without using cell culture and karyotyping.

Keywords: DSD, horses, SNP array

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OXIDATIVE STRESS AND ANTIOXIDANTS IN KIDNEY DISEASE

Mara AURORI^{1*} and Sanda ANDREI¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

*Corresponding author, e-mail: mara.aurori@usamvcluj.ro

Introduction: Kidney disease is a commonly encountered pathology in small animal practice and is typically progressive, resulting in significant morbidity and mortality in both dogs and cats. It is classified in two major syndromes, namely Acute Kidney Injury (AKI) and Chronic Kidney Disease (CKD). AKI is characterized by a significant increase in serum urea and creatinine, with a gradual onset of anuria. CKD is a syndrome defined by structural and functional renal changes, which persists for more than 3 months, occurring commonly in elderly patients. Oxidative stress (OS) represents an imbalance between pro-oxidants and antioxidants, through the production of excess free radicals and the organism's inability to counteract the action of these radicals using the endogenous antioxidant system. Several studies have shown that OS plays an important role in the pathogenesis of AKI, which occurs with the onset of ischemia or exposure to various nephrotoxic substances. In CKD, impaired mitochondrial function and increased production of ROS are the leading causes of OS. Hydro-electrolyte imbalances, anaemia and inflammatory conditions encountered in renal pathology are associated with systemic oxidative stress, which in turn can cause inflammation and additional tissue damage. Thus, OS can affect the progression of kidney disease to End Stage Renal Disease (ESRD). Furthermore, there is interest in identifying various compounds that can counteract the effects of OS in kidney disease, which are included in diet and are essential elements in traditional medicine in various countries.

Aims: The aim of this paper is to present the most recent knowledge on the involvement of OS in the pathogenesis of kidney disease, focusing on both enzymatic and nonenzymatic antioxidant markers.

Conclusions: OS is involved in the pathogenesis of kidney disease and is characterised by complex, co-dependent processes that participate in renal pathophysiology. Currently, there are encouraging results related to the inhibition of OS by administering exogenous antioxidants. However, the role of antioxidant therapy requires further investigation in patients with kidney disease.

Keywords: antioxidants, kidney disease, oxidative stress

ISOLATION AND IDENTIFICATION OF *CLOSTRIDIUM DIFFICILE* FROM CATTLE USING INNOVATIVE METHODS

Corina BERES¹, Marian MIHAIU², Dariana-Olivia BRĂTFELAN³, Romolica MIHAIU⁴ and Liora-Mihaela COLOBĂȚIU⁵

^{1,2,3} Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

⁴ Faculty of Economics and Business Administration, University "Babeș-Bolyai", Cluj-Napoca

⁵ Faculty of Medicine, University of Medicine and Pharmacy "Iuliu Hațieganu" Cluj-Napoca

*Corresponding author, e-mail: marian.mihaiu@usamvcluj.ro

Introduction: *Clostridium difficile* is a gram-positive spore-forming anaerobic bacterium that is known to be a major cause of antibiotic-associated diarrhea in humans and gastrointestinal infections in animals. Farm animals can represent a big reservoir of *C. difficile*, especially those very young and with an affected immune status.

Aims: The study aims to describe the technique of using a chromogenic medium for the detection and isolation of *C. difficile* from fecal samples from cattle with different age range and confirmation of the identity of *C. difficile* strains using an automatic method.

Materials and methods: A total of 62 fecal samples were collected using sterile gloves and sterile containers directly from the rectal area of the animals, labeled, and afterward transported immediately to the laboratory. For the isolation, 1 g of sample was inoculated on a chromogenic selective agar CHROMID® *C. difficile* and incubated for 24h at 37° C using a controlled atmosphere. After incubation, the confirmation was performed using VITEK 2 COMPACT equipment.

Results: *C. difficile* was isolated and confirmed from 21 (33.87%) out of 62 fecal samples. The highest percentage of positive samples was detected in calves aged between 0 and 4 months with digestive clinical signs (10 positive animals out of 26).

Conclusion: The chromogenic selective agar CHROMID® *C. difficile* has proven to be easy to use and effective in detecting *C. difficile*. As a result of the severity of *C. difficile* infections in hospitals, better surveillance of contamination is required through a food chain study as a necessity to change the epidemiological paradigm of this bacterium. The obtained results offer an initiation of a national database regarding the study of *C. difficile* isolation methods from cattle, a species recognized as a reservoir of contamination.

Keywords: Cattle, *Clostridium difficile*, identification, isolation.

HYPERHOMOCYSTEINEMIA AND ASSOCIATED OXIDATIVE STRESS, IN CORRELATION WITH THE RISK OF DEVELOPING CARDIOVASCULAR, RENAL AND HEPATIC PATHOLOGIES

Mihaela COTUL^{1*}, Mara AURORI¹ and Sanda ANDREI¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: mihaela.cotul@usamvcluj.ro

Introduction: Hyperhomocysteinemia (HHcy) is an independent risk factor for cardiovascular diseases and is associated with the main causes of mortality and morbidity around the world (Azad et al., 2017). The main causes of HHcy are a number of genetic defects, as well as various life and nutritional habits (Tinelli et al., 2019).

Aims: The main goal was to observe the influence of the type of pathology on oxidative stress and homocysteine (Hcy) levels.

Materials and Methods: In this study, a total of 13 dogs of different breeds, ages and clinical conditions were included and divided into 5 different groups. Blood samples were collected for biochemical analyses such as: 1) determination of metabolic profile, 2) determination of some oxidative stress markers and 3) determination of blood homocysteine concentration. For all subjects involved in this study, an extensive metabolic profile was determined.

Results: The results obtained in our study demonstrate the existence of a link between the existing type of pathology and the existing hyperhomocysteinemia, having different (minor / major) effects on the metabolic profile and the oxidative status existing in the body during metabolic disorders, along with the oxidative stress generated at the cellular level.

Conclusion: Based on previous correlations, an increasing tendency of plasma homocysteine levels has been observed in all 4 types of pathologies investigated, especially the group of patients with renal disorders, and thus we can understand the connection of the metabolism of this plasma marker with the oxidative stress generated by the general predisposing diseases for geriatric patients.

Keywords: dog; hyperhomocysteinemia, multiple pathologies, oxidative stress

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COMPARATIVE TECHNIQUES OF MOLECULAR GENETIC SEXING OF THE REPTILES FROM THE SQUAMATA ORDER

George-Iulian ENACRACHI¹, Andrei Daniel MIHALCA¹, Alexandra Iulia DREANCĂ¹, Anamaria Ioana PASTIU^{1*} and Dana Liana PUSTA¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

*Corresponding author, e-mail: oana.pastiu@usamvcluj.ro

Introduction: Molecular sexing of reptiles is an accurate method of sexing the juvenile or adult reptiles (in monomorphic species) and in some cases, it is the only method to identify the sex of a specific individual. Although molecular sexing is widely used in ecological or evolutionary research on different types of animals. However, in reptiles, these methods were not considered applicable (Pokorna and Kratochvil, 2009). Recently, Rovatsos and Kratochvil (2017) have demonstrated the fact that ~50% of reptile species can be easily sexed using qPCR.

Aims: Taking in consideration the results from the study of Rovatsos and Kratochvil (2017), this research wants to demonstrate the efficacy of the method on (yet) unstudied species of reptiles from Romania and compare the advantages and disadvantages with other sexing methods's.

Materials and Methods: Biological samples will be collected from the field. Afterwards, the DNA will be extracted and purified in order to apply the qPCR method.

Results: Hopefully, the qPCR sexing method can be successfully applied in the case of the reptiles from the Squamata order from Romania. Therefore, the research will result in effortless and non-invasive sexing of the indigenous species.

Conclusion: As the authors state, this method can be used for endangered species, clinical cases, but also can have a very significant impact in the domain of evolutionary biology and in the studies regarding the sex ratio of a specific population of reptiles.

Keywords: DNA extraction, PCR, qPCR, reptile sexing

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RISK ASSESSMENTS REGARDING THE CONTAMINATION OF POULTRY WITH GERMINES OF THE GENUS *SALMONELLA SPP.*, IN A HIGH CAPACITY SLAUGHTERHOUSE

Anca FORGACIU¹, Ingrid-Alexandra ROTAR-MENYHART^{1*}, Corina BERES¹,
Andrei GREAPCĂ¹, Romolica MIHAIU², Ioan PAȘCA¹ and Marian MIHAIU¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences
and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Economics and Business Administration, University "Babeș-Bolyai", Cluj-Napoca

*Corresponding author, e-mail : rotar.ingrid94@gmail.com

Introduction: The frequency of salmonellosis in Europe remains high, being considered the second most common disease reported, transmitted through food. *Salmonella spp.*, was most commonly detected in poultry meat with the highest reported positive samples in fresh turkey meat (3.5%), fresh broiler chicken (2.2%).

Aims: The study aims to describe the results of the antemortem examination, including bacteriological investigation of germs of the genus *Salmonella spp.*, the results of the postmortem, antemortem examination performed in poultry slaughterhouses, surveillance of poultry contamination with germs of the genus *Salmonella spp.*

Materials and methods: The samples were collected in a large capacity slaughterhouse on two slaughter lines, performing 403 laboratory samples, these being taken from the neck region from broiler chickens using sterile containers and instruments using alternative methods and analytical method of reference for the detection of germs of the genus *Salmonella spp.*

Results: The results of the ante-mortem inspection carried out on the holding of origin were consistent, including with negative results of testing for salmonellosis. The postmortem examination on group I performed on each bird showed the following types of lesion : bruise/fractures (14.25%), contaminated viscera (11.48%), ascites/edema (10.49%), cellulite (20.30%) , tumors (2.57%) , peritonitis/perihepatitis (4.75%), pericarditis (3.36%), overload (0.19%), hepatitis (10.69%), dermatitis (1.38%) , poor plucking (0.79%), death before slaughter (0.39%), death on arrival (2.57%), contaminated (2.97%) , fever (4.75%). The postmortem examination on the second group performed on each bird showed the following types of lesions: bruises / fractures (6.75%), contaminated viscera (28.23%), ascites / edema (10.93%), cellulite (14.91%), tumors (1.39%), peritonitis / perihepatitis (4.57%), pericarditis (0.39%), overload (2.98%), hepatitis (3.57%) , dermatitis (0.79%), mild plucking (1.98%), death before slaughter (0.99%), death on arrival (3.77%), contaminated (10.93%), fever (7, 75%).

Conclusion: The antemortem examination performed on two groups, aimed at document control and negative certification at the bacteriological examination in the direction of salmonellosis and assessment of health and well-being, and it certifies results in accordance with specific legislation. The postmortem examination on batch I and batch II performed on each individual bird revealed the aforementioned lesions with the corresponding percentages. Surveillance of poultry meat for contamination with germs of the genus *Salmonella spp.*, by collecting samples representative of the skin level in the neck region , in group I , it highlighted 397 compliant samples, out of a total of 403 samples and 6 non-compliant samples. *Salmonella infantis* was identified in these non-compliant samples following laboratory examination.

Keywords: antemortem , postmortem surveillance and laboratory, bird meat, risk evaluation , risk of contamination.

THE VALUES AND VARIABILITY OF BIOMETRIC MEASUREMENTS IN HUNGARIAN GREY CATTLE IN WEST ROMANIA

Ovidiu Ionut GEORGESCU¹, Iuliu TORDA, Beatrice Ana-Maria TUDOR¹, Bianca Cornelia LUNGU¹, Gabriel OTAVA¹, Calin MIRCUI^{1*} and Ioan HUTU¹

¹*Faculty of Veterinary Medicine, Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, RO.*

*Corresponding author, e-mail: calimircu@usab-tm.ro

Introduction: The Podolian type of grey cattle was widely distributed in Eastern and Southeastern Europe between the Ukraine and Italy. The Hungarian Grey cattle have emerged as a highly bred form that dominated stocks in the Carpathian Basin during the last centuries.

Aims: The study was analyzed the values and variability of body measurements on Hungarian Grey, a native breed universally used in the past, and currently to produce beef (Sas et al. 2000) and with important resilience study potential ().

Materials and Methods: The body mass (BM), height at the withers (HW), croup height (HR), trunk height (HB), body length (LT), width of bi-iliac (WBIL), and width of bi-ischiatic (WBIIS) in male and female cattle were measured. Average, standard deviation, error of average and variability were calculated for all farm animals, females and males. Binary correlations, regression between variables and average differences between males and females were performed for measured animals.

Results: Overall BM was 371.83 ± 13.99 kg, HW = 127.85 ± 1.66 cm, HR = 130.89 ± 1.42 cm, HB = 128.62 ± 1.59 cm, LT = 139.89 ± 2.95 cm, WBIL = 46.87 ± 10.81 cm and WBIIS = 19.72 ± 10.39 cm. With exception of WBIL ($p=0.037$), no significant differences between steers/bulls and cattle were observed. The BW was highly correlated with HW ($r=0.885$ at $p<0.000$), with HB ($r=0.885$ at $p<0.000$), with HR ($r=0.857$ at $p<0.000$), with LT ($r=0.883$ at $p<0.000$) and weakly correlated with WBIL ($r=0.527$ at $p<0.000$), with WBIIS ($r=0.580$ at $p<0.000$) and WBIL ($r=0.828$ at $p<0.054$). The results were concordant with other old and new studies carried on this breed. A significant ($F=44.715$ at $p<0.000$) and complex morphometric relation ($R^2=0.848$) was established between measurements (HB and LT) in order to estimate the body mass.

Conclusion: The measurement and morphometric relations can prove helpful in further study of breed resilience and economical efficiency of Hungarian Grey in West Romanian farms.

Keywords: Hungarian Grey cattle, body measurements

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DYNAMIC EVALUATION OF THE QUALITY PARAMETERS OF RAW BUFFALO MILK USING A HIGH-PERFORMANCE EQUIPMENT

Filippos Georgios NIKOLAU¹, Alina Ioana FAT^{1*}, Alexandra NEGRILA¹, Arghir ILEA¹, Romolica MIHAIU², Marian MIHAIU¹, Sorin Daniel DAN^{1*}

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences
and Veterinary Medicine, Cluj-Napoca, Romania

² Faculty of Economics and Business Administration, University "Babeş-Bolyai", Cluj-Napoca

*Corresponding author, e-mail: fat.alinaioana@yahoo.com

Introduction: World milk production comes from cows, buffaloes, goats, sheep and camels, and buffalo milk is considered to be the second most consumed after cow's milk. The buffalo milk is one of the richest products from a compositional point of view and characterized by higher fat, total solids, proteins, caseins, lactose and ash contents than cow, goat, camel and human milk.

Aims: The aim of this study was to evaluate the quality parameters of raw buffalo milk, using high performance equipment.

Materials and Methods: This evaluation was performed by determining the physical-chemical parameters with major impact in terms of milk quality, the number of somatic cells and the total number of germs. For a period of 12 months, samples of raw buffalo milk were collected and analyzed from a farm authorized for the production of buffalo milk, resulting a dynamic evaluation of the quality parameters. The study is based on the use of high-performance equipment - CombiFossTM7, which has the ability to analyze all parameters necessary for official controls of milk production and quality (fat, protein, lactose, SU, pH, freezing point depletion, urea, SCC and TVC).

Results: The obtained values for the physical-chemical parameters analysed ranged between 7.7-9.63 g for fat (g/100 g), 3.77-4.79 g for proteins (g/100 g) and 4-4.62 g for lactose (g/100 g). In the case of Somatic cell count, the results have indicated values ranged between 81-558 cells/ml (ml x 1000).

Conclusion: Even if the gross composition does not exceed the allowed limits, Total viable count exceeded milk the European standards in the case of 39% of the analyzed samples.

Keywords: dynamic evaluation, high performance equipment, milk quality, physical-chemical parameters, SCC, TVC

NANOPARTICLES DESIGNED FOR ANTHOCYANINS TRANSPORT INSIDE MELANOMA CELLS

Madalina NISTOR¹, Monica FOCSAN², Roxana POP¹, Adela DAESCU¹,
Adela PINTEA¹ and Dumitrita RUGINA^{1*}

¹University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Romania

²Nanobiophotonics and Laser Microspectroscopy Center, Interdisciplinary Research Institute in
Bio-Nano-Sciences, Babes-Bolyai University, Cluj-Napoca, Romania

*Corresponding author, e-mail: dumitrita.rugina@usamvcluj.ro

Introduction: Anthocyanins are water-soluble pigments that are able to protect plants against stress conditions. In humans, anthocyanins exert positive effects in various pathologies like obesity, diabetes, chronic inflammation and cancer, including melanoma.

Aims: Melanoma is an aggressive type of cancer with crucial need for novel therapy development and improvement. In this light, we proposed here a fluorescent pH-sensitive nano-sized system, carrier for anthocyanins inside melanoma cells, easy to be monitored via a pH-controlled release.

Materials and methods: The nanoparticles were assembled on a CaCO₃ template, on which layers of polyelectrolytes (polyacrylic acid) and polyethyleneimine) were added alternatively, with anthocyanins extracted from *Aronia melanocarpa* fruits grafted in between. Also, they were decorated with three pH-sensitive fluorophores. Dynamic Light Scattering and Zeta-Potential were used for their physical characterization. WST-1 assay measured the cytotoxicity of nanoparticles on B16-F10 melanoma cells. The intracellular internalization and localization of nanoparticles were analyzed with fluorescence and transmission electronic microscopy.

Results: The nanoparticles were successfully assembled and characterized to have around 800nm and positive surface. An *ex-vivo* experiment proved the release potential of anthocyanins in solution. No cytotoxicity of nanoparticles was shown according to WST-1 assay. The internalized nanoparticles localization was visualized by using fluorescence microscopy.

Conclusions: The currently presented data contributes to the enlargement of the existing knowledge on the encapsulation technology of anthocyanins, leading to a real breakthrough in local delivery therapies.

Keywords: anthocyanin, fluorescent, melanoma, nanoparticles, pH

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USE OF MICROFLUIDIC ELECTROPHORESIS IN THE ANALYSIS OF MILK PROTEINS - METHOD IMPROVEMENT

Beatrice Ana-Maria TUDOR¹, Oana-Maria BOLDURA^{1*}, Călin MIRCUI¹,
Camelia TULCAN¹, Simona MARC¹, Ovidiu GEORGESCU¹, Ioan HUȚU¹

¹*Faculty of Veterinary Medicine, Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Romania*

*Corresponding author, e-mail: [oanaboldura@usab-tm.ro](mailto: oanaboldura@usab-tm.ro)

Introduction: Microfluidic electrophoresis (ELFO) has become a widely applicable method that allows the analysis of proteins fractions from different biological matrices. ELFO presents advantages that include time reduction low sample consumption, high method efficiency and the integration of results in the context (Hutu & Mircu, 2015). With sample proper preparation the method becomes accurate and robust and the reagents and consumables used are considerably reduced.

Aims: This paper describes the adaptation and improvement of a raw milk protein analysis protocol, described in the standard microfluidic electrophoresis analysis procedures of Agilent Company, using the technology of Bioanalyzer 2100 equipment.

Materials and Methods: The described protocol makes adaptations regarding the preparation of biological samples composed of raw milk in the pre-analytical stage with multiple benefits in reporting the final results.

Results: In normal cow's milk, mixed, there are $3.3 \pm 0.14\%$ protein, $2.7 \pm 0.10\%$ casein, $0.45\% \pm 0.05$ albumin and $0.1-0.2\% \pm 0.03$ globulin. However in the composition of milk various but significant percent of fats could be find and the here described procedure is practically another step required for the elimination of those interfering substances. The described method involves the pre-analytical stage of preparation of raw milk samples, separation and quantification of major milk proteins and quantification of the total protein content. The described method has a high value and gives exact dates of phenotypic values of proteins fraction which can be use in genetic animal breeding of dairy.

Conclusion: A standard procedure for analysis of milk protein content was improved by adjusting the pre-analytical step of the method. The improvement proved to have an important beneficial impact on the analysis as the result was very accurate in terms of quantity and quality of analysed biomolecules and also it has drastically reduced the errors of the equipment.

Keywords: microfluidic electrophoresis, milk proteins, quantification, analysis interferences.

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DNA SEX IDENTIFICATION USING DIFFERENT BIOLOGICAL SAMPLES FROM FOUR COMPANION BIRD SPECIES

Maria-Carmen TURCU^{1*}, Anamaria Ioana PAȘTIU¹, Lucia Victoria BEL¹,
Vlad COCOSTÎRC¹, Felix LUCACI¹ and Dana Liana PUSTA¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca, Romania*

*Corresponding author, e-mail: carmen.turcu1603@gmail.com

Introduction: Most companion birds (more than 50% of the world-wide birds) have no distinct sexual dimorphic traits (Griffiths et al., 1996).

Aim: The aim of this study was to identify the CHD (chromodomain helicase DNA binding protein) genes from sexual chromosomes of birds (Z and W) from various tissue samples collected from four companion bird species (*Gallus gallus domesticus*, *Melopsittacus undulatus*, *Psittacus erithacus*, *Ara ararauna*).

Materials and Methods: Samples of feathers, oral swabs, blood and various tissues (by necropsy) were collected. Feathers were processed by mechanical processing and by grinding using the Tissue Lyser II. Isolation of DNA was performed using the Isolate II Genomic DNA, Bioline kit. Quantification of DNA was performed using the NanoDrop ND-1000 spectrophotometer. DNA amplification by PCR technique was performed using the P2 and P8 primers according to the method described by Griffiths et al., 1998.

Results: Hen and rooster whose DNA sexing has been previously confirmed based on phenotypic characters as female and male, have been confirmed by PCR. Budgerigar corpses whose DNA sexing identified one male and one female has been confirmed based on necropsy results. African Grey Parrot whose sex was identified by DNA sexing as female has been confirmed based on a genetic sexing previously performed in another laboratory. The Blue and Yellow Macaw, whose sex was determined as male by DNA sexing was later confirmed based on the results of the necropsy performed after cardiac arrest caused by overlapping pathologies.

Conclusion: DNA concentration was higher in blood samples than in oral swabs or feathers, but blood collection is considered an invasive procedure that subjects birds to handling stress. For feather samples mechanical denaturation before DNA extraction is recommended. Oral swab samples are suitable for isolating and amplifying DNA in order to sex monomorphic birds.

Keywords: DNA sexing, PCR, birds, blood, feathers, oral swabs

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SESSION 9: VETERINARY MEDICINE - CLINICAL SCIENCES

BRACHYCEPHALIC OBSTRUCTIVE AIRWAYS SYNDROME: MUCH MORE THAN WHAT YOU THINK!

Gilles DUPRÉ

Veterinary medicine University of Vienna, AT

European School for Advanced Veterinary Studies, LU

*Corresponding author, e-mail: gillespierre.dupre@gmail.com

Introduction: For many years, brachycephalic obstructive airways (BOAS) syndrome has been anatomically characterized by the collapse of the nares and the elongation of the soft palate which in turn was suspected to be responsible for a laryngeal obstruction.

Aims: This paper aims at summing up the recent anatomical knowledge pertaining to brachycephalic dogs and to match it with a proper understanding of the pathophysiological effects of the increased inspiratory pressure.

Materials and Methods: Our past and recent articles on BOAS are collated from the years 2000 and a comprehensive summary is provided.

Results: Anatomical changes due to BOAS also include displaced turbinates, tongue and soft palate hyperplasia (independent from elongation) which contribute to dynamic collapses of the upper airways: Naso-pharyngeal and laryngeal collapses. The increased inspiratory negative pressure is likely the trigger for gastro-oesophageal and pharyngeal reflux which both aggravates the encumbering of the upper airways. Sub-clinical middle-ear diseases might be the result of a combination of both anatomical disorders and reflux in the naso-pharynx.

Conclusion: In the present collated research work, we demonstrate that the common “elongated soft palate” characterization of the brachycephalic dogs is way too simplistic and takes into account neither the naso-pharyngeal collapse nor the gastro-oesophageal reflux. A more holistic approach of the syndrome shall help the veterinarians provide a better surgical care and a better selection of the future breeding stock.

Keywords: Brachycephalic syndrome, nasopharyngeal space, gastro-oesophageal reflux

Acknowledgments: *All the team members in Paris, Vienna and in UK, who, under my guidance, produced fantastic clinical research on the topic*

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ENTOMOLOGICAL SURVEY TO STUDY THE POSSIBLE INVOLVEMENT OF ARTHROPOD VECTORS IN TRANSMISSION OF AFRICAN SWINE FEVER VIRUS IN ROMANIA

Oana-Maria BALMOȘ^{1*}, Alexandru SUPEANU², Paula TAMBA³, Cristina-Daniela CAZAN¹, Angela Monica IONICĂ¹, Andrei Paul UNGUR¹, Monica MOTIU³, Florin Alexandru MANITA³, Beatris Corina ANCUCEAUNU³, Florica BĂRBUCEANU³, Sofie DHOLLANDER⁴ and Andrei Daniel MIHALCA¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

² National Sanitary Veterinary and Food Safety Authority, Bucharest, Romania

³ Institute for Diagnosis and Animal Health, Bucharest, Romania

⁴ European Food Safety Authority, Parma, Italy

*Corresponding author, e-mail: oana-maria.balmos@usamvcluj.ro

Introduction: African swine fever (ASF) represents a global threat with huge economic consequences for the swine industry. Even though direct contact is likely to be the main transmission route from infected to susceptible hosts, recent epidemiological investigations have raised questions regarding the role of hematophagous arthropods.

Aims: To provide a Scientific Report on the specific situation of the African Swine Fever (ASF) in Romania and to analyze the risk factors that led to the summer peak in ASF outbreaks in domestic pigs in the country.

Materials and Methods: Sampling was done in June-September 2020, based on specific entomological traps. All collected arthropods were preserved in ethanol 70%, at -20°C and, using a stereomicroscope, identified the order, family and species to which the arthropod belongs. All identified arthropods have been tested by PCR for ASFV according to the protocols used by ASF LNR for testing of ASF samples. Afterwards, the samples were transferred for molecular identification of pig DNA to MacroGen, Netherlands.

Results: Our study demonstrates that the most common vectors found around pig farms are *Culicoides* and *Stomoxys*, and the DNA of the ASFV can be detected in both groups with a higher probability in commercial farms and if pigs are present at the time of sampling. The ASFV DNA seems to persist more in vectors than the pig DNA from the blood meal.

Conclusion: The detection of ASFV DNA in vectors is not an indication of their vectorial role. To demonstrate the vectorial role, a first step would be the isolation of the living virus in such arthropods and to perform experimental transmission studies.

Keywords: African Swine Fever Virus, hematophagous arthropods, Romania, vector.

MULTI-ACTOR FARM HEALTH ACTION PLAN DEVELOPMENT IN ROMANIAN DAIRY FARMS

Stelian BARAITAREANU^{1*} and Livia VIDU¹

¹ University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

*Corresponding author, e-mail: stelian.baraitareanu@gmail.com

Introduction: Disseminating Innovative Solutions for Antibiotic Resistance Management (DISARM) thematic network (see: <https://disarmproject.eu/>) promoted the best innovative solutions to reduce the need for antibiotics in animals. Innovative models of the Multi-Actor Farm Health Plans (MAFHP) have been designed by DISARM team for dairy, sheep, swine, and broiler farms and several countries have begun using the MAFHP. The interest in the MAFHP development in Romanian dairy farms was also manifested in Romania.

Aims: The design of the MAFHP in Romanian dairy farms by using the DISARM Project model.

Materials and Methods: Six dairy farms of different sizes were selected for the development of MAFHP. The farm biosecurity was scored by using Biocheck.UGent™ system (<https://biocheck.ugent.be/en/questionnaires/dairy-cattle-11/start-questionnaire?language=en>). The system allows for benchmarking of dairy farms and herd-specific advice for biosecurity improvements (Damiaans *et al.*, 2020). The Multi-Actor Farm Health Teams (MAFHT) for diagnosing the dairy farms' main points of improvement were organized in each farm. MAFHTs bring together the owner or manager of the farm, the farm veterinarian, and one or two agricultural consultants. MAFHP used the planning-do-check-adjust cycle.

Results: In correlation with the Biocheck.UGent™ results, specific situations were personalised in all six MAFHPs. In each farm were determined and listed goals and points of improvement. Each goal was specific, measurable, acceptable, realistic, and time-specific. The actions had a project owner and an implementer, and clear deadlines.

Conclusion: All MAFHTs identified farm practices to reduce bacterial disease and the need to use antibiotics and all six MAFHPs received positive feedback.

Keywords: AMR, best practices, dairy farm innovation, multi-actor farm health teams

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PANCREATITIS – CHALLENGES OF THE CLINICAL AND PARACLINICAL DIAGNOSIS

Andrei BLĂGEANU ¹, Vasile VULPE ¹ and Aurelian Sorin PAȘCA ¹

¹*Faculty of Veterinary Medicine, University of Life Sciences, Iași, România*

*Corresponding author, e-mail: andrei.blageanu@gmail.com

Introduction: Pancreatitis in dogs and cats is an acute pathology, defined as a reversible inflammation of the pancreas with the histological appearance of oedema, neutrophilic infiltration and necrosis areas. The etiology of this pathology is considered idiopathic but studies show there are a few risk factors that can predispose towards this condition. From the risk factors, the most important are: genetic predisposition, obesity, nutrition, intoxication or endocrine disorders.

The diagnosis of pancreatitis is realised using multiple exams like: clinic, imagistic and biochemistry of the blood. The clinic signs are quite varied, starting from general gastrointestinal, towards severe or system complications; we mention signs as: loss of appetite, vomiting, abdominal pain, dehydration, diarrhea. The imagistic diagnosis of this pathology, can bring information about the pancreatic parenchyma and also the presence of free peripancreatic fluid. Abdominal defence during the ultrasonography is another sign that can help towards a final diagnosis. Biochemical diagnosis is accepted as the golden standard and is based on the determination of canine pancreatic lipase (cPL) and feline pancreatic lipase (fPL), and also other biochemical markers or haematological can come in addition.

Aims: The paper combines elements of statistics and uses a practical case for explaining the entire process and the difficulty of diagnosing pancreatitis.

Material and methods: The base of this paper is constituted by a clinical case with pancreatitis that underwent all the investigations presented and elements of statistics gathered by the authors.

Results: The obtained data show that pancreatitis represent a pathology with a sinuous evolution, that necessitates corroborating clinic data with special examination for obtaining a final diagnosis.

Conclusion: The paper emphasizes the importance of a thorough examination when we have a suspicion of pancreatitis, with an accent on paraclinic exams. The canine pancreatic lipase (cPL) or feline pancreatic lipase (fPL) represents the best method of determining the pathology being followed closely by the ultrasonography examination.

Keywords: pancreatitis, cPL, ultrasonography

SWINE DISEASES ON COMMERCIAL FARMS IN SERBIA

Jovan BOJKOVSKI*¹, Sreten NEDIĆ¹, Sveta ARSIĆ¹, Ivan VUJANAC¹, Renata RELIĆ², Ivan PAVLOVIĆ³, Ivan DOBROSAVLJEVIĆ⁴, Zsolt BECSKEI¹ and Radiša PRODANOVIĆ¹

¹ Faculty of Veterinary Medicine, University of Belgrade, Serbia

² Faculty of Agriculture, University of Belgrade, Serbia

³ Scientific Veterinary Institute of Serbia, Belgrade, Serbia

⁴ Specialisic veterinary Institute, Požarevac, Serbia

*Corresponding author e-mail: bojkovski@vet.bg.ac.rs

Introduction: In large animal agglomerations, diseases can be observed according to the size of spreading, the type of causative agent, and its zoonosis or enzootic character. In intensive swine breeding, both infectious and multicausal etiology diseases can be encountered. Certain organs or organ systems can be affected.

Aims: The study aimed to establish the type and the frequency of swine diseases on commercial farms.

Materials and Methods: At two commercial farms, all swine were clinically examined (suckling piglets, weaners, fatteners, sows, and boars), and samples were taken from animals with health disorders. Feed samples were taken as well. The collected material was analyzed, and the results obtained were statistically processed.

Results: The following diseases were present on the commercial farms: colibacillosis, dysentery, edema disease, esophagogastric ulcer, PRDC, proliferative enteropathy of multicausal etiology, and some parasitosis.

Conclusion: The health condition of the swine herd depends on the housing conditions, the quality of the diet, and the application of prophylactic measures on the farm.

Keywords: commercial farm, herd disease, prophylactic measures, swine

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ANTIPARASITIC ACTION OF *LACTOBACILLUS CASEI* ATCC 393 AND *LACTOBACILLUS PARACASEI* CNCM STRAIN IN CD-1 MICE EXPERIMENTALLY INFECTED WITH *TRICHINELLA BRITОВI*

Zsolt BOROS^{1*}, Dan VODNAR², Mihai-Horia BAIES^{1*}, Calin GHERMAN¹,
Anamaria COZMA-PETRUȚ⁴ and Vasile COZMA^{1,3}

¹Department of parasitology and parasitic diseases, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

²Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.

³The Academy of Agricultural and Forestry Sciences, Bucharest, Romania

⁴The "Iuliu Hațieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania

■ Both authors have contributed in equally manner to this study

*Corresponding author, e-mail: zsolt.boros@usamvcluj.ro

Introduction: Trichinellosis is caused by the larvae from the genus *Trichinella*. There is worldwide interest regarding the effect of probiotics on different *Trichinella* species.

Aims: This study aimed to evaluate the antiparasitic effect of *L. casei* ATCC 393 and *L. paracasei* CNCM in CD-1 mice experimentally infected with *T. britovi*.

Materials and Methods: Eight groups of 10 mice were used, with 4 control groups (C1–negative ♂ mice; C2–negative ♀ mice; C3–positive *T. britovi* ♂ mice; C4–positive *T. britovi* ♀ mice) and 4 experimental groups which received orally a daily dose of 100 µl (10⁵ CFU/ml in Ringer sol) of *L. casei* (original) and *L. paracasei* (commercial) probiotics (E1–♂ mice, *T. britovi* + *L. casei*; E2–♀ mice, *T. britovi* + *L. casei*; E3–♂ mice, *T. britovi* + *L. paracasei*; E4–♀ mice, *T. britovi* + *L. paracasei*). On day 7 all mice (except C1 and C2) were infected with *Trichinella* (100 larvae). On day 9 p.i. 5 mice/group were euthanized, the adults in the intestinal content (ic) and walls (iw) were identified and numbered. On day 32 p.i. 5 mice/group were euthanized, afterward, trichinoscopies (tri) (1 compressor/mouse) and artificial digestions (ad) were used.

Results: On day 9 p.i. the number of adults found in the ic and iw were higher in the control groups (200 and 213 adults in the ic of C3 and C4; 101 and 145 adults in the iw of C3 and C4). On day 32 p.i. the highest number of larvae were in tri and ad in the control groups (882 and 1119 larvae in C3 and C4 during tri; 15.921 and 13.755 larvae were in C3 and C4 during ad). The experimental groups on days 9 and 32 p.i. had a lower parasite count than the control groups. *L. casei* ATCC 393 was more efficient in reducing the number of parasites than *L. paracasei* CNCM with a statistical significance of $p < 0.05$ in intestinal adult parasite count ($p = 0.008$ and $p = 0.003$ in females) ad (males $p = 0.01$). *L. paracasei* CNCM having statistical significance ($p = 0.007$) only in ad in female mice.

Conclusion: The results suggest that *L. casei* ATCC 393 was more efficient in reducing the number of parasites in male (ad) and female (adult parasites in ic and iw) mice.

Keywords: CD-1 mice, probiotics, *T. britovi*

Acknowledgment: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°816172.

RECREATIONAL BEHAVIOUR, RISK PERCEPTIONS, AND PROTECTIVE PRACTICES AGAINST TICKS: A CROSS-SECTIONAL STUDY DURING THE COVID-19 LOCKDOWN IN ROMANIA

Silvia-Diana BORȘAN^{1*}, Sabina Ramona TRIF² and Andrei Daniel MIHALCA¹

¹ *Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania*

² *Department of Psychology, "Babeș-Bolyai" University, Cluj-Napoca, Romania*

*Corresponding author, e-mail: silvia.borsan@usamvcluj.ro

Introduction: Gaining insight into the risk perceptions and the knowledge evolution of the public about emerging or changing health risks is vital for the improvement of health promotion activities. Currently, scientific evidence regarding the attitudes of the Romanian public towards ticks is scanty.

Aims: To identify how the lockdown enforced by the COVID-19 pandemic in Romania impacted the recreational behavior, risk perceptions, and protective practices of the Romanian population regarding ticks.

Materials and Methods: A cross-sectional, nationwide web-based questionnaire was designed following a „before/after” pattern, and distributed via social media to evaluate the aforementioned criteria. The survey was available from the 6th until the 15th of May 2020, which marked the last day of the travel ban in Romania. The collected data were processed by applying both uni- and multivariate methods.

Results: Respondents reported a higher frequency of finding ticks on themselves and their dogs during the lockdown. Bathing/showering and checking the body for ticks were the two most used protective behaviours both before and during the lockdown. Nevertheless, an overall lower usage rate of protective measures was registered during the lockdown. Almost all dog owners used a form of ectoparasite control for their dogs, and only three stopped due to lockdown-associated reasons. Respondent characteristics that were found to be positively associated with risk perceptions were being female and living in peri-/suburban/rural environments.

Conclusion: Changes in the preferences for recreational locations, rates of protective practices usage, amount of time spent in specific areas, or tick seasonal activity, might have contributed to the observed results. Concerning risk groups, men of all ages, senior citizens, and rural inhabitants should be targeted by Romanian authorities when promoting local or nationwide tick awareness campaigns.

Keywords: COVID-19 lockdown, questionnaire, tick

TRAUMA ETIOLOGY IN DOGS AND CATS: A RETROSPECTIVE STUDY OF 4626 CASES

Răzvan COJOCARU¹, Larisa SCHUSZLER¹, Daniel BUMB¹, Rebeca BARNEA¹
and Cornel IGNA^{1*}

¹ *Veterinary Medicine, Banat University of Agricultural Sciences and Veterinary Medicine
"King Michael I of Romania", C. Aradului no. 119, Timișoara, Timiș, Romania (USAMVBT)*

*Corresponding author, e-mail: ignacornel@gmail.com

Introduction: Traumatic injuries are a major health hazard having an important impact in animal's welfare. The outcome following a traumatic event in the animal's life, depends on multiple factors, the most common ones being the cause and the location of the trauma, the amount of kinetic energy and the way it was distributed to the animal, but also human activities and lifestyles, human-pet relationships and pet-management local strategies.

Aims: This retrospective study aims to evaluate the impact of traumatic injuries in 4626 dogs and cats that presented to the Surgical Department from the USAMVBT's Veterinary Hospital between 2000 and 2020.

Materials and Methods: Medical records between 2000 and 2020 were reviewed. All dogs and cats admitted with a history of trauma within this period were eligible for this study. For each patient we looked upon the following information: species, breed, animal size, age, sex, etiology, affected body region, outcome. Chi-square test of independence with Yates correction was performed to examine the relationship between variables at a level of significance sated at $p < .05$.

Results: The most frequent traumatic injuries were represented by road traffic accidents, young animals under 1 year of age being more prone than other age groups $\chi^2(4, N=4626) = 43$, $p < .001$ and dogs being more affected than cats $\chi^2(1, N=4626) = 107.66$, $p < .001$.

Conclusion: The veterinarian's role in diagnosing and dealing with trauma cases is fundamental in emergency resuscitation and definitive treatment of injured animals. Increased number of vehicles in the last twenty years can potentially have an impact also on the incidence of the dogs and cats involved in road traffic accidents. There is a tendency of misdistribution of the NAI cases in the other categories like RTA.

Keywords: cat, dog, non-accidental injuries, road traffic accidents, trauma

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SEROPREVALENCE RATES AGAINST FLAVIVIRUSES: WEST NILE, TICK-BORNE ENCEPHALITIS, AND USUTU VIRUSES IN HUMANS IN NORTH-WESTERN AND CENTRAL ROMANIA

Mircea COROIAN^{1,2,*}, Andrei Daniel MIHALCA¹, Silvia BORȘAN¹, Zsuzsa KALMÁR², Mirela FLONTA³ and Mihaela LUPȘE³

¹ *Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania*

² *The “Iuliu Hațieganu” University of Medicine and Pharmacy, Epidemiology Department, Cluj-Napoca, Romania; The University Hospital of Infectious Diseases, Cluj-Napoca, Romania*

³ *The University Hospital of Infectious Diseases, Clinical Laboratory, Cluj-Napoca, Romania*

*Corresponding author, e-mail: mircea.coroian@usamvcluj.ro

Introduction: West Nile virus (WNV), Usutu virus (USUV) and Tick-borne encephalitis virus (TBEV) are Arboviruses belonging to Flaviviridae family, characterized by vectorial transmission, able to cause neuroinvasive infections. The circulation of these viruses is considered endemic for Europe, due to annual outbreaks reported in many countries. The transmission between hosts is accomplished by hematophagous arthropods such as mosquitoes and ticks.

Aims: The aim of our study was to assess the circulation and distribution of West Nile virus, Usutu virus and Tick-borne encephalitis virus among healthy blood donors in north-western and central Romania.

Materials and Methods: Human blood samples were collected between November 2019-February 2020, from six counties from the northwestern region of Romania. The samples were serologically tested by ELISA, NS1 ELISA and Neutralization Assay.

Results: Overall we obtained a seroprevalence of 3.25% for WNV, 2.33% for TBE and 0% for USUV.

Conclusion: Despite the low prevalence obtained in the hereby study further research is required for an optimal overview of the epidemiological status of the Romanian population regarding these Flaviviruses, together with countrywide awareness campaigns.

Keywords: arboviruses, Tick-borne encephalitis virus, Usutu virus, West Nile virus.

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UPDATES ON THE DISTRIBUTION OF THELAZIA SPECIES IN LIVESTOCK IN ROMANIA

Vlad-Dan COTUȚIU^{1*}, Angela Monica IONICĂ³, Cristina Daniela CAZAN², Silvia-Diana BORȘAN¹ and Andrei Daniel Mihalca¹

¹Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

²CDS-9, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

³Clinical Hospital for Infectious Diseases Cluj-Napoca, Romania

*Corresponding author, e-mail: vlad.cotutiu@usamvcluj.ro

Introduction: Bovine and equine thelaziosis has been the focus of many studies over the course of the last century. However, information about the distribution of these nematodes in Romanian livestock is scarce. Thelaziosis is one of the vector borne zoonotic filariosis with economic and public health implications. Up to date various Muscidae species were either confirmed or incriminated as vectors for this disease. No data is currently available on their distribution in Romania.

Aims: The presence of *Thelazia gulosa*, *Thelazia skrjabini* and *Thelazia rhodesi* was documented in the North and North Eastern part of the country, yet there were no mentions of *Thelazia lacrymalis* in Romania. The aim of the present study was to evaluate the distribution of *Thelazia* species in Romanian livestock.

Materials and methods: Bovine and equine eyes were collected after slaughter (from authorized abattoirs) between January 2021 and July 2021. The samples were examined for the presence of *Thelazia* species. Species identifications was done using both morphological and molecular analysis.

Results: From 343 bovine samples, 43 (12.53%) were positive. Of these 35 (81.4%) were *T. rhodesi*, 7 (16.3%) *T. skrjabini* and 1 (2.3%) coinfection with *T. gulosa* and *T. skrjabini*. From 59 equine samples, 3 (5.1%) were positive. All nematodes (100%) were *T. lacrymalis*. All nematodes were also confirmed by molecular analysis, based on the genetic analysis of the mitochondrial gene cytochrome *c* oxidase subunit 1(*COI*).

Conclusion: The current study expands the known distribution of *Thelazia* species in bovines to all ecoregions of Romania. This is also the first report in domestic equines in Romania. Further studies are required to determine the current distribution *Thelazia* species and their vectors considering the economic and public health implications.

Keywords: Thelaziosis, *Thelazia lacrymalis*, *Thelazia gulosa*, vector borne nematodes, Romania

EMERGENCE OF THE INVASIVE *Aedes japonicus japonicus* (DIPTERA: CULICIDAE) IN AN URBAN AREA, ROMANIA

Cintia HORVÁTH^{1*}, Cristina Daniela CAZAN^{1,2} and Andrei Daniel MIHALCA¹

¹ Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Calea Mănăştur 3-5, 400372, Cluj-Napoca, Romania

² CDS-9, Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Calea Mănăştur 3-5, 400372, Cluj-Napoca, Romania

*Corresponding author, e-mail: cintiahorvath@usamvcluj.ro

Introduction: The Asian bush mosquito, *Aedes (Finlaya) japonicus japonicus* (Theobald 1901) (Diptera: Culicidae), is naturally occurring in Southeast Asia, but in the past three decades it has become invasive around the world. Its invasion is mostly facilitated by human activities, the increased trade and climate warming. *Ae. japonicus* is rapidly expanding its range; the success behind its colonization process lies in its tolerance to lower temperatures, which is responsible for a wider distribution range compared to other invasive species, indicating a bigger colonizing potential in the future.

Aims: An entomological survey was conducted at the International Airport of Cluj-Napoca, Romania with the aim to monitor *Aedes* invasive mosquito species based on a coordinated Pan-European initiative within the framework of Aedes Invasive Mosquitoes COST Action (www.aedescost.eu/aimsurv).

Materials and Methods: Monitoring of *Ae. japonicus* was carried out between 30th of June 2020 and 29th of September 2020. Two types of traps, BG-Sentinel trap baited with BG lure and dry ice, and ovitraps were placed at the airport apron areas where aircraft were parked while on land.

Results: A number of 26 mosquito eggs, resembling to be invasive mosquito eggs, were found on 24th of August in one of the ovitraps placed at the airport. The eggs were reared into adults, which were later morphologically identified as *Ae. japonicus*. The species was also molecularly confirmed by molecular biology analysis of the mitochondrial gene cytochrome c oxidase subunit 1 (COI). On 15 October, another female of *Ae. japonicus* was caught accidentally inside a building in Cluj-Napoca's central area.

Conclusion: The present study reports for the first time the presence of *Ae. japonicus* in Romania. Our findings draw attention to the dissemination of invasive mosquito species, which present a significant risk to the public health system and economy. This finding highlights the need for further surveillance programs to assess this species status in Romania.

Keywords: *Aedes japonicus*, Asian bush mosquito, invasive species, surveillance, airport

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**INCIDENCE OF CANINE HIP DYSPLASIA IN RADIOLOGY
DEPARTMENT OF THE FACULTY OF VETERINARY MEDICINE
CLUJ-NAPOCA (OCTOBER 2019 - JUNE 2021)**

Felix Daniel LUCACI^{1*}, Robert Cristian PURDOIU¹, Anamaria-Ioana PAȘTIU¹, Radu LĂCĂTUȘ¹, Carmen-Maria TURCU¹, Vlad COCOSTÎRC¹ and Dana Liana PUSTA¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences
and Veterinary Medicine, Cluj-Napoca, Romania.*

*Corresponding author, e-mail: felix.lucaci@usamvcluj.ro

Introduction: Canine hip dysplasia is characterized by joint instability, subluxation, or even luxation of the femoral head, which causes a deformation of the joint with the early production of coxarthrosis. Canine hip dysplasia may occur due to genetic factors (25-85%) and various environmental factors, such as: inadequate nutrition, too rapid body development, or hormonal imbalances.

Aims: The main purpose of the paper was to determine the incidence of canine hip dysplasia from October 2019 until June 2021 in the Faculty of Veterinary Medicine in Cluj-Napoca, as well as the exact determination of the degrees of hip dysplasia in examined dogs.

Materials and Methods: A total of 173 X-rays on the canine hips were taken between October 2019 and June 2021 in the Radiology Department of the Faculty of Veterinary Medicine from Cluj-Napoca. X-rays were taken with the Roentgen TEMCO Grx machine, then imported into the RadiAnt DICOM™ program, and interpreted according to the FCI grading scheme. Statistical analyses were made in the IMB SPSS STATISTICS™ program. A total number of 110 x-rays of the hips from various dog breeds were analyzed and 63 X-rays were excluded due to different causes.

Results: From a total of 110 dogs presented in this study, 50 dogs were graded A, 15 dogs were graded B, 26 dogs were classified with grade C, with grade D were classified 6 dogs and with grade E were diagnosed only 8 dogs.

Conclusion: In the present research work, out of 110 dogs examined (61 males and 49 females) more than a half (N=65; 59,1%) were free from canine hip dysplasia. Thus, out of the total of 110 dogs, 37 males (33,6%) and 28 females (25,5%) were diagnosed with grade A or B of canine hip dysplasia.

Keywords: canine hip dysplasia, digital radiology, incidence, Norberg angle, statistics

DENTAL PROBLEMS ASSOCIATED WITH CANINE DISTEMPER VIRUS

Raluca-Ioana NEDELEA^{1*}, Andreea MĂRINCUS² and Adrian TOMA²

¹*Faculty of Veterinary Medicine, USAMV Cluj-Napoca, Romania*

²*Clinica Veterinară Calvaria, Cluj-Napoca, Romania*

*Corresponding author, e-mail: Raluca.Nedelea@dentovet.ro

Introduction: Canine distemper virus is a highly contagious virus that usually affects dogs, wolves, ferrets, raccoons and wild ferrets. When dealing with the distemper virus and the whole cohort of its known symptoms, one needs to think about the dental aspects. Dental issues appear and are not to be neglected for the survivors of the canine distemper virus. The age at which the virus is achieved, the sequelae with which dogs remain post-disease are fundamental parameters that will influence future dental problems.

Aims: This article aims to present the dental problems associated with the canine distemper virus acquired in different life stages.

Materials and Methods: Two dogs with dental problems associated with the canine distemper virus were presented in the veterinary dental office. One of them acquired the virus before definitive teeth's development. The other contracted the virus by the age of one, after all teeth were present in the oral cavity. Distemper teeth, as they are known, are prone to complicated fractures, to discolorations. Their appearance is pathognomonic. When the virus is contacted after teeth forming, and if the central nervous system is affected, dogs may remain with distemper myoclonus localized on the facial muscles. This myoclonus will induce high pressure, repeated forces on teeth that will lead to an extensive series of dental issues. Generalized endo-periodontal lesions will be present due to myoclonus.

Results: The case with the canine distemper virus acquired before the end of teeth' development was presented for dental crown fracture due to lower resistance of the offended enamel. We managed to save the tooth by performing endodontic treatment. Dental problems associated with myoclonus are hard to be managed. If one may think that a wide-spread treatment option, surgical extractions, may lead to success, biology will invalidate this.

Conclusions: Distemper teeth are preferable to dental problems due to myoclonus. They are more manageable to be treated.

Keywords: distemper, dog, teeth, myoclonus, extraction

DIVERSITY OF PIROPLASMIDS IN EUROPEAN WILD FELIDS

Luciana Cătălina PANAIT^{1*}, Kristýna HRAZDILOVÁ^{2,3}, Georgiana DEAK¹, Călin Mircea GHERMAN¹ and David MODRÝ^{4,5,6} and Andrei Daniel MIHALCA¹

¹ Department of Parasitology and Parasitic Diseases, Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

² CEITEC VETUNI, University of Veterinary Sciences Brno, Czech Republic

³ Faculty of Medicine in Pilsen, Biomedical Center, Charles University, Czech Republic

⁴ Department of Veterinary Sciences/CINeZ, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Prague, Czech Republic

⁵ Biology Centre, Institute of Parasitology, Czech Academy of Sciences, Czech Republic

⁶ Department of Botany and Zoology, Faculty of Science, Brno, Czech Republic

*Corresponding author, e-mail: luciana.rus@usamvcluj.ro

Introduction: Haemoparasites of the order Piroplasmida are protozoans that infect a wide variety of domestic and wild animals, and even humans.

Aims: Our aim was to evaluate the genetic diversity of *Cytauxzoon* and *Babesia* in European wild felids.

Materials and Methods: The presence of *Cytauxzoon* and *Babesia* spp. was tested by using nested PCR protocols, targeting the highly conserved 18S rDNA, mitochondrial cytochrome b (CytB) and cytochrome c oxidase subunit I (COI) genes. For this, 106 samples from wild felids (92 from *Felis silvestris* and 14 from *Lynx lynx*) from Germany, Romania, Luxembourg, and Czech Republic and 51 samples (44 *Felis silvestris* and 7 *Lynx lynx*) from Romania were collected and screened for the presence of *Cytauxzoon* spp. and *Babesia* spp., respectively. Furthermore, 18 *Cytauxzoon* sp. positive samples from wild felids from Europe, and comparative material from USA positive for *C. felis*, were included in the study.

Results: DNA of *Cytauxzoon* spp. was amplified from 64 samples, while 20 samples were positive for *Babesia* spp. in 18S rDNA analyses. Phylogenetic analyses of *Cytauxzoon* spp. 18S rDNA revealed the presence of two separate clades of New World and Old World isolates, with a low inner diversity of the European clade. On the contrary, phylogenetic analyses of CytB and COI genes affirmatively revealed three highly supported clades, resulting in three defined genotypes. Considering the intra- and interspecific variability of CytB and COI genes, geography, host species and phylogenetic analyses of the three genes, we conclude that the detected genotypes of *Cytauxzoon* in European wild felids represent three new species, which we recently described: *C. europaeus*, *C. otrantorum*, and *C. banethi*. In *Babesia* spp. 18S rDNA analyses, all sequences showed 100% similarity to *B. canis* by BLAST. Conversely, in Cytb and COI genes analyses the presence of two *Babesia* spp., *B. pisicii* and *B. canis*, was revealed. The pairwise comparison of both mitochondrial genes of *B. pisicii* showed a genetic distance of at least 10.3% from the most closely related species, *B. rossi*.

Conclusion: This study reveals a high and unexpected diversity of piroplasmids in wild felids from Europe, providing additional proof that the solely use of 18S rDNA analyses is insufficient for a clear differentiation between closely related piroplasm species.

Keywords: *Babesia*, *Cytauxzoon*, European wild felids, piroplasmids

EVALUATION OF MEDETOMIDINE-KETAMINE FOR IMMOBILIZATION OF FERAL HORSES IN ROMANIA

Ovidiu ROȘU¹, Iulia MELEGA^{2*}, Alina L. EVANS³, Jon M. ARNEMO^{3,4}
and Susanne KÜKER³

¹*Faculty of Veterinary Medicine, University of Agronomic Sciences and Veterinary Medicine Bucharest, Romania*

²*Faculty of Veterinary Medicine, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania*

³*Department of Forestry and Wildlife Management, Inland Norway University of Applied Science, Koppang, Norway*

⁴*Department of Wildlife, Fish and Environmental Studies, Swedish University of Agricultural Sciences, Umea, Sweden*

*Corresponding author: iulia.melega@usamvcluj.ro

Introduction: The handling of wild or feral animals, like it is carried out in the current population of free-ranging horses in the Danube Delta, often requires chemical immobilization. However, studies on anesthesia protocols on feral horses are rare. Although opioid combinations have been successfully used for the immobilization of feral horses, there is a need for combinations using more accessible drugs.

Objective: We evaluated the chemical immobilization of 91 free-ranging feral horses (*Equus ferus caballus*), remotely immobilized with a combination of 30 mg Medetomidine (M) and 775 mg Ketamine (K) in a single disposable 6 ml dart.

Material and methods: Targeted animals were approached and darted from distance using a remote drug delivery system. Induction time, recumbency time, recovery time, physiological variables and oxygen hemoglobin saturation were recorded. In 8 horses, arterial blood gas and hematology analysis were performed in two-time points.

Results: Targeted horses presented a wide range of age and body conditions. Eighty-one horses had a mean induction time of 7.2 min, while for 89 horses the mean recumbency time was 67 min. Ten horses required supplemental K intravenously. In 58 horse's anesthesia was partially reversed with atipamezole. Increased heart rate, respiratory rate and hypoxia were constant findings, while an increased temperature was recorded in 6 animals. Hypoxemia (n=8), hypercapnia (n=5), high glucose (n=3) and increased blood lactate levels that increased in the second sample were registered. Recoveries were smooth, with one (n=86) attempt of standing.

Conclusion: MK provided reliable immobilization in feral horses. Based on the observed hypoxemia, oxygen supplementation is strongly recommended for this protocol.

Keywords: field anesthesia, feral horses, ketamine, medetomidine.

THE INFLUENCE OF GEOGRAPHICAL FACTORS IN THE EPIDEMIOLOGY OF AFRICAN SWINE FEVER IN ROMANIA

Andrei UNGUR^{1*}, Ștefania MUREȘAN¹, Luciana PANAIT¹ and Cornel CĂTOI¹

¹ *Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania*

*Corresponding author, e-mail: andrei.ungur@usamvcluj.ro

Introduction: The continuous and rapid spreading of African swine fever (ASF) virus has a significant economic and social impact. Environmental and geographical factors could play a major role in the transmission of ASF. Thus, it was observed the existence of predictability relationships between the density of rivers and forests and the presence of infection in the pig population studied, between 2018 and 2019. Another study held in Russia, demonstrated that aquatic environments could be a risk factor in the outbreak of ASF outbreaks in 2007-2010.

Aims: The main highlighted objective of this study is the correlation between the presence of outbreaks and the number of affected pigs with the geographical elements, such as: altitude, humidity, temperature, distance from forest, rivers and lakes.

Materials and Methods: This study took into account 417 reported outbreaks of ASF between 06.02.2020-04.03.2021, with 94124 affected domestic pigs, from 295 localities of Romania. For the statistical analysis, only the number of affected pigs from the extensive rearing system or within the farms of the authorized person type was taken into account.

Results: The highest number of affected pigs or foci of infection was identified at altitudes between 100 and 500 m, average humidity between 60% and 80%, average temperature during spring and summer between 10–14°C and 16–22°C. Regarding the distances to the forest, rivers or lakes, the highest number of affected pigs or outbreaks of ASF was identified at distances of less than 5 km from the forest and river and less than 15 km from the lakes.

Conclusion: The results showed a positive correlation between the number of affected pigs and the number of outbreaks in the same locality, and the presence of a linear line between the distance to the lake and the number of ASF outbreaks detected.

Keywords: African swine fever, epidemiology, geographical factors.

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ANTIBIOTIC-LOADED POLYMERIC NANOPARTICLES AS TOOLS AGAINST ANTIBIOTIC RESISTANCE: A META-ANALYSIS

Emilia UNGUREANU¹, Sergiu Dan ZĂBLĂU¹, Marina SPÎNU¹, Lucjan WITKOWSKI², Florinel BRUDAȘCĂ¹ and Constantin CERBU¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Calea Mănăștur nr. 3-5, 400372, Cluj-Napoca, Romania;

² Division of Veterinary Epidemiology and Economics, Institute of Veterinary Medicine, Warsaw University of Life Sciences, Nowoursynowska 159c, 02-776 Warsaw, Poland

*Corresponding author, e-mail: emilia.ungureanu@usamvcluj.ro

Introduction: The increased usage of antimicrobial therapy led to a major global health challenge that required the development of a new strategy to enhance antibiotic therapy. As a consequence, nanotechnology, defined as the understanding and restructuring of biomaterials on the order of nanometers, has emerged (Safari *et al.*, 2014). The development of drugs in nanoparticle systems with antibiotics allows the therapeutic effect to be achieved with the minimum dosage because of their unique physicochemical properties (Kalhapure *et al.*, 2015). Therefore, the antibiotic-loaded polymeric nanoparticles are representing a superior solution due to characteristics such as better bioavailability and a controlled release at the desired site (Castro, 2020).

Aims: To highlight and summarize the antibiotics that were improved in terms of performance by loading into polymeric nanoparticles as well as their advantages and limitations and also to present the synthesis methods and polymer characteristics, for a better understanding of the current trends.

Materials and Methods: The paper is based on scientific articles and systematic reviews identified on the Web of Science database, centralized and classified according to specific keywords.

Conclusion: The physicochemical properties of these nanosystems such as zeta potential, particle size and solubility, are important parameters in their employment as antibacterial drug delivery systems (Eleraky *et al.*, 2020). This review provides a systematic and detailed description of the characteristics of each polymeric nanosystem that is suitable for antibiotic delivery and describes the challenges such as biological issues, biocompatibility, intellectual property and costs compared to the traditional therapy.

Keywords: antimicrobial resistance, antibiotic-loaded nanoparticles, drug delivery, polymeric nanoparticles

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DIAGNOSIS AND IMPACT OF COLIBACILLOSIS IN BROILER CHICKEN IN THE ALGERIAN CENTER

Achour YAHIA^{1*}, Faiza MEBKHOUT¹, Chaima SIRINE¹ and Saada BENKOUIDER¹

¹ *Institute of Veterinary Sciences, University of Blida 1, Algeria*

* Corresponding author, e-mail: achourveto@yahoo.fr

Introduction: In Algeria, poultry production has experienced real development over the past 20 years, but this progress is not achieved without problems. In fact, most poultry farmers are not professionals and do not master the application of basic hygiene rules, thus promoting the emergence of various pathologies. Colibacillosis, one of these diseases, which is considered a secondary infection, currently represents one of the most important causes of economic losses in the poultry sector.

Aims: The aim of our study was to evaluate the economic losses and diagnostic methods of avian colibacillosis in broiler chicken.

Materials and Methods: The experimental study was carried out on 15 poultry houses in 3 wilayas of Algerian centre (Blida, Médéa and Bouira). Our work was based in the first place on the collection of data concerning the technical parameters, the livestock management (sanitary and medical prophylaxis) and during infection, the rate of mortality and morbidity, weight loss, the appearance of secondary infections. Autopsies on infected animals as well as laboratory confirmations were performed.

Results: Our results show that this disease (colibacillosis) is the most frequent (28%) compared to other diseases encountered during the experiment and can cause economic losses of up to 15% of body weight and 3% of mortality, especially when it appears as a secondary infection. In terms of diagnosis, respiratory symptoms were encountered in 60% of cases. Respiratory and septicemic lesions appear from the second week of age, but brutal mortalities and omphalitis are the most characteristic signs at the breeding start-up period. The Laboratory diagnosis shows that all suspicions (100%) based on symptoms and lesions were confirmed positive.

Conclusion: Particular attention must be accorded to this pathology to control the factors that promote its appearance and avoid the economic losses that it generates.

Keywords: Broiler chicken, Diagnosis, *E.coli*, economic loss.

POSTER PRESENTATIONS

SESSION 1: AGRICULTURE

MONITORING OF APHIDS SPECIES IN THE POTATO CROP FROM
ȚARA BÂRSEINina BĂRĂSCU¹, Daniela DONESCU¹, Victor DONESCU¹¹National Institute of Research and Development for Potato and Sugar Beet Braşov, Romania*Corresponding author, e-mail: nina.barascu@gmail.com

Introduction: With a high capacity for adaptation and colonization in many ecological systems, including crops, aphids are interesting models of study; the main aphid species associated with potatoes worldwide are non-specific to this crop (Saguez et al. 2013). Aphids can cause damages to potato plants by inducing feeding injuries, as well by transmitting plant viruses (Rajagopalbabu et al. 2013).

Aims: In order to evaluate the fluctuations of aphids in potato crop, an investigation was carried out in Țara Bârsei, using a 56 years long time series data. To identify the aphid species and to assess the relevance of their structure and abundance, between the years 1963 and 2018, a study of these pests in potato crop was conducted.

Materials and Methods: Aphid monitoring was carried out using the method of yellow water traps, suitable for studies on aphid population structure, abundance and flight activity. The investigation was performed immediately after the emergence of potato plants and it continued until potato vines started yellowing. Species were identified using keys for identification of alatae aphids.

Results: During the fifty-six years studies, the aphid species collected were identified from different taxa. Great differences were observed on aphid structure, abundance, distribution and flight activity over the studied years. Some aphid species were more or less regularly trapped on potato crops during the years. For seed potato crop, the greatest interest was presented by *Myzus persicae* species, the main viral vector from this crop.

Conclusion: The monitoring of aphid populations, the analysis of the abundance of aphid species contribute to the knowledge of the activity and evolution of the aphid fauna specific to potato crops over long periods of time.

Keywords: aphids, potato crop, species

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A TIMELINE REVIEW OF MOBILE-BASED INFORMATION SYSTEMS WITH IMPLICATIONS IN SOILS CHARACTERIZATION

Bogdan-Vasile CIORUȚA^{1,2*} and Mirela COMAN^{2,3}

¹*Doctoral School SAI, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

²*Office of Informatics, North University Center of Baia Mare-Technical University Cluj-Napoca,
Baia Mare, Romania*

³*Faculty of Engineering, North University Center of Baia Mare - Technical University of
Cluj-Napoca, Baia Mare, Romania*

*Corresponding author, e-mail: bogdan-vasile.cioruta@usamvcluj.ro

Introduction: There is a wide range of Environmental Information Systems (EISs), both desktop and mobile platforms, with usability in industry and applied ecological studies. Of these, EISs for mobile devices have begun to be increasingly used in the current activity of those concerned with soil protection and agriculture management.

Aims: According to the utilization impact of the mobile EISs in environmental protection, in general, and soils characterization, in particular, the present study proposes an analysis of the mobile-based information systems with implications in soils characterization, in an attempt to illustrate another perspective on soil protection and sustainable agriculture.

Materials and Methods: The indexing, analysis, description, and dissemination of mobile-based information systems with implications in soils characterization were done through the prism of the Google Play Store and other dedicated sites.

Results: The results obtained showed that the soil monitor mobile-based applications with a focus on environmental impact assessment, also in contaminated soils management, requires complex interdisciplinary knowledge, as well as profound technical information developed in the environment-informatics complex context.

Conclusion: We try to demonstrate that the innovative technology associated with mobile apps, focusing on soil pollution monitoring and assessment can be an alternative to the classical monitoring approach, where the classic work agenda is still not absent from the field.

Keywords: Environmental Information Systems, mobile apps, soil pollution, sustainability.

YIELD TRAITS AND ANTIOXIDANT ACTIVITY IN SOME ROMANIAN GARLIC (*ALLIUM SATIVUM* L.) ACCESSIONS

Mihaela CORNEANU¹, Cristina BĂBEANU^{2*}, Ovidiu PĂNIȚĂ³

¹ Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania” from Timisoara, Departament of Genetics, Timisoara, Romania

² University of Craiova, Faculty of Science, Craiova, Romania

³ University of Craiova, Faculty of Agriculture, Craiova, Romania

*Corresponding author, e-mail: cbabeanu@yahoo.com

Introduction: Garlic (*Allium sativum* L.), an important vegetable, a widely cultivated crop presents a large variability in vegetative traits, as well as, in bioactive compounds content, between accessions. In order to increase genetic variability, the collection of a large number of landraces is the only means available regarding to yield, quality, tolerance to biotic and abiotic stress (Petropoulos, 2018). Garlic is a source of various phytochemicals and antioxidant compounds that have the ability to scavenge free radicals, reducing oxidative stress are considered of special interest (Denre et al., 2013).

Aims: The aim of this study is to determine the variability in yield traits, total flavonoids, ascorbic acid content and antioxidant activity in 24 garlic accessions, after 8 years of “ex-situ” cultivation, for a further breeding program.

Materials and Methods: Biological material, 24 garlic accessions (*Allium sativum* L.) have been collected from a polluted area (Middle Jiu Valley) and cultivated “ex situ” (West Plain) for 8 years. In 2018 biometric observations on yield traits and biochemical analysis (total flavonoids content, antioxidant activity, radical-scavenging capacity, ascorbic acid content) were performed. The data were statistically analyzed using STATISTICA 10.0 software.

Results: Significant differences have been observed in all yield characters, as well as in the biochemical indices investigated. The effect of genotype is very significant for all yield characters, while the environmental conditions presented significant effect on bulb diameter and weight and very significant effect on cloves number/bulb. Total flavonoids content that varies between 33.17 µg/1g and 49.46 µg/1g. The ascorbic acid content determined shows values between 0.144mg/1g and 0.308 mg/1g. The antioxidant activity of garlic extract, measured by the DPPH radical scavenging method varies between 14.08% and 22.64 %. A positive significant correlation has been observed between the antioxidant activity and total flavonoid content and ascorbic acid content

Conclusion: Studies on garlic accessions harvested from a polluted area may reveal some germplasm sources for stress resistance genes and on the basis of these results, it is possible to choose the genotypes for further evaluation – dry matter content, sulphur compound content, genome analysis.

Keywords: *Allium sativum* L., antioxidant activity, flavonoids, yield traits.

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***CORYTHUCHA CILIATA* SAY, 1832 – PEST OF PLANE TREES (*PLATANUS* SPP.)**

Teodora FLORIAN¹, Diana POPUȚA, Horia BUNESCU¹

¹*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca*

*Corresponding author, e-mail: teodora.florian@usamvcluj.ro

Introduction: The research aimed the study of an invasive species that recently appeared in our country, *Corythucha ciliata* Say (the sycamore lace bug or the plane tiger) (Hemiptera, Tingidae) (Tatu and Tăușan, 2011). Knowing this pest is very important in order to control it, to keep the appearance of the parks pleasant and clean. The insect is an aggressive pest of plane trees (*Platanus* spp.), which harms their leaves, leading to premature defoliation (Halbert and Meeker, 1998).

Aims: Identification and monitoring of *Corythucha ciliata* Say populations; observations on the host plants in the analyzed space; tracking the biological cycle of the species *Corythucha ciliata* Say and the extent of pest.

Materials and Methods: In order to identify and monitor the sycamore lace bug, direct observations were made by visual control of the trees (*Platanus* spp.), samples were collected from 5 trees in the form of biological materials (leaves, adult insects, larvae), which were brought to laboratory, analyzed under a microscope and photographed. To track the biological cycle, colored sticky trap-type panels were used to capture adults. The studies were made between 2020-2021.

Results: Following the observations made, *Corythucha ciliata* Say was identified in 4 locations: Chereușa (Satu-Mare County), Tășnad (Satu-Mare County), Cluj-Napoca (Cluj County) in 2020 and Sibiu (Sibiu County) in 2021. The sycamore lace bug was observed on two plane species, *Platanus x acerifolia* Willdenow and *Platanus occidentalis* Linné. On 23.08.2021, in the ecological conditions of Cluj-Napoca (Cluj County) - "Iuliu Hațieganu" Sports Park (coordinates 46 ° 45'55 "N 23 ° 33'33" E), following the analysis of the 5 trees, the numerical density of the pest on the plane leaves was a maximum of 30 adults/leaf and 63 larvae/leaf. Concerning the biological cycle, following the research carried out in the "Iuliu Hațieganu" Sports Park, it was found that, in the temperate-continental climate of Cluj-Napoca, *Corythucha ciliata* Say has 2 generations per year. The first generation appears in May, with increasing temperature and the second generation was observed in September.

Conclusion: Following research conducted in 2020-2021, the invasive species *Corythucha ciliata* Say, was identified in 4 locations in Transylvania, on two species of planes, *Platanus x acerifolia* Willdenow and *Platanus occidentalis* Linné. In the ecological conditions of Cluj-Napoca (Cluj County), the numerical density of the pest on the plane leaves was of maximum 30 adults/leaf and 63 larvae/leaf. Concerning the biological cycle, it was found that, in the temperate-continental climate of Cluj-Napoca, the species has 2 generations per year.

Keywords: *Corythucha ciliata* Say, sycamore lace bug, pest, plane trees

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HEALTH OF POTATO PLANTS IN DIFFERENTIATED FERTILIZATION CONDITIONS AT REMETEA, HARGHITA COUNTY

Vasile FLORIAN¹, Nórbert FERENCZ-CSIBI¹, Cristina MOLDOVAN¹, Teodora FLORIAN^{1*}

¹ Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author, e-mail: teodora.florian@usamvcluj.ro

Introduction: The paper presents the results of rigorous research carried out in Remetea, Harghita County. The research is based on the field experience organized in 2020, where four potato varieties were studied: Laura, Sante, Finka and Red Lady. The study carried out found that in the pedoclimatic conditions at Remetea, the Laura variety was best behaved, being the only one that during the growing season recorded an average degree of attack of less than 15%

Aims: Identifying the sensitivity of the varieties studied to the aphid and downy mildew attack in the pedoclimatic conditions from Remetea, Harghita County, and the influence of fertilization on phytosanitary condition of the potato.

Materials and Methods: A bifactorial experience was set up in Remetea, Harghita County. Four potato varieties were studied: Sante, Finka, Red Lady and Laura. Differentiated fertilization was carried out as follows: Nitrogen was applied in two phases, in the first phase at planting, and followed by another application to rebilocation, the fertilizer used was ammonium nitrate. The foliar fertilizer used was PLONVIT ACTIVE CARTOF, applied at the first and second treatment on 27.06.2020 and 14.07.2020.

Results: If we analyze the evolution of the degree of attack, it can be seen that at the end of July, the degree of attack of the pseudo-fungus *Phytophthora infestans* was only 1%. Although chemical treatments were applied against this pathogen, the degree of attack increased until August, reaching an average level of over 45%. Comparing the non-fertilized variants with those fertilized with nitrogen, we observed that the degree of attack increases by about 40%, reaching a level of 20%. Foliar fertilization, on the other hand, led to a decrease in the degree of attack. The least negatively influenced by nitrogen fertilization was the Laura variety, being the only one in which the differences from the control are only distinctly significant. In 2020, 6 species of aphids were identified in Remetea: *Macrosiphum euphorbiae*, *Aphis fabae*, *Aulacorthum solani*, *Aphis frangulae*, *Phorodon humuli*, and *Myzus persicae* (the last species being the most critical vector of viruses)

Conclusion: The attack of the *Phytophthora infestans* is still a limiting factor in the production of potato plants. Following the research conducted in 2020, the degree of downy mildew attack exceeded the value of 45% in August. Nitrogen fertilization has led to the sensitization of potato plants to downy mildew attacks. As for the aphid attack, it had an insignificant value.

Keywords: potato, phytosanitary condition, aphids, *Phytophthora infestans*, fertilization

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THE IMPACT OF RESIDUES FROM NEONICOTINOID INSECTICIDES APPLIED AS SEED TREATMENT IN PESTS CONTROL ON SUNFLOWER CROP, HONEY BEES AND HIVE PRODUCTS

Alin GHEORGHE¹, Roxana ZAHARIA^{1*}, Viorel FATU¹, Angela AMUZA¹, Emil
GEORGESCU², Georgeta TRASCA³, Paula L. PINTILIE⁴, Agripina SAPCALIU⁵,
Carmen MINCEA¹

¹Research and Development Institute for Plant Protection, Bucharest, Romania

²National Agricultural Research Development Institute, Fundulea, Romania

³Agricultural Research Development Station Pitesti, Romania

⁴Agricultural Research Development Station Secuieni, Romania

⁵Research and Development Institute for Beekeeping, Bucharest, Romania

*Corresponding author, e-mail: roxyanna_21@yahoo.com

Introduction: For several years at the European Commission level it is closely monitored the possible interaction between bees' health and pesticides and in 2013, the use of plant protection products and treated seeds containing three of these neonicotinoids (clothianidin, imidacloprid and thiamethoxam) were severely restricted in order to protect honeybees by Regulation (EU) No 485/2013. In recent years, Romania has occupied leading positions in sunflower productions according to Eurostat data, being the eighth agricultural power in Europe.

Aims: Monitoring populations of *Tanymecus dilaticollis*, *Opatrum sabulosum* and *Agriotes* spp, but also the neonicotinoid residues level in soil, plants in various stages of development (leaves and inflorescences), in honey bees and hive products (pollen, honey) from three representative areas, respectively Moldova Plateau, Subcarpathic Hills and southern part of Romania.

Materials and Methods: The biological material consisted in three species of soil pests, sunflower plant samples, dead honey bees and hive products. Barber traps placed on the diagonal of the experimental plots were used to monitor the soil pests and observations were performed to determine the attack degree. The soil samples were collected with a well, at a depth of 20 cm, and the plant samples in different BBCH stages. Honey bees and hive products samples were collected according to a procedure elaborated by R.D.I. Apiculture.

Results: Monitoring the pest attack has shown that seed treatments keep the populations of the three pests below the economic damage threshold. Residues levels were determined in accredited laboratories from Germany, France and Bulgaria using certificated methods. The statistical analysis shows very low variability between annual samples, most samples being, in terms of residues, below the limit of quantification. It is also very important that the lowest percentage of samples with residues above the limit of quantification was recorded in samples of honey, inflorescences and bees, the annual deviations being insignificant.

Conclusion: Of the total samples, most with residue content above LOQ, are soil samples, an absolutely normal situation, as the neonicotinoid treatment was applied to the seed.

Keywords: honey bees, hive products, neonicotinoids, residues, *Tanymecus dilaticollis*.

BLACK SCURF (*RHIZOCTONIA SOLANI*) INFLUENCE ON POTATO YIELD USING DIFFERENT AGRICULTURAL PRACTICES

Manuela HERMEZIU¹ and Radu HERMEZIU¹

¹ Department of Technology and good agriculture practice, National Institute of Research and Development for Potato and Sugar Beet, Brasov, Romania

*Corresponding author, e-mail: hermeziuum@gmail.com

Introduction: Black scurf and stem canker on potato caused by *Rhizoctonia solani* is one of the most common and oldest diseases of potato affecting stem, stolons and tubers. Currently, *Rhizoctonia* disease is managed by cultural practices (Secor and Gudmestad, 1999), but fungicides are currently used when losses are great (Parry, 1990).

Aims: The present research work study the potential of some fungicides to control potato black scurf diseases and the influence on crop yield.

Materials and Methods: Two field experiments were conducted to include a trial in monoculture and another one trial in rotation. Two Romanian varieties, Brasovia (with yellow skin) and Cezarina (with red skin) were planted in 4 replicates plots and five different fungicides were applied. The level of tubers disease was analyzed using a four step scale.

Results: Total yield with different black scurf degree of attack was between 12.48 t/ha to the untreated (control) variant and 20.32 t/ha to Prestige variant on monoculture field and between 12.00 t/ha to the untreated (control) variant and 12.38 t/ha to Serenade 8.0 l/ha variant. Hundred tubers from the 35-55 mm and >55 mm size category were selected and assessed for presence of sclerotia. The total yield and % of tubers with attack was between 35.64 to untreated (control) variant and 25.86 to Amistar variant in the field with rotation and between 18.33 and 15.58 to sercadis variant in monoculture field.

Conclusion: High prevalence of black scurf of potato is due to the favorable climatic condition for the inoculum, monocropping and poor cultural practices. Low soil temperature and high moisture level was the major factors favoring the development of disease in the second location. Potato crop cultivated without proper rotation tactics may lead to the encouragement of soil-borne diseases.

Keywords: black scurf (*Rhizoctonia solani*), control, fungicides, potato, yield

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ANALYSIS OF SOME POTATO VARIETIES CONCERNING THE SUSCEPTIBILITY TO QUARANTINE PEST *DITYLENCHUS* SP.

Manuela HERMEZIU^{1*}, Radu HERMEZIU¹, Carmen CHELMEA¹ and Diana PETRE¹

¹ *Department of Technology and good agriculture practice, National Institute of Research and Development for Potato and Sugar Beet, Brasov, Romania*

*Corresponding author, e-mail: hermezium@gmail.com

Introduction: Nematodes are mostly root feeders living in soil and cause gradual yield reduction. The degree of damage depends on crop husbandry, nematode density and environmental conditions (Evans, 1993). The damage caused consists of a high reduction of tubers quality and in significant quantitative losses during the storage. Under certain conditions losses can reach 43% of production (Melnic et al., 2015).

Aims: monitoring the external and internal symptoms of potato tubers taken from different locations and highlighting the importance of phytosanitary quality of planting material

Materials and Methods: the evaluation was performed by collecting 5 samples (potato plants) from 5 locations together with the soil from their rhizosphere. In the laboratory were analyzed: underground vegetative organs of plants - newly formed roots, stolons and tubers; extraterrestrial vegetative organs - stem, leaves; the soil in the rhizosphere of plants

Results: Although climatic conditions mainly govern the geographical distribution of most nematode species, climatic conditions have a significant effect on the density of plant parasitic nematode populations and the damage caused by them. with nematodes. Other phenomena (sprouting, greening) were observed in varying proportions in the studied varieties.

Conclusion: Knowing that nematodes are polyphagous pests and simple crop rotation is not enough, the other aspects of technology applied with discernment contribute to the protection of the crop as a whole. In the present research work, we demonstrated that the essential component of any control program is primarily the use of certified seed.

Keywords: *Ditylenchus* sp., potato, seed material, simptomatology, technology

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DEVELOPMENT OF DECISION SUPPORT SYSTEM BASED ON THE BAYESIAN RIDGE ALGORITHM FOR IRRIGATION OF COTTON

Dimitrios LEONIDAKIS¹, Evangelos PSOMAKELIS^{2,3}, Christoforos-Nikitas KASIMATIS⁴, Nikolaos KATSENIOS⁴, Ioanna KAKABOUKI⁵, Ioannis ROUSSIS⁵, Antonios MAVROEIDIS⁵ and Aspasia EFTHIMIADOU⁴

¹*Farmacon G.P., K. Therimioti 25, Giannouli, Larisa, 41500 Thessaly, Greece;*

²*School of Electrical and Computer Engineering, National Technical University of Athens, 15780 Athens, Greece*

³*Department of Informatics and Telematics, Harokopio University of Athens, 17778 Athens, Greece*

⁴*Department of Soil Science of Athens, Institute of Soil and Water Resources, Hellenic Agricultural Organization-Demeter, Sofokli Venizelou 1, Lycovrissi, 14123 Attica, Greece;*

⁵*Laboratory of Agronomy, Department of Crop Science, Agricultural University of Athens, 11855 Athens, Greece;*

*Corresponding author, e-mail: nkatsenios@gmail.com

Introduction: Almost 70% of the world's production of cotton is derived from irrigated conditions [1]. Decision Support Systems are information systems that can support complicated decision-making activities which are vital for sustainable agriculture, such as irrigation management optimization [2].

Aims: The aim of this study was to develop a Decision Support System for the irrigation of cotton, making suggestions about possible irrigation plans, meaning the exact dates that farmers should irrigate, with little to no effects on the total yield.

Materials and Methods: The Field Sensors used were SMT 12 and ECH2O EC-5 measuring soil temperature and soil moisture at 27 cm below ground level. The data logger was RFRN 13 iMETOS RadioNode DD connected to iMETOS 3.3 motherboard (Pessl Instruments). The Weather Station used was Vantage Pro2 6322C and the measurements retrieved were: air temperature (°C), air relative humidity (RH) (%), wind Speed (m/sec), evapotranspiration (mm) and precipitation (mm). The measurement of em38 has been conducted by using ground conductivity meter EM38-MK2, at a distance of 5 meters lengthwise of each field.

Results: The information system which was implemented using the Bayesian Ridge algorithm is designed to optimize the use of irrigation resources, by reducing water use to only when it is necessary. According to our results, the number of irrigations, could be reduced to 2-3 instead of 3-5 irrigations that were applied to the five experimental fields of this study.

Conclusion: In the present work, we depicted a novel DSS technology based on water saving without affecting the yield.

Keywords: cotton, DSS, IoT sensors , irrigation, remote sensing

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MONITORING RESIDUES OF NEONICOTINOIDS APPLIED AS SEED TREATMENT FROM OILSEED RAPE CROP

Ion LEVEANU¹, Viorel FĂTU¹, Angela AMUZA¹, Alin GHEORGHE¹,
Emil GEORGESCU², Georgeta TRASCA³, Paula L. PINTILIE⁴, Agripina SAPCALIU⁵,
Carmen MINCEA¹

¹Research and Development Institute for Plant Protection, Bucharest, Romania

²National Agricultural Research Development Institute, Fundulea, Romania

³Agricultural Research Development Station Pitesti, Romania

⁴Agricultural Research Development Station Secuieni, Romania

⁵Research and Development Institute for Beekeeping, Bucharest, Romania

*Corresponding author, e-mail: i.levEANU@yahoo.com

Introduction: The importance of rapeseed crop is given by the considerable cultivated areas. According to FAO data, an average of 2263 kg/ha was registered in Romania, and the area cultivated with rapeseed was approximately 352 thousand ha in 2019.

Aims: Monitoring and evaluation of neonicotinoid insecticides residues impact applied as seed treatment on rapeseed crops, on honey bees mortality (*Apis mellifera*); detection and monitoring of residue levels in rapeseed plants and hive products, as well as monitoring populations of the main pests, respectively *Phyllotreta* sp, *Psilliodes* sp. and *Athalia rosae*, in the agro-pedoclimatic conditions specific to Romania.

Materials and Methods:

Material: soil pest, plant samples, honey bees, pollen, honey, bee brood. Neonicotinoid residues were determined in accredited laboratories from Germany, Bulgaria and France.

Methods: procedures for evaluating the impact of seed treatment on pest population. The plants sampling was carried out according to a specific procedure, respectively 10 samples from each BBCH development stage, taken on the diagonal of the experimental plots. Bee samples were collected according to the procedure developed by R.D.I. for Beekeeping.

Results: Concerning residues level in soil, honey bees and honey samples, it can be conducted that soil samples recorded the highest percentage of residues above LOQ, while inflorescence and honey samples contained the lowest percentage of residues over LOQ. The honey and inflorescence samples did not contain any neonicotinoid nor cyantraniriprol residues.

Conclusion: Seed treatments with neonicotinoid insecticides applied in rapeseed crop maintain pest populations below economic damage threshold.

From the total amount of analysed samples, the majority with residue content above LOQ, are soil samples, an absolutely normal situation, as the neonicotinoid treatment was applied to the seed.

Keywords: bees, , hive products, hive products, residues, oil seed rape, seed treatment.

THC YIELD AND GREENHOUSE COVER MATERIALS: OPTIMIZING THE PROFIT OF MEDICAL CANNABIS

Maria KOUSOYLA¹, Stella BRAKATSOULA¹, Christina NIKAKI¹, Dimitrios BILALIS¹, Alexandros TATARIDAS¹, Ioannis ROUSSIS¹, Ioanna KAKABOUKI¹, Panayiota PAPASTYLIANOU¹ and Antonios MAVROEIDIS^{1*}

¹ Department of Crop Science, Laboratory of Agronomy, Agricultural University of Athens, Greece

*Corresponding author, e-mail: antoniosmauroeidis@gmail.com

Introduction: Even though Delta-9-tetrahydrocannabinol (THC) is a psychoactive substance studies indicate that it has therapeutic properties (National Academies of Sciences, Engineering, and Medicine). Moreover, the shift in Greek legislation regarding the legalization of cannabis resulted in new business opportunities for medical-cannabis related companies (Folina et al., 2019).

Aims: This study aimed to evaluate the effect of different greenhouse cover materials on THC production and design a business plan for any potential medical-cannabis related company in Greece.

Materials and Methods: Initially, the THC yield per greenhouse was estimated and thus, the suitability of each greenhouse cover material for medical-cannabis production. The economic viability of a potential medical-cannabis related business in Greece was evaluated based upon a SWOT analysis, the Gross Annuity, the Net Profit, the Gross Profits, the Agricultural Farmer's Income, the Net Annuity, and the Capital Efficiency.

Results: The highest THC yield was reported on the greenhouse constructed with EVO² 7804 AC as cover material. According to the results of our comparative Economic Analysis medical-cannabis production in greenhouses constructed with the aforementioned material would significantly increase profits.

Conclusion: Greenhouse medical-cannabis production is much promising in Greece. Nevertheless, the use of appropriate greenhouse cover materials should be considered as they affect THC yield and therefore, the profit of the company.

Keywords: business plan, *Cannabis sativa*, greenhouse, THC

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THE INFLUENCE OF FOLIAR FERTILIZATION ON DIFFERENT SOYBEAN GENOTYPES

Adrian NEGREA^{1,2}, Raluca REZI^{1*}, Teodor RUSU², Camelia URDĂ¹, Vasilena SUCIU^{1,2}

¹ Agricultural Research and Development Station Turda, Turda

² University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Cluj Napoca

* Corresponding author, e-mail: raluca.rezi@scdaturda.ro

Introduction: Soybean (*Glycine max* (L.) Merrill) is one of the most important leguminous crop, and the breeding progress made possible expanding the crop in various regions of the world (Kolesar et. al., 2020).

Also, soybean seeds have a major contribution in medical, food and cosmetic industries, being an important source of oil and crude protein, Bozhanska, and Naydenova, 2020 reported 22-25% oil and 42-50% protein, in the end, soybean is large scale used for livestock feed (Shea et. al., 2020).

Aims: The aim of this study follows the influence of the foliar fertilization for different soybean genotypes based on yield and quality indices.

Materials and Methods: The research was carried out in 2020 by the Soybean Breeding Laboratory from Agricultural Research and Development Station Turda, Romania. The experimental design was a randomized block system with three replications where each soybean variety was sown on two rows, 12 m length and 50 cm distance between rows, with the harvested plot of 10 m⁻¹.

Results: Foliar fertilization had both positive and negative effects for 1000-grain weight and yield, however quality traits do not seem to be influenced by applying supplement of microelements during the vegetation period.

Conclusion: The research suggests that genotype is the determining factor in the efficiency of foliar fertilization.

Keywords: foliar fertilization, soybean, quality, yield.

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THE IMPACT OF HEAVY METALS ON HUMAN HEALTH

Bianca Alexandra POP¹, Paula Dumitrița POP²

Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author: e-mail: biancaa.pop@yahoo.com

Introduction: One of the biggest sources of environmental pollution are heavy metals. Due to the activities processed by minerals, large amounts of lead, zinc and related elements (cadmium, mercury, etc.) were released, affecting the air, water resources, soils, vegetable crops and cereals. All this can have major repercussions on human health. The purpose of this paper was to evaluate the effective induced heavy metals on humans.

Methods: To achieve this goal, several databases such as Science Direct, Pubmed and government sites were consulted.

Results: Long-term effects of exposure to heavy metals include respiratory problems such as pneumoconiosis, asbestosis, silicosis and cancer. They can also cause intoxication and organ damage. Metals considered risk factors for cancer are arsenic, cadmium, chromium and mercury. Although selenium plays an important role in the proper functioning of the thyroid gland, excessive consumption leads to silicosis.

Conclusion: Prolonged exposure to heavy metals leads to the degradation of human health through the appearance of many diseases. Mining waste management can be a way to combat these problems.

Keywords: heavy metals, health, minerals

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THE LINK BETWEEN IODINE AND HASHIMOTO'S THYROIDITIS

Paula-Dumitrița POP¹, Bianca Alexandra POP²

Faculty of Agriculture, University of Agriculture Sciences and Veterinary Medicine, Cluj-Napoca

*Corresponding author: e-mail: paula.pop19@yahoo.com

Introduction: Hashimoto's thyroiditis (HT) is a chronic form of autoimmune thyroiditis, this being a very common disease. Genetic susceptibility and environmental triggers are key factors that lead to the loss of tolerance and development of the disease. Major risk factors that increase subclinical hypothyroidism and autoimmune thyroiditis include radiation, infections, stress, medications, and excessive iodine. In recent years, several observational studies have reported that excessive iodine intake in different populations leads to an increase in the incidence and prevalence of Hashimoto's thyroiditis. The purpose of this paper was to evaluate the link between iodine and Hashimoto's thyroiditis.

Methods: To achieve this purpose, several data bases such as PubMed, science direct, and government sites were accessed by using keywords.

Results: Iodine is essential for thyroid hormone synthesis and is a component of the thyroid hormones thyroxine (T₄, prohormone) and tri-iodothyronine (T₃, active hormone). Thyroglobulin (Tg) is an important target in the iodine-induced autoimmune response due to post-translational changes in iodate Tg. Studies have shown that in persons presenting thyroid antibodies, the levels of these thyroid antibodies progressively decrease when the majority of them react against a nonspecific pattern of thyroglobulin (Tg) epitopes. Enhanced iodine intake increases the antigenicity of Tg through the incorporation of iodine into its molecule and the formation of iodinated Tg epitopes or even the generation of noniodinated pathogenetic Tg epitopes that are normally cryptic.

Conclusion: Hashimoto's thyroiditis is a chronic inflammatory disorder of the thyroid gland, and excessive iodine intake is the main risk factor.

Regarding the loss of self-tolerance, the iodine effect is correlated with the intrinsic characteristics of Tg, namely its changes induced by post-translational iodination.

Keywords: autoimmune disease, Hashimoto's thyroiditis, iodine, thyroid hormones.

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INFLUENCING FACTORS IN OBTAINING MICROGREENS IN HYDROPONIC CONDITIONS

Teodor RUSU, Paula Ioana MORARU* and Mihai Avram MAXIM

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: paulaioana.moraru@usamvcluj.ro

Introduction: In recent years microgreens gain interest for their sustained nutraceutical properties, but data on their nutrition are so far limited. Although they are often grown hydroponically, their mineral needs are still little unknown (Giurgiu, 2016).

Aims: In this paper is presented a review of the literature, which demonstrates that the production of microgreens using hydroponic systems must be organized with care for controlling the many environmental and production parameters to achieve desired outputs and of an adequate quality.

Materials and Methods: The review of the literature and data collection followed in detail certain keywords relevant for the production of microgreens in hydroponic systems, such as: species, temperature, humidity, pH, electrical conductivity, oxygen dissolved in water, carbon dioxide, nutrient solutions, and the influence of light (quantity, quality and photoperiods).

Results: Nutritional solution, temperature and light regime have the most important role in seed germination and development, with many promising explorations in refining these techniques to achieve optimal plant production in its phenological stages. The pH, electrical conductivity, dissolved oxygen and temperature are also important factors which influence secondary metabolism from an incipient phase, which in the final stages increases both the perceived and actual value of the plants by contributing to human health and nutritional fortification.

Conclusion: It is necessary to standardize certain cultivation protocols to ensure their quality. This high degree of control necessary for optimal growth is also a benefit of hydroponic systems, as the sophisticated organization can lead to the elaboration of certain protocols to control as many factors which can positively, and negatively, influence plants in order to obtain a crop as uniform as possible throughout the year, with higher concentrations of active substances and nutrients valuable for human health.

Keywords: microgreens; hydroponic system; review.

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SESSION 2: ENVIRONMENTAL PROTECTION

BIOMASS ESTIMATION OF WILLOW SHORT ROTATION COPPICE IN MARGINAL SITES FROM THE WEST OF ROUMANIA

Wilhelm HOLLERBACH¹, Mihaela CORNEANU² and Cornelia BUZATU-GOANTA (nee HERNEA)^{2*}

¹ Faculty of Agriculture, Banat's University of Agricultural Science and Veterinary Medicine "King Michael I" of Romania, from Timisoara, Romania

² Faculty of Horticulture and Forestry, Banat's University of Agricultural Science and Veterinary Medicine "King Michael I" of Romania, from Timisoara, Romania

*Corresponding author, e-mail: cornelia.buzatu-goanta@usab-tm.ro

Introduction: Willow short rotation coppice (SRC) is important not only for their biomass production but also for their potential role in the reduction of CO₂ emission. Usually, the SRC is established on agricultural land but the establishment on the marginal area started to be studied according to many benefits of SRC.

Aims: This study aimed to estimate the biomass of three Romanian willow clones in marginal site condition

Materials and Methods: Three Romanian clones from National Institute for Research and Development in Forestry (RO 892, RO 1077 and RO 1082) were used to establish SRC on three different sites: on ash pond Timisoara, saline soil (Ghilad), Control (Ghilad and Timisoara). The SRC was established in 2015 with 20 cm cuttings planted manually, and half of them were cut back one year later. No fertilization or irrigation was applied. The quantitative traits taken into account for each plant were: diameter at 1.0 m, and the maximum height of each shoots, and the number of shoots per stool. The biomass was estimated by harvested the plants, weighted fresh material on the field, transported it to the laboratory, dried material and weighted them. Statistical analyses have been done by STATISTICA 10 soft.

Results: The yield production of willow varied according to clones, site and cut or uncut variants. Even the cut-back method is usually in willow SRC higher yields were not obtained only in these experimental variants. The highest biomass, like we expected was obtained for culture "Control Timisoara" and the lower for ash pods Timisoara. In terms of clones, biomass varied according to sites: RO 1977 performed better in good site conditions and RO 1082 on marginal sites.

Conclusion: The research highlighted the capacity of willow to grow on difficult site conditions like saline soil or ash pods. The yield production was significant lower than on agricultural land but the culture can be considered and the others benefits should be evaluated in future researches.

Keywords: biomass estimation, marginal sites, willow SRC

Acknowledgement: The culture establishment and initial research were financially supported by MEN UEFISCDI, Programme PN II 2014- 2017, project no. 111/2014 SAROSWE.

THE EFFECT OF ANTAGONIST ABIOTIC STRESS ON THE PHOTOSYNTHETIC PARAMETERS OF *SALVIA OFFICINALIS* L. PLANTS

Andreea I. LUPITU*, Cristian MOISA, Dana M. COPOLOVICI, Lucian COPOLOVICI

Faculty of Food Engineering, Tourism and Environmental Protection and Institute of Technical and Natural Sciences Research-Development-Innovation of "Aurel Vlaicu" University,
2 Elena Dragoi St, 310330 Arad, Romania

*Corresponding author, e-mail: pag.andreea@yahoo.com

Introduction: Plants are regularly exposed to several biotic and abiotic stressors. Drought and flooding are abiotic stresses, which strongly affects plant growth, development, quality, and crop yield. *Salvia officinalis*, sage, is a plant of the *Lamiaceae* family. Traditionally, sage is used for the treatment of different kinds of disorders: inflammation, hyperglycemia, seizures, ulcers, gout, rheumatism, dizziness, tremor, paralysis, and diarrhea. Some pharmacological activities have been attributed to sage plants like antioxidant, antidementia, anticancer, anti-inflammatory, antimicrobial, antimutagenic, and hypolipidemic (Ghorbani and Esmaeilzadeh, 2017).

Aims: This study aimed to analyze the effect of antagonist stress - drought-flooding - on *Salvia officinalis* plants on the photosynthetic parameters.

Materials and Methods: Experiments were carried out using six weeks sage plants, sown in plastic pots filled with commercial soil, and grown in special chambers, under controlled conditions. For both control and treated plants, the foliage photosynthetic characteristics (*net assimilation rate* (A), *stomatal conductance to water vapor* (g_w)) were monitored using a Portable Gas Exchange Fluorescence System, Walz, Germany.

Results: The effects of drought and flooding stress were studied for 17 days, and we observed that plants suppressed stomatal openings to conserve water during stress periods (drought-flooding).

Conclusion: In the present research work, we noticed that during drought stress periods, plants suppress stomatal opening to conserve water.

Keywords: drought, photosynthetic parameters, *Salvia officinalis*.

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SORTING OF MIXED PLASTIC WASTE USING THE RAMAN SPECTROSCOPY TECHNIQUE AS A SUSTAINABLE SOLUTION

Ioana MARICA^{1*}, Mihaela ALUAȘ¹ and Simona CÎNTĂ PÎNZARU¹

¹*Faculty of Physics, Babeș-Bolyai University, Cluj-Napoca, Romania*

*Corresponding author, e-mail: ioana.marica@stud.ubbcluj.ro

Introduction: The current challenge for the plastic recycling processes is represented by the sorting techniques which should yield high efficiency and sustainability and to be based on the circular economy principles [1]. Also, the wide variety of plastics waste that comes from the environment is a real challenge [3]. Raman Spectroscopy technique has the capability to sort the mix of plastics using their characteristic Raman fingerprint [2].

Aims: Taking into account the little Raman data regarding plastic degradation in the natural environment, we aimed to determine the Raman signal variability of degraded plastic waste. All the results will be part of a plastic Raman database which will be a source of validation in the sorting process of plastic. Using the Raman spectral dataset, a sorting methodology will be proposed as a sustainable initiative.

Materials and Methods: Around 160 samples of long-term degraded plastic waste in the natural environment were analyzed. The measurements were done using a Renishaw inVia Reflex confocal Raman spectrometer.

Results: The main spectral changes observed due to degradation are: band shifts, relative intensity changes and additional bands. The plastic Raman database comprises all the spectral data with their description and characterization of each sample.

Conclusion: In the present research work, we determined the molecular changes associated with the degradation processes to whom plastics waste are exposed and we included all the results in the plastic Raman database. These data and the proposed methodology for plastic sorting represents a potential use in the plastic sorting process.

Keywords: Aged plastic waste, plastic Raman database, Raman sorting tool.

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GREEN SYNTHESIS AND CHARACTERISATION OF SILVER NANOPARTICLES OBTAINED FROM POST-DISTILLATION WASTES AND HYDROLATS

Cristian MOISA*, Andreea LUPITU, Lucian COPOLOVICI, Dana COPOLOVICI

Faculty of Food Engineering, Tourism and Environmental Protection and Institute of Technical and Natural Sciences Research-Development-Innovation of "Aurel Vlaicu" University, 2 Elena Dragoi St, 310330 Arad, Romania

*Corresponding author, e-mail: moisa.cristian@yahoo.com

Introduction: Worldwide environmental problems raise the need for a more ecological approach to the chemical synthesis of metal nanoparticles (NPs) (Nancy and Elumalai, 2019). By using aqueous extracts obtained from post-distillation waste materials and hydrolats, a by-product resulted from the essential oil industry, the resulting green nanoparticles, represent a sustainable alternative for the classical synthetic route (Csakvari et al., 2021).

Aims: Considering that medicinal and aromatic plants are an important source of bioactive compounds (essential oils, phenolic compounds, flavonoids), this study aimed to use post-distillation wastes and hydrolat from *Thymus vulgaris* L. to further value the important biomolecules with the potential to mediate the green NPs synthesis.

Materials and Methods: For the green NPs synthesis, the plant infusions and hydrolats were freshly prepared and filtered through a 0.45 mm PVDF membrane filter and added dropwise to boiling 1 mM silver nitrate solution under constant stirring, at a ratio of 1:15. The total reaction time was 10 minutes, followed by a cooling period to room temperature.

Results: The bio-reduction of silver ions was mediated by the phenolic compounds present in the aqueous extracts and hydrolats. This process was easily observed by a visual colour change from pale gold to a reddish-brown and confirmed by UV-Vis spectral analysis, with an average particle size of 35-50 nm. Nanoparticle morphology was observed using Scanning Electron Microscopy (SEM) and the average spherical shape of AgNPs was noticed.

Conclusion: The recovered biomolecules from the post distillation waste extracts, have mediated a fast, easy, and eco-friendly reaction that reduced Ag^+ to Ag^0 to spherical AgNPs with a small average particle size, as was revealed by the SEM analysis.

Keywords: antioxidant activity, green synthesis, medicinal plants, phenolic compounds, plant wastes.

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RAMAN SPECTROSCOPY, XRD TECHNIQUES AND WATER ANALYSIS SERVING THE SUSTAINABLE DEVELOPMENT OF THE “SNAIL HILL” GEOLOGICAL RESERVE, CORUND, ROMANIA

Zoltan PAL^{1*}, Simona CINTA PINZARU¹ and Tudor TAMAS²

¹ Faculty of Physics, Babes-Bolyai University, Kogalniceanu 1, RO-400084 Cluj-Napoca, Romania

² Faculty of Geology, Babes-Bolyai University, Kogalniceanu 1, RO-400084 Cluj-Napoca, Romania

*Corresponding author, e-mail: zoltan.pal@ubbcluj.ro

Introduction: The carbonate deposit of Corund area (Harghita County, Romania) is uniquely capitalizing the base material for aragonite and calcite mining and grinding/polishing activity, which was established 111 years ago. In 1962 the exploitation was closed due to communist unprofessional greed, and beginning with 1980, the former quarries were declared IUCN IV category geological reserve. The protected values started to be shared with the public in 2011 by the visitor pathway established in the reserve and continued with opening the unique *Museum of Aragonite* in 2012. The growing number of visitors, the raising awareness of the public for unique natural landscape leads to the need for a sustainable development strategy implementation based on advanced scientific data.

Aims: Here we provide summarized results from systematic sampling of the carbonates and waters obtained using Raman spectroscopy, XRD, optical microscopy, and chemical composition of the local mineral water springs. The present study is expected to contribute with scientific outcomes to increase the interactivity in visiting the area, to enhance the visitor experience in a sustainable manner.

Materials and Methods: The approach is primarily based on analysis and summarizing the scientific data from the systematic sampling collections using the InVia Reflex Raman and Bruker XRD instruments combined with chemical analysis in the past three years.

Results: Micrometer level alternance of co-existent aragonite and calcite layers, in both recent and old deposits of the “Snail Hill” protected area are demonstrated. The chemical analysis reveals that these spring waters are the most mineralized among all Romanian springs. Presenting, sharing in an interactive way all these recent scientific results support strategies for the sustainable development of the protected area. The study allocates a technical sketch and a possible cost/benefits/sustainability analysis for each proposed solution, which could contribute to enhance the visitor experience with self-polishing aragonite souvenirs, knowledge sharing, and can be used in fundraising proposals, sustainable development projects, education, and green growth.

Conclusion: In the present research work, we demonstrated that a forgotten story and natural phenomena can metamorphose into an interactive development of a protected area using state-of-the-art research methods. The enhanced scientific research contributed to edification of a small entrepreneur idea, based on the sustainable utilization of natural resources.

Keywords: aragonite, Raman spectroscopy, XRD, natural reserve, sustainability.

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VALORIZATION OF RECYCLED POLYPROPYLENE COMPOUNDED WITH STYRENE-ISOPRENE-STYRENE ELASTOMER

Maria RÂPĂ*, Cristian PREDESCU, Ecaterina MATEI, Andra Mihaela PREDESCU and Andrei Constantin BERBECARU

Faculty of Materials Science and Engineering, University POLITEHNICA of Bucharest, Romania

*Corresponding author, e-mail: maria.rapa@upb.ro

Introduction: Processing of polypropylene (PP) by injection and extrusion technologies represents more than 90-95% of the PP processing fields and generated a considerable amount of waste. However, the mechanical and thermal properties of recycled products are lower than those of virgin material (Keledi *et al.* 2012, Rapa *et al.* 2017).

Aims: The objective of this study is to obtain the modified recycled polypropylene (rPP) with commercially elastomer namely styrene-isoprene-styrene (SIS) with proper physical-mechanical and thermal properties for possible applications by injection molding technology.

Materials and Methods: rPP coming from post-consumer boxes and SIS was provided by KRATON, USA. The compounded rPP-based thermoplastic elastomer was investigated by thermal properties and mechanical properties.

Results: The recycled composite material has a higher impact resistance than the unmodified polymer (about 2 times higher). The experimental results showed that the advanced recycling of PP waste could be ensured with favorable effects for environmental protection as well as to manufacture new items with high performance.

Conclusion: The processing of recycled polypropylene compound by injection molding process contributes significantly both at environment protection and important economy in petrochemical resources.

Keywords: compounding, injection moulding, recycled polypropylene

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ANTIBIOTICS BIOSORPTION FROM WATER MATRICES USING COMPOSITE MATERIALS BASED ON MICROBIAL BIOMASS AND NATURAL POLYMERS

Lăcrămioara RUSU^{1*}, Cristina G. GRIGORAȘ¹, Mirela SUCEVEANU¹, Andrei I. SIMION¹, Lidia FAVIER²

¹Faculty of Engineering, "Vasile Alecsandri" University of Bacau, Romania

²Ecole Nationale Supérieure de Chimie de Rennes, France

*Corresponding author, e-mail: lacraistrati04@yahoo.com

Introduction: Environment pollution by pharmaceuticals is a challenging issue due to their potential environmental risk, especially to water quality. Antibiotics are a category of drugs consumed in large quantities worldwide, so they are found in different water matrices (wastewater, surface water and groundwater). (Cheng *et al.*, 2021; Vrinceanu *et al.*, 2019; Wang *et al.*, 2021).

Aims: This paper focused on the removal of antibiotics from aqueous solutions using biosorption as a method and *Saccharomyces cerevisiae* immobilized in calcium alginate beads as a biosorbent. Taking into account the negative impact of cephalixin (CPX) on the environment (risk factor greater than 1) this antibiotic was chosen as a target molecule.

Materials and Methods: Biosorbent was synthesized and characterized by SEM and FTIR techniques. Also, point of zero charge was determined. Batch biosorption experiments were conducted in order to evaluate the effect of initial pH, biosorbent dose and CPX initial concentration.

Results: The immobilization process successfully took place. The prepared biosorbent has a mesoporous structure and microorganism is homogeneously distributed in the polymer matrix. This aspect is confirmed by results of SEM and FTIR analysis. The best biosorption efficiency for CPX (86.23%) was obtained at acidic pH (4), for CPX initial concentration of 30 mg/L and biosorbent dose of 1g/L.

Conclusion: The findings of this study indicate that the synthesized biosorbent have the potential to be applied in treatment of drugs-contaminated water matrices.

Keywords: antibiotic, biosorption, calcium alginate, cephalixin, *Saccharomyces cerevisiae*

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THE VOLATILE ORGANIC COMPOUNDS PROFILE AND PARTICULATE MATTER ANALYSED FROM A LOCAL DEPARTMENT STORE

Andreea ȚEPENEU¹, Lucian COPOLOVICI^{1,2*}, Cristian MOISA², Andreea LUPITU²,
Dana COPOLOVICI^{1,2}

¹*Faculty of Food Engineering, Tourism and Environmental Protection "Aurel Vlaicu"
University, Romania*

²*Institute of Technical and Natural Sciences Research-Development-Innovation of "Aurel Vlaicu"
University, Romania*

*Corresponding author, e-mail: lucian.copolovici@uav.ro

Introduction: People spend more than 80% of their time indoors. Indoor air quality has a considerable impact on human health. People who spend a long time in buildings with poor indoor air quality can be affected by various symptoms and even diseases, depending on the intensity of the source of pollutants. The most common indoor pollutants are particulate matter (PM), formaldehyde (HCHO), volatile organic compounds (VOC), and carbon dioxide (CO₂).

Aims: We studied the modifications of volatile organic compounds and concentrations of PMs, formaldehyde, and carbon dioxide in different departments of a general store.

Materials and Methods: The particulate matter (PM₁, PM_{2.5}, and PM₁₀), formaldehyde, and carbon dioxide concentrations have been determined daily using a multiparameter. Volatile organic compounds (terpenes, aldehydes, ketones, and alcohols) have been monitored using a gas chromatography-mass spectrometry technique.

Results: The volatile organic compounds concentrations are changing with the daytime and influx of buyers. Aldehydes dominate the profile of volatile organic compounds for non-food departments and terpenes for food departments. The lifetime cancer risk (LTCR) for every critical compound has been calculated.

Conclusion: In the present research work, we demonstrated that different pollutants could be presented in the market, and their profiles depend on departments.

Keywords: indoor pollution, volatile organic compounds, formaldehyde, particulate matter

SESSION 3: FOOD SCIENCE AND TECHNOLOGY

STABILITY EVALUATION OF RED ONION SKIN ANTHOCYANINS LIPOSOMES

Florina STOICA¹, Nicoleta STANCIUC¹, Iuliana APRODU¹, Gabriela Elena
BAHRIM¹, Gabriela RAPEANU^{1*}

¹*Faculty of Food Science and Engineering, University of "Dunărea de Jos", Galați,
Domneasca Street 111, Galați, Romania*

*Corresponding author, e-mail: Gabriela.Rapeanu@ugal.ro

Introduction: Onions (*Allium cepa* L.) belong to the *Liliaceae* family and are one of the most cultivated vegetable crops used for culinary purposes. Generally, in industrial processing, the outer dried layers of the onion are removed, even though these parts are demonstrated to be rich in bioactive compounds. The outer skins of red onions provide a good source of plant compounds such as phenolics, including flavonoids (quercetin and anthocyanins). Additionally, red onion skins have numerous health benefits including well-known antioxidant activity and anti-inflammatory, anti-microbial, anti-viral, and anti-cancer properties.

Aims: The present work aimed to obtain and evaluate the stability of two experimental variants of liposomes prepared from an anthocyanin-rich extract of red onion skin. Red onion skin anthocyanins were encapsulated by freeze-drying in soy phosphatidylcholine (SP) vesicles with the addition of polymers, such as citrus pectin (P) and whey proteins isolate (WPI).

Materials and Methods: Red onions were purchased from a local market (Galați, Romania). The chemicals used were acquired from Sigma (Sigma-Aldrich Co, St. Louis, MO). All chemicals and reagents used in experiments were of analytical grade. The measurements of all phytochemicals were performed using the double-beam UV-VIS spectrophotometer with data analysis software, (Libra S22, Biochrom, UK).

Results: Results showed that the polymer-associated liposomes had high entrapment efficiency.

Hence, the encapsulation efficiency of the liposomes varied from 84.43% for variant 1 (V1) to 82.53% for variant 2 (V2). V1 presented higher stability during 28 days of storage in the dark at temperature of 4 °C compared with V2.

Conclusion: The results suggest that both liposomes exhibited high bioactive compounds content with high antioxidant activity. Therefore, the proposed polymer-associated vesicles loaded with red onion skin extract display a great potential for functional food and nutraceutical applications.

Keywords: bioactive compounds, encapsulation efficiency, liposomes, red onion skin anthocyanins

THERMAL STABILITY OF BIOACTIVE COMPOUNDS EXTRACTED FROM RED GRAPE SKINS

Daniela SEREA¹, Nicoleta STANCIUC¹, Iuliana APRODU¹, Gabriela Elena BAHIM¹,
Gabriela RAPEANU^{1*}

¹ Faculty of Food Science and Engineering, University of "Dunărea de Jos", Galati,
Domneasca Street 111, Galati, Romania

*Corresponding author, e-mail: Gabriela.Rapeanu@ugal.ro

Introduction: The agricultural sector produces a large amount of byproducts, representing an increasing interest as industrial crops both due to the economic reasons and from the environmental concerns. This is particularly true regarding the side products arisen from the winemaking. Grapes (*Vitis vinifera* L.) belong to world's largest fruit crops. Since about 80% of the total amount is used in wine-making, the rest of 20% (about 10 million tons) of grape pomace arises within a few weeks from the harvest campaign. Grape skins are potential sources of dietary fiber and phenolics, particularly, flavonols, flavanols, anthocyanins and proanthocyanidins. Therefore, the thermal stability of polyphenols should be considered during grape processing to estimate the biological activity retention of the final product.

Aims: The aim of this study was to evaluate the effect of temperature and heating time on the anthocyanins, total phenolic content and antioxidant capacity of red grape skin extract extracted from *Babeasca neagră* variety at temperatures between 80 and 140°C.

Materials and methods: The grapes (*Babeasca neagra* variety) were harvested in October 2020 and were provided from a winery in Vrancea county, Romania. The chemicals used were purchased from Sigma (Sigma-Aldrich Co., St. Louis, MO). All chemicals and reagents used in the experiments were of analytical quality. Measurements of all phytochemicals compounds were performed using the UV-VIS dual beam spectrophotometer with data analysis software (Libra S22, Biochrom, UK).

Results: The results indicate that the thermal degradation of bioactive compounds followed the kinetics of the first order reaction. Temperature-dependent degradation was appropriately modeled on the Arrhenius equation. According to the Arrhenius model, the activation energies for the degradation of total anthocyanins were 36.63 ± 0.007 KJ / mol, 31.61 ± 0.007 kJ / mol for total polyphenols and 8.69 ± 0.002 kJ / mol for antioxidant activity.

Conclusion: The calculated kinetic parameters confirmed the irreversible degradation of the bioactive compounds extracted from grape skins (*Babeasca neagră* variety). Both temperature and heating time had a significant impact on the content of bioactive compounds. This information is important for practical application in food industry in order to use optimal heating conditions to minimize polyphenols degradation.

Keywords: red grape skins, bioactive compounds, thermal treatment, degradation kinetics

EVALUATING THE POTENTIAL OF OLEOGELS AS MILK FAT REPLACING SYSTEM IN A BREAKFAST SPREAD FORMULATION

Andreea PUȘCAȘ, Maria GONȚA, Anda TANISLAV, Georgiana MARTIS, Andruța Elena MUREȘAN, Romina Alina (VLAIC) MARC, Vlad MUREȘAN *

Department of Food Engineering, Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 400372 Cluj-Napoca, Romania

* Corresponding author, e-mail: vlad.muresan@usamvcluj.ro

Introduction: An alternative breakfast spread made from butter, cocoa and sugar exists on the market. For economic and technological reasons, in the original recipe, butter is replaced with vegetable oils such as palm oil or partially hydrogenated sunflower oil. In comparison, walnut oil is a healthy product, rich in bioactive compounds and it is desirable to increase its consumption.

Aims: The aim of the study is to reformulate chocolate butter using walnut oil oleogel as a milk fat replacing system.

Materials and Methods: Candelilla (CL) and carnauba (CB) waxes structured the oleogels in a concentration as low as 5%. Also, 5% glycerol monostearate (GMS) was used to develop the monoglyceride based oleogel. The novel breakfast spread consists of 75% oleogel, 20% sugar and 5% cocoa powder. Oleogels and spreads samples were characterized by critical gelation concentration, polarized light microscopy, oscillatory rheology, texture profile analysis, instrumental color assessment and oil binding capacity

Results: The firmest oleogels were those of CB, CL and GMS, with a hardness of 170g, 80g and 127g respectively. CL and GMS oleogels displayed a spreadability comparable with the reference. High oil binding capacities were registered for all samples. Small, spherulitic crystals were present in the reference butter observed under polarized light microscopy. The oleogels and the oleogel spreads exhibited larger and more dense crystals. G'>LVR of the reference butter was higher than those of the oleogel containing product and the oleogels. All the samples displayed predominantly solid-like structure. A frequency dependent behavior of all samples was observed.

Conclusions: The results indicate that the oleogels have the potential as milk fat replacing ingredient.

Keywords: breakfast spread, oleogelation, waxes, monoglyceride

Acknowledgement: This work was supported by a grant of the Romanian Ministry of Research, Innovation and Digitization CNCS/CCCDI-UEFISCDI, project number PN-III-P1-1.1-TE-2019-2212, within PNCDI III.

GC-MS ANALYSIS OF UNPOLAR FRACTION OF APPLE “FLORINA” FRUITS GROWN UNDER DIFFERENT MANAGEMENT PRACTICES

Nadezhda PETKOVA*¹, Tatyana BILEVA², Ekaterina VALCHEVA², Galya DOBREVSKA³, Neli GROZEVA⁴, Ivayla DINCHEVA⁵, Vladislav POPOV²

¹University of Food Technologies, Technological Faculty, Department of Organic Chemistry and Inorganic Chemistry, 26 Maritza Blvd., 4002, Plovdiv, Bulgaria

²Agriculture University, Faculty of Plant Protection and Agroecology, Department of Agroecology and Environmental protection, 12 Mendelev Blvd., 4000, Plovdiv, Bulgaria.

³Agriculture University, Faculty of Horticulture with Viticulture, Department of Fruit Growing, 12 Mendelev Blvd., 4000, Plovdiv, Bulgaria.

⁴Trakia University, Faculty of Agriculture, 6000 Stara Zagora, Bulgaria

⁵AgroBioInstitute, Agricultural Academy, 8 Dr. Tsankov Blvd., Sofia, Bulgaria

*Corresponding author, e-mail: petkovanadejda@abv.bg

Introduction: Apples (*Malus×domestica* Borkh.) are one of the most important tree fruit crops grown in midlatitude climate zones. Despite their lower levels of lipid concentration (0.2-0.6 %), fatty acids and lipids are important structural and metabolic constituents.

Aims: The aim of the current research was to investigate the metabolite profile of n-hexane, fraction from Florina apple fruits grown in conventional and organic orchards.

Materials and Methods: Apple fruits were grown in conventional and organic orchards. The n-hexane fraction were obtained from whole apple fruits by Soxhlet extraction, then extracts were saponified and analyzed by GC-MS.

Results: The highest yield of lipid content was found in conventionally grown apple orchards – 0.9/100 g dw. Forty-four unpolar compounds were identified by GC-MS analysis. In the investigated apple were mainly detected the following phytochemical compounds: saturated and unsaturated fatty acids; fatty alcohols, alkanes, phytosterols and terpenoids. Saturated fatty acids, fatty alcohols, alkanes and phytosterols dominated in organic apple orchards, while in the conventionally grown apples terpenoids. Oleanolic acid acetate and ursolic acids acetate dominated in conventional orchards.

Conclusion: The detected compounds in unpolar fraction from Florina apple fruits demonstrated the nutritional lipid composition, as fatty acids dominated (30-50 % TIC). Monounsaturated fatty acids and polyunsaturated acids dominated in conventionally apple orchards.

Keywords: apple, fatty acids, GC-MS analysis, unipolar fraction, terpenoids

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COMPARATIVE ANALYSIS OF FACTORS RELATED TO ORGANOLEPTIC QUALITY IN MUSCAT WINES FROM PROTECTED DESIGNATIONS OF ORIGIN IN VALENCIA

Marisa JIMÉNEZ-PÉREZ^{1*}, Ana ADALID¹, Estela MORENO¹, Ana FITA¹, Fernando GARCÍA-BIECO², Fernando TARÍN² and Adrián RODRÍGUEZ-BURRUEZO^{1*}

¹ Institute COMAV, Universitat Politècnica de València, Spain

² Cheste Agraria Coop., ANECOOP, Cheste, Spain

*Corresponding author, e-mail: adrodbur@doctor.upv.es

Introduction: Muscat wines in the Region of Valencia (Spain) are produced from *Moscatel de Alejandria* variety and they are recognized Valencian agri-food products, included in three Protected Designations of Origin (DO): Vinos Alicante, Valencia and Utiel-Requena. Different types of Muscat wines are produced in these areas: i) sparkling sweet (5-8% alcohol), ii) dry white (11-13%) and iii) liquor sweet called *Mistela* (15%). There are remarkable differences in the flavour of the three types, and also differences have been described within each type.

Aims: An initiative aimed at characterizing the quality factors of Muscat wines is being developed since 2020, and involves PDO Vinos de Alicante, PDO Valencia and several wineries (coordinated by Cheste Agraria Coop.). The content of main compounds related to flavour was estimated and compared to assess differences among wine types and origins.

Materials and Methods: three local wines per PDO, corresponding to the three types mentioned, were analysed by HPLC to determine the levels of sugars and acids and GC/MS to determine the main volatiles. The obtained data were statistically analysed by ANOVA analysis.

Results: Sparkling wines showed high levels of glucose (mean 30 g/L) and particularly fructose (50 g/L), while dry wines showed lower levels of both (15-20 g/L). In comparison, the levels of both sugars exceeded 100 g/L in *Mistela* wines. In terms of acids, malic was predominant in the three wines (2-2.5 g/L), followed by tartaric (1-1.3 g/L) and to a lesser extent citric (0.37-0.57 g/L). Finally, considerable differences were found in the volatile profile.

Conclusion: Differences among Valencian muscat wines are mainly due to quantitative and qualitative differences in sugars and specific volatiles, while acids do not appear as main factors. Differences between geographical origins are also discussed.

Keywords: acids, sugars, volatiles, wine flavour

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QUINOA VALORIZATION IN THE MANUFACTURE OF PASTA

Maria Simona CHIȘ¹, Adriana PĂUCEAN^{1*}, Simona MAN¹, Anamaria POP¹, Domuța CONSUELA¹ and Sevastița MUSTE¹

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: adriana.paucean@usamvcluj.ro

Introduction: Quinoa (*Chenopodium quinoa Willd*) is a pseudo-cereal from Andean region with a rich chemical composition based on nutrients such as proteins and essential amino-acids, vitamins, minerals and phytochemicals.

Aims: The aim of the present research was to obtain pasta rich in bioactive compounds through the valorization of quinoa flour in different percentages (15%, 25% and 35%) and the use of red beat (50% to the total flour addition).

Materials and Methods: The experimental variants were assessed by determining the physico-chemical (moisture, protein, ash, lipids, total phenols and antioxidant activity) and sensory characteristics. AACC methods were used for the moisture, protein, ash and lipids, meanwhile Folin Ciocalteu and DPPH (2,2-diphenyl-1-picrylhydrazyl) methods were used for analyzed total phenols and antioxidant activity, respectively. The carbohydrates were calculated by subtracting from 100 the values from moisture, protein, lipids and ash, while, sensory analysis was performed using hedonic test.

Results: The increased addition of quinoa flour influenced in a positive way the nutritional characteristics of the final pasta, enhancing its protein, ash, lipid, total phenols and antioxidant activity. This could be explained through the rich chemical composition of quinoa in protein, lipids and ash, but also due to its total phenols and antioxidant activity content. Nevertheless, it is important to mention the highly content of red beat in total phenols and antioxidant activity. With respect to sensorial analysis, the pasta made with 25% quinoa addition was the most appreciated by the consumers, reaching a hedonic score of 8.16.

Conclusion: In the present research work, we demonstrated that the use of 25% quinoa and 50% red beat in the manufacture of pasta could lead to a nutritional improvement of the final product.

Keywords: bioactive compounds, *Chenopodium quinoa Willd*, pasta.

BANANA PEEL WASTE AS A VALUABLE INGREDIENT IN GLUTEN FREE MUFFINS

Maria Simona CHIȘ¹, Adriana PĂUCEAN^{1*}, Simona MAN¹, Ioana Izabela DUMITRAȘCU, Anamaria POP¹, Bianca Vasilica BELDEAN (TĂȚAR)¹ and Sevastița MUSTE¹

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: simona.man@usamvcluj.ro

Introduction: Banana is one of the most popular fruit and its peel has been used in folk medicine for the treatment of different diseases such as ulcers, inflammation, cough, diarrhoea. The peel is mainly rich in phenolic compounds, dietary fibre and antioxidant capacity (Vu, Scarlett, and Vuong 2018).

Aims: The main objective of the present paper was to valorise the banana peel in gluten free pastry products such as muffins. Therefore, different percentages of banana peel were used in order to replace rice flour, as follows: 10, 20 and 30% respectively.

Materials and Methods: The three experimental samples were analysed from the physico-chemical point of view (moisture, protein, ash, lipids, total phenols and antioxidant activity), using AACC methods and also from the sensorial point of view by using hedonic test. Colour, taste, aroma, overall appearance and texture were the mainly indicators analysed by consumers through hedonic test. Total phenols and antioxidant activity were analysed by Folin Ciocalteu and DPPH (2,2-diphenyl-1-picrylhydrazyl) methods.

Results: The gluten free muffins were improved in protein and ash, meanwhile, lipids did not change their amount in the experimental variants. Likewise, total phenols and antioxidant activity increased their content as increased the banana peel amount, mainly because to its chemical composition. The sensorial analysis highlighted that 30% banana peel could be successfully used in the manufacture of gluten free muffins by replacing rice flour. A higher addition of banana peel leads to a product with a dark colour and an increased texture hardness.

Conclusion: Banana peel represents a valuable source of bioactive compounds which could be used in pastry manufacturing.

Keywords: banana peel, gluten free muffins, waste.

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DEVELOPMENT AND QUALITY EVALUATION OF GLUTEN-FREE BISCUITS BASED ON COMPOSITE RICE-CHICKPEA-BUCKWHEAT FLOUR AND CHIA SEEDS

Simona MAN¹, Adriana PĂUCEAN^{1*}, Simona CHIȘ¹, Maria ROȘCA¹, Anamaria POP¹
Ioana Elena MUREȘAN (VIMAN)¹ and Sevastița MUSTE¹

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: adriana.paucean@usamvcluj.ro

Introduction: To obtain the biscuits, chia seeds were used together with a composite mixture of rice flour, chickpea flour and buckwheat flour. The incorporation of chickpea and buckwheat in composite flour based biscuits can be justified due to their beneficial nutraceutical properties. Their gluten-free nature, also play important role in preventing a celiac problem.

Aims: The purpose of this study was to manufacture an assortment of biscuits for special nutrition, enriched in valuable nutrients and having good sensorial characteristics, using chia seeds and composite flour based on rice-chickpea-buckwheat flour.

Materials and Methods: The rice flour (RF) and chickpea flour (CF) was blended with buckwheat flour (BF) resulting composite flour with following ratios 60:25:15. In order to optimize the technological recipe, three different percentages of chia seeds (CS) were used: 8%, 12%, 16%. The proximate compositions and sensory qualities of the composite biscuits were determined and compared with biscuits prepared without chia seeds (0%) as the control sample. The optimization of the gluten-free biscuits recipe was realized through sensory analyses, performing a hedonic test (9 point scale). The finished products were evaluated for total phenolic content (TPC) by Folin–Ciocalteu method, while the radical scavenging activity (RSA) was determined by using the radical DPPH scavenging capacity assay. Physicochemical analyses were determined according to AACC methods.

Results: The results showed that the ratio of composite flours 60%RF, 25%CF and 15%BF had a significant effect on physicochemical and sensory properties of biscuits, and the sample with 12% chia seeds getting the highest degree of acceptability for consumers.

Conclusion: This study suggests a plausible substitution of wheat flour by gluten-free composite flour. Moreover, chia seeds have provided sensory characteristics accepted by consumers, successfully replacing gluten and eggs in biscuit making recipes.

Keywords: biscuits, chia seeds, composite flour, quality characteristics

THE EFFECTS OF BITTER MELON (*MOMORDICA CHARANTIA* L.) POWDER ON THE QUALITY CHARACTERISTICS OF DARK BREAD

Adriana PĂUCEAN¹, Simona MAN^{1*}, Simona CHIȘ¹, Ecaterina PURICE¹, Larisa Rebeca ȘERBAN¹, Ioana Elena MUREȘAN (VIMAN)¹, Anamaria POP¹ and Sevastița MUSTE¹

¹ Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: simona.man@usamvcluj.ro

Introduction: Bitter melon (*Momordica charantia* L.) has been used traditionally as a medicinal food in many developing countries. It is a tropical fruit but successfully acclimatized by Romanian vegetable researchers. The exotic fruit, also called "plant insulin", is used by companies in the pharmaceutical industry for the treatment of diabetes. It contains vitamins, minerals, flavonoids, and it is a good source of phenolic compounds, particularly gallic acid. Bitter melon also contains a variety of other bioactive compounds, especially saponins, peptides, and alkaloids.

Aims: The purpose of this study is the assessment of the quality of dark bread obtained at four levels of added bitter melon powder (1,5, 2%, 2,5% and 3%).

Materials and Methods: The raw materials used in these experiments have been purchased from markets of specialized stores from Romania. Bread samples were subjected to physico-chemical examination: volum, porosity, moisture, ash and fat (according to STAS 91-2007), protein (by Kjeldhal method) and total carbohydrate calculated as the difference: 100 - (moisture + ash + proteins + lipids). Total phenols content (TPC) was analyzed by the Folin Ciocalteu method and the antioxidant activity was determined by DPPH (2,2-diphenyl-1-picrylhydrazyl) method. The sensory analysis was performed using the hedonic test. The panellists analysed the products using the nine-point hedonic scale with the following sensory attributes: appearance, texture, taste, odour, flavour and overall acceptability.

Results: The bitter melon powder addition has a positive influence on TPC and antioxidant activity of dark bread. The sensory evaluation indicated that the dark bread fortified with 2% bitter melon powder have the highest acceptability score.

Conclusion: Considering the results from the bioactive compounds, sensory characteristic, and the health benefits, we can conclude that the bread sample with 2% bitter melon is optimal.

Keywords: bioactive compounds, bitter melon, dark bread, powder

YEAST BIOMASS - A NUTRITIOUS AND SUSTAINABLE SOURCE FOR FISH FEED - REVIEW

Corina DUMITRACHE¹, Mihai FRINCUI² and Constanta MIHAI^{1*}

¹ *Faculty of Land Reclamation and Environmental Engineering, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

² *Research Center for the Study of Agri-Food Quality, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

*Corresponding author, e-mail: mihai_tania@yahoo.com

Usually, for the protein and lipid intake of fish feed recipes, the main ingredients are fishmeal and fish oil. In order to protect biodiversity and to use all natural resources in a sustainable way, it is desirable to obtain alternative ingredients in fish feed, with a nutritional value at least as high as the usual ones. Thus, the use of yeasts is a solution to improve the economic profitability of aquaculture, as well as to reduce the impact on the environment. Using the nutritional potential of yeast strains creates sustainable opportunities for new sources of protein. Therefore, this paper aims the studies and scientific achievements on the use of yeast biomass as an excellent source of protein, carbohydrates and lipids and an alternative source to the use of fish meal / oil and soy derivatives in fish feed. It has been found that the administration of glucans (MOS) in the yeast cell wall enhances immunity and many other types of immune responses, resistance to bacterial, viral infections and environmental stress on some fish species. In addition, this paper provides useful data on the beneficial effects on the health, growth rate and immunity of fish by using yeast biomass in their feed.

Keywords: aquaculture, fish feed, sustainable, yeast

ANTIOXIDANT ACTIVITY, LIPID OXIDATIVE STABILITY, PHYSICOCHEMICAL AND SENSORY PROPERTIES OF YOGURT FORTIFIED WITH MANGO (*Mangifera indica*) PUREE

Corina PREDESCU^{1*} and Camelia PAPUC^{1,2}

¹University of Agronomic Sciences and Veterinary Medicine of Bucharest, Department of Preclinical Sciences, 59 Măraști Blvd, District 1, 011464, Bucharest, Romania,

²Academy of Romanian Scientists

*Corresponding author, e-mail: durduncorina@yahoo.com

Introduction: Yogurt is a very popular food and can be consumed by human beings of all ages because is healthy and offer some good quality proteins and lipids. Yogurt can be a delicious snack when is fortified with mango puree. Mango fruit is known as a great source of phenolic compounds with antioxidant activity.

Aims. The aim of the present study was to determine the effect of mango (*Mangifera indica* L.) puree fruits on lipids stability, some physicochemical parameters and sensorial properties of yogurt during refrigeration period, compared to untreated yogurt.

Materials and Methods: Yogurt was prepared from cow milk, provided from a farm from Ilfov county. The fruits used for the experiment were bought from supermarket. Fruit puree was obtained from fresh and boiled pulp and peel mango. Mango puree was added at 0% and 5% (w/v). Yogurt samples were collected after 0, 2, 4, 6 and 8 days of refrigeration for analysis of several parameters [pH, total acidity, total phenolics content (TPC), total flavonoids content (TFC), antioxidant activity (AA), TBARS value and sensorial properties (Blassy et al., 2020).

Results: The highest AA was determined for the yogurt samples treated with boiled mango puree. Comparatively, untreated samples TBARS value was lower than the samples treated with mango puree ($p > 0,05$). The sensory evaluation results revealed some statistical differences between the acceptability of the three types of yogurt.

Conclusions: The addition of mango (*Mangifera indica* L.) puree fruits on yogurt significantly enhanced the lipids oxidative stability, decreased TBARS value and modified its sensorial properties in the acceptability limits.

Keywords: antioxidant activity, lipid oxidation, mango puree, yoghurt

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FIVE WILD EDIBLE LEAFY PLANTS FROM ASTERACEAE FAMILY - SOURCES OF ANTIOXIDANTS AND FRUCTANS

Nadezhda PETKOVA¹, Ivanka HAMBARLIYSKA^{1*}, Mina TODOROVA¹, Radka VRANCHEVA²

¹Department of Organic Chemistry and Inorganic Chemistry, University of Food Technologies,
26 Maritza Blvd, Plovdiv, Bulgaria

²Department of Analytical Chemistry, University of Food Technologies, 26 Maritza Blvd.,
Plovdiv, 4002, Bulgaria

*Corresponding author, e-mail: vanya.hambarliyska@gmail.com

Introduction: The leaves of some wild representatives of Asteraceae family as spiny sow thistle (*Sonchus asper* (L.) Hill, annual sow thistle (*Sonchus oleraceus* L.), dandelion (*Taraxacum officinale* Web.), prickly lettuce (*Lactuca serriola* L.) and common chicory (*Cichorium intybus* L.) were consumed in many countries from Europe, Asia and Australia as salads and soups.

Aims: The aim of the current study was to evaluate the pigment content, phenolic acids, sugar and fructan content in leaves of five wild edible plants from Asteraceae family.

Materials and Methods: Natural pigments, total phenols, phenolic acids and total flavonoids were evaluated in 95 % ethanol extracts. The antioxidant activity of analyzing plants was evaluated by two methods (DPPH and FRAP assays). The fructans content in water extracts was defined spectrophotometrically by resorcinol-thiourea reagent, while sugars were analyzed by HPLC-RID method.

Results: The results revealed that *Sonchus asper* and *Sonchus oleraceus* extracts contained the highest amount of chlorophylls and total phenols. Eight phenolic acids were detected in the leaves of wild plants. The chlorogenic acid dominated in *Sonchus asper* leaves, while caffeic and cinnamic acids dominated in dandelion leaves. Dandelion and chicory leaves were evaluated as rich sources of flavonoids and fructans (nystose and 1-kestose) were found in them. *Sonchus asper* and *Taraxacum officinale* extracts exhibited the highest radical scavenging activity.

Conclusion: The current study revealed the nutritional potential of some wild leafy vegetables, commonly considered as weed plants. Among the investigated plants *Sonchus asper*, and *Taraxacum officinale* and *Cichorium intybus* were evaluated as rich sources of polyphenols, phenolic acids and fructans.

Keywords: antioxidants, fructans, pigments, total phenols, wild edible plants

DIETARY DIVERSITY SCORE AND THE INCIDENCE OF CHRONIC KIDNEY DISEASE IN AN AGRICULTURAL MOROCCAN ADULT'S POPULATION

Rachida MOUSTAKIM¹, Mohamed MZIWIRA^{1,2}, Mohammed EL AYACHI¹ and
Rekia BELAHSEN¹

¹Laboratory of Biotechnology, Biochemistry & Nutrition. Training and Research Unit on Nutrition & Food Sciences. Chouaib Doukkali University. Faculty of Sciences, El Jadida, Morocco

²Higher Normal School of Hassan II University Casablanca, Morocco

*Corresponding author, e mail: rachi-84@hotmail.fr

Introduction: Evidence suggests that diet play an important role in chronic kidney disease (CKD) (Snelson et al 2017). Dietary diversity score (DDS) is well recognized as an indicator for assessing diet quality and food security (Kennedy and Ballard, 2013; Karoune et al 2016). However, its association with CKD has not been investigated.

Aims: The aim of this study was to estimate the prevalence of CKD and to evaluate its association with DDS among a Moroccan population sample from Sidi Bennour province.

Materials and Methods: A cross sectional study was conducted among 210 individuals. General information among others was collected. Weight, height and waist circumference were measured and body mass index (BMI) was calculated. Blood samples were collected and the serum creatinine was determined. Subsequent glomerular filtration rate (eGFR) was estimated by the modification of diet in renal disease (MDRD) formula and the chronic kidney disease was defined by an eGFR < 60 ml/min/1.73m². Dietary intake was assessed using a 24-h dietary recall, and DDS was computed according to the FAO guidelines.

Results: The participants mean age was 54.18±13.45 years, with a sex ratio of 0.38 and 4.4% as the prevalence of chronic kidney disease. The dietary diversity score was lower than 3 (lowest DDS) in 14.4% of the subjects, between 4 and 5 (medium DDS) in 72.5% and higher than 6 (high DDS) in 13.1% of the subjects. Subjects with higher DDS have higher level of eGFR compared to those with lower DDS while the DDS was not associated with the incidence of CKD in the present study.

Conclusion: The study data analysis revealed no significant association between DDS and CKD.

Keywords: Chronic kidney disease, diet, Dietary diversity score, food security, 24-h dietary recall

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JELLIES ENRICHED WITH *SORBUS AUCUPARIA*: DEVELOPMENT AND CHARACTERIZATION OF A NOVEL FUNCTIONAL FOOD PRODUCT

Giorgiana A. SPALLER¹, Crina C. MUREȘAN¹, Romina M. MARC (VLAIC)¹, Vlad MUREȘAN¹, Andruța E. MUREȘAN¹ and Georgiana S. MARȚIȘ^{1*}

Faculty of Food Science and Technology, Cluj-Napoca, Romania

*Corresponding author, e-mail: georgiana.petrut@usamvcluj.ro

Introduction: Rowanberries (*Sorbus aucuparia*) have high nutritional values and health benefits. These are due to the high concentration of phytonutrients such as vitamins, carotenoids, phenolic acids, and minerals, such as iron, potassium, calcium, and magnesium. The use of bioactive compounds in the food industry is becoming more popular. The *Sorbus* genotypes have been traditionally used in various processed foods. The research of scientific literature demonstrates the potential pharmacological effects of rowanberries are due to their composition of biologically active compounds (Sarv et al. 2021).

Aims: The aim of this study is to propose innovative jelly with high content of bioactive components of rowanberries.

Materials and Methods: The wild *Sorbus* fruits were picked at their optimal ripe maturity in October of 2020 when all berries in the cluster reached full coloration and were frozen at -18 °C.

In this study, the biochemical profile of fruits and jelly of *S. Aucuparia* genotype was analyzed. Primary metabolites (sugars and organic acids) and flavonoids were analyzed by using the HPLC-RI method.

Results: Following the Physico-chemical analysis performed on the fruits, high content of flavonoids, namely catechin and vanilla acid, and carbohydrates can be observed. The main flavonoids of jelly enriched with rowanberries are epicatechin (4.1 g/100 g), vanilla acid (2.64g/100 g), and catechin (2.51 g/100 g). Citric acid increases and tartaric acid remains constant in the jelly samples with *Sorbus aucuparia*. From carbohydrates content, fructose and glucose predominate in the final product.

Conclusion: Being abundant in flavonoids, extracts of *Sorbus aucuparia* could serve as a valuable resource of bioactive compounds to functional food or pharmaceutical industries.

Keywords: flavonoids, HPLC-RI, jelly, organic acids, *Sorbus aucuparia*

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STATE OF THE ART ON FUNCTIONAL COATINGS FOR APPLICATIONS IN THE AGRI-FOOD INDUSTRY

Paul-Alexandru POPESCU^{1*}, Vlad Ioan POPA², Amalia Carmen MITELUT¹, Elena Elisabeta POPA¹, Mihaela DRAGHICI¹ and Mona Elena POPA¹

¹ *Faculty of Biotechnology, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania*

² *Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania*

*Corresponding author, e-mail: paul.alex.popescu@gmail.com

Introduction: Nowadays, consumer's awareness regarding edible and functional coatings used in the food industry is increasing because of their novel approach on prolonging the shelf life of agri-food products that during storage, are subjected to a loss of quality attributes, which inevitably contributes to food waste. A novel way to diminish this problem is the use of edible packaging and edible coatings which are capable of increasing the shelf life of food products by delaying microbial spoilage and providing moisture and gas barrier properties.

Aims: The aim of this study is to review the literature and outline the most recent findings and developments regarding edible and functional coatings used in the food industry.

Materials and Methods: For a better understanding of this topic several online databases were electronically searched for research articles published in the last 10 years. The literature search comprised of research articles and reviews on the following topics: functional coatings, edible coatings, sustainable food systems.

Results: Functional and edible coatings can be applied directly on the food product, or can be added around the food product. The most common techniques used to apply the edible coatings on the food products are, dipping, spraying, fluidized-bed, and panning. Edible coatings and films are used on different food products, mainly because they help maintain the organoleptic properties, such as aroma, taste and appearance and prologue their shelf life.

Conclusion: The new concept of functional coatings and edible packaging has significantly influenced the marketing of food. Functional coatings can be defined as a system that extends the shelf life of a food product or to improve its sensory properties while providing food safety.

Keywords: edible food packaging, functions coatings, shelf-life, sustainability

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PRELIMINARY RESULTS FOR IMPROVING THE COLLOIDAL STABILITY OF SUNFLOWER TAHINI AND HALVA PRODUCTS BY WAX BASED OLEOGELATION MECHANISM

Anda Elena TANISLAV, Andreea PUȘCAȘ, Andruța MUREȘAN, Georgiana MARTIȘ (PETRUȚ), Romina MARC (VLAIC), Vlad MUREȘAN*

Food Engineering Department, Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Mănăstur Street, 400372 Cluj-Napoca, Romania.

* Corresponding author: vlad.muresan@usamvcluj.ro

Introduction: Halva is a confectionery product based on nougat and different oilseeds paste (tahini). It shows a structure formed by the physical interaction between tahini particles and sugar fibers. The oil separation during storage has been considered a natural phenomenon, but current trends consider this process a defect that gives a depreciated commercial appearance and further accelerates the lipid oxidation.

Aims: The aim of this study is to evaluate the influence of both high-melting and low melting waxes on the stability of sunflower tahini and halva products during controlled storage but also to monitor the textural changes and sensorial acceptance of the developed products.

Materials and Methods: Tahini samples containing several waxes (sunflower, carnauba, rice bran and beeswax) in different concentrations (1%, 2% and 3%) were prepared and their textural parameters and colloidal stability (CS) during storage was determined. For preparing the halva prototypes, 60% sunflower tahini containing waxes and 40% nougat, were used.

Results: The tahini samples (excepting the 1% containing beeswax) demonstrated higher CS ($p < 0.05$) as compared to the reference prepared without wax. The main effects: wax type and storage time, accounted 51.64%, and 18.58%, respectively of the tahini CS variability. When it comes for the halva, the CS of all samples containing different waxes (excepting the sample with 1% beeswax) showed statistically significant ($p < 0.05$) higher values in comparison to the reference which registered the lowest CS (94.06%).

Conclusion: It was demonstrated that the addition of edible waxes significantly improves the colloidal stability of sunflower tahini and halva samples.

Keywords: Colloidal stability, halva, oil separation, tahini, wax oleogels.

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TECHNO-FUNCTIONAL PROPERTIES OF INNOVATIVE DOUGH AND COOKIES BASED ON FOREST SEEDS

Anda Elena TANISLAV¹, Raluca VÎLCU¹, Andruța MUREȘAN^{1*}, Andreea PUȘCAȘ¹,
Romina Alina MARC (VLAIC)¹, Alina M. TRUTA², Vlad MUREȘAN¹

¹*Food Engineering Department, Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Mănăstur Street, 400372 Cluj-Napoca, Romania.*

²*Department of Forestry, Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Mănăstur Street, 400372 Cluj-Napoca, Romania.*

* Corresponding author: andruta.muresan@usamvcluj.ro

Introduction: The red oak fruit is an achene recognized for its biologically active potential provided by compounds with antioxidant activity and polyphenols. Beechnut is characterized by protein and fat content and studies evaluate the potential for its use as a nutritional food due to the fatty acids, amino acids and essential minerals it contains.

Aims: The aim of this study was to characterize and evaluate the influence of beechnut and red oak addition in innovative dough and cookies by monitoring physico-chemical and textural parameters.

Materials and Methods: Two experimental prototypes were produced while partially substituting (P1– 10% and P2– 30%) the wheat flour with red oak acorn powder and compared with the control sample (PM); the beechnut flakes were used as an innovative replacement of conventional almond flakes. The determination of total polyphenols was performed spectrophotometrically by Folin-Ciocalteu method and antioxidant activity by DPPH assay.

Results: Dough samples demonstrated higher total polyphenols content (P1– 135.65 and P2– 326.62 mg GAE/100 g) compared to the reference (68.24 mg GAE/100 g). The antioxidant capacity of cookies is favorably influenced by the proportion of forest seeds (PM– 13.02 and P2– 94.95%). All the analyzed samples were favorably evaluated by the panelists, but the most popular was the prototype enriched with 10% acorn powder.

Conclusion: In the present research work, it was demonstrated that the addition of acorn powder and beechnut flakes significantly improves nutritional value compared to the control test.

Keywords: acorn, beechnut, cookies, dough, forest seeds

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FOOD DIVERSITY AND VARIETY SCORE OF PREGNANT WOMEN IN THE PROVINCE OF EL JADIDA

Houda ELFANE^{1*}, Sanaa EL JAMAL¹, Mohamed MZIWIRA², Mohammed El Ayachi¹
and Rekia BELAHSEN¹

¹*Training and research unit in nutrition and food sciences. Faculty of Sciences, Chouaib Doukkali University. El Jadida, 24000. Morocco, 2Ecole Normale Supérieure. Hassan II University*

*Corresponding author, e-mail: houdaelfane@gmail.com

Introduction: Diet is an important factor for the successful course of pregnancy and the growth of the fetus. Malnutrition during pregnancy can lead to intrauterine growth retardation (IUGR) and / or fetal hypotrophy, and put these low-birth-weight infants at greater risk of pathologies in adulthood.

Aims: The objective of this study is therefore to assess and compare the quality of the diet and the nutritional status of two groups of pregnant women at the time of childbirth while assessing their newborn's weight at birth.

Material and method: This prospective study was carried out on 200 pregnant women who are in labor and who presented to the maternity ward of Mohamed V hospital in El Jadida for childbirth. An established questionnaire is used to collect information on socio-demographic and economic factors. Food diversity and variety scores were constructed using a semi-quantitative food frequency questionnaire.

Results: The age group between 20 and 30 years old pregnant women was the most representative with a rate of 67%. The majority of parturient (77.5%) come from rural areas and 72.5% have a low socio-economic level. The mean BMI of these women was 28.25 ± 2.75 kg / m². The mean of the dietary diversity score is 8.88 ± 1.35 food groups and the mean of the food variety score is 15.90 ± 2.09 food items.

Conclusion: It is important to pay special attention to pregnant women when developing nutrition and pregnancy monitoring programs to ensure that they receive sufficient quality and quantity of food.

Keywords: diversity score, pregnant woman, variety score

EPIDEMIOLOGICAL PROFILE OF PREGNANT WOMEN AND NEWBORN BIRTH WEIGHT IN EL JADIDA PROVINCE / MOROCCO (CASE-CONTROL STUDY)

**Houda ELFANE^{1*}, Sanaa EL JAMAL¹, Mohamed MZIWIRA², Mohammed EL
AYACHI¹ and Rekia BELAHSEN¹**

¹Training and research unit in nutrition and food sciences. Faculty of Sciences,
Chouaib Doukkali University. El Jadida, 24000. Morocco

²Ecole Normale Supérieure. Hassan II University

*Corresponding author, e-mail: houdaelfane@gmail.com

Introduction: Low birth weight (LBW) is an important predictor of neonatal morbidity and mortality; it reflects the nutritional status of the mother and the quality of health services during pregnancy.

Material and methods: In this cross-sectional case-control study, anthropometric parameters were measured and compared in newborns with normal weight and those with LBW and the maternal and socioeconomic risk factors associated with LBW are examined.

Results: The study identified 172 parturient who gave birth to newborns with LBW and 172 parturient who gave birth to newborns with normal weight. The proportions of LBW are greater among first-time mothers (50.6%), illiterate mothers (59.9%) and professionally inactive (86.6%). The mean weight of LBW newborns is 2013.95 ± 372.95 g compared to 3380 ± 217.59 g for normal weight newborns. After adjustment in relation to the variables integrated in the analysis, the factors associated with LBW are low socio-economic level (OR = 3.18; 95% CI: 1.09-9.23), insufficient follow-up of the PNC. (OR = 2.91; 95% CI: 1.71-4.95), the rural environment origin (OR = 0.52; 95% CI: 0.30-0.91) and the absence of nutritional education (OR = 0.17; 95% CI: 0.09-0.34).

Conclusion: A well-targeted and coordinated education and, awareness-raising actions on early pregnancy and the diet of pregnant women, could have a positive impact on improving the rate of births of children with a weight deficit.

Keywords: anthropometric measurements, low birth weight, pregnant woman, risk factors, nutritional status

THE IMPACT OF LAVENDER ESSENTIAL OIL ON THE QUALITY AND SHELF-LIFE OF SMOKED SAUSAGES

Isabela Voichița BULAI^{1*}, Mara GEORGESCU¹, Oana Mărgărita GHIMPEȚEANU¹, Ștefania Mariana RAITA² and Dana TĂPĂLOAGĂ¹

¹ *Department of Animal Production and Public Health. University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

² *Department of Preclinical Sciences. University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

*Corresponding author, e-mail: isabelaisaconi@gmail.com

Introduction: Lavender (*Lavandula angustifolia*) has been used in dried plant form or as an essential oil since ancient times and enjoys a great deal of attention due to its antimicrobial and antioxidant properties attributed especially to phenolic and polyphenolic substances. The lavender essential oil has been tested for preserving meat products.

Aims: The objectives of this paper were to evaluate the applicability of lavender essential oil in the manufacture of sausages and to observe its effect on the stability of the physicochemical and histological properties of smoked sausages during cold storage for a period of 9 days.

Materials and Methods: Fresh pork (trim) was ground and mixed thoroughly in the production of experimental sausages with different concentrations of essential oils: 0.2%, 0.5%, 1%, 1.5%, 2%, 2.5%, and 3%. The essential oils of lavender (*Lavandula angustifolia*) used in this study were purchased from the Fares - Orăștie Company.

Results: For most samples, lavender oil enrichment is associated with maintaining a relatively constant pH during the follow-up period. In all supplemented samples, the final pH is lower than that for the control sample, and for higher concentrations, a significant decrease in pH towards the end of the storage period is obvious. Thus, as far as the pH is concerned, the preservative effect is obvious at all concentrations and significant at higher concentrations, which is also confirmed by the results indicated by the fluctuation of TVBN.

Histologically, the samples of sausages treated with high concentrations of lavender oil reveal the integrity of the muscle fibers and the sarcolemma compared to the control sample

Conclusion: The results of this study reveal a qualitatively demonstrated effective preservative action. Experimental studies on large batches of samples are required to confirm the statistical significance of these conclusions

Keywords: lavender essential oil, physico-chemical analysis, smoked sausages

BIOACTIVE COMPOUNDS IN SEA BUCKTHORN – A REVIEW

Mona Elena POPA¹, Amalia Carmen MITELUȚ¹, Elisabeta Elena POPA^{1*}, Paul Alexandru POPESCU¹, Mihaela Cristina DRĂGHICI¹, Vlad Ioan POPA², Silvana DĂNĂILĂ-GUIDEA¹

¹*Faculty of Biotechnology, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

²*Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

*Corresponding author, e-mail: elena.eli.tanase@gmail.com

Introduction: Natural products for food and nutritional supplements have gained increased attention in recent years (Korekar et al., 2014). Sea buckthorn (*Hippophae rhamnoides* L.) is a thorny deciduous plant widely grown in Eurasian countries. Different parts of this plant are considered as a good source of bioactive substances and used in folk medicine. Today it is used as a candidate for functional food ingredient - the berries are especially rich in vitamin C and flavonoids.

Aims: The aim of this study was to review the literature regarding the bioactive compounds found in sea buckthorn berries, leaves and other by-products.

Results: *In vitro* studies, and *in vivo* human and animal models, have found the juices, jams and oil derived from the fruits to have a range of beneficial anti-inflammatory, anticancer, antioxidant and anti-atherosclerotic effects; these have been attributed to the presence of phenolics, vitamins, minerals, amino acids, fatty acids and phytosterols (Olas, 2018).

Conclusion: Sea buckthorn is a unique plant with great medical value, being a source of many bioactive compounds with antioxidant, anti-platelet, anti-cancer, anti-bacterial and antiviral activities.

Keywords: sea buckthorn, bioactive compounds,

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NISIN ANTIMICROBIAL ACTIVITY AGAINST SOME FOOD SPOILAGE MICROORGANISMS

Elisabeta Elena POPA¹, Amalia Carmen MITELUT^{1*}, Paul Alexandru POPESCU¹,
Vlad Ioan POPA², Mihaela Cristina DRĂGHICI¹, Mihaela GEICU-CRISTEA¹
and Mona Elena POPA¹

¹ Faculty of Biotechnology, University of Agronomic Sciences and Veterinary Medicine
of Bucharest, Romania

² Research Center for Studies of Food Quality and Agricultural Products, University of
Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

*Corresponding author, e-mail: amaliमितेलुत@yahoo.com

Introduction: Nisin is a natural antimicrobial agent and food-grade material, naturally produced from *Lactococcus lactis* subspecies *lactis* (Luo et al., 2019). It is widely used in the food industry against food spoilage microorganisms, because it represents the only bacteriocin approved for food preservation (Yu et al., 2020).

Aims: The aim of this study was to determine the antimicrobial activity of nisin against some spoilage microorganisms and also the minimum inhibitory concentration for this agent, in order to be used in the development of new packaging materials with improved functionality for meat preservation.

Materials and Methods: The antimicrobial activity was determined against two spoilage fungi (*Aspergillus brasiliensis* and *Penicillium expansum*) and two bacteria strains (*Bacillus cereus* and *Bacillus subtilis*), using the disc diffusion method.

Results: The results obtained are promising, showing that even a lower concentration of nisin can inhibit fungi and bacteria development.

Conclusion: Nisin presents antimicrobial activity and can be successfully used in the development of new packaging materials suitable for meat preservation and shelf-life prolonging.

Keywords: nisin, packaging materials, meat preservation

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PRELIMINARY MODELS FOR MEAT ANALOGUES BASED ON EXTRACTIVE PRODUCTS FROM CONVENTIONAL OILSEEDS

Maria-Ioana SOCACIU¹, Andreea PUȘCAȘ¹, Anda Elena TANISLAV¹, Andruța MUREȘAN¹, Alina Maria TRUȚĂ², Cristina Anamaria SEMENIUC^{1*}, Vlad MUREȘAN^{1*}

¹*Department of Food Engineering, Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Manaștur Street, 400372 Cluj-Napoca Romania*

²*Department of Forestry, Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Manaștur Street, 400372 Cluj-Napoca, Romania*

*Corresponding author, e-mail: vlad.muresan@usamvcluj.ro; cristina.semeniuc@usamvcluj.ro

Introduction: In the growing world population, proteins from non-animal and alternative sources are currently developed, while there is an increasing pressure to reduce livestock meat production due to ethical and environmental concerns.

Aims: This study proposes developing demonstrating models for meat analogues based on extractive products from conventional oilseeds and aromatized with different aromatic plants or their essential oils (EO)

Materials and Methods: Designing and formulation of composites paste (experimental demonstrators) were carried out by varying the degree of thermal treatment applied to the raw material, and the amount of auxiliary materials responsible for consistency and the final flavor of the products. Also, thermal treatments time were optimized for product pasteurization and sterilization. The 9-point hedonic scale has been used to evaluate sensory attributes like appearance and color, consistency and texture, odor and taste, aftertaste, respectively overall acceptability, and a 5-point scale purchase intention.

Results: The formulations where aromatic plants were used received higher overall scores than the ones with essential oils added (thyme 7.4, and rosemary 7.5), except the oregano assortments (oregano EO 7.7). The most appreciated sensory attributes were odor and taste in all tested samples, the values ranging between 8.0-8.3. The highest purchase intention registered the formulation with oregano EO, where 36% of respondents answered with "definitely will buy".

Keywords: aromatic plants, essential oils, meat analogues, oilseeds, sensory attributes

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ACTIVE PACKAGING MATERIAL TO EXTEND THE SHELF-LIFE OF FRESH FISH

Maria-Ioana SOCACIU¹, Melinda FOGARASI¹, Elemér Lajos SIMON², Sonia Ancuța SOCACI², Andersina Simina PODAR², Vlad MUREȘAN¹, Cristina Anamaria SEMENIUC^{1*}, Dan Cristian VODNAR^{2*}

¹*Department of Food Engineering, Faculty of Food Science and Technology, UASMV Cluj-Napoca, Romania*

²*Department of Food Science, Faculty of Food Science and Technology, UASMV Cluj-Napoca, Romania.*

*Corresponding author, e-mail: cristina.semeniuc@usamvcluj.ro; dan.vodnar@usamvcluj.ro

Introduction: The brook trout (*Salvelinus fontinalis*) is a species of freshwater fish in the genus *Salvelinus* of the family Salmonidae (Invasive Species Compendium). Under normal refrigerated storage conditions, its shelf-life is limited by the development of enzymatic and chemical reactions (Socaciu et al., 2018). Therefore, keeping fish quality during the supply chain is a challenge for food manufacturers.

Aims: In this research were studied the efficiency of edible films prepared from heat-denatured whey protein isolate solutions, with (WPIf+2.5%TEO) and without tarragon essential oil (WPIf), on the quality and shelf-life of brook trout samples during storage at 4°C.

Materials and Methods: The control and covered fish samples were periodically assessed (at 3 days) over 15 days of storage for the physicochemical (pH, electrical conductivity (EC), total volatile basic nitrogen (TVB-N), thiobarbituric acid reactive substances (TBARS), microbiological (total viable count (TVC), psychrotrophic count (PTC), lactic acid bacteria (LAB), and H₂S-producing bacteria), and sensory properties (color discoloration, odor, and overall acceptability).

Results: The WPIf+2.5%TEO has proven to be effective during storage at 4°C. The tarragon essential oil caused delays of chemical reactions and microorganisms growth in the fish sample, leading to retention of desirable sensory attributes for a longer period. At the same time, due to the low level of incorporation tarragon essential oil didn't negatively affect the organoleptic properties of the fish sample.

Keywords: active packaging material; brook trout; edible film; shelf-life; tarragon essential oil

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QUALITY ELEMENTS OF TOAST BREAD ASSORTMENT IN A SOUTH – EASTERN ROMANIAN PROFILE UNIT

Oana Mărgărita GHIMPEȚEANU^{1*}, Carmen Daniela PETCU¹, Isabela Voichița ISACONI (BULAD)¹, Oana-Diana OPREA¹, Florin FURNARIS¹, Otilia Cristina MURARIU², Mara GEORGESCU¹

¹ Faculty of Veterinary Medicine, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

² University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" Iași, Romania

*Corresponding author, e-mail: ghimpe_marga@yahoo.com

Introduction: In the last years, the consumption of bakery products has increased due to the diversity of assortments, preparation technology and taste which determined the existence of a very large range of breads with high nutritional value.

Aims: The proposed objectives were: determining the quality parameters of the four varieties of bread, highlighting the statistically significant differences and correlations between the quality parameters and evaluation of some nutritional aspects.

Materials and Methods: Four assortments of toast sliced bread-Toast Integral (T.I.), Toast Classic (T.C.), Toast Graham (T.G.) and Toast with Rye (T.R.) were analyzed. Three samples from 15 consecutive production batches from each bread assortment (180 samples) were taken to analyze and the average value of the analyzed parameters was used for statistical evaluation. The determinations were done according to SR 91/2007 and included: weight, humidity, acidity, porosity, elasticity, water activity. Also, the nutritional profile (content of fats, saturated fatty acids, carbohydrates, sugar, protein, fiber and salt) was evaluated and the results were compared with the values declared on the label.

Results: The assortments with higher fiber content, respectively T. I., T.G. and T.R. had higher humidity than T.C. The acidity was significantly increased in the assortments of fiber-rich breads (T.I., T.R., T.G.) compared to sliced white bread (T.C.). Except for the pair T.I. - T.R., the porosity constituted an element of statistical differentiation for all the other pairs of investigated assortments. Basically, the highest porosity was T.C. (87.13%), followed by T.R., T.I. and T.G. Water activity did not differ significantly between bread assortments. In T.I., the increase in weight was correlated with the decrease in porosity. This can be an effect of baking in the tray, so in conditions of constant volume ($r = -0.627$). The T.C. products with higher humidity were also characterized by higher elasticity ($r = 0.582$). The analyzed products were characterized by lower fat contents and saturated fat actions compared to the values written on the package.

Conclusion: The quality parameters of the investigated products were characterized by low values of coefficients of variation, which suggests that technological processes are controlled, repeatable. It is necessary to revise the labels in order to correct the nutritional information provided to the consumer.

Keywords: quality parameters, statistical evaluation, toast

RECENT RESEARCHES FOR COENZYME Q₁₀ FROM FOOD MATRICES. SUPPLEMENTATION IN AGING AND DISEASES

Andersina-S. PODAR¹, Cristina-A. SEMENIUC^{1*}, Maria-I. SOCACIU¹, Melinda FOGARASI¹, Anca-C. FĂRCAȘ¹, Sonia-A. SOCACI^{1*}

¹*Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine from Cluj-Napoca, Strada Mănăştur, nr. 3-5, Cluj-Napoca, Romania*

*Corresponding author, e-mail: sonia.socaci@usamvcluj.ro; cristina.semeniuc@usamvcluj.ro

Introduction: In the literature, Coenzyme Q₁₀ (CoQ₁₀) usually is identified as the only endogenously synthesized lipid-soluble antioxidant compound. Most animal-originated foods, such as meat, egg, and dairy products, are sources of CoQ₁₀ (Bae et al., 2018). Other available food sources of CoQ₁₀ can be vegetable oil, fish, bee pollen and microorganisms. But the problem is correlated to the absorbability of CoQ₁₀ which becomes more difficult with age, because of its higher molecular mass (863.7 Da) and poor water solubility. In general, the recommended dosage is 100-200 mg/day CoQ₁₀ to achieve a therapeutically beneficial effect in the body (Tobin, *et al.*, 2014).

Aims: This review focused on the health benefits of CoQ₁₀ dietary supplementation and its bioavailability for human body.

Materials and Methods: In order to achieve the set goal, a screening of the scientific literature from the last 20 years dealing with this theme, was conducted. The literature screening was performed using: National Centre for Biotechnology Information (PubMed), Science Direct, Web of Science, Nature and Elsevier databases.

Results: Stress, infections, poor eating habits and ageing are only a few disorders which affect the organism's ability to provide adequate amounts of CoQ₁₀. More than 200 clinical trials have investigated its use as a drug or dietary supplement and reported beneficial effects for human health.

Conclusion: Researches suggest that using CoQ₁₀ supplements alone or in combination with other nutritional supplements may help to maintain the health of elderly people or treat some of the health conditions and diseases.

Keywords: Absorption, Coenzyme Q₁₀, dietary supplementation, health benefits

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CLASSIFICATION AND COMPARISON OF TEXTURAL ATTRIBUTES, COLOR AND PHYSICOCHEMICAL INDICES FOR 22 APPLE VARIETIES

Andruța MUREȘAN¹, Madălina MILITARU², Anda Elena TANISLAV¹, Andreea PUȘCAȘ¹, Mădălina MATEESCU¹, Romina Alina MARC (VLAIC)¹ and Radu SESTRAS^{*3}

¹*Food Engineering Department, Faculty of Food Science and Technology, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Manaștur Street, 400372 Cluj-Napoca, Romania.*

²*Research Institute for Fruit Growing Pitesti, 402 Mărului Street, 117450, Mărăcineni, Romania.*

³*Department of Horticulture, Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Manaștur Street, 400372 Cluj-Napoca, Romania.*

* Corresponding author: e-mail: rsestras@usamvcluj.ro

Introduction: The modern cultivated apple (*Malus×domestica* Borkh.) is probably the result of interspecific hybridization currently, more than ten thousand cultivars exist. The large number of cultivars also reflects a broad range of variability in the quality traits.

Aims: The aim of this study was to classify and compare the textural attributes and physicochemical indices for 22 apple varieties.

Materials and Methods: For all studied apple varieties the main quality indices were determined. The color and textural attributes were determined by instrumental analysis.

Results: The 22 studied apple varieties mean water content was 85.05% with coefficient of variation (CV) of 0.4%, titratable acidity mean 0.55% malic acid with a CV of 3.73%, soluble solid content mean 16.22% with CV of 4.29% indicating a relatively small difference in-between varieties for these indices. Per contra, relatively large differences among varieties were registered for single fruit weight, volume and ash content with means of 119.52g, 155 l, and 2.32%, and CVs of 19.05%, 22.49%, and 26.68% respectively. Color and texture indices also registered high differences.

Conclusion: Considerable variations were observed between different apple varieties in terms of textural attributes, color and physicochemical properties. Information from this study may be useful for selecting optimum hybridizing apple varieties to different purpose in apple-breeding programs.

Keywords: apple quality, classification, textural attributes.

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PHENOLIC PROFILE OF VARIOUS WILD EDIBLE MUSHROOM EXTRACTS FROM TRANSYLVANIA AND THEIR ANTIOXIDANT PROPERTIES

Melinda FOGARASI^{1*}, Cristina Anamaria SEMENIUC¹, Maria-Ioana SOCACIU¹,
Sonia Ancuta SOCACI², Anca FARCAS², Dorin TIBULCA¹, Dan SALAGEAN¹,
Maria TOFANA²

¹ Department of Food Engineering, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca, Romania

² Department of Food Sciences, University of Agricultural Sciences and Veterinary
Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: melinda.fogarasi@usamvcluj.ro

Introduction: Mushrooms with their delicate flavour and texture are recognised as a nutritious food and an important source of biologically active compounds with medicinal values. Generally, mushrooms are low in energy and high in dietary fibre, and an excellent source for antioxidants as they accumulate a variety of secondary metabolites, including phenolic compounds.

Aims: Based on the antioxidant properties of mushrooms, the aim of this study is to evaluate the phenolic profile and antioxidant activity of five varieties of mushrooms extracts.

Materials and Methods: Five species of edible wild mushrooms (*B. Edulis*, *C. cibarius*, *A. bisporus*, *P. ostreatus*, *L. piperatus*), were purchased from the mushroom collection center located in Zalau, Salaj, Romania. The fresh mushrooms were dried in an oven. The dried samples were ground to powder prior to analysis. Methanol solvent was used to extraction. The extracts of dried wild edible mushrooms were analyzed for antioxidant activity in different assays, namely, ABTS radical cation decolorization assay, total phenolic content and total flavonoid content. The phenolic acids identification and quantification were done by high-performance liquid chromatography coupled with mass spectrometry (HPLC-MS).

Results: The experimental results revealed that regardless the mushrooms species, 4-Hydroxybenzoic acid and cinnamic acid were the main phenolic compound present in all selected species. However, in terms of total phenolic compounds, flavonoid content and antioxidant activity *Boletus edulis* greatly over performs the other mushroom species.

Conclusion: As an overall conclusion it can be stated that among the studied mushroom species *Boletus edulis* has the greatest potential to be used as a natural source of bioactive compounds for the production of functional foods.

Keywords: bioactive compounds, phenols, wild edible mushrooms

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FUNCTIONAL QUALITY AND SENSORIAL PROFILE OF BAKERY PRODUCTS ENRICHED WITH CRICKET FLOUR, CARROTS, BLUEBERRIES AND BEETROOT

Otilia Cristina MURARIU¹, Florin MURARIU², Oana Mărgărita GHIMPEȚEANU and Ioan PUIU^{2*}

¹ Faculty of Agriculture, University of Life Sciences Ion Ionescu de la Brad Iasi, Romania

² Faculty of Veterinary Medicine, University of Agriculture Science and Veterinary Medicine of Bucharest

*Corresponding author, e-mail: puiu_ioan@uaiasi.ro

Introduction: Due to the high nutritional value, cricket flour may be considered a valuable protein additive in novel bakery products. Bread products obtained from cricket flour has an excellent source of protein (especially essential amino acids), healthy fats (especially polyunsaturated fatty acids), minerals (as calcium, iron and zinc), vitamins (B₁₂) and fibers. Cricket use as raw material from insect farm production have a smaller environmental footprint, due to the generates of smaller quantities of CO₂ or methane, gases that are harmful to the environment.

Aims: This paper presents the results of the cricket flour/ carrots/ cranberries/ beetroot addition in bakery products.

Materials and Methods: The bread was nutritionally enriched by replacing 3% the white flour or whole meal flour with cricket flour. Also, it was used additions represented by some functional products, such us: beets, carrots and blueberries, thus obtaining 7 experimental variants. The obtained products were analysed for their nutritional compositions, textural properties as well as sensorial evaluation and consumer acceptance.

Results: The results indicate the addition of the cricket flour, carrots, berries and beetroot influenced the porosity, the protein and minerals content and the antioxidant value. The brightness of the products enriched with cricket flour decreased, the products presenting a gray hue. The results of the sensory evaluation showed that bread with addition of cricket powder, rich in protein is accepted by consumers, but the preferred options are those with the addition of blueberries and carrots.

Conclusion: In the present research work, we demonstrated that bakery products with addition of cricket flour and functional raw materials are innovative products with a high nutritional value due to the protein content and antioxidant components.

Estimates of population growth in the coming years lead to finding solutions to ensure consumption per capita and the availability of resources available to meet the nutritional needs of people. In the situation of growing needs, crickets are a category of insects that are a raw material for food production with high nutritional value due to their significant content in protein, fat, minerals and vitamins.

Keywords: bakery products, cricket flour, quality, protein content

INSIGHTS ON SOLANACEOUS RESISTANCE AGAINST TOMATO LEAFMINER *TUTA ABSOLUTA* (MEYRICK) (LEPIDOPTERA: GELECHIIDAE)

Roxana CICEOI*, Mihaela IORDACHESCU, Amalia UDRIȘTE

*Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic
Sciences and Veterinary Medicine of Bucharest, 59, Mărăști Bd. 011464, Bucharest, Romania*

*Corresponding author, e-mail: roxana.ciceoi@qlab.usamv.ro

Introduction: The multiple negative impacts of intensive use of synthetic pesticides on environment, humans and other non-target organisms forced researchers and practitioners to develop sustainable methods of prevention and control for the most destructive pests, breeding resistant varieties being one of the most eco-friendly approaches. Among the many pest species that invaded the whole world in the last decades, one of the most frightening is the tomato leafminer, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae), a devastating pest of cultivated tomato worldwide. Tomato is one of the most important agriculture commodities, including the main mean of subsistence in many countries, but recently this pest is in transition to polyphagy, as more than 40 plant species, 9 families, including Monocotyledons, are now reported to be its host. Therefore, a deeper understanding of resistance mechanism of tomato and other species against *Tuta absoluta* is required by breeding programs.

Aims: The present review aims to present the current available knowledge on resistance mechanisms against tomato leafminer, *Tuta absoluta*.

Materials and Methods: Around 60 peer reviewed papers were analysed to have a comprehensive overview on resistance mechanisms against tomato leafminer as well as data from the Breedbase system (Sol Genomics Network).

Results: Many different resistance mechanisms were identified in tomato resistance against *T. absoluta*, among which the role of trichomes, the role of different volatile compounds etc. For instance, the resistance of wild tomatoes, *Solanum habrochaites*, has been attributed to volatile compounds as tridecan-2-one, undecan-2-one, and zingiberene, not found in sensitive cultivars. A comprehensive list of different cultivars or wild species displaying tomato leafminer resistance is presented.

Conclusion: The present review aims at facilitating the work of molecular biologist and breeders in their attempt of developing resistant or tolerant tomato varieties, one of the fundamental components of integrated pest management (IPM) programs for tomato.

Keywords: resistance, tomato, *Tuta absoluta*

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EVALUATION OF QUALITY FACTORS OF ORXATA DE XUFA PRODUCED IN THE PDO “XUFA DE VALENCIA”

Ana ADALID¹, Estela MORENO¹, Ana FITA¹, Nuria PASCUAL-SEVA², Bernardo PASCUAL-ESPAÑA², José María BOU³, Marisa JIMÉNEZ-PÉREZ¹, Adrián RODRÍGUEZ-BURRUEZO^{1*}

¹ COMAV Institute, Universitat Politècnica de València, Spain

² Centro Valenciano de Estudios sobre el Riego, Universitat Politècnica de València, Spain

³ Chufas Bou S.L., Puzol, Spain.

*Corresponding author, e-mail: adrodbur@doctor.upv.es

Introduction: *Orxata de Xufa* is an ancient local product from Horta Nord shire (north of Valencia city). The cultivation of xufa or tiger nut (*Cyperus esculentus*) was introduced centuries ago by muslim conquerors. In Valencia a new use (juice) arose by melting and squeezing dried nuts with water: xufa milk or orxata. It is only produced in the Horta Nord under the PDO *Xufa de Valencia*. However, its quality factors (and impact of growing conditions) must still be evaluated.

Aims: An initiative to evaluate the quality of Valencian orxata is being developed since 2020, involving PDO Xufa de Valencia and several producers and processors.

Materials and Methods: dried nuts from two different locations of the Horta Nord (Alboraya: organic-AO; Meliana: conventional mixture-MC) were used to prepare different samples in the facilities of Chufas Bou processors. The orxatas were then analysed to determine the levels of reduced sugars and ascorbic acid (HPLC), total phenolics (Folin method) and starch.

Results: On average, the nuts from AO showed higher size than those from the MC mixture. In terms of composition, MC showed higher levels of ascorbic acid (13 vs 7 mg/kg). In contrast, AO contained higher levels of total sugars 24 g/kg vs. 19 g/kg, in particular sucrose (22 vs 18 g/kg).. Finally, the content in total phenolics was slightly higher in the organic orxata from Alboraya (AO): 363 mg/kg vs 343 mg/kg.

Conclusion: Our study suggests a wide variation in quality factors of Valencian orxatas, wich mainly depend on geographical origin and growing conditions. Also, organic cultivation could improve levels of sugars and phenolics, although additional analysis, sampling other areas of the Horta Nord, would be needed.

Keywords: ascorbic acid, juice, phenolics, sugars, tiger nut

Acknowledgment: This work has been partly financed by Generalitat Valenciana through the project L'Or Blanc de l'Horta: *OrXECO* (2020/VALORIZA/VSC013). Authors are grateful to Cons. Reg. PDO *Xufa de Valencia*.

COMPARATIVE ANALYSES OF MONOVARIETAL VIRGIN EXTRA OLIVE OILS FROM THE REGION OF VALENCIA

Ana ADALID¹, Estela MORENO-PERIS¹, Marisa JIMÉNEZ-PÉREZ¹, Isabel LÓPEZ-CORTÉS¹, María Dolores RAIGÓN¹, Vicente INSA², Ana FITA¹, Adrián RODRÍGUEZ-BURRUEZO^{1*}

¹ COMAV Institute, Universitat Politècnica de València, Spain

² Cooperatives Agro-Alimentàries Comunitat Valenciana, Valencia, Spain

*Corresponding author, e-mail: adrodbur@doctor.upv.es

Introduction: Due to its Mediterranean location, the Comunitat Valenciana is one of the most ancient producer of olive oil in Spain. In fact, olive trees older than 1000 years have been reported in Northern Valencia. As a result, there is a plethora of local varieties, e.g.: *Farga*, *Morrut*, *Serrana*, *Espadán*, *Blanqueta*, *Villalonga*, *Alfafara*, *Callosina*, which provide specific quality profiles to extra virgin oils, in particular when used alone (monovarietal oils). However, there is a lack of comparative studies on their main quality factors.

Aims: An initiative to evaluate the quality of Valencian virgin extra olive oils is being conducted since 2020, involving PDO Aceite de la Comunitat Valenciana and a network of cooperatives coordinated by (Federation) Cooperatives Agro-Alimentàries de la Comunitat Valenciana.

Materials and Methods: 14 monovarietal extra virgin olive oils produced in September-November 2020 were sampled from different producers along the Region of Valencia. They were analysed immediately for fatty acid profile, content in total phenolics and main phenolics, and antioxidant capacity DPPH.

Results: Oleic acid was the main fatty acid, although their contribution to total fats ranged from 60% to 83% of *Rojal* and *Villalonga*, respectively. A similar trend was found in linoleic acid, ranging from 4.5% to 23% of *Morrut* and *Rojal*, respectively. A considerable variation was also found in total phenolics, ranging between 136 and 517 mg/kg of *Blanqueta* and *Villalonga*, respectively. Finally, the antioxidant capacity correlated to the content in phenolics.

Conclusion: Our findings confirm that there is a huge variation on the profile of fatty acids among monovarietal extra virgin olive oils produced in Valencia, and the variety is the main factor. And the same was found in terms of antioxidants.

Keywords: antioxidants, extra virgin oils, fatty acids, phenolics

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LIGAND BINDING OF HONEY BEE (*APIS MELLIFERA*) MAJOR ROYAL JELLY PROTEINS

Carmen Ioana MUREȘAN^{1*}, Ramona SUHAROSCHI¹, Oana L. POP¹ and Anja BUTTSTEDT²

¹ Faculty of Food Science, University of Agricultural Science and Veterinary Medicine, Romania

² Forestry and Agricultural Biotechnology Institute (FABI),

Department of Zoology and Entomology, University of Pretoria, South Africa

*Corresponding author, e-mail: carmen.muresan@usamvcluj.ro

Introduction: Royal jelly (RJ) is a secretion of the hypopharyngeal and mandibular glands of worker bees that take care of the brood in the hive. About 50% of the dry weight of RJ consist of proteins from which up to 90% are the major royal jelly proteins (MRJPs).

Aims: Protein stability in the presence of ligands is a topic of major interest for biotechnology, pharmaceutical and food industries, as well as being a priority for researchers studying proteins. The protein stability of MRJPs can be investigated by using differential scanning fluorimetry (DSF) which has the benefit of fast analysis of the stability changes and characterization of the effect of different environments (ligands, buffers) on their structure.

Materials and Methods: We tested the stability in the presence of different ligands (vitamins, neurotransmitters) for MRJP1 and MRJP2 purified from RJ by using DSF which allows measuring thermal unfolding of proteins by using a fluorescence dye (SYPRO® Orange). The fluorescence intensities (FI) of MRJPs at 2 μM concentration and SYPRO® Orange (1:1000 dilution) were measured using the Real-Time PCR System (FRET channel, excitation: 450-490 nm, detection: 560-580 nm). Further, the FI were plotted as a function of temperature and fitted with Origin 5.0 (Microcal Software Inc., Northampton, MA, USA) according to the Boltzmann equation to determine the melting temperature (T_m) at which the concentration of folded and unfolded protein is equal.

Results: The oligomeric form of MRJP1 exhibited increased starting fluorescence, therefore T_m values were only determined for the monomeric form of MRJP1 and for MRJP2. When binding to the protein, ligands stabilize the protein and determine an increase in melting temperature as proof of direct interaction.

Conclusion: The results show that DSF is an easy and fast method for checking MRJPs stability which requires a small amount of protein of interest and thus could be used for future biochemical assays, structural or ligand binding studies of MRJPs.

Keywords: apalbumin, differential scanning fluorimetry, MRJPs, ThermoFluor

THE EFFECT OF VEGETAL OILS ADDITION ON THE BIOACCESSIBILITY OF CAROTENOIDS FROM CHERRY TOMATOES

Cristina GHERASIM¹, Andrea BUNEA¹, Adela PINTEA^{1*}, Francisc DULF¹

¹ University of Agricultural Sciences and Veterinary Medicine, Department of Chemistry and Biochemistry, 3-5 Calea Mănăştur Street, Cluj-Napoca, Romania

*Corresponding author: apintea@usamvcluj.ro

Introduction: Numerous studies have demonstrated that a diet rich in carotenoids is associated with a low incidence of cardiovascular diseases, macular degeneration and cataract formation. However, their beneficial effects are limited by a low bioaccessibility, especially from raw/unprocessed food sources.

Aim: this study aimed to determine the possible increase in carotenoid bioaccessibility from tomatoes by adding cold pressed vegetal oils with different fatty acid profile and unsaturation degree.

Materials and methods: The simulated *in vitro* gastrointestinal digestion was performed using the INFOGEST protocol. Fresh vegetables samples, without and with vegetal oils, were subjected to an *in vitro* digestion protocol consisting of three phases, i.e. oral, gastric and small intestinal phases. The digesta was centrifuged and an aliquot of the micellar phase was mixed with a solvent, centrifuged, filtered and stored at -80°C . Total carotenoids were extracted from fresh tomato and from the digesta. In order to determine the bioaccessibility, all samples were analyzed by C30-HPLC-PDA. The quantification was done using external calibration with commercial standards.

Results: The main carotenoids identified in cherry tomatoes and corresponding digesta were lycopene, beta carotene and lutein. Three oils were used, in order to increase the bioaccessibility of carotenoids, namely olive oil, sunflower oil and flaxseed oil. The addition of the oils showed a significant increase on the bioaccessibility of beta-carotene, but there were not significant changes on the bioaccessibility of lutein and lycopene. The addition of olive oil showed the most significant effect, followed by sunflower oil and flaxseed oil.

Conclusions: Even though many vegetables are carotenoid-rich sources, the fraction that becomes accessible for absorption is low. The results presented in this study could be used to find solutions to increase the bioaccessibility of these useful compounds.

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INFLUENCE OF FRYING CONDITIONS ON ACRYLAMIDE LEVEL OF FRENCH FRIES

Mioara NEGOIȚĂ, Adriana Laura MIHAI*, Alina Cristina ADASCĂLULUI and Gabriela-Andreea HORNEȚ

National Research & Development Institute for Food Bioresources, IBA Bucharest, Romania

*Corresponding author, e-mail: mihai_laura21@yahoo.com

Introduction: By frying potatoes the chemical process contaminant acrylamide (AA) is formed, which is considered a potential carcinogen.

Aims: The aim of this study was to investigate the effect of frying conditions (temperature, duration) on AA level, fat content, fatty acids composition, color and texture parameters of French fries (FF).

Materials and Methods: Potatoes of Queen Anne variety were fried in palm oil by simulating the frying conditions of a fast-food restaurant, using a fryer, and temperature was set at 150, 170 and 190°C, respectively. For each temperature, three frying duration were used: 6, 8 and 11 min. The ratio between the amount of potatoes and the oil used and the size of the potato strips were the same, 1:4 (mass/mass) and 9 mm. The content of AA/fatty acids in FF was determined by GC-MS/MS – SRM mode and GC-MS – SIM mode, and the fat content was determined by the Soxhlet method. Konica Minolta spectrophotometer was used to measure the color, and the Instron 5944 analyzer was used for the texture analyses.

Results: As the frying time increased, from 6 to 11 min, the AA level varied between: 118.47- 232.05 µg/kg (150°C), 188.38- 684.37 µg/kg (170°C) and 192.36- 1114.41 µg/kg (190°C), respectively.

The increase in temperature (from 150°C to 190°C) and frying time (from 6 to 11 min) led to an increase in saturated and polyunsaturated fatty acids content in FF by 1.43% and 9.66%, respectively, and a decrease by 3.52% in the monounsaturated fatty acids. Correlations between the AA level and the color parameters (L^* , a^*) were found ($R = 0.88 - 0.99$). These correlations were higher as the temperature and frying time increased.

The texture of FF was also influenced by the frying conditions. The hardness of FF increased with increasing temperature and frying times, respectively.

Conclusion: The results showed that the AA level, as well as the fat content increased with increasing temperature and frying time.

Keywords: acrylamide, colour, fast-food, French fries, GC-MS/MS

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MONOFLORAL HONEYS AS A POTENTIAL SOURCE OF NATURAL ANTIOXIDANTS, MINERALS AND MEDICINE

Rodica MĂRGĂOAN^{1,*}, Erkan TOPAL², Ralitsa BALKANSKA³, Banu YÜCEL⁴, Titanilla ORAVECZ⁵, Mihaiela CORNEA-CIPCIGAN¹ and Dan Cristian VODNAR⁶

¹ Advanced Horticultural Research Institute of Transylvania, UASVM Cluj-Napoca, Romania;

² Apiculture Research Center, Aegean Agricultural Research Institute, İzmir, Turkey;

³ Department of Special Branches-Bees, Institute of Animal Science, Kostinbrod, Bulgaria;

⁴ Department of Animal Science, Faculty of Agriculture, Ege University, İzmir 35100, Turkey;

⁵ Marketing Department, Faculty of International Management and Business, Budapest, Hungary;

⁶ Department of Food Science, UASVM Cluj-Napoca, Romania

*Corresponding author, e-mail: rodica.margaoan@usamvcluj.ro

Introduction: Monofloral honey (MH) is obtained from the nectar of a single plant species and nowadays proving to be significantly compared to polyfloral honey. Additionally, to its high nutritional value, it also possesses antimicrobial, antioxidant, anti-inflammatory and anticancer effects.

Aims: This review aims to highlight the importance of integrating MH as a daily consumption product, due to its antioxidant activity altogether with the *in vitro* activities.

Results: The physicochemical composition of MH varies based on its botanical origin, region of production and applied processes. It was demonstrated that Serbian monofloral honeys are strongly correlated to the phenolic profiles, thus emphasizing their use as chemical markers to distinguish between MHs. Furthermore, the physicochemical properties are also used to distinguish honey types.

The phenolic acids and flavonoids are used as plant origin and honey quality indicators. The antioxidant and antibacterial properties are due to MHs (acacia, manuka, hovenia, pine, tualang and forest honeys) high concentrations of phenolic acids, flavonoids and carotenoids. Acacia, Clover and Gelam honeys have the potential to control obesity by reducing excess weight gain. Thyme and acacia honeys can reduce the visibility of prostate and endometrial cancer cell lines, whereas manuka inhibited the cell proliferation in MCF-7 and CT26 cell lines.

Conclusion: MHs present a variety of dietary phytochemical compounds with functional properties such as phenolic compounds and minerals. They have the potential to be used as natural and functional ingredients with special attention to their use in the medical field.

Keywords: antioxidant activity, health effects, minerals, monofloral honey, phenolic compounds

CHANGES IN THE BEHAVIOR OF VEGETABLE CONSUMERS IN BUCHAREST AND THE NEIGHBORING AREAS CAUSED BY THE COVID-19 CRISIS

Petruța TUREK-RAHOVEANU¹, Ancuța MARIN^{1*} and Rozi BEREVOIANU¹

¹ *Research Institute for Agricultural Economy and Rural Development, Bucharest, Romania*

*Corresponding author, e-mail: marin.ancuta@iceadr.ro

Introduction: As is well known, the horticultural sector is of strategic importance to agriculture and consumers, generating direct and indirect employment in many regions of the European continent. Romania ranks third in the hierarchy of vegetable growing countries in Europe, producing 3.2% of the total amount of vegetables produced in the European Union, on an area that represents 9% of the total vegetable areas in the EU.

Aims: This study focuses on the determinants of the decision to buy fresh and canned vegetables and on the satisfaction of buyers on these purchases.

Materials and Methods: The quantitative survey was used to collect information, and the investigation technique was used as an investigation technique, structured in the form of an opinion poll. The opinion poll applied is a questionnaire-based survey that provided information on the situation of vegetable consumers and the change in consumption behaviour caused by the COVID -19 health crisis.

Results: According to the data provided by NIS, the average annual consumption of vegetables per capita in our country has varied, in the last 10 years, between 75.5 kg/person/year and 96.9 kg/person /year. According to the WHO, the recommended consumption of vegetables is 400 grams per day per person, respectively 140 kg per year. Compared to this average, in Romania, the average consumption was 142.5 grams per day per person, respectively 54 kg per year. It results that in Romania, the average annual consumption is 61.43% of the WHO recommendations. Most respondents prefer the classic option of buying (directly from the market), buying between 1-3 kg per purchase. If taste and provenance were the basic criteria in the purchase of vegetables in previous years, the economic crisis caused by the health crisis COVID-19 brought the price in the first place due to the decrease of buyers' incomes or other financial problems. The triggering of the state of emergency brought with it behavioural changes among both producers and consumers. However, the need for consumption/family did not suffer, and the quantities purchased being comparable to those of previous years, buyers turning to vegetables with a low degree of perishability.

Conclusion: The study provides results on consumers' selection criteria (variety, taste, price, origin) and their hierarchical changes during the COVID-19 health crisis.

Keywords: consumer behaviour, vegetables, Covid -19, Romania

METABOLIC FOOD WASTE – CAUSES AND PREVENTION

Emanuela Diana GHERMAN^{1*} and Ioana Mihaela BĂLAN¹

¹ Faculty of Management and Roural Tourism, Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania", Timișoara, Romania

*Corresponding author, e-mail: ema.gherman@usab-tm.ro

Introduction: Metabolic Food Waste (MFW) was first described in 2016 by the researchers Serafini and Toti as "the waste of resources and the unnecessary ecological cost due to an excessive consumption of foods leading to obesity". The term represents an indicator for the amount of food that is consumed above the nutritional requirements, leading to weight gain as excess body fat and the impact of overconsumption on the environment, as carbon, water and land footprint (Serafini and Toti, 2016).

Aims: Extensive measures are taken worldwide to prevent and reduce food waste along distribution chains, but the exact causes of metabolic food waste are unknown, and there are no methods to prevent it. We need to identify the causes and potential methods to prevent and reduce metabolic food waste while increasing consumer awareness of unsustainable diets and the health risks of overconsumption and shifting the trend toward more environmentally conscious consumption patterns (Balan, 2020) in order to achieve a global state of food security.

Materials and Methods: The study is based on an analysis of external data available on food waste, nutrient requirements, the environmental impact of food waste and consumer behaviour.

Results: The primary causes identified for metabolic food waste are the lack of nutritional education amongst all categories of consumers, a poor understanding of nutrient requirements leading to adopting high fat – high sugar diets, (Smil, 2004) lack of access to appropriate food resources or reduced availability of fresh produce.

Conclusion: To counter the negative impacts of metabolic food waste on both the environment and human health, decisive action is needed to raise consumer awareness of healthy and sustainable diets, coupled with a shift in wealth distribution to improve developing countries access to nutritious food to achieve the 2030 targets of the United Nations' SDGs.

Keywords: diet, food security, metabolic food waste, nutrition, overconsumption

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INFLUENCE OF pH ON STABILITY OF ANTHOCYANINS PIGMENTS FROM *AMELANCHIER LAMARKII* JUNE BERRIES

Adela DAESCU¹, Madalina NISTOR¹, Dumitrita RUGINA¹ and Adela PINTEA^{1*}

¹ University of Agricultural Sciences and Veterinary Medicine, Department of Chemistry and Biochemistry, Cluj-Napoca, Romania

*Corresponding author, e-mail: apintea@usamvcluj.ro

Introduction. Anthocyanins are water-soluble pigments responsible for red, purple and blue colour in fruits and vegetables. Due to their intense and eye-catching hues have been traditionally used as natural pigments in food products. Unfortunately, the food applications of anthocyanins-rich products are limited by their stability at various pHs. *Amelanchier lamarkii* juneberries are a great source of anthocyanins, understudied in scientific literature.

Aims. Our aim was to identify each anthocyanin from fresh juneberries and evaluate their individual stability at different pH solutions.

Materials and Methods. The extraction procedure was realized with methanol (0.03% HCl). Samples were exposed to various pH buffers (1, 5, 8) at different times (0, 1, 4, 24h). Then, the anthocyanins identification was done by liquid chromatography with diode array detection coupled with mass spectrometry LC-ESI-MS.

Results: Three anthocyanins were identified in the juneberries extract: cyanidin-3-galactoside, cyanidin-3-arabinoside and cyanidin. The major anthocyanin identified was cyanidin-3-galactoside, with molecular ion identified at m/z 449. Each anthocyanin reacted differently to the pH changes in the environment. The exposure of the less stable anthocyanin, cyanidin, to pH 1, 5, 8 led to a reduction of the concentration detected by HPLC analysis. Regarding the cyanidin-3-galactoside, only pH 8 (4, 24h) affected its concentration. No relevant modifications were observed for cyanidin-3-arabinoside.

Conclusions: Considering the importance of anthocyanins regarding the beneficial health effects and their pH stability relevance for their utilization in food products, the results obtained in the present study could be useful for nutraceutical and food industries.

Keywords: anthocyanins, juneberry, pH stability

Acknowledgement: The work of Adela Maria Daescu was supported by the European Social Found, Human Capital Operational Programme 2014-2020, project no. POCU/380/6/13/125171. This research was funded by the Romanian National Authority for Scientific Research, CNDI– UEFISCDI, project number PN-III-P1-1.1-TE-2019-1276.

STUDY ON THE RECOVERY OF BIOACTIVE COMPOUNDS FROM VEGETABLE WASTE AND BY-PRODUCTS IN THE FORM OF A NEW FUNCTIONAL MEDICINAL WATER-BASED DRINK

Andrei BORSA^{1*}, Anca Corina FARCAS², Sonia Ancuța SOCACI², Mădălina Lorena Medeleanu² and Mircea Valentin MUNTEAN³

¹ Faculty of Food Science and Technologies, Department of Food Engineering, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.

² Faculty of Food Science and Technologies, Department of Food Science, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.

³ Faculty of Agriculture, Department of Technical Sciences and Soil Sciences, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: andrei.borsa@usamvcluj.ro

Introduction: More and more people have an unbalanced diet that generates deficiencies over time. Shortage of magnesium and iron is a frequent disorder that indirectly provokes many side effects common to other diseases, without people knowing the cause. In recent studies, new alternative treatments with functional drinks have been tested in order to correct these imbalances. The use of vegetable waste gives an innovative approach as it globally represents most of the losses suffered by industrialized countries.

Aims: This paper aims to present the traceability of some bioactive compounds in the whole production stages in the local small juice industry and identify a practical approach in order to harness the vegetable waste and by-products that are usually thrown away by developing an innovative functional beverage based on medicinal water.

Materials and Methods: The bioactive compounds from some of the most common vegetable residues were identified using modern methods and characterized to reveal their traceability from fruit to juice and waste.

Results: Analyses of the bioactive compounds show that just a fraction of the total polyphenols are transferred to juices, while some remain in the waste and by-products, showing a good untapped valorization potential. The combined use of Vâlcele medicinal water, rich in Fe and Mg, and vegetable residues in the functional drink worked synergistically. The added vegetable substrate was able to cover the slightly unpleasant mineral water taste and generate a high fiber content, allowing the drink to target people affected by irritable bowel syndrome and people with magnesium and iron deficit.

Conclusion: In the present paper, we have highlighted the bioactive potential of vegetable waste, and we have identified a practical method of valorization through a functional medicinal water based-drink following the principle of a circular economy.

Keywords: bioactive compounds, drink, vegetable waste

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THE ANALYSIS OF THERMALLY PROCESSED VEGETABLE OIL AND ITS APPLICATIONS IN BIOTECHNOLOGICAL PROCESSES

Laura MITREA¹, Alexandru RUSU², Francisc-Vasile DULF³ and Dan-Cristian VODNAR^{1*}

¹ Faculty of Food Science and Technology, Life Science Institute, University of Agricultural Sciences and Veterinary Medicine, Cluj Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania;

² CENCIRA Agrofood Research and Innovation Centre, 6/66 Ion Mester Street, 400650 Cluj-Napoca, Romania;

³ Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania;

* Corresponding author, e-mail: dan.vodnar@usamvcluj.ro

Introduction: The population increase causes the generation of massive amounts of wastes from different sources, and an example in this way is given by the lipids generated from the food sector, like the used cooking oil. Processed oil represents a sort of residual biomass that can be valorized while diminishing environmental issues.

Aims: The present work investigates the physicochemical properties of the oils derived from food processing to establish their potential as a carbon source for biotechnological approaches.

Materials and methods: The experiments consisted of waste oil analysis of different origins in terms of fatty acids profile, rheology, pH, density, and colour. Used cooking oil was obtained by heating the samples for 30 min at 180°C. The processed oils were analyzed in triplicates in parallel with the crude ones.

Results: The results obtained within this experiment showed different physical and chemical profiles between processed and unprocessed oils. All the investigated oils modified their colour after 30 min of heating at 180°C.

Conclusion: Waste oils derived from the food sector present different physico-chemical characteristics from the unprocessed ones. These could represent a valuable carbon source for different biotechnological purposes; for example, these might be integrated into fermentation as the main nutrient for lipophilic microorganisms.

Keywords: processed vegetable oils, physical characterization, chemical characterization.

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CHOKEBERRY POMACE AND RED BEETROOT POWDER VALORIZATION INTO CONFECTIONARY FOOD PRODUCTS

Anamaria POP^{1*}, Adriana PĂUCEAN¹, Simona MAN¹, Simona CHIS², Liana
SALANȚĂ² Anca FĂRCAȘ and Sevastița MUSTE¹

¹ Department of Food Engineering, ² Department of Food Science, University of Agricultural Sciences
and Veterinary Medicine, 3-5 Manastur St., 400372, Cluj-Napoca, Romania;

*Corresponding author, e-mail: anamaria.pop@usamvcluj.ro

Introduction: *Aronia melanocarpa* L. (also known as aronia or chokeberry) has attracted a great interest due to its unique composition of bioactive compounds which ensures multiple health-promoting properties. The measurement of ability to scavenge DPPH revealed notable variation between antioxidant activities (all expressed as radical equivalents per μM Trolox/100 g DW) of aronia fresh fruit (279.38), aronia juice (127.45) and aronia pomace (301.89) (Jurendic, T., 2021).

Aims: The present study compares the impact of chokeberry pomace and beetroot powder by substitution almond powder in Macarons products in terms of sensory and bioactive compounds.

Materials and Methods: Process optimization consists in the reformulation of Macarons by substituting almond flour with chokeberry pomace powder in a percentage of 30% and 45%, and red beetroot powder in a percentage of 35% and 45%. Product characterization consists in sensory and physico-chemical aspects by determining the moisture content, ash content, total polyphenol content (TP) by Folin Ciocalteu (mg GAE/100 g DM.) Antioxidant capacity was determined by DPPH (1,1-diphenyl-2-picrylhydrazyl) radical method. Sensory Analysis was performed by 9 points hedonic scale.

Results: TP content varies from 168.14 to 192.58 (mg GAE/100 g DM.) for samples with added powdered beet in a percentage of 30 and 45% respectively and between 290.33 and 443.81 (mg GAE/100 g DM.) for the intake of pomace chokeberry powder.

Conclusion: Due to its low cost and reach in bioactive compounds, the sensorial results of the present study demonstrated that 35% aronia pomace powder could be added in Macarons manufacturing without affecting the products aftertaste, offering promising healthy alternative to consumers.

Keywords: aronia, beetroot, by-product, chokeberry pomace, powder

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GENETICS OF XANTHAN GUM BIOSYNTHESIS

Alexandru Vasile RUSU*

Life Science Institute, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca,
Romania

*Corresponding author, e-mail: rusu_alexandru@hotmail.com

Introduction: Xanthan gum is an extracellular exopolysaccharide polysaccharide secreted by the plant-pathogenic gram-negative bacterium *Xanthomonas campestris* pv. *campestris* (Xcc) and related species, by biotechnological processes. The biosynthetic pathway of xanthan production involves several steps. Many important industrial applications of xanthan can be mentioned such as food and beverage, nutraceuticals, cosmeceuticals, pharma, etc.

Aims: This article outlines aspects of the genetic loci involved in xanthan gum biosynthesis.

Results: Genes *xanA* and *xanB* are the two important genes for xanthan gum biosynthesis. *xanA* encodes for an enzyme with phosphoglucosyltransferase and Phosphomannomutase activity. The gene product from *xanB* is a bifunctional enzyme with Phosphomannose isomerase and GDP-mannose phosphorylase activity. The enzymes required for further xanthan synthesis are encoded in a 16 kb gene cluster in the Xcc genome. This so-called *gum* gene cluster contains twelve open reading frames (*gumB* to *gumM*). The enzymes for the synthesis of GDP-mannose, UDP-glucose and dTDP-rhamnose located in a 35.3 kb gene cluster. The genes encoding the proteins of xanthan biosynthesis are located in the *gum* gene cluster which encompasses a 14 kb region. 12 genes of the *gum* gene cluster whose products are involved in the biosynthesis, can be found both in glycosyltransferases and in modifying enzymes as well as enzymes that are responsible for the polymerization and the transport of xanthan gum.

Keywords: biosynthesis, xanthan gum, gum gene cluster

Acknowledgement: The work was supported by a grant from the Romanian National Authority for Scientific Research and Innovation, CNCS—UEFISCDI, project number PN-III-P2-2.1-PED-2019-1723 within PNCDI III.

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ANTIOXIDANT EFFECT OF *CAPPARIS SPINOSA* EXTRACT ON THE STABILITY OF SOYBEAN OIL

Muhammad FAROOQ^{1*}, Elham AZADFAR², Monica TRIF^{3*}, Alexandru RUSU⁴, Mahnia SHARIFI⁵, Zohreh BAHRAM⁵, Naila ILYAS⁶ and Yunyang WANG^{1*}

¹ College of Food Science and Engineering, Northwest A&F University, Yangling, Shaanxi, PR China

² Young Researchers, and Elites Club, Sabzevar Branch, Islamic Azad University, Sabzevar, Iran

³ Centre for Innovative Process Engineering (CENTIV) GmbH, Stuhr, Germany

⁴ Life Science Institute, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

⁵ Department of Food Chemistry, Sabzevar Branch, Islamic Azad University, Sabzevar, Iran

⁶ Graduate School of Chinese Academy of Agricultural Sciences, Beijing, China

*Corresponding author, e-mail: farooq.fst28@gmail.com, monica_trif@hotmail.com, wyy10421@163.com

Introduction: There are several ways to prevent the oxidation of edible oils. Addition of synthetic or natural antioxidants is the most common one. As synthetic antioxidants have adverse effects such as mutagenicity and carcinogenicity in the human body, research on natural antioxidant to replace synthetic ones for different applications is ongoing.

Aims: In this study, the antioxidant activity of an ethanolic extract of *Capparis spinosa* L. has been tested on the oxidative stability of soybean oil.

Materials and Methods: The extraction of *Capparis spinosa* antioxidants has been done by ultrasound method with ethanol. Evaluation of antioxidant activity was measured by examining free radical scavenging activity.

Results: The results shown that with increasing the concentration of *Capparis spinosa* extract in soybean oil, the free radical scavenging activity is significantly increased. A statistically significant difference between the control, BHT (synthetic antioxidant) and samples containing *Capparis spinosa* extract has been determined.

Conclusion: The results of oxidative stability of oil containing different concentrations of *Capparis spinosa* extract showed that the extract concentration of 1600 ppm is reducing the TBA index and increasing the oxidative stability index of oil compared to other extract concentrations and BHT.

Keywords: *Capparis spinosa*, natural antioxidant, oxidation, soybean oil, stability

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CAYENNE PEPPER AND LYCIUM BARBARUM (GOJI) SWEET CHILI JAM PROCESSING - QUALITY EVALUATION

Anamaria POP¹*, Adriana PĂUCEAN¹, Simona MAN¹, Simona CHIS¹, Liana SALANȚĂ² Anca FĂRCAȘ² and Sevastița MUSTE¹

¹ Department of Food Engineering, ² Department of Food Science, University of Agricultural Sciences and Veterinary Medicine, 3-5 Manastur St., 400372, Cluj-Napoca, Romania;

*Corresponding author, e-mail: anamaria.pop@usamvcluj.ro

Introduction: According to statistics, jams have steadily increased in recent years, leading to the development of new innovative products. Many goji products are sold on the health food market, in particular, through the Internet market, praised for well-being and longevity, and they are usually very expensive. (Donno, D., 2015)

Aims: The purpose of this paper was to study the valorization of goji berries and red hot peppers in obtaining a new assortment of hot sweet pepper jam.

Materials and Methods: Process optimization consists in the reformulation of *Lycium barbarum* (Goji) and hot pepper jam processing. Product characterization consists in sensory and physico-chemical aspects by determining the moisture content, ash content, total polyphenol content (TP) by Folin Ciocalteu (mg GAE/100 g DM.) Antioxidant capacity was determined by DPPH (1,1-diphenyl-2-picrylhydrazyl) radical method. Sensory Analysis was performed by 9 points hedonic scale.

Results: In accordance with the proposed objectives, three experimental variants of hot pepper jam were obtained, at the laboratory level, as follows: J1-0% Goji - Blank; J2 - 10% ground Goji berries; V3 10% whole hydrated Goji berries and 0.08 citric acid for each variant. The jam presented the following characteristic: pH 3.6-3.7; soluble solids content of 60,5-65,2 °Brix;

Conclusion: In the sensory analysis, the hedonic test in 9 points highlighted the preferences of the study participants, variant V3, being the best rated variant in terms of perception of quality indices: colour, appearance, smell, aroma, taste and general appreciation. This study can be used as a reference to obtain red pepper jam enriched with goji, helping to add value to this relevant food commodity.

Keywords: antioxidants; *Cayenne pepper* goji, Jam, *Lycium barbarum*,

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PROTEINS RELATED TO THE BIOSYNTHESIS OF XANTHAN GUM

Alexandru Vasile RUSU*

Life Science Institute, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca,
Romania

*Corresponding author, e-mail: rusu_alexandru@hotmail.com

Introduction: *Xanthomonas campestris* pv. *campestris* (Xcc) is used industrially for the production of the exopolysaccharide xanthan, that is used in the food industry as a thickener. The biosynthetic pathway of xanthan production involves several proteins.

Aims: This article outlines aspects of the proteins involved in xanthan gum biosynthesis. Genes that are responsible for xanthan gum biosynthesis are of particular importance. Two gene regions could be identified which had a growth phase-specific transcription profile. One of the two gene regions mainly contains genes of ribosomal proteins and showed an induction in the exponential and a repression in the stationary growth phase.

Results: The genes (*gumB* to *gumM*) lie together on a 16 kb gene cluster in the Xcc genome and encode for enzymes of the biosynthesis of the pentasaccharide basic unit, modification, export and polymerization of xanthan gum. The genes are organized in an operon, which has a promoter in front of *gumB* and an additional promoter in front of *gumK*. The protein *gumF* acetylates the middle mannose building block and *gumG* the terminal mannose building block. In a subsequent reaction, Fru 1-P is converted into fructose-1,6- by the protein FruK bisphosphate (FruP2) phosphorylated.

Another interesting cluster is cluster O. With six genes, it is the smallest of the 15 gene clusters. It contains genes that show very strong repression in phase 2. Three genes in this cluster, *cysI*, *cysD* and *metL*, code for proteins of the amino acid synthesis of cysteine or methionine.

Keywords: biosynthesis, protein, xanthan gum

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FOAM-MAT DRYING OF ONION PASTE: STUDYING THE EFFECT OF DIFFERENT PARAMETERS ON POWDER QUALITY

Muhammad FAROOQ^{1*}, Javed M. IQBAL², Monica TRIF^{3*}, Rizwan SHUKAT², Alexandru RUSU⁴, Naila ILYAS⁵ and Yunyang WANG^{1*}

¹ College of Food Science and Engineering, Northwest A&F University, Yangling, Shaanxi, PR China

² National Institute of Food Science and Technology, University of Agriculture Faisalabad, Pakistan

³ Centre for Innovative Process Engineering (CENTIV) GmbH, Stuhr, Germany

⁴ Life Science Institute, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

⁵ Graduate School of Chinese Academy of Agricultural Sciences, Beijing, China

*Corresponding author, e-mail: farooq.fst28@gmail.com, monica_trif@hotmail.com, wyy10421@163.com

Introduction: Most of agricultural products are very susceptible to spoilage which results into many nutritional and sensory changes in foods. Spoilage causes many changes in composition, flavor and texture of food which become unacceptable for consumption. Drying is a very common and old process for the preservation of food products and extends shelf life.

Aims: The study aimed to develop onion foam-mat drying powders and to study the different quality parameters of these powders.

Materials and Methods: Moisture content, pH, acidity, water solubility index (WSI), water absorption index (WAI), total soluble solids, foam expansion, foam stability, and color values of dried onion powders were all studied in relation to different concentrations of foaming agent and drying temperature.

Results: Onion powder was developed using foam mat drying technique with different concentrations of egg albumin as a foaming agent and carboxyl methylcellulose as a foam stabilizer, and then dried in a hot air tray drier at different temperatures with 3mm onion foam sheet thickness.

Conclusion: Onion powders developed by foam-mat drying process are very stable against spoilage. Moreover, this method of drying reduced the quality changes due to temperature effects.

Keywords: foam-mat, onion, quality, powder

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SESSION 4 HORTICULTURE AND FORESTRY

EFFECT OF PRE-HARVEST APPLICATION OF SA, K_2SiO_3 , AND $CaCl_2$, ON STORABILITY AND QUALITY ATTRIBUTES OF “ARRA18” TABLE GRAPE CULTIVAR

Adel. M. R. A. ABDELAZIZ¹, Samar A.M.A. SHAARAWI^{2*}.and Wael. M. BRAHIM¹

¹ Central Lab. of Organic Agriculture, Agricultural Research Center (ARC), Giza, Egypt.

² Fruit Handling Research Department, Horticulture Research Institute, ARC, Giza, Egypt.

*Corresponding Author, e-mail: sshaarawi@hotmail.com

Introduction: Grapes is one of the most important horticultural crops in Egypt. The "ARRA 18" table grape variety is one of the ARRA group varieties that have been recently introduced to Egypt. Growth pattern, nutritional requirements and storage behavior were studied under the Egyptian conditions. Pre-harvest application of potassium silicate, calcium chloride and salicylic acid as spraying treatments is a promising strategy for the management of fruit quality and exhibits a high potential in controlling post-harvest losses of horticultural crops (Asghari and Aghdam 2010; Mohamed et al. 2017).

The Aim: This study was conducted to investigate the storability of “ARA18” cultivar after some pre-harvest treatments that were applied during the growing season.

Materials and Methods: The current research was conducted during two consecutive seasons (2019-2020) on grapevine trees grown in a private farm at el Sadat City-Desert road, Egypt. Treatments were applied as foliar sprays at three different stages during the growing season before harvest. ‘ARRA18’ trees were sprayed with potassium silicate (K_2SiO_3), salicylic acid (SA), and calcium chloride ($CaCl_2$), while untreated vine trees sprayed with water served as control. Mature clusters were harvested, then placed in carton containers and stored in cold storage at $0\pm1^\circ C$ to study the storability of ‘ARRA18’. Records of physical and chemical quality parameters were taken at 7-day intervals.

Results: All treatments reduced weight loss, berry softening and decay incidence comparing to control under storage conditions. Potassium silicate (K_2SiO_3) generally showed the highest significant effect compared to other treatments and control.

Conclusion: Overall quality parameters were markedly maintained by all treatments compared to control. The use of (K_2SiO_3) at both applied concentrations significantly proved to be the most effective treatment in keeping the overall quality of stored grapes.

Key words: ARRA18, $CaCl_2$, cold storage, potassium silicate, salicylic acid.

FRUIT QUALITY OF SOME HOT PEPPERS CULTIVARS FROM VEGATABLE RESEARCH DEVELOPMENT STATION BUZAU

Ovidia Loredana AGAPIE^{1*}, Costel VÎNĂTORU¹, Andreea STAN³, Mihai FRÎNCU³,
Elena BARCANU-TUDOR¹, Florin STĂNICĂ²

¹*Vegetable Research and Development Station Buzău, Romania*

²*University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

³*Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic
Sciences and Veterinary Medicine of Bucharest, Romania*

*Corresponding author email: dobre.ovidia@yahoo.com

Introduction: Native from the America, hot pepper is a Solanaceous fruit belonging to the genus *Capsicum* that comprise thirty-five species. Peppers are one of the most important vegetables crops in the word due to their innovative and versatile uses (Lagunovschi et al., 2016).

Aims: The aim of this research was to evaluate 10 *Capsicum* cultivars from the Vegetable Research and Development Station Buzau (VRDS), in terms of fruit quality traits and yield, in order to future breeding program.

Materials and Methods: Ten cultivars of hot peppers bred at Vegetable Research and Development Station Buzau were collected and fruit quality (dry matter content, fruit firmness, the soluble solids, titratable acidity and ascorbic acid content) was evaluated at different ripening stages (unripe and ripe fruit).

Results: A very highly significant difference ($p < 0.01$) was found for the studied quantitative parameters, showing a great variability among the studied accessions. The dry matter content (%) in hot peppers followed an upward trend during ripening. During ripening, the firmness, the TSS content and the titratable acidity increase for all studied cultivars and there were significant differences between them. A broad range of variation for Vitamin C content in both stage of maturity was found in the study.

Conclusion: In the present research work, a great variability among the studied accessions was found. Fully ripe fruits were found considerably richer than unripe fruits in the studied bioactive factor. The Roial variety has a high content in vitamin C, regarding daily nutritional recommendation, 100 g of fresh unripe fruit will provide more than 100% the necessary of ascorbic acid. Due to the low content in dry matter and total soluble solids, the accession A12A can be recommended for chili powder. The present data are also important in providing information on the composition of pepper fruits during ripening to decide the proper harvesting time according to direction of use.

Keywords: ascorbic acid, bioactive compounds, biodiversity, *Capsicum spp.*, dry matter

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SOMATIC HYBRIDIZATION, AN OLD TECHNIQUE USED FOR GAINING NEW PHENOTYPES IN POTATO CULTIVARS

Adriana AURORI^{1,2*}, Enikő LÖRINCZ-BESENYEI², Imola MOLNAR², Elena RAKOSY-TICAN²

¹Advanced Horticultural Research Institute of Transylvania, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

²Plant Genetic Engineering Group, Babes-Bolyai University, Romania

*Corresponding author, e-mail: adriana.aurori@usamvcluj.ro

Introduction: It is expected that until 2050 the potato productivity to increase with over 50% in the context of reducing the pesticide use. This would be possible only by using cultivars with an integrated resistance to pests and pathogens. Somatic hybridization between potato and the wild relatives can be one of the best solutions for achieving the stable introgression of resistance genes, including those determining polygenic traits, creating the potential for gaining multiple resistances in the same cultivar in one hybridization step.

Aims: The goal of this study was to increase the genetic variability of potato by transferring genes from one of the wild relatives, *S. chacoense* (Rakosy-Tican et al., 2019).

Materials and Methods: Somatic hybridization was performed between *S. tuberosum* and *S. chacoense*, having a DNA Mismatch Repair system deficiency, by mesophyll protoplast electrofusion.

Results: Over 100 of hybrid lines were obtained. They were characterized genetically, by SSR, to determine the hybrid nature and phenotypically, for the presence of new traits. The resistance to Colorado potato beetle was successfully transferred from *S. chacoense* to the SHs and BC1 progeny (Molnar et al., 2017). Moreover, new traits were encountered, the tolerance to drought and salinity being of more importance (Molnar et al, 2021).

Conclusion: In the present study, we demonstrated that somatic hybridization combined with MMR deficiency can contribute additively for increasing the potato genetic pool.

Acknowledgements: This study was performed at the Plant Genetic Engineering Group, Babeş-Bolyai University, Romania

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**BIOLOGICAL CONTROL USING MICROORGANISMS
LECANICILLIUM LECANII, *METARHIZIUM ANISOPLIAE* AND
BEAUVERIA BASSIANA AGAINST *TUTA ABSOLUTA* (MEYRICK)**

**Elena BARCANU*, Ovidia AGAPIE, Ion GHERASE, Bianca TĂNASE,
Costel VÎNĂTORU**

Vegetable Research-Development Station Buzau, Romania

*Corresponding author, e-mail: barcanuelena@yahoo.com

Introduction: *Tuta absoluta* (Meyerick) also known as tomato leaf miner or tomato pinworm is a serious pest of tomato crop with larvae causing even 100% loss, if not effectively controlled. Native from South America currently it can be found throughout Europe, Africa and parts of Asia. In Romania was reported for first time in 2009 (Leaotă, 2009). In this research we tested the efficiency of entomopathogenic fungi on tomato leaf miner larvae.

Aims: Due to serious damage of *T. absoluta* on tomato crop and the low efficiency of chemical pesticides, we were looking to find an eco-friendly management in order to balance the violent attack.

Materials and Methods: In this study, 12 concentrations of *Lecanicillium lecanii*, *Metarhizium anisopliae* and *Beauveria bassiana* were prepared and tested on *T. absoluta* larvae to study the impact of entomopathogenic fungi on larvae mortality, under laboratory conditions.

Results: From 12 different concentrations of *Lecanicillium lecanii*, *Metarhizium anisopliae* and *Beauveria bassiana* only four of them had a mortality rate of over 50% on *T. absoluta* larvae. The higher concentration had the highest mortality rate. Research shows that microorganisms are effective, but at very high concentrations, leading to a higher cost of production. In these conditions, we could recommend either to increase the colony forming units in the commercial products, either to enrich the crop area with beneficial microfauna before establish the crop.

Conclusion: In the present research work, we demonstrated that the higher concentration of entomopathogenic fungi, the higher mortality rate will be. Also, the present study might be useful in developing future integrated management strategies for tomato leaf miner.

Keywords: biopesticides, entomopathogenic fungi, tomato leaf miner

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MOLECULAR SCREENING OF SOME APPLE PROGENIES FOR DETECTION *Vf* GENE USING MARKER ASSISTED SELECTION

Georgeta BIVOLARIU (GUZU)^{1*}, Ioan ZAGRAI¹, Luminița ZAGRAI¹,
Mirela Irina CORDEA^{2*}, Claudiu MOLDOVAN¹

¹Fruit Research & Development Station Bistrița, Romania

²Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

*Corresponding authors email: georgeta.guzu13@gmail.com; mcordea@usamvcluj.ro

Introduction: The apple species has many diseases that cause significant economic losses. Apple scab, caused by *Venturia inaequalis* is one of the most damaging pathogens that affects apple species (Jha *et al.*, 2009). Currently, apple scab is mainly controlled by the application of fungicides, but there are in progress many breeding programs aimed the obtaining progenies resistant to scab. Marker Assisted Selection (MAS) can be particularly useful in early selection of hybrids, which simplifies and significantly reduces costs (Winter and Kahl, 1995). Therefore, is using become more and more attractive.

Aims: The using MAS to identify the *Vf* resistance gene in a population of progenies resulting from the crossing of the genitors Auriu de Bistrița x Florina.

Materials and Methods: Cross combinations were made between Auriu de Bistrița cv. - a valuable local variety in terms of fruit quality but tolerant to scab, and Florina cv. used as a donor of *Vf* resistance. To confirm the presence of the *Vf* gene that confers resistance to scab, the progenies were tested by using two dominant primers pairs (AM19, U1₄₀₀), and another one codominant (AL07) used to distinguish homozygous and heterozygous genotypes.

Results: As expected, following the PCR results tests of the progenies derived from crossing between Auriu de Bistrița x Florina, a Mendelian segregation as a dominant trait was obtained. Thus, 50% of the progeny received the *Vf* gene and were considered resistant. The remaining 50% were homozygous recessive with the *vf* gene. Based on the results, Mendelian segregation was confirmed.

Conclusion: Marker Assisted Selection has confirmed to be an effective tool to identify from the early phase of seedlings the presence or absence of the *Vf* resistance.

Keywords: apple, progenies, marker, scab, *Vf* gene

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ICP-MS MEASUREMENTS OF LEAD AND STRONTIUM ISOTOPIC RATIOS SIGNATURES FROM ROMANIAN WINE

Florin Dumitru BORA^{1*}, Anamaria CĂLUGĂR², Claudiu Ioan BUNEA^{2*}, Vasile Răzvan FILIMON³, Gabriel TABARANU¹, Floricel Maricel DIMA⁴

¹ Research- Development Station for Viticulture and Enology Bujoru, 65 Eremia Grigorescu Str.,
Tîrgu Bujor, Galați, 805200, Romania

² University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Mănăştur Street,
Cluj-Napoca, Cluj, 400372, Romania

³ Research- Development Station for Viticulture and Enology Iași, 46 Alea Mihail Sadoveanu Str.,
Iași, 700489, Romania

⁴ Research-Development Institute for Aquatic Ecology, Fisheries and Aquaculture Galați, 54 Portului
Str., Galați, 800032, Romania

* Corresponding author, e-mail: claus_bunea@yahoo.com

Introduction: To establish the geographical origin of wines is a major concern issue for many countries around the world, in order to protect quality products in the case of false statements regarding their geographical origin.

Aims: The objective of this study is to determine the Pb, Sr concentration and $^{206}\text{Pb}/^{204}\text{Pb}$, $^{206}\text{Pb}/^{207}\text{Pb}$, $^{206}\text{Pb}/^{208}\text{Pb}$, $^{87}\text{Sr}/^{86}\text{Sr}$ from several Romanian winemaking regions, to highlight credible geographical markers of wine origin.

Materials and Methods: The Pb, Sr concentration and the ratios of Pb and Sr were determined using ICP-MS. Wine samples were obtained under microvinification conditions and was represented by native and international varieties of vine.

Results: A significant differences can be observed between the values recoded by Pb in wines obtained from varieties grown in Dealu Mare Valea Călugărească wine center (43.24 $\mu\text{g/L}$), Nicorești (39.15 $\mu\text{g/L}$) and Dealu Bujorului (33.12 $\mu\text{g/L}$), Panciu (35.66 $\mu\text{g/L}$). The content of Sr found in our study had a relatively wide range from 142.78 $\mu\text{g/L}$ to 936.12 $\mu\text{g/L}$. Regarding $^{206}\text{Pb}/^{207}\text{Pb}$ isotope rations, the vines grown in the Dealu Bujorului vineyard and Valea Călugărească vineyard, the values of the isotopic ratio of these varieties of vine shows traces of atmospheric pollution with lead on the vine.

Conclusion: The isotopic values of the vine cultivated in Greaca vineyard show traces of petrol, gasoline, combustion. Combining the $^{206}\text{Pb}/^{204}\text{Pb}$, $^{206}\text{Pb}/^{207}\text{Pb}$, $^{208}\text{Pb}/^{206}\text{Pb}$, and $^{87}\text{Sr}/^{86}\text{Sr}$ isotopic ratio may carry out a separation on the vineyards and wine-growing centers, and also a separation of the wine samples was possible.

Keywords: ICP-MS; Pb isotopes; Sr isotope; wine geographical origin

ECONOMIC ANALYSIS OF MEDICAL CANNABIS GREENHOUSE PRODUCTION FOR CBD IN GREECE

Stella BRAKATSOULA¹, Maria KOUSOYLA¹, Christina NIKAKI¹, Antonios MAVROEIDIS¹, Alexandros TATARIDAS¹, Ioannis ROUSSIS¹, Ioanna KAKABOUKI¹, Panayiota PAPASTYLIANOU¹, Kostas TSIBOUKAS² and Dimitrios BILALIS^{1*}

¹Department of Crop Science, Laboratory of Agronomy, Agricultural University of Athens, Greece

²Department of Agricultural Economics & Rural Development, Agricultural University of Athens, Greece

*Corresponding author, e-mail: bilalis@aua.gr

Introduction: Nowadays, a growing interest regarding cannabidiol (CBD) has been reported (Kalinowski et al., 2020). CBD is a cannabinoid biosynthesized in cannabis plants, with therapeutic properties (Kalinowski et al., 2020). These therapeutic properties in combination with the legislative changes regarding the legalization of cannabis in Greece (Folina et al., 2019) have created new business opportunities.

Aims: The initial aim of our study was to evaluate the effect of different greenhouse cover materials on CBD yield. Following this evaluation, a business plan was formed for the greenhouse whose cover materials prompted the highest CBD yield.

Materials and Methods: The overall CBD yield per greenhouse was estimated once the cannabis buds matured. The business plan and the economic analysis were designed and performed based on the Gross Annuity, the Net Profit, the Gross Profits, the Agricultural Farmer's Income, the Net Annuity, and the Capital Efficiency.

Results: Out of the three greenhouses (GH1, GH2, and GH3), the highest CBD yield was reported on GH2. Two different cover materials, with different properties, were used for the construction of GH2, EVO 7507 AC and KRITIFIL UV 2956. Our results indicate that in a five-year span, cannabis production in greenhouses built with the aforementioned materials could result in a Net Profit of more than 20.000.000 € ha⁻¹.

Conclusion: Greenhouse cover materials should always be considered in cannabis greenhouse production. Selecting appropriate cover materials can significantly increase producer's profit.

Keywords: business plan, *Cannabis sativa*, CBD, greenhouse

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AMURG GRAPEVINE CULTIVAR - EXTENTION IN CULTURE THROUGH CLIMATE CHANGE-BASED PRECISION VITICULTURE

Veronica Sanda CHEDEA^{1*}, Ana-Maria DRĂGULINESCU^{2,3},
Liliana-Lucia TOMOIAGĂ¹, Cristina BĂLĂCEANU² and Maria Lucia ILIESCU¹

¹Research Station for Viticulture and Enology Blaj (SCDVV Blaj), 515400 Blaj, Romania

²Research and Development Department, Beia Consult International, 007182
Bucharest, Romania

³Telecommunications Department, University Politehnica of Bucharest, 061071
Bucharest, Romania

*Corresponding author, e-mail: chedeaveronica@yahoo.com

Introduction: Amurg grapevine cultivar, homologated in 1989 at the Research Station for Viticulture and Enology Blaj was obtained by intraspecific sexual hybridization between the acclimatized genitors Muscat de Hamburg and Cabernet Sauvignon cultivars having a unique Transylvanian terroir. Climate-Smart Agriculture (CSA) is a concept that encourages the adoption of smart agriculture practices for water and nutrient management, the cultivation of stress-resistant crops, precision fertigation, green manures, and UAVs, thus rendering precision agriculture as an instrument to decrease the environmental impact. The concept of Climate Change-based Precision Viticulture (CCPV) enriches the previously defined CSA by adopting sustainable low-environmental impact viticultural procedures and practices, improving these technologies through the exploitation of the current climate modifications and Internet of Things technologies..

Aims: To introduce the CCPV concept in order to benefit from climatic changes, decision support systems, and IoT technologies to support the extension of the Amurg cultivar.

Materials and Methods: The study reviews de data concerning the Amurg cultivar, climatic parameters in Tarnave vineyard and IoT technology in viticulture.

Results: The CCPV-driven architecture for the extension in culture of the Amurg grapevine cultivar, consists of two modules, the physical world (vineyards) and the digital world (smart applications for winemakers). The proposed approach will bring an important input to extending the cultivation of this cultivar in Transylvania by designing and developing a new technology CCPV applied in the vineyard for smart viticulture based on the following concept: IoT, cloud computing, data cybersecurity, blockchain (for Amurg vine cultivar traceability).

Conclusion: The novel technology proposed will open new perspectives for grapevine cultivation in this area, enriching the wine assortment with a new, red, autochthonous, disease tolerant grape cultivar. This also opens up new marketing possibilities for the Târnave vineyards.

Keywords: climate change; Amurg cultivar; Internet of Things; precision viticulture

Acknowledgments: This work was supported by the Romanian Ministry of Agriculture and Rural Development, grant numbers ADER 7.5.3 and ADER 7.1.4.

THE EFFECTS OF SOME COMPOUNDS ON HUMAN HEALTH FOUND IN ARONIA AND GOJI BERRIES

Anca Maria CHIOREAN¹, Erzsebet BUTA² and Viorel MITRE^{2*}

¹ Fruit Research & Development Station Bistrita, Drumul Dumitrei Nou, no. 3, Bistrita, Romania

¹ Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca,

*Corresponding author, e-mail: viorel.mitre@usamvcluj.ro

Introduction: *Aronia melanocarpa* is known as chokeberry and belongs to the *Rosaceae* family *Aronia* genus, native in North America and Canada. Due to the therapeutic properties, black chokeberries are very popular and appreciated fruits. The total content of the most important compounds, polyphenols and antioxidants influences many chokeberry activities like antioxidative, anti-inflammatory, hypotensive, antiviral, anticancer, antidiabetic and antiatherosclerotic (Jurikova et al., 2017). Goji berry is also an important source of carotenoids and antioxidants and is been used as a medicine in China for hundreds years. It belongs to *Solanaceae* family *Lycium* genus and is considered as a super fruit due to the chemical compounds. The amount of bioactive elements found in black goji fruits, offer protection against cardiovascular diseases, diabetes and other comorbidities (Islam T. et al., 2017). Due to the high content of the most important compounds, these berries are increasingly used in human nutrition and the extracts for in the pharmaceutical industry.

Aims: The aim of current article is to describe two species of fruiting shrubs in order to highlight the importance of their compounds on human health.

Materials: The biological material is represented by black aronia and goji berries which have an antioxidant capacity ten times higher than other berries.

Conclusions: In this scientific paper it will be done a review about the bioactive compounds found in aronia and goji berries and the influences of their on human health.

Keywords: aronia, antioxidants, goji, health, polyphenols.

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GOJI BERRY GALL MITE EXPANSION IN EUROPE, WITH EMPHASIS ON SOUTHEASTERN PART OF ROMANIA

Roxana CICEOI^{1*}, Andrei TABACU², Vasilica PALANCIUC³, Minodora GUTUE⁴

¹Research Center for Studies of Food Quality and Agricultural Products,

²Didactic, Research and Development Station for Viticulture and Fruit Growing
Pietroasa - Istrița, Romania

³Faculty of Horticulture, ⁴Faculty of Agriculture. All entities belong to University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59, Mărăști Bd. 011464, Bucharest, Romania

*Corresponding author, e-mail: roxana.ciceoi@qlab.usamv.ro

Introduction: Romania become in recent years one of the most important growers of goji berry, especially for organic production. In Europe the goji crop is expanding rapidly, to satisfy the increased market demand on goji functional foods, with effect in chronic diseases (cancer, diabetes, atherosclerosis etc.) treatment. In 2008, a non-indigenous species of Eriophyid mites, called *Aceria kuko*, was identified on goji plants in Guernsey, UK, and spread rapidly. EU plant protection institutions took eradication measures, but the pest continue to spread (Suvák, 2020).

Aims: The paper presents the current distribution of goji berry gall mite in Europe and in Romania and suggest the use of new citizen science tool (*ProtectGoji maps*) that intends both to increase awareness of goji producers and consumers about this pest and to geolocate the species expansion in Romania for a better containment and control strategy.

Materials and Methods: Data was gathered using the GBIF, iNaturalist and personal observations and communication. The *Protect Goji maps* will illustrate in real time goji mite expansion in Romania and the reservoirs of spontaneous *Lycium* spp. plants.

Results: Over the last five years, *A. kuko* managed to spread in new territories, covering now 21 EU countries. In Romania the pest was found on spontaneous goji berry shrubs, at 4,67 km direct flying distance from a known infested site. and at 75 km on cultivated plnts.

Conclusion: The goji berry gall mite is expanding its range, with unknown consequences on the cultivated and spontaneous plants, and geolocation of infested spots is proposed as a measure of containment.

Keywords: *Aceria kuko*, citizen observations, goji berry

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Acknowledgement: This research work was carried out within the 2021-0028/14.07.2021 ProtectGoji project, financed by the University of Agronomic Science and Veterinary Medicine of Bucharest.

MICROPROPAGATION OF RASPBERRIES (*RUBUS IDAEUS* L.) IN LIQUID MEDIUM BY TEMPORARY IMMERSION BIOREACTOR IN COMPARISON WITH SOLID CULTURE

Doina CLAPA¹, Monica HÂRȚA^{2*}, Cornel Viorel POP³

¹*Institute of Advanced Horticulture Research of Transylvania, University of Agricultural Science and Veterinary Medicine, Cluj – Napoca, Romania.*

²*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania*

³*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, 400372 Cluj-Napoca, Romania*

*Corresponding author, e-mail: monica.harta@usamvcluj.ro

Introduction: Temporary Immersion Bioreactor (TIB) is a suitable technique for large scale micropropagation and it was successfully applied to various plant species.

Aims: The aim of this work was to test the capacity of in vitro proliferation of the raspberry cultivars 'Maravilla' and 'Willamette' on solid culture media compared to liquid media.

Materials and Methods: The two varieties were cultured in vitro on two media, namely Murashige & Skoog 1962 (MS) and Driver and Kuniyuki walnut medium 1984 (DKW), both supplemented with 0.5 mg/l 6-benzyladenine (BA). In the control cultures on solid media the media were gelled with 5g/l Plant Agar, whereas for the cultures in liquid media Plantform bioreactors were used. For cultures in solid media we used 720 ml jars containing 100 ml medium/jar and the bioreactors contained 500 ml media each. The immersion time was one minute every four hours and ventilation was done through the Millipore filters of the bioreactors, without an air pump. The solid as well as the liquid media were autoclaved for 20 minutes at 121° C and 1 atm; pH was adjusted to 5.8 before autoclavation. The in vitro cultures were incubated in the growth room at 16 h photoperiod, 32.4 $\mu\text{mol m}^{-2}\text{s}^{-1}$ light intensity and temperature of $23 \pm 3^\circ\text{C}$.

Results: After six weeks of in vitro culture we established the proliferation rates and lengths of the axillary shoots obtained in all the experimental treatments. The highest proliferation rate was 16 ± 2.03 , obtained in cv. 'Willamette' on solid MS medium with 0.5 mg/l BA. In cv. 'Maravilla' the highest proliferation rate was 7.8 ± 0.75 , on DKW medium supplemented with 0.5 mg/l BA. In cv. 'Willamette' the shoots obtained in the multiplication stage were short, with an average length of 2.30 ± 0.18 cm, whereas in cv. 'Maravilla' a higher number of shoots were suitable for acclimatization, with an average length of 2.86 ± 0.32 cm.

Conclusion: Our research highlighted that raspberry (*Rubus idaeus* L.) 'Maravilla' and 'Willamette' can be propagated by using bioreactors, although further research is needed to improve the efficiency of this method.

Keywords: bioreactor, micropropagation, proliferation, raspberry

SUSCEPTIBILITY OF TABLE GRAPEVINE CULTIVARS FROM THE TÂRNAVE VINEYARD TO THE PATHOGENIC FUNGUS *PHOMOPSIS VITICOLA* Sacc.

Maria COMȘA*, Liliana TOMOIAGĂ, Veronica Sanda CHEDEA, Alexandra SÂRBU, Maria ILIESCU

*Research Station for Viticulture and Enology Blaj
Str. Gh. Barițiu, no. 2, România*

*Corresponding author, e-mail: comsa_m@yahoo.com

Introduction: Grapevine escoriose, caused by the *Phomopsis viticola* Sacc fungus, is one of the main fungal grapevine trunk diseases (GTD) spread in the Târnavă vineyard, both for wine grape cultivars and table grape cultivars. To date, few studies have been performed on the sensitivity of table grape cultivars from Târnavă vineyard against this pathogen. Cultivation of escoriosis tolerant cultivars may be a future alternative in strategies for managing GTD.

Aims: The aim of this study was to identify varieties tolerant to natural *P. viticola* infections based on the symptoms manifested on the vegetative organs.

Materials and methods: The studies were carried out in the collection of grapevine cultivars of SCDVV Blaj, in April-July 2021, being monitored 13 cultivars of table grapes: Victoria, Muscat Poloskey, Arcadia, Codreanca, Muscat New York, Muscat Bleu, Original, Muscat de Hamburg, Timpuriu de Cluj, Transilvania, Cetățuia, Splendid, Moldova. The degree of the attack was determined based on the symptoms observed on leaves and shoots.

Results: Following the evaluations performed based on the symptoms observed in the climatic conditions of 2021, April-July, it was found that the Victoria cultivar has a very high susceptibility, with a high attack degree (AD), both on leaves and shoots (AD = 20.7% and AD = 20.3%, respectively). The cultivar of Moldova was considered tolerant, with weak symptoms, so with a low AD (0.2% on the leaves and 0.5% on the shoots, respectively).

Conclusion: Table grape cultivars have different degrees of susceptibility to escoriosis, the knowledge of this fact supporting the management of GTD.

Keywords: escoriosis, grapevine, cultivar, susceptibility

Acknowledgments: This research was funded by the Romanian Ministry of Agriculture and Rural Development, grant number ADER 7.5.3 and ADER 7.1.4.

MONITORING THE POPULATION OF MOTHS OF THE GRAPEVINE FROM THE TÂRNAVE VINEYARD BY USING DIGITAL TOOLS

Maria COMȘA^{1*}, Liliana TOMOIAGĂ¹, Sorița ORIAN², Mihaela IVAN², Daniela Maria POPESCU²

¹Research Station for Viticulture and Enologie Blaj, Str. Gh. Barițiu, no. 2, România

²SC JIDVEI SRL, Research Department, Str. Gării, no. 45, România

*Corresponding author, e-mail: comsa_m@yahoo.com

Introduction: Grapevine moths, *Lobesia botrana* (eudemis) and *Eupoecilia ambiguella* (cochilis) are internal pests of the grape berries and cause significant economic losses due to larval feeding, while degrading the quality of the fruit. They can even cause the complete loss of yield by favoring the installation of *Botrytis cinerea* (gray mold). The use of precision farming-specific management elements, such as digitization, have become indispensable to meet current and future challenges in viticulture.

Aims: The aim of this work is to monitor the *Lobesia botrana* (eudemis) and *Eupoecilia ambiguella* (cochilis) populations in Tarnave vineyard by using digital tools.

Materials and Methods: The study was carried out in Tarnave vineyards, during the years 2017-2018. Atrabot and Atrambig pheromone traps have been installed to monitor moth populations. Data collection was done in the following ways: monitoring the spreading area with the GPS coordinates, flight monitoring, capture monitoring, attack degree, photos and other information. These were performed using the smart application "4Grapes", the information being stored in a Cloud software, where they can be viewed in real time.

Results: The species *Lobesia botrana* and *Eupoecilia ambiguella* were present in the monitoring network (Podgoria Tarnave). The dominance of one of the species is given by the climatic preferences and the altitude of the area, so that *Lobesia botrana* is dominant in the Jidvei viticultural center, Sanmiclăuș viticultural area, and the species *Eupoecilia ambiguella* dominates in the Tăuni viticultural area. During the study years, the first flights appeared in mid-April and continued until the end of October, due to higher than normal temperatures in the autumn.

Conclusion: The digital tools used in the study have the transmission of observations directly from the field, in real time, with precise location, providing support in making decisions on measures to protect the vine. Moths are spread over the entire monitored area, causing economic damage only in certain areas of the outbreak.

Keywords: monitoring, moths, viticulture, precision agriculture, spatial analysis

RECENT DEVELOPMENTS REGARDING DROUGHT-TOLERANT SUNFLOWER USING TRANSFORMATION WITH *RHIZOBIUM RHIZOGENES*

Mihaiela CORNEA-CIPCIGAN¹, Cristian Radu SISEA¹, Rodica POP¹, Emmy
DHOOGHE², Ellen DE KEYSER², Adriana AURORI^{1*}

¹ Advanced Horticultural Research Institute of Transylvania, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca, Romania

² Plant Sciences Unit, Flanders Research Institute for Agricultural, Fisheries and Food Research
(ILVO), Caritasstraat 39, B-9090 Melle, Belgium

*Corresponding author, e-mail: adriana.aurori@usamvcluj.ro

Introduction: Despite progresses made in agriculture, the rapid environmental changes urge researchers to find new breeding strategies for yield improvement of *Helianthus annuus* (sunflower), one of the most important sources of edible oil. In this context, morphological characteristics of roots could be used as indicators for drought resistance (Comas *et al.*, 2013).

Aims: This review aims to present advancements regarding the response of sunflower to transformation with *Rhizobium rhizogenes* as part of the strategy for inducing a stronger root system.

Results and discussions: Based on the achievements in rapeseed and different species from the *Asteraceae* family (chicory, *Osteospermum* (Desmet *et al.*, 2021)), in which transformation via *R. rhizogenes* was successful, the expectation of obtaining the same results for sunflower was high. Unfortunately, sunflower proved to be recalcitrant to *in vitro* regeneration, particularly from roots, so only transformed roots and chimeric plants were obtained when using rhizobacteria (Parks *et al.*, 2020). However, the chimeric plants could be used as a standalone system to study the functionality of the roots.

Conclusion: More efforts are needed for establishing a successful breeding strategy for sunflower using rhizobacteria to obtain an increase of tolerance to drought.

Keywords: *Helianthus annuus*, drought resistance, *Rhizobium rhizogenes*, root system

Aknowlegements: RootsPlus is a SusCrop – ERA-NET project funded by the following national funding agencies: Executive Agency for Higher Education, Research, Development and Innovation Funding, Vlaanderen, Agentschap Innoveren & Ondernemen.

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A STUDY ON THE FACTORS AFFECTING GREENHOUSES EMISSION IN COTTON IN GREECE

Antigolena FOLINA, Ioanna KAKABOUKI, Antonios MAVROEIDIS, Stella KARYDOGIANNI, Varvara KOUNELI, Dimitrios BILALIS and Ioannis ROUSSIS*

Laboratory of Agronomy, Faculty of Crop Science, School of Plant Sciences, Agricultural University of Athens, Greece

*Corresponding author email: iroussis01@gmail.com

Introduction: While cotton cultivation is considered as the main cash crop for Greece, cultivation practices and their environmental-friendly level are the focus of recent research (Darawsheh et al., 2020; Karydogianni et al., 2020). Research is examined the main sources of greenhouses gases in cotton cultivation. Until now, crop cultivation stimulates greenhouse gas (GHG) emissions only from soil. For this reason, the main sources are found to be agricultural practices such as irrigation and fertilization (Ma et al., 2020).

Aims: It is imperative to be estimated sources of greenhouses emission in cotton cultivation for the territory of Greece. The present study takes into account all the factors related to cotton cultivation, from fertilizers production to energy consumption for all cultivation techniques such as tillage.

Materials and Methods: The data were calculated using Cool farm tool software. In order for the data to be representative and verifiable, the average of all the fields is referred to in the study. The analysis of the emissions concerned all the fields where cotton is grown in a remarkable area.

Results: The total CO₂ emissions coming from an average value of 117.32 acres are 43.11 kg. The main source of emissions is the fuels used for all processes in the field such as harvesting, cultivator, irrigation, etc.

Conclusion: Many factors significantly affected the GHG emissions from cotton fields in Greece. Although water supply and N fertilizer are the main sources for emissions only from soil, there are many factors to exanimated in order to minimize adverse effects of climate change.

Keywords: cotton crop, greenhouses gases, N fertilizer, water supply

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THE MAIN PHENOTYPIC CHARACTERISTIC OF ELIDA, A NEW LUFFA CULTIVAR OBTAIN AT VEGETABLE RESEARCH DEVELOPMENT STATION BUZAU, ROMANIA

Ion GHERASE^{1*}, Elena BARCANU¹, Ovidia - Loredana AGAPIE¹,
Bianca - Elena TANASE¹, Costel VINATORU¹, Elena Maria DRAGHICI²

¹*Vegetable Research and Development Station Buzău, No. 23, Mesteacănului Street, zip code 120024, Buzău, Romania*

²*University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania*

*Corresponding author email: ion2196@yahoo.com

Introduction: *Luffa cylindrica* also known as sponge gourd, Egyptian cucumber or Vietnamese luffa is an annual cucurbit vine native south Asia. In India, China, Japan and Vietnam the crop is cultivated on large areas, being a plant with multipurpose uses. Since 1962 at Vegetable Research Development Station (VRDS) Buzau, has begun the acclimatization of this species, but, although it was heavily promoted, no Romanian variety has been registered so far.

Aims: The present study aims to present the main quantitative characteristics of the new variety obtained at VRDS Buzau, Elida.

Materials and Methods: The Breeding and Biodiversity Laboratory within VRDS Buzau has attained a new cultivar of sponge gourd, suitable not only for industry, but also for fresh consumption. The breeding method used was hybridization followed by individual selection.

Results: The plant produces a large number of fruits, the average length of the fruit in the green stage is 56.2 cm and 44.8 cm at the physiological maturity (sponge stage). Luffa sponges have a length varying from 30-50 cm, with high degree of porosity, high specific pore volume and they are biodegradable. The average weight of the sponge is 26.3 g. The seed color is white and the average weight of the seeds / fruit is 37.4g. The species can be grown in the greenhouse and field in a palisade system. The best results were obtained in greenhouse. The plant has shown an increased resistance to pathogens compared with other cucurbits.

Conclusion: The Elida cultivar has a distinct phenotypic expressiveness with high quality fruits. Since year 2020 the cultivar was registered in the Official Catalogue of Romanian Crop Plants. The cultivar has shown a high plasticity and can also be grown in ecological system.

Keywords: *Cucurbitaceae*, loofah, sponge gourd

PRELIMINARY RESULTS ON EVAPOTRANSPIRATION FOR SWEET CHERRY TREES (PRUNUS AVIUM) AND GROWTH RESPONSES TO DRIP IRRIGATION IN BISTRITA FRUIT REGION

Zsolt JAKAB-ILYEFALVI* and Anca CHIOREAN

Fruit Research and Development Station Bistrita, Romania

*Corresponding author: zsolt.jakab@yahoo.com

Introduction: Sweet cherry cultivation trends and researches concentrate nowadays all across Europe and worldwide on changing the training system and rootstock combinations from larger trees to smaller ones using higher planting densities equipped with various irrigation systems (Möhler, 2005). Among the recent introduced rootstocks some have vulnerabilities to various stress factors, mainly the soil conditions in dry periods during summer, when small precipitations are registered, thus they require necessary irrigation. Several researches showed that very good results can be obtained with the drip irrigation method in different rootstock x scion combinations.

Aims: The objective of the research was to determine the water requirements and influence of drip irrigation levels on vegetative growth (height of tree, trunk cross-sectional area 25 cm above grafting point, volume of trees and branch cross sectional area, length of shoot growth) of the model sweet cherry cultivar 'Kordia' in local climatical conditions in Northern Transylvania.

Materials and Methods: The study was carried out recently during 2020-2021 in a 3 year old drip irrigated sweet cherry experimental orchard (*Prunus avium*) planted with Kordia cultivar grafted on Gisella 5 and Gisella 3 rootstocks, located in Bistrita, Romania. The objective of the research was to determine the water requirements and influence of drip irrigation levels on vegetative growth of the Kordia cherry cultivar in local climatical conditions. The trees were subjected to two different irrigation treatments (T1-100%, T2-125% of the physiological need of plants) with different amounts of water based on adjusted coefficients of Class A pan evapotranspiration.

Results: The water amount from T1 was sufficient to complete the estimated full need of the plants and T2 completed with more than 25 % gave more intense vegetative growth characteristics. Calculations of evapotranspiration (ET_c) values for irrigation treatments summed up during March-July (2020-2021) values ranging 486.5-469 mm. The effect of irrigation treatments on height of tree, trunk cross-sectional area 25 cm above grafting point, volume of trees and branch cross sectional area, total shoot growth, had significant influences when considering T2 (1.25 Epan) treatment.

Conclusion: Preliminary research results showed that Kordia/Gisella 3 rootstock gave good results on adapting to high density planting system, but it is necessary to introduce irrigation in the orchard management system. Kordia/Gisella 5 gave larger growth responses when compared with Gisella 3 and probably had a better adaptation on dry and heavier soils with higher clay content than Gisella 3.

Keywords: cherry, drip irrigation, evapotranspiration, vegetative growth

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THC YIELD AND GREENHOUSE COVER MATERIALS: OPTIMIZING THE PROFIT OF MEDICAL CANNABIS.

Maria KOUSOYLA, Stella BRAKATSOULA, Christina NIKAKI, Dimitrios BILALIS,
Alexandros TATARIDAS, Ioannis ROUSSIS, Ioanna KAKABOUKI, Panayiota
PAPASTYLIANOU and Antonios MAVROEIDIS*

Department of Crop Science, Laboratory of Agronomy, Agricultural University of Athens, Greece

*Corresponding author, e-mail: antoniosmauroeidis@gmail.com

Introduction: Even though Delta-9-tetrahydrocannabinol (THC) is a psychoactive substance studies indicate that it has therapeutic properties (National Academies of Sciences, Engineering, and Medicine). Moreover, the shift in Greek legislation regarding the legalization of cannabis resulted in new business opportunities for medical-cannabis related companies (Folina et al., 2019).

Aims: This study aimed to evaluate the effect of different greenhouse cover materials on THC production and design a business plan for any potential medical-cannabis related company in Greece.

Materials and Methods: Initially, the THC yield per greenhouse was estimated and thus, the suitability of each greenhouse cover material for medical-cannabis production. The economic viability of a potential medical-cannabis related business in Greece was evaluated based upon a SWOT analysis, the Gross Annuity, the Net Profit, the Gross Profits, the Agricultural Farmer's Income, the Net Annuity, and the Capital Efficiency.

Results: The highest THC yield was reported on the greenhouse constructed with EVO² 7804 AC as cover material. According to the results of our comparative Economic Analysis medical-cannabis production in greenhouses constructed with the aforementioned material would significantly increase profits.

Conclusion: Greenhouse medical-cannabis production is much promising in Greece. Nevertheless, the use of appropriate greenhouse cover materials should be considered as they affect THC yield and therefore, the profit of the company.

Keywords: business plan, *Cannabis sativa*, greenhouse, THC

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DEVELOPMENT OF DECISION SUPPORT SYSTEM BASED ON THE BAYESIAN RIDGE ALGORITHM FOR IRRIGATION OF COTTON

Dimitrios LEONIDAKIS¹, Evangelos PSOMAKELIS^{2,3}, Christoforos-Nikitas KASIMATIS⁴, Nikolaos KATSENIOS⁴, Ioanna KAKABOUKI⁵, Ioannis ROUSSIS⁵, Antonios MAVROEIDIS⁵ and Aspasia EFTHIMIADOU⁴

¹*Farmacon G.P., K. Therimioti 25, Giannouli, Larisa, 41500 Thessaly, Greece;*

²*School of Electrical and Computer Engineering, National Technical University of Athens, 15780 Athens, Greece*

³*Department of Informatics and Telematics, Harokopio University of Athens, 17778 Athens, Greece*

⁴*Department of Soil Science of Athens, Institute of Soil and Water Resources, Hellenic Agricultural Organization-Demeter, Sofokli Venizelou 1, Lycovrissi, 14123 Attica, Greece;*

⁵*Laboratory of Agronomy, Department of Crop Science, Agricultural University of Athens, 11855 Athens, Greece;*

*Corresponding author, e-mail: nkatsenios@gmail.com

Introduction: Almost 70% of the world's production of cotton is derived from irrigated conditions (Chaudhry, 2010). Decision Support Systems are information systems that can support complicated decision-making activities which are vital for sustainable agriculture, such as irrigation management optimization (Rinaldi and He, 2014).

Aims: The aim of this study was to develop a Decision Support System for the irrigation of cotton, making suggestions about possible irrigation plans, meaning the exact dates that farmers should irrigate, with little to no effects on the total yield.

Materials and Methods: The Field Sensors used were SMT 12 and ECH2O EC-5 measuring soil temperature and soil moisture at 27 cm below ground level. The data logger was RFRN 13 iMETOS RadioNode DD connected to iMETOS 3.3 motherboard (Pessl Instruments). The Weather Station used was Vantage Pro2 6322C and the measurements retrieved were: air temperature (°C), air relative humidity (RH) (%), wind Speed (m/sec), evapotranspiration (mm) and precipitation (mm). The measurement of em38 has been conducted by using ground conductivity meter EM38-MK2, at a distance of 5 meters lengthwise of each field.

Results: The information system which was implemented using the Bayesian Ridge algorithm is designed to optimize the use of irrigation resources, by reducing water use to only when it is necessary. According to our results, the number of irrigations, could be reduced to 2-3 instead of 3-5 irrigations that were applied to the five experimental fields of this study.

Conclusion: In the present work, we depicted a novel DSS technology based on water saving without affecting the yield.

Keywords: DSS, IoT sensors, cotton, irrigation, remote sensing

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EFFECTS OF FERTILIZATION ON GROWTH AND PRODUCTIVITY OF THREE MILK THISTLE POPULATIONS

Vasiliki LIAVA, Anestis KARKANIS*, Nicholas DANALATOS and Nikolaos TSIROPOULOS

*Department of Agriculture Crop Production and Rural Environment,
University of Thessaly, Volos, Greece*

*Corresponding author, e-mail: akarkanis@uth.gr

Introduction: Milk thistle (*Silybum marianum* (L.) Gaertn.) is an alternative medicinal crop since its fruits contain silymarin, which is known for hepatoprotective activities (Karkanis et al., 2011; Valková et al., 2020).

Aims: The present study aims to assess the impact of a stabilized nitrogen fertilizer alone or combined with a foliar fertilizer on the plant growth and fruit yield of three wild milk thistle populations originated from Greece.

Materials and Methods: The fruits of three populations ("Palaionterveno", "Mesopotamia", and "Spata") were sown in plastic pots containing peat. Fertilization treatments were i) control - without application of fertilizer, ii) application of a stabilized nitrogen fertilizer (27-0-0, 100 kg N/ha), and iii) use of the stabilized fertilizer followed by applications of a foliar fertilizer (100 cc/100 L, 10% w/w P₂O₅, 8% w/w K₂O, 0.1% w/w Fe, 0.1% w/w Mn, 0.1% w/w Zn) at three different growth stages.

Results: The different populations and fertilization treatments influenced plants growth. There were statistically significant differences between the fertilization regimes in the rosette diameter, plant height, chlorophyll content, dry weight of plants, and root system. Similarly, the three populations differed significantly on the above-mentioned traits except for the dry weight of the plants. Considering the fruit yield, an interaction of the two factors was recorded.

Conclusion: The study showed that fertilization can enhance plant growth parameters and fruit yield, while the selection of milk thistle population with high productivity is an important factor in order to obtain a high crop yield.

Keywords: foliar fertilizer, milk thistle, yield

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COMPARATIVE STUDY BETWEEN SELENA – A ROMANIAN CREATED GRAPE VARIETY AND TRAMINER ROZ, IN TÂRNAVE VINERYARD CLIMATIC CONDITIONS

Maria ILIESCU¹, Alexandra SÎRBU¹, Liliana TOMOIOAGĂ¹,
Maria COMȘA¹, Anamaria CĂLUGĂR² and Anca Cristina BABEȘ^{2*}

¹ Research and Development Station for Viticulture and Oenology Blaj, Romania

² Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

* Corresponding author: ancababes@usamvcluj.ro

Introduction: The Research Station for Viticulture and Enology Blaj has a tradition in the improvement of varieties because over time, as a result of a scientific research activity carried out with competence and responsibility, valuable varieties and clones of vines have been created, characterized by superior qualities of productivity, quality and resistance, able to improve the assortments in culture. The Selena variety was obtained by sexual hybridization of the varieties (Iordana x Traminer roz) x (Raisin de Saint Pierre x M. Pearl of Csaba), (Cristea et al., 1995).

Aims: The present study is focused on the comparison between Selena – a Romanian created grape variety and Traminer roz, regarding the grapes and wines quality in climatic conditions of Târnavă Vineyard.

Materials and Methods: The research was made during 2018-2020, on both varieties in different farms (four location) in Târnavă vineyard regarding harvest quality and quantity (sugar content, level of total acidity, weight of 100 berries, weight of a bunch and weight of grapes/vine). After vinification, the main oenological parameters were analyzed (alcohol content, total and volatile acidity content, content of dry extract, content of free and total SO₂, residual sugars and pH).

Results: The result showed a similar quality of the grapes between varieties, but significantly higher of quantity of harvest for Selena. The alcohol content was 12,32 % vol. for Selena and 13,42 % vol. for Traminer roz and residual sugar under 4 g/l for both wines. Against Traminer roz, the total acidity of Selena wines is higher, which gives the wines a freshness and a personality. All other oenological parameter in the wine samples were under maximum allowed limit.

Conclusion: In the present research work, we highlight the quality of grapes and wines obtained from Selena – a Romanian created grape variety.

Keywords: alcohol, grapes, harvest quality, wine

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ADVANTAGES OF THE USE IN THE LANDSCAPE ARCHITECTURE OF RESISTANT OR TOLERANT PLANTS TO THE ABIOTIC STRESS

Diana-Maria MIRCEA^{1*}, Monica BOSCAIU², Oscar VICENTE³,
Adriana F. SESTRAS¹

¹*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine, 3-5 Manastur, 400372 Cluj-Napoca, Romania*

²*Mediterranean Agroforestry Institute (IAM), Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain*

³*Institute for Conservation and Improvement of Valencian Agrodiversity (COMAV), Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain*

*Corresponding author, e-mail: diana-maria.mircea@usamvcluj.ro

Introduction: Ornamental plants provide both aesthetic pleasure and improvement of the environment and quality of life. Properly utilized, they can restore disturbed landscapes, control erosion, reduce energy for climatization and water consumption (Savé, 2009).

Aims: The development and maintenance of sustainable landscapes have become nowadays one of the most challenging and imperative tasks. Heat, drought, cold and salinity are the main factors of abiotic stress that induce severe damage in every plant species.

Materials and Methods: In this review, based on primary literature there are discussed the roles of ornamental plants with an adequate response to abiotic stresses in the landscape architecture.

Results: The ability of plants to tolerate the most important abiotic stress factors (e.g., heat, drought, cold and salinity etc.) varies within genera, species and even cultivars. Ornamental plants show different adaptation mechanisms to overcome the negative effects of abiotic stress (Toscano *et al.*, 2019), including morphological, physiological and biochemical modifications (Acosta-Motos *et al.*, 2017). The appropriate use of the resistance and tolerance mechanisms of plants to abiotic stresses can ensure a new landscape design with a great economic, ecological, aesthetic and sustainable value.

Conclusion: Understanding how plants perceive different stressors, how early signals are transmitted inside the plant, as well as interpreting the diversity of response pathways triggered by them, become essential in the current context of climate change, economic and social life.

Keywords: abiotic stress, adaptation mechanisms, ornamental plants, sustainability

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ANTIOXIDANT ACTIVITY IN SEA BUCKTHORN IN PURPLE LIGHT

Ioana MOLDOVAN¹, Cornel-Viorel POP^{2*}, Răzvan ȘTEFAN², Lehel LUKÁCS¹ and Loredana OLAR²

¹ Horticultural Research Station, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Veterinary Medicine, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: viorel.pop@usamvcluj.ro

Introduction: A free radical is a molecule with one or more unpaired electrons and it is a highly reactive entity. Some substances that belong to the enzymatic and non-enzymatic systems are capable to protect tissue against action of free radicals. These substances constitute a group of endogenous antioxidants that act by scavenging the free radicals. Electron paramagnetic resonance (EPR) was used to characterize antioxidant activity in sea buckthorn.

Aims: In this research we try to study the effect of purple light on growth, development and antioxidant activity of sea buckthorn fruits.

Materials and Methods: The biological material was performed to the species *Hippophae rhamnoides*. The shrubs studied were covered with filters plastic colored in purple, the control was released (without filter), the process is called - EDW. The fruits were harvested at maturity in early October. Harvesting was done on 3 floors: b1 - floor I (top), b2 - floor II (middle) and b3 - III (base). Free radicals were examined using electron paramagnetic resonance (EPR) spectroscopy by measuring free radical EPR signal intensities. The samples were investigated at room temperatures with an EPR spectrometer Bruker Elexys 580 in a standard chamber, continuous wave, in the X-band (9.4 GHz) with magnetic field modulation of 100 kHz and attenuation 20 dB.

Results: In this study it is shown how the exposure of colored light (EDW process) affects the properties of radicals in sea buckthorn fruits. The EDW process increases the number of long-lived radicals and may affect their recombination. Long-lived organic radicals included in these plants are not harmful.

Conclusion: All these samples are characterized by high antioxidant activity and total phenolic content. These properties significantly increased after the EDW process. The results presented here demonstrate that all fruits resulting after EDW process are beneficial to human health and can also be applied to develop various new food products or new pharmaceutical products.

Keywords: *Hippophae rhamnoides*, EPR method

THE EFFECT OF HYDRIC STRESS OF IN VITRO Highbush BLUEBERRY INVESTIGATED BY EPR SPECTROSCOPY

Cornel Viorel POP¹, Doina CLAPA²

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania*

²*Institute of Advanced Horticulture Research of Transylvania, University of Agricultural Science
and Veterinary Medicine, Cluj-Napoca, Romania*

*Corresponding author, e-mail: doina.clapa@usamvcluj.ro

Introduction: Electron paramagnetic resonance (EPR) spectroscopy is specific for paramagnetic molecules, such as free radicals and transition metal ions containing unpaired electrons (Mn, Fe, Cu) (Miller and Brudvig, 1991). Among all analytical tools, electron paramagnetic resonance (EPR) spectroscopy is the only technique that directly detects free radicals (Morsy and Khaled, 2002).

Aims: The aim of this research was to evaluate the effect of simulated hydric stress in *in vitro* culture conditions of the highbush blueberry cv. 'Bluecrop' by EPR technique.

Materials and Methods: To simulate water stress, the explants were inoculated on Woody Plant Medium (WPM) culture medium supplemented with 100 mg/L Sequestrene 138, 1 mg / L Z, and 30g/L of sugar. The culture medium was solidified with 4g/L plant agar. Five concentrations of PEG 6000 were used: 10 g/L, 20 g/L, 30 g/L, 40 g/L, 50 g/L and control without PEG. 720 ml glass jars with 100 ml medium and 16 inoculum/jar were used as culture vessels. After inoculation, the culture vessels were incubated in the growth room with a controlled environment (23 ± 3 °C, $27\text{--}32.4$ mmol•m⁻²•s⁻¹, 16 h photoperiod) for six months. The EPR measurements were performed on un Bruker ELEXSYSE - 580 spectrometer with continuous wave at X-band. The paramagnetic electronics resonance spectra were measured for a fresh shoot, immediately as soon as it was removed from the culture vessel.

Results: EPR results on 'Bluecrop' samples with different concentrations of PEG 6000 indicate an increase in the number of paramagnetic centers as the concentration of PEG 6000 in the sample decreases. This is observed in the manganese ions spectra; this trace element is sensitive to the increase in PEG 6000 concentration.

Conclusion: In the present study it was shown that the EPR method is an effective method for highlight the effect of hydric stress on blueberries.

Keywords: *Vaccinium corymbosum* L., PEG 6000, EPR method

PRELIMINARY POLLEN GRAIN CHARACTERIZATION OF SEVERAL APPLE AND PLUM VARIETIES

Vlad Ioan POPA¹, Liliana BĂDULESCU², Mihaela IORDĂCHESCU³,
Anca Amalia UDRIȘTE^{4*}

¹University of Agronomical Sciences and Veterinary Medicine of Bucharest, Research Center for Studies of Food Quality and Agricultural Products, Laboratory of Plant Morphology and Microscopy

²University of Agronomical Sciences and Veterinary Medicine of Bucharest, Faculty of Horticulture, Department of Horticultural Systems Bioengineering

³University of Agronomical Sciences and Veterinary Medicine of Bucharest, Research Center for Studies of Food Quality and Agricultural Products, Laboratory of Plant Molecular Biology

⁴University of Agronomical Sciences and Veterinary Medicine of Bucharest, Research Center for Studies of Food Quality and Agricultural Products, Laboratory of Plant Molecular Physiology

*Corresponding author: Anca Amalia UDRIȘTE, e-mail: amalia.udriste@qlab.usamv.ro

Introduction: Pollen can be a great way to determine both the species and varieties of different plants. It acts like a fingerprint, being unique to each plant species.

Aims: The aim of this paper was to observe differences both at morphological level and from the pollen viability point of view of 21 apple (*Malus domestica* Borkh.) and 19 plum (*Prunus domestica* L.) varieties, differences that can be correlated with genotype variation in further genotyping research, with the final goal of using these results as a basis for genotype-assisted breeding programs.

Materials and Methods: Pollen grain morphology was assessed using a Scanning Electron Microscope and pollen viability was analyzed using *in vitro* germination.

Results: This study demonstrated significant differences in both the size of pollen grains and the percentage of viable pollen through *in vitro* germination.

Conclusion: Among the apple varieties, Belle de Boskoop presented the largest pollen grains, and among the plum varieties Timpurii de Țurlești. Aura apple variety had the lowest viability percentage.

Keywords: *Malus domestica*, *Prunus domestica*, pollen germination, pollen morphology

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STUDIES OF THE EFFECTIVENESS OF THE INNOVATIVE SYSTEMS APPLIED IN ORGANIC VITICULTURE TO CONTROL ARTHROPODS

Aurora RANCA^{*1}, Sergiu Ayar ENE¹, Anne Laure FRAGNIERE², Vittorio ROSSI³, Tito CAFFI³, Sasa SIRCA⁴, Josep Armengol FORTI⁵, Daniel WIPF⁶, Patrik KEHRLI²

¹Research Station for Viticulture and Enology Murfatlar, 905100 Murfatlar, Romania

²Agroscope, Route de Duillier 50, CP 1012, 1260 Nyon 1, Suisse

³Università Cattolica del Sacro Cuore, via E. Parmense 84, 29122 Piacenza, Italy

⁴Agricultural Institute of Slovenia, Hacquetova ulica 17, 1000 Ljubljana, Slovenia

⁵Universitat Politècnica de València, Camino de Vera S/N, 46022 Valencia, Spain

⁶AgroSup Dijon, CNRS, INRA, Univ. Bourgogne Franche-Comté, 21000 Dijon, France

*Corresponding author, e-mail: auroraranca@yahoo.com

Introduction: Plant diversity has the potential of naturally controlling arthropod pests. Their activity can be increased by the provision of nectar and pollen-rich plant species (Apiaceae, Asteraceae or Fabaceae).

Aims: to develop new viticultural systems based on increased plant diversity (cover crops) within vineyards by planting selected plant species for the control of arthropods.

Materials and Methods: The experimental vineyards were set-up in Murfatlar - Romania, Changins – Switzerland, Piacenza - Italy, Manče - Slovenia, Valencia - Spain and in the Chablis - France. Each vineyard was divided in two subplots traditional and innovative, a part of these subplots remained untreated. A common protocol was developed and applied in the experimental plots to collect comparable data. All partners conducted visual samplings and set-up traps in order to monitor beneficial and pest arthropods. Trap contents and data were sent to Agroscope for determinations and analyses.

Results: Analyzing the collected data from 2019 and 2020 together, there were no significant differences in the abundance of arthropod pests such as the grapevine moth *Lobesia botrana*, the red spider mites *Panonychus ulmi*, the two-spotted spider mites *Tetranychus urticae* as well as the two of vine leafhoppers *Empoasca vitis* and *Scaphoideus titanus* between the innovative and the traditional system. Regarding arthropod beneficials, only parasitoids benefited significantly from the planting of cover crops in the innovative systems. Yet, predators such as spiders and carabids were significantly more abundant in vineyards with understorey vegetation (innovative system in all countries and traditional system in Italy, Switzerland and one vineyard in Slovenia) than in vineyards with bare soil (traditional system in Romania, Spain and one vineyard in Slovenia). The other beneficials, e.g. predatory mites, hoverflies and bees were affected neither by the production system nor the type of understorey. Overall, the determined arthropod community tended to be more abundant in the innovative system compared to the traditional one.

Conclusion: The determined arthropod community was more abundant in the innovative system. The arthropod biodiversity seems to benefit due to the cover crops but without directly affecting pest suppression.

Keywords: Beneficials, cover crops, pest control

AN APPARENT BREAKDOWN OF Vf RESISTANCE OCCURING IN AN APPLE ORCHARD IN BISTRITA AREA

Smaranda-Doina ROȘU-MAREȘ¹, Georgeta-Maria GUZU¹, Ioan ZAGRAI¹,
Carmen PUIA²

¹ Fruit Research & Development Station Bistrița, Romania

² Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine
Cluj-Napoca, Romania

Corresponding author, e-mail: smaranda.boila@usamvcluj.ro

Introduction: Scab resistance through the Rvi6 gene was largely used in Romanian breeding programs for a long period of time. As a result, many varieties that use this resistance mechanism were created. Fruit Research & Development Station (FRDS) Bistrita was involved in such work, and consequently several resistant varieties were obtained. However, it is now known that Vf resistance is a monogenic trait, and hence provides a limited protection since various races of scab were reported.

Aims: Checking the efficacy of Vf resistance mechanism under the present conditions in Bistrita area.

Materials and Methods: Three Vf resistant apple varieties (Aura, Salva and Bistritean) bred at FRDS Bistrita were monitored in the field in comparison with the Rvi6 Florina and Prima cvs., and Idared and Golden Delicious cvs. known as sensitive to scab.

In addition, molecular markers (AM-19, U1400 and AL 07) were used in PCR to check if Rvi6 gene is “really” present in the genome of the three Romanian varieties.

Results: No apple scab symptoms were detected in the year 2019 on four of the varieties: Florina, Prima, Aura, and Salva. Expectedly, symptom frequency on leaves was high on Idared and Golden Delicious but it could also be observed on Bistritean. On 2020 sporadic scab lesions on leaves were found on Aura and Bistritean then in 2021 on all of the five resistant cultivars. PCR results using the three markers showed the presence of Rvi6 gene on Bistritean, Salva, Aura, Prima and Florina and confirm a previous study performed by Militaru M. et al. (2020).

Conclusion: The results obtained suggests a possible breakdown of Rvi6 under the present ecological condition in Bistrita area. The fact that in the last years scab symptoms occurred on Rvi6 varieties could lead to the hypothesis that different scab races are now present in the area or that one of the existing races suffered a mutation that overcomes Rvi6.

Keywords: apple, breaking Rvi6, molecular markers, scab.

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STUDIES ON THE REDUCTION OF SULFUR DIOXIDE IN WINES USING DIFFERENT SUBSTANCES WITH ANTIOXIDANT AND FUNGISTATIC PROPERTIES

Alexandra SÎRBU¹, Maria ILIESCU¹, Liliana TOMOIAGĂ¹, Maria COMȘA¹,
Anca Cristina BABEȘ², Anamaria CĂLUGĂR², Laura ENACHE^{3*}

¹Research Station for Viticulture and Enology Blaj, Romania

² Department of Horticulture and Landscaping, University of Agricultural Sciences and Veterinary
Medicine, Cluj-Napoca, Romania

³ Research Institute for Viticulture and Enology Valea Calugareasca, Romania

*Corresponding author, e-mail: laurafotescu@yahoo.com

Introduction: Sulfur dioxide and sulfur compounds are effective means of achieving many of the goals of modern technology. To limit the amounts of SO₂ in wine, some substances with antioxidant and fungistatic properties could be used.

Aims: The experiments aims to reduce the SO₂ content of bulk wine by adding "Longevity", a specific inactive yeast and the "Bactiless" biopolymer, in different doses.

Materials and Methods: The research was applied on the Feteasca alba and Feteasca neagra wines, obtain through classical technology of white and red dry wines, respectively, both from the 2020 harvest. The experimental variants were: Control, Longevity (20, 30, 40, 0 and 40 g/hl) with Bactiless (20, 35, 50, 50 and 0 g/hl). The substances were left to operate for 10 days. The evolution of free and total sulfur dioxide and alcohol were tracked.

Results: The wine was analyzed for comparison before and after treatment, following the evolution of free and total sulfur dioxide and alcohol concentration. For Feteasca alba and Feteasca neagra wines, the alcohol concentration was 12,5% vol, which remains the same. Applying 40 g/hl of Bactiless for Feteasca alba wine, free SO₂ was reduced from 35,00 mg/l to 25,00 mg/l and total SO₂ was reduced from 122,50 mg/l to 117,50 mg/l. Adding 20 g/hl of Longevity and 20 g/hl of Bactiless to Feteasca neagra wine, free SO₂ was reduced from 22,50 mg/l to 12,50 mg/l and total SO₂ was reduced from 85,00 mg/l to 77,50 mg/l.

Conclusion: The results obtained for both Feteasca alba and Feteasca neagra wines, indicate a sulfur dioxide content under the values below the maximum limit allowed by the wine legislation. The values of sulfure dioxide (total and free) were lower than those prior to treatment. The analyzed wines kept their varietal characteristics and organoleptic properties, but with a low sulfur dioxide content.

Keywords: Bactiless, longevity, sulfur dioxide, wine

Acknowledgment: The work was funded by the program ADER 2020-2022, project 7.4.1 of the Romanian Ministry of Agriculture and Rural Development.

A SHORT PRESENTATION OF DWARF FRENCH BEAN "ANISIA" CULTIVAR OBTAINED AT SCDL BUZAU

Bianca Elena TĂNASE¹, Adrian ASĂNICĂ², Costel VÎNĂTORU¹, Elena BARCANU¹,
Ovidia AGAPIE¹, Ion GHERASE¹

¹*Vegetable Research and Development Station Buzau, Romania*

² *University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*

*Corresponding author email: biancae.tanase@yahoo.com

Introduction: The genus *Phaseolus* L. comprises about 75 species distributed in the New World between southwestern Canada and northern Argentina, with its center of diversity in Mexico, where over 90% of the species are found (Pérez de la Vega, et al. 2017). *Phaseolus vulgaris* is one of the most important vegetables with high nutritional value consisting in proteins, iron, magnesium, folic acid and complex carbohydrates (Pachico, 1993).

Aims: The aim of this study was to obtain a dwarf french bean genotype with the following characteristics: yield and quality potential, earliness and extreme environmental conditions.

Materials and Methods: The variety was obtained by repeated individual selection and now is submitted to the conservative selection program. Phenological, biometric and laboratory measurements were carried out during the vegetation period using the UPOV descriptors. For all agro-morphological, descriptive statistics were calculated: the means, standard deviation (SD), coefficient of variation and correlation matrix (Pearson).

Results: The 'Anisia' cultivar has straight, uniform and high quality pods. The degree of curvature pod is low, about 2-3 %. The pods have a simultaneous maturation, making the harvesting easy. The average weight of a pod at consumption maturity was 4.23 g and the pod at physiological maturity 13.14 g. The yield potential of fresh pods is 18-20 t/ha.

Conclusion: The research has been completed with obtaining of a new variety of dwarf french bean that has been registered in the Official Catalogue of Romanian Crop Plants under the name 'Anisia'. The analyzed characters passed the DUS test.

The variety has a distinct phenotypic expressiveness with a high yield and quality potential.

Keywords: beans, breeding, *Phaseolus*, pods

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FLATID PLANT HOPPER METCALFA PRUINOSA (SAY) (HEMIPTERA FLATIDAE) - POPULATION DYNAMICS IN TARNAVE VINEYARD

Liliana Lucia TOMOIAGĂ*, Maria COMSA, Veronica Sanda CHEDEA, Viorel
BUDIU, Florin MOTEA

Research Station for Viticulture and Enology Blaj (SCDVV Blaj), Alba County, Romania

*Corresponding author, e-mail: tomoialiliana@yahoo.com

Introduction: *Metcalfa pruinosa* (Say 1830) (Hemiptera Flatidae) or flatid plant hopper or North American plan thopper, a species introduced to Europe in the late 1970s, has become in recent years a major pest of a wide range of taxa in many countries on the continent. Global warming has favored the proliferation and spread of the species in Romania, so in the spring-summer of 2021 in the plantations of Tarnave vineyard was observed a high density of *Metcalfa pruinosa* species larvae on the leaves, shoots and bunches of grapevines.

Aims: Observations on the dynamics and biology of the species *Metcalfa pruinosa* (Say 1830) (Hemiptera Flatidae) in the conditions of the Tarnave vineyard and the tolerance of the grapevine varieties to the attack of the flatid plant hopper.

Materials and methods: The monitoring of the *Metcalfa pruinosa*'s presence and attack was done through visual observations on the experimental plots of SCDVV Blaj located in Blaj and Craciunelul de Jos from May to August 2021. The presence of the flatid plant hopper was determined by collecting and transporting the specimens to the entomology laboratory of SCDVV Blaj where they were identified and observed. The attack degree (AD) of the attack was determined.

Results: Under the conditions of the Tarnave vineyard, the first larvae's stages were observed at the beginning of May 2021. The nymph stage was difficult to observe due to the waxy secretion that covers them, but they were seen starting with June 5th 2021. The first adults appeared on July 13th. The values found for the varieties Fetească regală, Feteasca albă and Riesling italian were AD = 21%, AD= 15%, and AD = 16% respectively at Crăciunelu de Jos and AD=15% for Rubin and AD=18% for Blasius at Blaj.

Conclusions: The results showed the tendency of proliferation of the population of *Metcalfa pruinosa* species both on the grapevine and on the vegetation adjacent to the studied vineyards, the insect having one generation per year. Studies on the tolerance of *Vitis vinifera* varieties to the attack of flatid plant hopper will continue in the coming years.

Keywords: *Metcalfa pruinosa*, attack degree, grapevine cultivars, tolerance

Acknowledgements: This research was funded by the Romanian Ministry of Agriculture and Rural Development, program ADER 2020 – 2022, project 7.1.4.

RESEARCHES CONCERNING PHENOTYPIC AND BIOCHEMICAL EXPRESSIVITY FOR NEW GENOTYPES OF *PERILLA* SPP.

Costel VÎNĂTORU¹, Bianca MUŞAT^{1*}, Camelia BRATU¹, Geanina NEGOŞANU¹,
Adrian PETICILĂ² and Matilda POPESCU¹

¹ Vegetal Genetic Resource Bank- for Vegetables, Floriculture, Aromatic and Medicinal Plants Buzău

² Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine of Bucharest

*Corresponding author, e-mail: zamfir_b@yahoo.com

Introduction: During flowering, the frequency of pollinators foraging on *Perilla* was high. Honey bees comprised 93% of all insect visitors to this crop, with an average number of 14 individuals per sq. m. (Cinzia Barbieri et co., 2011). *Perilla* is cultivated as one commercial oilseed crop in other countries like Japan, Korea and northern India. Now it has also been introduced to Europe, Russia and USA as an oilseed crop (R. K. Bachheti et.co, 2014). *Perilla* plant contains a number of important phytochemicals such as Rosmarinic acid, Luteolin, Chrysocoriol, Quercitin (Akriti Dhyani et co., 2019)

Aims: Breeding and spreading for field production and also phenotypic and biochemical identification

Materials and Methods: Three varieties of *Perilla spp.* were studied and bred by repeated individual selection. The working methods consisted in phenotypic and biometric observations. The biochemical analyses were performed at dried leaves, flowers and seeds by gas chromatograph.

Results: The 3 varieties have distinct phenotypic characteristics: V1 with green leaves, V2 with bicolour leaves and V3 with red leaves. The chemical composition demonstrates the presence of useful compounds for human nutrition such as antioxidants, polyphenols, minerals, essential oils, B-carotene, amino acids with impressive antioxidant activity. The varieties are also melliferous.

Conclusion: The 3 varieties have strong characteristics of distinctiveness and a rich chemical composition

Keywords: antioxidants, oilseed, melliferous

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PHENOTYPIC AND BIOCHEMICAL CHARACTERISATION OF THE NEWLY DEVELOPED CULTIVAR OF *MOMORDICA CHARANTIA* – BRÂNCUȘI

Costel VÎNĂTORU¹, Bianca MUȘAT^{1*}, Camelia BRATU¹, Geanina NEGOȘANU¹,
Matilda POPESCU¹ and Cristian ȘOMOIAG¹

¹*Vegetal Genetic Resource Bank- for Vegetables, Floriculture, Aromatic and Medicinal Plants Buzău*

*Corresponding author, e-mail: zamfir_b@yahoo.com

Introduction: The original home of the species is not known, other than that it is a native of the tropics. Bitter melon grows in tropical areas (Dinakaran S.K. et al., 2010). Our study has shown clearly for the first time that karela improves glucose tolerance in diabetes, confirming previous anecdotal reports. (Leatherdale B. et al., 1981). *Momordica charantia* contains a collection of biologically active plant chemicals including triterpenes, proteins, steroids (Ahmad N. et al., 2016).

Aims: Phenotypic and biochemical characterization of a new variety obtained

Materials and Methods: The collection consists of 30 varieties, from which Brancusi variety was bred by repeated individual selection. The working methods consisted in phenotypic and biometric observations. The biochemical analyses were performed by sensory and physicochemical examination of 3 variants of processed fruit: powder, paste and dried fruit.

Results: The researches were completed by Brancusi variety patent that presents a distinct phenotypic expressiveness with white immature fruit and the highest yield per plant, of 9.2 kg. The highest percentage of total invert sugar, 1.18 g% but also carbohydrates 69.4 g% was obtained in the fine powder variant, which outlines a specific direction of use with numerous benefits in human nutrition.

Conclusion: A variety called Brancusi was obtained, with distinct phenotypic characteristics that give it uniqueness compared to other varieties.

Keywords: breeding, carbohydrates, white fruit

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A REVIEW REGARDING MICROPROPAGATION TECHNIQUES APPLIED ON TWO ECONOMICALLY IMPORTANT SPECIES: *IPOMOEA* *BATATAS* AND *SOLANUM TUBEROSUM*

Oana VENAT^{1,2}, Cătălina-Ioana NICOLAE^{1,2*}, Adrian PETICILĂ², Costel
VÎNĂTORU³ and Dorel HOZA²

¹Research Center for Studies of Food and Agricultural Products Quality, University of Agronomic
Sciences and Veterinary Medicine, Bucharest, Romania

²Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine, Bucharest,
Romania

³Vegetal Genetic Resource Bank- for Vegetables, Floriculture, Aromatic and Medicinal Plants Buzău,
România

*Corresponding author, e-mail: catalinaioana.nicolae@gmail.com

Introduction: *Solanum tuberosum* is the third world ranking species in terms of yield and consumption, after rice and wheat. *Ipomoea batatas* is the seventh world ranking production vegetable and provides food for over 68% of population. They are growing and fructification in hard climate conditions with arid soils or desert (sweet potato), and have important role in biodiversity through culture conditions adaptability, plant diseases and pathogens resistance (potato). Despite all these advantages, infections that are combined on those species reduce production capacity up to 90% in both species and this factor can be controlled to some extent by using micropropagation techniques and thermotherapy.

Aims: There is a constant concern for finding the connection between auxines-cytokines-gibberellins and others techniques that are capable to make micropropagation the suitable multiplication technique for *Solanum tuberosum* and *Ipomoea batatas*.

Materials and Methods: Scientific papers, treaties and communications were studied in order to gather the most relevant dates regarding micropropagation of those two species.

Results: The high genetic variability this two species have makes it difficult to standardize micropropagation protocols, such as disinfection, phytohormones combinations and other techniques used in micropropagation regarding the devirosation of the plant material and the production of virus free material.

Conclusion: *Solanum tuberosum* and *Ipomoea batatas* are two species that are two of the most cultivated worldwide, in poor or in development countries based on their nutritional values and their economical importance, scientists and breeders are focusing on biotechnologies to produce new varieties with high production capacity and promising resistance to pest, diseases and viruses.

Keywords: *Ipomoea batatas*, micropropagation, *Solanum tuberosum*, virus free

TOWARDS A WIDENING OF ROMANIAN NUCLEAR-STOCK PLUM VARIETIES

Luminița Antonela ZAGRAI*, Ioan ZAGRAI

Fruit Research & Development Station Bistrița, România

*Corresponding author, e-mail: lumizagrai@yahoo.com

Introduction: To reduce economic losses caused by viruses and phytoplasmas, one of the main preventive measures is to use 'certificate' plant material. Nuclear-stock material, also called Prebasic material, represents the top of storied pyramid of the certification scheme, and it's prerequisite for a successful production of propagation-stock, and then certified propagation or planting fruit trees. To secure a healthy plum propagation material along the whole chain of certification scheme, requirements stated in EPPO standards must be followed.

Aims: A nuclear-stock plum collection under insect-proof house is conserved at FRDS Bistrița and consist in twenty-one varieties and one rootstock used for stone fruits propagation. A widening of Romanian plum varieties at Prebasic category is required to create the opportunity to establish a unique valuable nuclear-stock collection of Romanian varieties and to secure the prerequisite for a good transfer of Romanian plum breeding results to the practical application.

Materials and Methods: Ten to twenty plants belonging to six Romanian plum varieties (Diana, Silvia, Tita, Pescăruș, Gras românesc and Tuleu dulce) were monitored in the field along two consecutive years for potential viral symptoms, and tested by serological and molecular tools. Selected trees of each variety were grafted onto virus-free Saint Julien rootstock, into insect-proof house, and retested. Serological tests were done for the following pathogens: *Plum pox virus*, *Prune dwarf virus*, *Prunus necrotic ring spot virus*, *Apple mosaic virus*, *Apple chlorotic leaf spot virus*, *Myrobalan latent ringspot virus*. Molecular test was used for 'Candidatus *Phytoplasma prunorum*'.

Results: Three grafted plants from each of the six varieties were chose to became Candidate-Prebasic material. Biological indexing of the Candidate-Prebasic was also started by using virus free plants of GF 305. The Candidate-Prebasic plants will be retested next year for the same viral pathogens, and also for the other pathogens and pest. Those plants which will confirm the status free of all pathogens and pests required by the rules of national regulatory will be certified as 'Prebasic' category, and preserved in nuclear-stock collection under insect-proof house at FRDS Bistrița.

Conclusion: Candidate-Prebasic material, the precursor for Prebasic category, was established to other six valuable Romanian plum varieties.

Keywords: Candidate-Prebasic plants, EPPO standards, plum, varieties

SESSION 5: ECONOMICS AND RURAL DEVELOPMENT

BIBLIOMETRIC ANALYSIS ON BIOECONOMY FOR SUSTAINABLE FOOD SYSTEMS

Steliana RODINO^{1*}, Maria Cristina STERIE¹, Gabriela Dalila STOICA¹ and Andreea Daniela GIUCĂ¹

¹ *Research Institute for Agriculture Economy and Rural Development, Bd. Marasti, nr 61, Bucharest Romania*

*Corresponding author, e-mail: steliana.rodino@yahoo.com

Introduction: Food systems, nutrition security, improved health and wellbeing is becoming an important pillar for the development of science, technology, policy and overall society. Ensuring food and nutrition security is key concern of the bioeconomy while food systems are included directly in nine out of the seventeen sustainable development goals set by United Nations General Assembly.

Aims: This paper overviewed the emergence and evolution of the concept of bioeconomy related to food systems, demonstrating that there is a high concentration of research studies on research and innovation in food science included in bioeconomy as a response to challenges of a regional and global nature.

Material and Methods: In order to identify the current trends in bioeconomy sector related to food science and technology in the research fields, a retrospective and descriptive bibliometric study was undertaken. Scopus collection was used as the data source, being actually the largest database of abstracts and articles in the world.

Results: The study took place in august 2021, by selection of keywords bioeconomy, bio-economy, bio-based economy and food related keywords. The analyzed period was from 1979 to 2022. Thus, a total of 935 publications met the search criteria and were analysed. The number of publications started to grow exponentially between 2012 and 2015, immediately after the launch of the first strategy for the bioeconomy in the European Union. This demonstrates the awareness of the importance of bioeconomy sector as one of the triggers for boosting innovation in food sector development.

Conclusions: Analysing the research papers published in the area and given the current trend in European strategies towards greener production, bioeconomy is arising as a significant tool to handle the challenges of food security and nutrition and generate sustainable economic growth.

Keywords: food systems, bioeconomy, innovation

RESEARCH ON THE IMPLEMENTATION OF EXTENSIVE NATURAL PROCESSES, WITHOUT ENERGY CONSUMPTION, FOR SUSTAINABLE WASTEWATER MANAGEMENT

Maria VAC¹, Călin VAC^{2*}, Dan MURESAN³, Andrei BOLBOACA³ and Anagabriela DEAC³

¹*Babes-Bolyai University Cluj-Napoca Romania*

²*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania*

³*Building Services Engineering Department, Technical University of Cluj-Napoca, Romania*

*Corresponding author, e-mail: calin.vac@usamvcluj.ro

Introduction: Sustainable development is now a necessity in the context of climate change, over-consumption of energy, discharges of very large amounts of waste into the environment, poverty and social exclusion, poor management of natural resources, biodiversity loss, inappropriate soils exploitation, affecting the long-term quality of life.

Aims: This article aims to investigate how the implementation of energy-free municipal wastewater collection and management systems is undoubtedly a truly sustainable solution, respecting the basic principles of environmental protection, public health protection, identification of economic resources for construction and exploitation, in harmony with socio-cultural integration within the human settlements they serve.

Materials and Methods: The practical validation of these solutions is being tested on the Cojocna agro-zootechnical farm, and covers wastewaters from the domestic use of administrative buildings, rainwater and meteoric waters, but also agro-zootechnical wastewater from farm animals. The research methodology is based on in situ calculations and determinations on the farm, carried out by a complex and transdisciplinary research team, and presented in the paper.

Results: This paper presents solutions for the sustainable management of wastewater without energy consumption, using extensive treatment processes, based on natural processes of decomposition and assimilation. The system consists of the multipurpose filtration anaerobic biological reactor, representing the primary stage, the horizontal or vertical lower flow filter plate, representing the secondary stage and the upper flow filter plate, representing the tertiary stage.

Conclusion: The overall conclusion that emerges from the research is that the energy-free management plant using natural processes is a possible and robust, high-efficiency, flexible, adaptable solution with easy deployment in all conditions.

Keywords: wastewater management, extensive natural processes, sustainable development, entrepreneurship

LCA AND LCCA METHODS IN APPLE ORCHARD MANAGEMENT, CONVENTIONAL AND ORGANIC

Ionela Mițuko VLAD^{1*}, Gina FÎNTÎNERU¹, Mariana BURCEA¹, Ana Cornelia BUTCARU¹, Ion CERTAN¹ and Tudor STANCIU¹

¹ University of Agronomic Sciences and Veterinary Medicine, 59 Bd. Mărăști, 011464, Bucharest, Romania

*Corresponding author, e-mail: vlad.ionela@managusamv.ro

Introduction: Life cycle assessment (LCA) is a scientific method measuring the environmental footprint of materials, products and services throughout their life. A LCA process includes defining objectives and scope, factor inventory analysis, impact assessment and interpretation. LCCA (Life Cycle Cost Analysis) is another life cycle approach that analyses the monetary costs directly involved for a product. Some limitations of the process will contribute to a differentiation in the ways of applying the LCA method in fruit production systems, which may lead to different results (Cerruti *et al.*, 2014). Meanwhile, the biggest challenge for most organizations is a real and substantial application of sustainability by measuring and comparing results, to meet the principles of sustainability (Petrillo *et al.*, 2016).

Aims: The paper aims to establish a framework based on the method of LCA and LCCA in order to select the best parameters of apple technology by identifying the particularities of fruit production technologies and providing practical recommendations on how to approach the two methods.

Materials and Methods: The methodology of the paper is the use of LCA and LCCA methods, as techniques for assessing the environmental elements associated with the technological process and the economic indicators.

Results: The results consist in a framework designed based on the LCA and LCCA methods suitable for application to the apple tree technologies in conventional and ecological system.

Conclusion: In the context in which the global development of societies poses high pressure on the environment, this methodological framework will identify the environmental risks corroborated with evaluation of technical and economic indicators at the level of fruit farms.

Acknowledgement: This work was supported by a grant of the University of Agronomic Sciences and Veterinary Medicine of Bucharest, project number 2021-0016, acronym ECO-LCA, within IPC 2021.

Keywords: LCA, LCCA, apple tree technologies

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SESSION 6: ANIMAL SCIENCE

EFFECT OF FISH MEAL SUBSTITUTION BY CRICKET FLOUR ON QUAIL PERFORMANCES IN THE SUDANO-GUINEAN ZONE OF CAMEROON

Francois DJITIE KOUATCHO^{1*}, Bachirou MOHAMADOU¹, Răzvan Mihail RADU-RUSU², Haman MOHAMADOU¹, Daniel SIMEANU², Aoudou BOBGA¹, Ioan Mircea POP², J.R. KANA³, T.L. NGAMO¹, Marius Giorgi USTUROI²

¹ Faculty of Sciences, University of Ngaoundéré, Cameroon

² Iasi University of Life Sciences, Romania

³ Faculty of Agronomy and Agricultural Sciences. University of Dschang, Cameroon

* Corresponding author, e-mail: franckdjitie@gmail.com

Introduction: Fish meal is an expensive feedstuff that counts to 70% of the poultry feeding cost. About 27% of marine fishing is processed into fishmeal or fish, not providing farming needs. Usage of local protein resources like cricket (*Acheta domesticus*) flour could be feasible.

Aims: Increasing the efficacy of quail farming, via fishmeal substitution by cricket flour in quail nutrition.

Materials and Methods: Study during Jul - Sep 2018 in Ngaoundéré, Cameroon, using 192 quails (4 wks old), allotted to 12 groups of 8 ♀ + 8 ♂. Each of the 4 experimental diets (T00, T15, T30, T45, levels of fish meal substitution by cricket flour of 0, 15, 30, 45%) in basic diet (CP 20,18%; ME 3013,78 Kcal/Kg) was randomly assigned to 3 groups in a completely randomized design (4 treats., 3 reps.). Data on growth, carcass and reproduction were analyzed via One-Way ANOVA and Duncan test.

Results: Cricket flour usage increased body weight (BW) in males (204,32±5,69g in T45) and regardless of sex (226,72±29,45g in T30) compared to 184,17±3,11g and 214,55±32,77g in T00. In females, 30% subst. increased BW (253,80±6,48g) and 45% decreased BW (216,67±6,49g) compared to T00 (244,92±6,07g). Carcass yield and cuts proportion were not significantly affected by substitution. Significantly higher liver % occurred in T15, T30 vs. T45. First eggs were laid at 7 weeks in T15, that had better lay performances. In T45 females, ovaries were less developed.

Conclusion: Cricket flour could replace fish meal in finisher and reproduction diets of quails at levels of 15 and 30%.

Keywords: Cameroon, cricket flour, fish meal, quail, production performance.

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HISTOMETRICAL METHODS IN ASSESSING TEXTURAL TRAITS OF GUINEA FOWL MEAT

Răzvan Mihail RADU-RUSU¹, Francois DJITIE KOUATCHO², Marius Giorgi USTUROI¹, Pierre Desire MBOUGUENG², Ioan Mircea POP¹, Gilles Bernard NKOUAM², Liviu-Dan MIRON¹, Daniel SIMEANU¹, Nicolas NJINTANG², Alexandru USTUROI¹, Dumitru Mihai ACATRINEI¹, Cristina Gabriela RADU-RUSU^{1*}, Claudia PÂNZARU¹, Roxana Nicoleta RAȚU¹

¹ Faculty of Food and Animal Sciences, Iasi University of Life Sciences, Romania

² Faculté des Sciences, Université de Ngaoundéré, Cameroun

* Corresponding author, e-mail: cradurusu@uaiasi.ro

Introduction: Texture affects acceptability of the meat in consumers, due to its hardness, juiciness and chew ability, affected by myocytes thickness and proportion of pure muscular tissue vs. connective fibers - meat stroma. Meat hardness and shear force could be derived from histological data.

Aims: Estimation of Guinea fowl meat textural traits by histometrical methods, in relation with gender and carcass cut.

Materials and Methods: Biological material, 90 Grey Guinea fowl (45 ♂ and 45 ♀) aged 3 months. Muscles were sampled from breast (*Pectoralis superficialis*, PS), thighs (*Semimembranosus*, SM), shanks (*Gastrocnemius lateralis*, GL), submitted to paraffin inclusion, HMB staining and microscopic analysis for myocytes thickness, muscle fascicles size, proportion of connective (CT) and pure muscular (MT) tissues. Data processing: descriptive statistics and ANOVA.

Results: Males myocytes in male's PS were thicker (51.28µm) than in SM (36.41µm) and GL (39.18µm). Females presented lower values (49.86µm in PS; 37.23µm in SM; 35.26µm in GL). Tissual categories varied accordingly: 75.18-76.23% MT and 23.77%-24.82% CT in PS, 81.34-81.82 % MT and in 18.18-18.66 % CT in SM; 79.42-80.04 % MT and 19.96-20.58% CT in GL.

Conclusion: White meat has thicker myocytes and more connective tissue than red one. The texture is expected to be better in Guinea fowl thighs meat. In males, meat is expected to be less tender, needing higher shear force for mastication, than in females.

Keywords: Connective tissue, Guinea fowl, myocytes, muscular tissue, texture.

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AN ANALYSIS OF THE REGIONAL DEVELOPMENT LEVEL IN ROMANIA USING PCA METHOD

Ancuța ROTARU ¹, Anamaria VÂTCĂ ¹, Ioana POP ², Sorin VÂTCĂ ³, and Luisa ANDRONIE ^{1*}

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.

² Department of Land Measurements and Exact Sciences, USAMV Cluj-Napoca, Romania.

³ Department of Plant Physiology, USAMV Cluj-Napoca, Romania.

* Corresponding author, e-mail: luisa.andronie@usamvcluj.ro

Introduction: Regional development is a concept that aims to boost and diversify economic activities, stimulate investment in the private sector, contribute to reducing unemployment and, last but not least, improving living standards. Regional development policy is one of the most important and complex policies of the European Union (Sedlacek and Gaube, 2010). Due to foreign direct investment, visible discrepancies are observed in the developing regions of Romania, most of the large investments being around Bucharest, the country's capital (Zaman *et al.*, 2011).

Aims: Through this paper, the authors aim to make a comparative analysis of the level of regional development in Romania at a distance of 10 years, starting from indicators selected by authors in the economic, social, education, health, agriculture, important areas in regional development.

Materials and Methods: There were analysed 12 statistical indicators using the PCA method. It is a statistical method used to reduce data, when the researcher wants to find out which variables in the set form coherent subsets that are relatively independent of each other. The data were taken from the website of the National Institute of Statistics of Romania.

Results: The PCA method was successfully applied on the 12 statistical indicators and in the two-time series (2009, 2019). The value of Bartlett's Test of Sphericity in both situations (299,662, Sig = 0.000 and 353,398, Sig = 0.000) shows the presence of at least one common factor, which explains the application of PCA. The number of main components preserved is highlighted after the application of the Kaiser Criterion (the KMO index has values between 0.5 and 1). It is observed that in the first situation (2009) 4 components are kept and in the second situation (2019) 3 components are kept. The first component was called by the authors economic statistics, the second social statistics and the third agricultural.

Conclusion: The paper tried to introduce the PCA based to notice an evolution of the regional development level in Romania, starting from the hypothesis that the level of development cannot be accurately described individually only from an economic, social, cultural point of view, etc.

Keywords: Correlation matrix, PCA, regional development.

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SESSION 7: BIOTECHNOLOGY

FT-IR SPECTROSCOPY MEASURES FOR CHARACTERIZATION OF SUGARS IN APPLES FRUITS

Luisa ANDRONIE¹, Ancuta ROTARU^{1*}, Ioana POP², Alexandru MATIES³

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

³ University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding author, e-mail: ancuta.rotaru@usamvcluj.ro

Introduction: Fourier transform IR spectroscopy (FT-IR) offers a rapid and nondestructive means of assessing the quality of apples by their relative sugar content that is this technique was applied for the quantitative analysis of total sugar in 5 apples varieties commercial fruit. Vibrational spectral techniques, FT-IR, offer several advantages in the context of current research and using this techniques we can identify molecular components in the samples studied.

Aims: In this study, because earlier claim shows that the plant used as stomachic, carminative, tonic, antipyretic, antidiabetic, in rheumatoid arthritis and gout, the present investigation was carried to characterized a principal components of fruits using FT-IR technique.

Materials and Methods: For FT-IR measurements were performed in the absorbance with a spectrophotometer FT-IR-4100 Jasco, using the KBr pellet technique. The spectra were obtained in the wavenumber range 265 cm⁻¹. Spectral resolution was set at 4 cm⁻¹ and all spectra were acquired over 256 scans. The sample was obtained from 0,003 g of dried fruits of apples and ground.

Results: The bands attributable to the apples fruits have been analyzed and discussed. In the “fingerprint” regione the intense and broad absorption band characteristic of glucose, fructose and sucrose in apples fruits is present, offering a quantitative assessment of their quality.

Conclusion: Using vibrational spectroscopy, it was proven that we can identify key molecular components in the samples studied and their molecular structure. This study has contributed to the characterization and identification of compounds in apples fruits.

Keywords: Apples fruits varieties, Fourier transform IR spectroscopy (FT-IR).

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ASSESSMENT OF L-TYROSINE USING SURFACE-ENHANCED RAMAN SCATTERING BY Ag NANOPARTICLES

Luisa ANDRONIE¹, Ancuta ROTARU^{1*}, Zamfir MARCHIȘ¹, Aurelia COROIAN¹,
Ioana POP², Ovidiu COLCER³, Sorina DÂRJAN³

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

³ University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

* Corresponding author, e-mail: ancuta.rotaru@usamvcluj.ro

Introduction: Amino acids are the molecular basis of proteins and enzymes. The principal elements of amino acids are carbon, hydrogen, oxygen, and nitrogen. Tyrosine is one of three hydroxyl containing amino acids. SERS substrate provide an innovative and powerful approach to protein and amino acids. Surface enhanced Raman scattering (SERS) technique has reached an increasing interest within the current applications in the bio-nanotechnology field [1], on one way due to the enormous interest in obtaining highly reproducible and controlled ordered metal arrays for optical sensing-based devices and on the other way, due to the unique and highly sensitive capability to detect and monitor trace amount of molecular species in complex biosystems.

Aims: The aim of this work was to investigate the adsorption of L-tyrosine species on Ag colloidal nanoparticles. The tyrosine does not easily absorb onto conventional silver surfaces.

Materials and Methods: The Surface-enhanced Raman scattering of aromatic acid (L-tyrosine) adsorbed on Ag colloidal particles have been obtained using citrate-reduces silver colloids at 10^{-4} mol⁻¹ concentration and the vibrational bands have been investigated in the spectral range of 170-1700 nm.

Results: SERS spectra of the L-tyrosine on Ag nanoparticles are discussed together with the corresponding molecular structures. The SERS analysis of L-tyrosine is important since they are considered the relevant amino acid because that are used by cells to synthesize proteins.

Conclusion: Surface enhanced Raman spectroscopy was employed for the investigation of the adsorbed geometry of the L-tyrosine and the functional groups involved in adsorption on the nanometer colloidal surface.

Keywords: Amino acids, L-Tyrosine, Surface enhanced Raman scattering (SERS).

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IMPROVEMENT OF LIPID AND LIPASE PRODUCTION IN *PICHIA KUDRIAVZEVII* USING CHEMICAL MUTAGENESIS

Viorica CORBU^{1*}, Ortansa CSUTAK¹

¹ Faculty of Biology, University of Bucharest, Romania

* Corresponding author, e-mail: viorica.corbu@yahoo.com

Introduction: Using genetically modified microorganisms for different industrial applications raises serious ethical issues. Therefore, random mutagenesis represents an alternative for enhancing production yields of yeast biocompounds.

Aims: Yeasts have high ability of producing enzymes, lipids a.s.o (Sreeharsha and Mohan, 2020). In this study, N-methyl-N'-nitro-N-nitrosoguanidine (NTG) mutagenesis was used to improve lipase and lipid production in a *Pichia kudriavzevii* strain grown on industrial wastes as carbon sources.

Materials and Methods: *P. kudriavzevii* CMGB-M6 strain from wine wort (Corbu and Csutak, 2019) was exposed to NTG mutagenesis (50µg/mL). The mutants selected on media with tributyrin were identified using PCR-RFLP on ITS1-5,8S rDNA-ITS2 region. Qualitative screening of lipase production was done on Tween 20, Tween 80 and tributyrin media. The amount of extracellular proteins was determined in presence of lipase inducers (Tween 20, Tween 80 and fried oil) using p-nitrophenyl butyrate. Accumulation of intracellular lipids was determined in presence of 5% fried oil, glucose, molasses, D-xylose and 0,5% ammonium sulphate, followed by NileRed staining. For quantitative assays a microplate reader ($\lambda_{\text{excitation}}=485\text{nm}$; $\lambda_{\text{emission}}=535\text{nm}$) was used.

Results: Three mutants were isolated; their taxonomical identification being confirmed by PCR-RFLP. Qualitative screening showed no significant improvement of lipolytic potential, suggesting that NTG most likely acted on genes encoding other extracellular proteins. Nevertheless, lipase inducers enhanced extracellular proteins rates in mutants. All strains had significant growth on D-xylose and molasses. Red Nile staining revealed fluorescent bodies, the mutants showing augmented lipid accumulation.

Conclusion: The NTG mutagenesis had a high impact on the ability of *P. kudriavzevii* CMGB-M6 to convert industrial wastes into lipids, representing an economic alternative to successfully optimize its biotechnological potential.

Keywords: Lipases; lipids; N-methyl-N'-nitro-N-nitrosoguanidine (NTG); *Pichia kudriavzevii*.

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AN INVESTIGATION INTO THE SENSITIVITY OF THREE LABORATORY METHODS FOR THE DETECTION OF ESBL *ESCHERICHIA COLI* IN FRESH MEAT

**Cosmin FAUR¹, Ștefania MESEȘAN^{1*}, Emanuel MUREȘAN¹, Adriana CRISTE¹ and
Robert H. MADDEN²**

¹ Department of Microbiology and Immunology, Faculty of Animal Science and Biotechnologies,
University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

² Veterinary Sciences Division, Bacteriology Branch, Agri-Food and Biosciences Institute, Belfast, UK

* Corresponding author, e-mail: stefania-dana.mesesan@student.usamvcluj.ro

Introduction: Antimicrobial resistance (AMR) is a major problem in some industries such as medicine, food industry and represents significant risks to human health (Marson *et al.*, 2016).

Aims: The goal of this study was to increase the detection of *E. coli* in raw meats resulting from replacing the aggressive EU selection and detection conditions with tryptone bile x-glucuronide chromogenic agar (TBX) (Anon 2001). In parallel, buffered peptone water (BPW) made selective for ESBL organisms by supplementation with cefotaxime (CTX), followed by isolation and detection on TBX as a procedure likely to increase the sensitivity of the detection methodology.

Materials and Methods: *Escherichia coli* in fresh meats involved a recovery step whereby 25g of meat was incubated overnight in BPW at 37 °C followed by selection on MacConkey agar (MCCA) supplemented with CTX and incubated at 44 °C (Hendriksen and Bortolaia, 2019). However, only 10μl of BPW suspension was streaked onto MCCA. Further, to select for *E. coli* the MCCA was incubated at 44 °C. The MCCA was supplemented with CTX adding additional stress to the *E. coli* and potentially reducing sensitivity.

Results: Sensitivity of each method was different from the others. In terms of the antibiograms, we used standard disc diffusion tests with cefotaxime, ceftazidime and both of them in combination with clavulanic acid. The results were significantly different in terms of sensitivity of detection of ESBL *E. coli* which ranged from 50% to 71%.

Conclusion: In the present research work, we investigated the antimicrobial resistance from 42 samples using three different laboratory methods in order to evaluate the sensitivity of *Escherichia coli* isolated from meat chickens in Romania. The study demonstrated low levels of resistance using ceftazidime with clavulanic acid and cefotaxime and clavulanic acid among *E. coli* isolates.

Keywords: Antibiotics, antimicrobial, *Escherichia coli*, isolation, resistance.

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BEE BREAD: SOURCES OF POTENTIAL VALUE-ADDED NUTRIENTS AND BIOACTIVE COMPOUNDS

Adriana Cristina URCAN^{1*}, Adriana Dalila CRISTE¹, Daniel Severus DEZMIREAN¹, Otilia BOBIȘ², Victorița BONTA²

¹ Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine, 3-5 Mănăștur Street, Cluj-Napoca, Romania

² Life Science Institute, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Mănăștur Street, Cluj-Napoca, Romania

* Corresponding author, e-mail: adriana.urcan@usamvcluj.ro

Introduction: Bee bread is a fermented bee product made of plant pollen, honey and bee saliva. This mixture undergoes through various biochemical transformations due to the action of enzymes from glandular secretions, microorganisms, humidity and temperature (35 °C) and it is generally used by bees as main protein source (Brodschneider & Crailsheim, 2010; Carroll *et al.*, 2017).

Aims: The aim of the present work is adding value to bee bread given more details about the main compounds that can provide health benefits as, for instance, sugars, free amino acids, phenolic and flavonoids content. Bioactivities as determination of DPPH scavenging activity, ABTS radical-scavenging, determination of ferric reducing/antioxidant power - FRAP were also performed to explore the biopotential of bee bread.

Materials and Methods: Determination of bioactive compounds and antioxidant activities was performed by the spectrophotometric method and determination of individual carbohydrates, amino acids and polyphenols by HPLC methods.

Results: The obtained results show that bee bread has a high quantity of proteins and essential amino acids, free sugars and a high amount of natural antioxidants such as polyphenols and flavonol glycoside derivative, being a product of the hive with a high biopotential. Data show a good value for the antioxidant activity and a possible correlation with the botanical source.

Conclusion: In conclusion the results suggest that bee bread could be considered sources of potential value-added nutrients and bioactive compounds.

Keywords: Amino acids, bee bread, bioactive compounds, fermentation.

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SESSION 8: VETERINARY MEDICINE - FUNDAMENTAL AND PRECLINICAL SCIENCES

***IN VITRO* STUDY OF ANTHELMINTIC ACTIVITY OF *INULA HELENIUM* AND *GENTIANA ASCLEPIADEA* EXTRACTS ON DONKEY STRONGYLES**

**Victoria BUZA¹, Maria Cătălina MATEI¹, Ion VLASIUC¹, Monica DĂNILĂ¹
and Laura Cristina STEFĂNUȚ¹**

¹ *Department of Preclinical Sciences, Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.*

*Corresponding author, e-mail: victoria.buza@usamvcluj.ro

Introduction: The rapid evolution and expansion of anthelmintic resistance has become a serious threat to public health around the world. The study of medicinal plants and their secondary metabolites might provide novel therapeutic alternatives for the currently used drugs.

Aims: Our study was designed to assess the possible ovicidal and larvicidal effects of 70% ethanol extracts of *Inula helenium* and *Gentiana asclepiadea* roots on donkey strongyle and to quantify the biologically active compounds of tested extracts.

Materials and Methods: Fecal samples from fifteen dairy jennies raised in a family farm located in Cluj County, Romania were collected for the testing. The obtained egg suspension was used for the following determinations: egg-hatching assay (EHA), larval development assay (LDA) and preparation of faecal culture (larval identification). Total phenolic content of plant extracts was determined using the Folin-Ciocalteu method, and total flavonoid concentration using the spectrophotometric method (aluminum chloride method).

Results: Tested plant extracts expressed strong ovicidal and larvicidal *in vitro* activity against donkey gastrointestinal nematodes at concentrations greater than 75 µg/mL, with slightly higher percentage of reduction for *I. helenium*. This can be explained by the difference in total flavonoids and polyphenolic content between plant extracts.

Conclusion: The performed study underlined that *I. helenium* and *G. asclepiadea* extracts represent valuable sources of compounds with anthelmintic potential.

Keywords: *Inula helenium*, *Gentiana asclepiadea*, plant extracts, anthelmintic, strongyle.

STUDIES *IN VITRO* REGARDING ANTIPROLIFERATIVE POTENTIAL OF RHODOXANTHIN ISOLATED FROM *TAXUS BACCATA* ARYLS

Daria-Antonia DUMITRAȘ^{1*}, Emo PALL¹, Mihai CENARIU¹,
Andrea BUNEA² and Sanda ANDREI¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania

² Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary
Medicine, Cluj-Napoca, Romania

*Corresponding author, e-mail: antonia.dumitras@usamvcluj.ro

Introduction: European yew (*Taxus baccata* L.) contains many active substances that can have a beneficial effect, such as taxol (known as Paclitaxel), but also others, like carotenoids, phenolic acids, sugars and fibers (Tabaszewska, 2021). Among the carotenoids, we must pay special attention to those with a retro structure, such as rhodoxanthin, which is the major carotenoid in the red aryls. Carotenoids exert their beneficial effects on the human and animal body through various mechanisms, among which the antioxidant potential is the main one, especially in the fight against neoplasms.

Aims: Our aim was to determine the cytotoxic and apoptotic effects of different concentrations of rhodoxanthin on two different cell lines.

Materials and Methods: Rhodoxanthin extracted from *Taxus baccata* was studied on two cell lines, HaCaT cells, a human keratinocyte line and B16F10 melanoma cell line. The rhodoxanthin used was extracted from *Taxus* aryl and purified by column chromatography.

Results: On normal cells, rhodoxanthin does not have a significant cytotoxic action, the percentage of viable cells being between 94.55 and 96.28 following their treatment with the extract of interest. The morphology of normal keratinocytes treated with rhodoxanthin remained unchanged, whereas on melanoma cells, rhodoxanthin has a strong cytotoxic effect, their viability percentage decreasing to 32.29% when using the highest concentration of rhodoxanthin (20.16 µg/mL). Also, in this case, cell morphology is visibly altered following rhodoxanthin exposure. Analysis by flow cytometry of cell viability based on the affinity of Annexin V for phosphatidyl-serine to determine the rate of apoptosis provided us with information similar to those given by the MTT test. Thus, for melanoma B16F10 cells exposed to rhodoxanthin, a majority of them were in early, delayed apoptosis or necrosis, while in the case of keratinocytes, the majority, between 95.3 and 97.2%, has been assigned to living cells.

Conclusion: The results obtained in the current study are valuable and indicate that rhodoxanthin possess a potential anticancer activity and definitely other beneficial effects. Further studies must be done in order to determine the antitumoral potency of this compound.

Keywords: apoptosis, B16F10, HaCAT, rhodoxanthin, viability, apoptosis

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DETERMINANTS OF INFECTION AS GENETIC INDICATORS IN MASTITIS IN COWS

Bianca Cornelia LUNGU¹, Ovidiu Ionut GEORGESCU¹, Beatrice Ana-Maria TUDOR¹,
Calin MIRCUI¹, Hortensja Lucja BRZÓSKA^{1*} and Ioan HUTU¹

*Faculty of Veterinary Medicine, Banat's University of Agricultural Sciences and Veterinary Medicine
"King Michael I of Romania" from Timisoara, Romania.*

*Corresponding author, e-mail: h.brzoska.12@alumni.ucl.ac.uk

Introduction: The resistance to antimicrobial substances severely impacts public health, and currently, there is a frequently observed abusive use of antibiotics leading to antimicrobial resistance (AMR) or antibiotic "resistome" (Wright, 2007). Bovine mastitis is largely diagnosed in dairy farms, with infections caused by widespread pathogens including *Streptococcus spp.*, *Staphylococcus spp.* and *Escherichia coli*.

Aims: Epidemiological screening for AMR of bacteria involved in mastitis in dairy cows was performed by gene expression testing: *ampC* - resistance to beta-lactam antibiotics and cephalosporins, *blaZ* - resistance to beta-lactam antibiotics, *ermB* - resistance to lincosamide, macrolide, *ermC* - erythromycin resistance, *mecA* - resistance to methicillin, and *tetK* - resistance to tetracycline.

Materials and Methods: Farms were selected by sampling from the University Extension unit's dairy farm database and milk samples were subjected to California Mastitis Test. Positive CMT samples obtained from each quarter were transferred using eSwab in the Animal Production Lab, cultured on Columbia blood agar and after isolation, also on MacConkey agar (Huțu et al., 2019). Qiagen DNeasy kit was used for DNA extraction and qPCR was run using Agilent thermocycler.

Results: In most of the samples tested (n = 42, from three different lactating farms), the presence of *ampC* (36 out of 42; 85.7%) and *blaZ* (95.2%) resistance genes confirmed AMR to beta-lactam and cephalosporin antibiotics. A variable presence of other tested AMR genes was detected, including *ermB*, showing resistance to lincosamide and macrolide (35.7%), *ermC* (28.6%), signifying erythromycin resistance, methicillin-resistant *mecA* (42.9%), and tetracycline-resistant *tetK* (78.6%).

Conclusion: The phenomenon of antimicrobial resistance is present in dairy farms in West Romania. A large number of AMR-inducing genes was detected in the samples tested, with the highest resistance observed to beta-lactam antibiotics and cephalosporins. Based on the obtained results, the authors strongly advise against the use of antibiotics in the treatment of dairy mastitis whenever possible.

Keywords: antimicrobial resistance, gene expression, mastitis

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IN VITRO QUALITATIVE ASSESSMENT OF TOLERANCE TO SIMULATED GASTRIC JUICE, BILE, FRUCTOSE, GLUCOSE AND LACTOSE FOR DIFFERENT PROBIOTIC BACTERIA

Maria-Cătălina MATEI LAȚIU^{1*}, Victoria BUZA¹, Flore CHIRILĂ¹, Zsolt BOROS¹, Călin LAȚIU², Andrei Radu SZAKACS¹ and Laura-Cristina ȘTEFĂNUȚ¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

² Faculty of Animal Sciences, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: catalina.matei@usamvcluj.ro

Introduction: Probiotics are considered to be live microorganisms with the ability to confer a health benefit to the host when they are administered in adequate amounts (Jensen et al., 2012). Their main site of action is at the intestinal level. In order to have a maximal effect, probiotic bacteria have to prove a high tolerance for the conditions present in the upper gastro-intestinal tract (Cotter and Hill, 2003).

Aims: The aim of the present study was to assess, from a qualitative point of view, the tolerance of different probiotic bacterial strains and combinations to simulated gastric juice, bile, fructose, lactose and glucose. Also, the influence of food on the bacterial growth after artificial digestion was analysed.

Materials and Methods: Three different commercial probiotic products were used, with the following bacteria combinations: *Bacillus subtilis* + *Bacillus licheniformis* + *Pediococcus acidilactici* (P1); *Enterococcus faecium* (P2); *Bacillus subtilis* + *B. licheniformis* + *B.coagulans* + *B.indicus* + *B. licheniformis* (P3). The bacteriologic assessment was realized for all the strains, in different conditions: simulated gastric juice (artificial digestion method), presence of bile, fructose, glucose, lactose. The bacterial tolerance to simulated gastric juice was assessed in two ways: in the absence of the food and in the presence of the food.

Results: Regardless of the probiotic bacterial strain or combination, the obtained results suggested that the tolerance to simulated gastric juice is higher if the food is present in the moment of digestion. The acidic pH of the gastric juice is modified by the presence of the food, aspect that may explain the higher tolerance of the bacteria to the simulated gastric juice. Bile tolerance is different from one combination to another. For P1 and P3 a low bactericide action was noted with a lysis zone of 1,5-2 mm around the round paper with liquid bile. Both, P1 and P3 contain sporulated bacteria that may improve their viability in the conditions of gastro-intestinal tract. The influence of fructose, lactose and glucose are not remarkable from a qualitative point of view.

Conclusion: In the present study it was suggested that the growth of different probiotic bacterial strains is influenced by the simulated gastro-intestinal conditions, sporulated bacteria presenting a slightly higher tolerance compared with non-sporulated strains.

Keywords: bacterial tolerance, gastro-intestinal tract, probiotics, simulated conditions

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ASSESSMENT OF PHYSICOCHEMICAL PARAMETERS AND MICROBIOLOGICAL QUALITY OF GOAT MILK

Cristiana Ștefania NOVAC¹, Sanda ANDREI^{1*}, George Cosmin NADĂȘ¹, Ioana Adriana MATEI¹, Cosmina Maria BOUARI¹, Sorin Daniel DAN¹ and Nicodim Iosif FIȚ¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

*Corresponding author, e-mail: sandrei@usamvcluj.ro

Introduction: Goat milk has been gaining attention worldwide due to its qualities, easy digestibility and lower allergenic properties compared to cow milk (Clark and Garcia, 2017). The composition of goat milk is influenced by non-infectious factors, but nevertheless infectious factors, such as mastitis influence milk physicochemical parameters, as well as the somatic cell count (SCC). Over time, the sterility of the healthy mammary gland has been questioned, thus it was concluded that there is an intramammary bacterial flora and that the occurrence of mastitis would be a consequence of a dysmicrobism (Rainard, 2017).

Aims: This paper aims to analyze the milk physicochemical parameters and SCC, as well as to characterize the milk microflora and its sensitivity to antibiotics.

Materials and Methods: The physicochemical parameters and SCC were analyzed using Lactoscan Milk Analyzer. Bacterial species identification was done using the Vitek® 2 Compact system and yeasts were identified using chromogenic media. The evaluation of antimicrobial susceptibility was performed using Kirby-Bauer disk diffusion test.

Results: On average, milk samples were characterized by 4.67% lactose, 4.17% lipids, 3.38% protein, electrical conductivity 6.21 mS/cm and 189.9×10^3 somatic cells/ml. The most frequently isolated microorganisms were *Enterococcus durans*, *Kocuria rosea*, *C. glabrata* and *C. krusei*. Amoxicillin and clavulanic acid was among the most efficient antibiotics.

Conclusion: The results are consistent with the findings in the literature and they suggest that the mammary gland of clinically healthy goats is not a sterile substrate, but it may be a reservoir of microbial agents whose role is not fully understood.

Keywords: antibiotic sensitivity, composition, goat milk, microflora

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CANNABIDIOL OIL *IN VITRO* AND *IN VIVO* CYTOTOXICITY STUDIES

Andra POPESCU¹, Orsolya SARPATAKI¹, Bogdan SEVASTRE¹, Alexandra DREANCA¹, Aurelia JOURDAN¹, Shani HIRSCH¹, Andras NAGY¹ and Ioan MARCUS¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca*

*Corresponding author, e-mail: alexandra.dreanca@usamvcluj.ro

Introduction: Cannabidiol oil (CBD oil) has a wide array of uses in both human and veterinary medicine, as it has anti-epileptic, analgesic, anxiolytic and cardioprotective effects, alongside its potential to mediate oncological side effects.

Aims: It is important to conduct both *in vitro* and *in vivo* cytotoxicity studies before reaching the general population of either humans or animals. It is of utmost importance to be certain that a product is safe for the patient whom it is beneficial for.

Material and methods: The *in vitro* cytotoxicity study was conducted on rat cardiac myocyte cultures. For the assessment of the proliferation potential and cytotoxic effect of CBD oil, confluent cultures were treated with 5 different concentrations of CBD oil (5, 10, 20, 25 and 30 µl). After 24 hours of exposure, cell viability was determined by an MTT test. The test reflects the normal functioning of the mitochondria and hence cellular viability. The *in vivo* cytotoxicity study was an acute study conducted on 7 male Wistar rats. The rats were given varying doses by oral gavage from 50 mg/kg to 2000 mg/kg in order to check for any signs of toxicity both clinically and histopathologically.

Results and discussions: The results obtained from the *in vitro* study indicated that no concentration showed any signs of cytotoxicity; at 20 and 25 µg concentrations, a statistically significant cellular proliferation was observed and at a 30 µg concentration, both cellular viability and proliferation were observed. The results obtained from the *in vivo* study showed little to no behavioral changes in the rats as well as no signs of cytotoxicity at the organ level.

Conclusions: This cannabidiol product, based on these toxicity results, is deemed to be safe for use in both human and veterinary patients for various pathologies.

Keywords: acute toxicity, cannabidiol, cytotoxicity, MTT

A MOLECULAR PROCEDURE FOR DETECTING DAIRY PRODUCTS ADULTERATION

Beatrice Ana-Maria TUDOR¹, Oana-Maria BOLDURA^{1*}, Călin MIRCUI¹,
Camelia TULCAN¹, Simona MARC¹, Bianca Cornelia LUNGU¹ and Ioan HUȚU¹

¹*Faculty of Veterinary Medicine, Banat's University of Agricultural Sciences and Veterinary Medicine
"King Michael I of Romania" from Timisoara,*

*Corresponding author, e-mail: [oanaboldura@usab-tm.ro](mailto: oanaboldura@usab-tm.ro)

Introduction: Dairy products are an essential component of human nutrition. It is considered that 30% of the need for lipids and proteins and 80% of the daily requirement of calcium is provided by dairy products. In this context the paper presents the validation of a modern method, based on DNA analysis (Hutu et al. 2013; Boldura et al. 2017), adapted to the requirements of a common market, fast and cost-effective to establish the specie composition of dairy products.

Aims: The goal of the presented work is the validation of a qualitative PCR detection technique of the composition of dairy products that will be adapted to the domestic market starting from experimental models developed and well defined internationally.

Materials and Methods: In the process of validating this method, three species of ruminants were considered: beef; sheep and goat. The reference material was certified by analysing milk proteins of each considered species. Cheeses were prepared from the certified milk in strictly controlled percentage mixtures. DNA isolated from the prepared cheeses was used to validate a multiplex PCR method, for the simultaneous detection of the three studied species.

Results: Identification of species based on milk protein content by using the method of microfluidic electrophoresis, has proven to be very accurate. But, the most efficient and accurate methods for detecting species composition of dairy products are based on detection of specific mitochondrial DNA sequences. The reference materials developed in this work are optimal for such studies and have been used successfully in the process of validating the method of detecting the composition of cheeses. At the same time, these materials made it possible to set a detection limit of 1% for the fraudulent addition of cow's milk to the composition of dairy products.

Conclusion: The experiments described here enable us to validate the detection PCR based detection procedure and also a limit of detection for the fraudulent addition of cow milk in unlabelled dairy products.

Keywords: dairy products, adulteration, multiplex PCR, mitochondrial DNA.

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STUDY REGARDING THE ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY OF *LONICERA JAPONICA* L. ALCOHOLIC EXTRACT

Camelia TULCAN¹, Maria Roberta TRIPON¹, Cristina GASPAR¹, Oana Maria BOLDURA¹, Simona MARC¹, Ioan HUȚU¹, Alina NEACSU² and Alma Lioara NICOLIN^{2*}

¹ Faculty of Veterinary Medicine, Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I" Timișoara

² Faculty of Agriculture, Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I" Timișoara

*Corresponding author, e-mail: alinaneacsu@usab-tm.ro, alma_nicolin@usab-tm.ro

Introduction: The use of natural products for healing purposes has gained great attention worldwide. Increased interest in certain plant products has been achieved mainly due to their ability in limit antibiotic resistance. Also, as the hypothesis that all biological processes at the cellular level are severely affected by the formation of free radicals has been confirmed, it is attempted to highlight some active principles in plants and their use as agents to counteract the oxidative process.

Aim: This paper aims to demonstrate the antioxidant and antimicrobial capacity of the alcoholic extracts from the leaves and flowers of *Lonicera japonica*, a widespread ornamental plant. The whole study is based on two major target activities: analysis of the antioxidant activity of the extracts as well as the quantification of their antimicrobial capacity on two bacterial strains: *S. aureus* and *E.coli*.

Materials and Methods: In order to analyze *L. japonica* antioxidant and antimicrobial properties, 70% methanolic extracts were obtained from its leaves and flowers in different flowering stages. The total antioxidant capacity of the extracts was determined via the FRAP method. For the determination of the superoxide dismutase activity (SOD), the hydroxylamine oxidation method (Elabscience *E-BC-K019-M* assay kit) was used. The total polyphenolic content was quantified via the Folin-Ciocalteu micromethod (gallic acid as standard) and the total flavonoids content was evaluated using the colorimetric method with NaNO₂ (rutin as standard). Antibacterial activity of the extracts was evaluated on *S. aureus* and *E. coli* by the broth microdilution method. The inhibition percent was calculated from the OD values of the extract-culture mixture.

Results: For the total antioxidant capacity, the results' values were in the range of $813,45 \pm 0,51$ and $1219,69 \pm 0,09$ U/ml, as for the SOD between $50,13 \pm 1,70$ and $204,59 \pm 0,87$ U/ml. The total polyphenolic content indicated values from $9,07 \pm 0,13$ to $11,27 \pm 0,01$ mg/g and the total flavonoids were up to $45,19 \pm 0,04$ mg/g. Regarding the antibacterial activity of *L. japonica* extracts, the inhibition percent (%) reached 57,44% on the *E. coli* strain and up to 43,12% on *S. aureus*.

Conclusion: The results obtained after testing the antioxidant and antibacterial activity of the alcoholic extract of *L. japonica* demonstrates the possibility of its successful use for both purposes. The antioxidant capacity of the extracts is primarily due to the presence in the structure of the plant organs of phenolic compounds such as polyphenols, phenolic acids and terpenes. Regarding the antimicrobial activity of *L. japonica*, the results reached considerable values, which could indicate the successful use of the plant extracts for antibacterial purposes.

Keywords: antibacterial activity, *Lonicera japonica*, methanolic extracts, oxidative stress

STUDIES REGARDING THE DETECTION OF SULFONAMIDE RESIDUES AND EVALUATION OF THE LEVEL OF CONTAMINATION IN POULTRY MEAT

Gabriela Valentina VESA¹, Anette Iudit GHEIȚI-HEGHEDUȘ^{1*}, Marian MIHAIU¹, Liora Mihaela COLOBĂȚIU² and Dariana BRATFELAN¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania*

²*Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania*

*Corresponding author, e-mail: anette-iudit.gheiti-heghedus@usamvcluj.ro

Introduction: The excessive or uncontrolled use of antibiotics in poultry farming can lead to contaminated food products. Subsequently, the human consumption of products contaminated with these substances increases the global phenomenon of antibiotic resistance.

Aims: The aim of this study was to develop and validate a high-performance liquid chromatography (HPLC) method suitable for the determination of sulphonamide residues in poultry meat. The level of antimicrobial resistance was identified in order to evaluate the current stage and to estimate the tendency of this phenomenon.

Materials and Methods: The HPLC method validation was performed in accordance with 2002/657/EC: Commission Decision of 12 August 2002. Samples of fresh meat collected from a poultry slaughterhouse were analyzed using the validated method in order to reveal the level of contamination. The data from EFSA was collected and analyzed following the antimicrobial resistance for isolates of *Salmonella* spp., *E. coli* and *Campylobacter* spp.

Results: The method had good selectivity, linearity ($R^2 \geq 0.99$), precision ($< 6\%$), effectiveness between 97.7-109.6% and low limits of detection (LOD) and quantification (LOQ) Sulphaquinoxaline residues were present in 2 samples and the level of contamination did not exceed the Maximum Residue Level ($31.98 \pm 5.18 \mu\text{g/kg}$ and $23.70 \pm 3.84 \mu\text{g/kg}$). The analysis of data from EFSA highlighted the general presence of antimicrobial resistance especially for the following antibiotics: ciprofloxacin, tetracycline, nalidixic acid, ampicillin, sulfamethoxazole and trimethoprim.

Conclusion: The present study brings a contribution to the process of stopping antibiotic resistance through new methods of monitorization of sulphonamide residues. The statistical data shows that there is a direct correlation between the market availability of antibiotics used in poultry farming and the occurrence of antibiotic resistance.

Keywords: contamination, EFSA, HPLC, sulphamide residues, validation

PREVALENCE OF DIGESTIVE CARRIAGE OF *E.FAECALIS* AND *E.FAECIUM* SPECIES IN BROILER AND CHARACTERIZATION OF THEIR ANTIMICROBIAL RESISTANCE PROFILE

Safia YOUSFI^{1*}, Amine MSELA², Nabila HAMMAMI¹, Madjid SADI¹,
Naouel FEKNOUS¹, Aicha DEBIB³ and Achour YAHIA¹

¹ Institute of Veterinary Sciences, Blida University 1, Algeria.

² University of Mouloud Mammeri of Tizi Ouzou, Algeria.

³ Institute of Sciences, University Morsli Abdellah of Tipaza, Algeria.

* Corresponding author, e-mail: tifou-y@hotmail.fr

Introduction: Enterococci are natural hosts of the digestive tract of humans and animals. The two main species responsible for infections in humans are *Enterococcus faecalis* and *Enterococcus faecium*. Today, three elements lead to a renewed interest in enterococci, namely the increasing number of their isolation during various infections, the importance of their place in nosocomial pathology and the emergence and accumulation of antibiotic resistance mechanisms.

Aims: The objective of our study is to evaluate the digestive carriage of two species of enterococci: *E.faecalis* and *E.faecium* in broilers, and to study the resistance of isolates to different families of antibiotics, in particular to Glycopeptides.

Materials and methods: The two species of enterococci were identified with conventional methods based on morphological and biochemical characters, and the isolates were tested for antibiotic susceptibility by the Kirby Bauer agar diffusion method and a panel of ten antibiotics was tested.

Results: The study of the digestive carriage of enterococcal species in broilers showed the predominance of *E.faecalis* (60%), followed by *E.faecium* (40%). High percentages of resistance to Tetracycline and Erythromycin were observed (88% and 61% respectively), low levels of resistance to Ciprofloxacin and Penicillin, with rates of 04% and 03% respectively. Resistance to high concentrations of Streptomycin was recorded (05%). However, all strains were sensitive to Vancomycin, Ampicillin, high level Gentamycin, Nitrofurantoines and Chloramphenicol.

Conclusion: The most frequent antibiotic resistances detected in our study are to antibiotics widely used in livestock (Tetracyclines and Macrolides). Vancomycin resistance was not detected in our study, but some of the reported resistances (resistance to high levels of Aminosides and Penicillins), if spread in the food chain, would have public health implications.

Keywords: Antibiotic resistance, Broiler, Digestive carriage, *E.faecalis*, *E. faecium*.

MODALITIES OF ANTIBIOTIC USE IN POULTRY FARMING: SURVEY IN THE WILAYA OF BOUMERDES AND AIN DEFLA

Safia YOUSFI^{1*}, Nabila HAMMAMI¹, Amine MSELA², Naouel FEKNOUS¹,
Aicha DEBIB³ and Achour YAHIA¹

¹ *Institute of Veterinary Sciences, Blida University 1, Algeria.*

² *University of Mouloud Mammeri of Tizi Ouzou, Algeria.*

³ *Institute of Sciences, University Morsli Abdellah of Tipaza, Algeria.*

* Corresponding author, e-mail: tifou-y@hotmail.fr

Introduction: Antibiotics are indispensable tools for the treatment of bacterial infections in both human and veterinary medicine. However, we must individually and collectively justify our treatment choices in order to preserve the effectiveness of the molecules as long as possible.

Aims: The objective of our work is to have information on the practices of antibiotic therapy in poultry farming and to appreciate the importance of therapeutic failures encountered in current practice.

Materials and Methods: A field survey by means of a questionnaire, carried out among 39 private veterinarians in the Wilaya of Boumerdes and Ain Defla, and who ensure the follow-ups of poultry farms, has described their practices towards antibiotics.

Results: The survey revealed a very frequent use of antibiotics in animal husbandry, both for prophylactic and curative purposes. The results also show that the majority of surveyed veterinarians (75%), prescribe antibiotics without going through the laboratory diagnosis, which obliges them to follow only the clinical aspect to formulate their diagnosis, this is followed by a probabilistic antibiotic therapy, an approach that is not without consequence, the indiscriminate use of these molecules has, in general, resulted in destroying the ecological barriers and selection of resistant strains. Also, the respondents say that they are confronted with the problem of therapeutic failures, and that antibiotic resistance is the most suspected cause.

Conclusion: The investigation revealed a remarkable lack of control over the use of antibiotics, from the choice of active molecules to their administration to animals. The promotion of good antibiotic therapy practices is more than ever necessary in order to limit the selection of resistant bacteria, to preserve the effectiveness of the antibiotic drug, but also to limit the presence of drug residues in food of animal origin.

Keywords: Antibiotic resistance, Antibiotic therapy, Poultry farming, Survey, Therapeutic failures.

EVALUATION OF STRESS THE RIDING HORSES, DURING THE HORSE-ASSISTED THERAPY ACTIVITIES IN THE CASE OF CHILDREN WITH AUTISM SPECTRUM DISORDERS

Ana Maria ZAGRAI (MAIEREAN)¹, Gabriel COTOR², Gavrilă ZAGRAI^{1*}, Gabriel GÂJÂILĂ², Marian GHÎȚĂ², Alina Maria IONESCU², Dragos Corneliu COTOR¹ and Aurel DAMIAN¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca*

²*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Bucharest*

*Corresponding author, e-mail: gavrilazag@yahoo.com

Introduction: Animal stress is an intense topic addressed by researchers in the field. The general adaptation syndrome, produced by short exposure to stressors with low or medium intensity, has a positive effect, inducing stress, and improving the body's adaptive capacity. Exposure of animals to strong or long-term stressors has the effect of inducing distress. It has negative implications that can lead to a pathological evolution.

Aims: Assessing the stressful effect they have on horses, the specific activities of equine-assisted therapy, in the case of children with autism spectrum disorders.

Materials and Methods: In our experiment we used 10 riding horses (8 females and 2 males) of Pure English Blood Race. The 10 horses, divided into 2 groups, were aged between 4-8 years. The animals had the same conditions of maintenance and diet. Blood samples were taken from the jugular vein in 5 ml heparinized tubes. The above parameters were determined using a ProCyt Dx Hematology Analyzer. The obtained data were statistically analyzed, calculating the Media and Standard Deviation (SD), using the Microsoft Excel application.

Results: In the case of group 1, the level of red blood cell count was 1.9% higher at the second collection. In group 2, the level of red blood cells was higher by 0.1% at the second harvest. In group 2, the level of leukocytes in the blood was 2.4% higher at the second harvest. The share of neutrophils in the leukocyte formula, in the case of group 2, was higher by 0.35% at the second harvest. The share of lymphocytes in the leukocyte formula, in the case of group 1, was lower by 9.09% at the second harvest. The share of lymphocytes in the leukocyte formula, in the case of group 2, was lower by 4.12% in the second harvest.

Conclusion: Our results highlight that the specific activities of equine-assisted therapy do not have a stressful effect on the pathways used. These activities were obviously less stressful than the usual recreational activities in a riding school, induced by the activities specific to equine-assisted therapy, activities that subject the animal to less intense physical effort than those following daily activity from riding.

Keywords: Equine, stress, autism, red blood cells, leukocytes.

RESEARCH ON THE DISTRIBUTION OF CORONARY ARTERIES IN PIG (SUS SCROFA DOMESTICUS)

Gavrilă ZAGRAI¹, Cristian Romeo BELU^{2*}, Iulian DUMITRESCU², Ștefania Mariana RAITA², Mădălina DOBRILĂ², Sorina-Andreea MIHAI², Dragoș Corneliu COTOR¹ and Aurel DAMIAN¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca

² Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine Bucharest

*Corresponding author: email: cristbelu@yahoo.com

Introduction: Pigs are some of the most widely used experimental models, an advantage being the characteristics of homeostasis and many morphological features comparable to those in humans. The pig is currently recognized as a non-smelly animal model, widely used in biomedical research. Moreover, the species is particularly important for experiments aimed at xenotransplantation of organs in humans.

Aims: The aim was to highlight some features of the coronary artery system in this species.

Materials and Methods: The present study was performed on 20 pig cords, from animals of different weights and ages (2-4 months). The cords were harvested from animals of common breeds. Using dissection techniques, step by step, the opening of the aortic bulb was followed, where the original orifices of the cardiac arteries - left and right coronary arteries were highlighted. After highlighting them, we inserted a catheter into the lumen of the coronary arteries, the right coronary artery, followed by the left coronary artery, after which we injected into the lumen of the vessel the contrast agent AGO, which was stained with red pigment. After injection of the contrast agent, the cords were placed in water with 10% formalin for approximately 24 hours to achieve fixation.

Results: In pigs, the myocardial volume served by the left coronary artery is higher compared to that served by the right coronary artery, which is why it is considered dominant. The coronary arteries detach from the aortic bulb, according to the classical norm described in the literature somewhat similar to those in humans. The left coronary artery is very short and divides into an interventricular paraconal branch and a left circumflex branch. They give branches intended mainly for the atrium and left ventricle. The paraconal branch gives rise in the proximal part to an interventricular septal branch that is distributed to the largest area of the dorsal and central part of the septum. The right coronary artery serves mainly the right atrium and ventricle and continues constantly as a subsinusal interventricular branch. The atrio-ventricular branch of the right coronary artery irrigates a small part of the dorsal interventricular septum, especially on the right side.

Conclusion: As a general conclusion, regardless of the polymorphism in all dissected cases, the left coronary artery was the dominant artery, there being no exception from the data known in the literature.

Keywords: heart, swine, coronary, arteries.

SESSION 9: VETERINARY MEDICINE - CLINICAL SCIENCES

IMPROVING THE MULTI-ACTOR FARM HEALTH PLAN IN ROMANIAN DAIRY FARMS BY USING NATIONAL EXCHANGE VISITS: A CASE STUDY

Stelian BARAITAREANU^{1*}, Alexandru DUTULESCU^{1,2}, Bogdan MIHAI^{1,3}, Robert MIHAI^{1,3}, Viorel NASTASE⁴, Tiberiu CONSTANTIN¹ and Livia VIDU¹

¹ University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

² Gruiu Dairy Farm, Romania

³ Moara Domneasca Dairy Farm, Romania

⁴ Agrozootehnica Ulmeni, Romania

*Corresponding author, e-mail: stelian.baraitareanu@gmail.com

Introduction: Prioritizing and promoting practitioners' expertise in finding and resolving dairy farm-specific challenges by organising “Danish stable” schools (DSS) with veterinarians, farmers, and other advisors have been extensively promoted in UK and Denmark (Vaars *et al.*, 2007; Morgans *et al.*, 2021).

Aims: Development of DSSs in Romanian dairy farms in order to exchange national experience, improve biosecurity and develop multi-actor farm health plans (MAFHP).

Materials and Methods: The DSS was organised in a dairy farm with a young farm health manager and 4 visiting practitioners with equal competencies (all the experiences and opinions of one practitioner are accepted by the other practitioners). The farm has a MAFHP with goals and points of improvement in a Planning-Do-Check-Adjust cycle.

Results: The main subjects debated were the improvement of watering by using float (ball) systems, ozone treatment as an alternative to the use of antibiotics in buiatrics, the management of recurrent udder diseases, and finding alternative treatment solutions to reduce antibiotic use in animals.

Conclusion: The DSS is an innovative approach in finding the best solutions to reduce the need for antibiotics in animals by using the practitioners' expertise.

Keywords: AMR, best practices, dairy farm innovation, stable school

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COMPARATIVE ASPECTS IN VITAMIN A DEFICIENCY IN REPTILES AND BIRDS KEPT IN CAPTIVITY AS PETS

Mariana-Gabriela BUMBU^{1,*}, Lucia-Victoria BEL¹ and Ioan MARCUS¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania*

*Corresponding author, e-mail: mariana-gabriela.bumbu@usamvcluj.ro

Introduction: In exotic animals kept in captivity, such as birds and reptiles, nutritional deficiencies are the most common problems. This is reflected in our lack of understanding of the nutritional needs of these animals, but also the unavailability of information to the owners. This paper aims to outline vitamin A deficiency in both birds and reptiles, this being the most common nutritional disorder present in animals that come into the clinic (Hernandez-Divers, 2008).

Reptiles: Vitamin A is often involved in reptile diseases, some manifestations being eyelid edema and ear abscesses. Insects are poor sources of vitamin A, retinol, because invertebrates generally do not convert carotenoids to retinol and most retinoids are found in insect eyes. Whole prey generally contains enough vitamin A in the liver. Vitamin A serves as a visual pigment in photoreceptors (cones and rods) and also encourages the formation of mucus-secreting cells at the expense of keratinized cells to synthesize glycoproteins, meaning it acts as a hormone that regulates epidermal growth. This effect becomes evident when vitamin A is insufficient, resulting in hyperkeratosis (Xie and Low, 2013).

Birds: Hypovitaminosis A can lead to metaplasia of mucous membranes, which in turn can lead to chronic rhinitis and respiratory fungal infections. Vitamin A is associated with epithelial cell differentiation and the immune system's response to bacterial infections. Vitamin A deficiencies in birds are often associated with poor epithelial cell development and thus may present in the form of sinus infections and poor skin care. Vitamin A deficiency is caused by offering an exclusive diet of seeds and nuts, especially sunflower seeds and peanuts (Schoemaker *et al.*, 1999).

Conclusion: The diet of birds and reptiles susceptible to this deficiency must be corrected so as to cover all nutritional deficiencies, and where dietary adjustment is not sufficient, appropriate veterinary therapy should be initiated.

Keywords: birds, deficiency, reptiles, vitamin A

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CAN WHEAT GERMINATION TEST BE USED TO PREDICT PREGNANCY IN EWES?

Nicolae Tiberiu CONSTANTIN^{1,2*} and Andra ȘIPOȘ^{1,2}

¹University of Agronomic Sciences and Veterinary Medicine, Bucharest, Romania

²Research and Development Institute for Bovine Balotești, Ilfov, Romania

*Corresponding author email: constantin.ntiberiu@yahoo.com

Introduction: Several invasive diagnosis methods to predict pregnancy in humans and animals, were used in the past. Since Antiquity, to avoid the possibility of miscarriage, grains germination test, was used to predict more safely the pregnancy in women. The abscisic acid is a component of pregnant females' urine that prevents germination of grains.

Aims: Taking into account the former experimental models of elicitation, we considering that wheat germination test based on abscisic acid activity is able to predict pregnancy in ewes.

Materials and Methods: Considering this principal, 20 samples of urine were collected from 10 pregnant ewes and 10 from non-pregnant animals. After urinalysis, 15 ml urine sample was added to 20 grains of wheat in a Petri dish, followed by a dilution of 1:4 with distilled water. In the control sample it was added just water, without urine. There were performed duplicates for each animal. For 10 days, all plates were kept in a constant environmental temperature (22°C) and humidity (42%).

Results: Statistical analysis revealed that after 5 and 10 days, wheat grains belonging to pregnant ewes were less germinated, and the shoots length was smaller than those from the control group. **Conclusion:** Even if the number of samples is small, it can be concluded that wheat germination test can be used to predict pregnancy in ewes.

Key words: ewes, germination test, pregnancy, wheat.

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PROPOSED SURGICAL TECHNIQUE FOR TREATMENT OF ATRESIA ANI TYPE I IN ONE PUPPY

Cosmina-Andreea DEJESCU^{1*}, Iulia MELEGA¹, Lucia BEL¹, Nicușor OROS¹,
Alexandra BIRIȘ¹, Alexandra MUREȘAN¹ and Liviu OANA¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca, Romania

*Corresponding author, e-mail: cosmina.dejescu@usamvcluj.ro

Introduction: Atresia ani is the most frequently diagnosed congenital anorectal anomaly in young animals. Four types of anal atresia are reported; type I being represented by anal stricture. The recommended treatment in atresia ani type I is balloon dilation and bougienage, but repeated interventions may be needed. Furthermore, a rectal fistula may develop as a complication of this techniques.

Aims: We describe a new surgical technique for treatment of atresia ani type 1.

Materials and methods: A 2-months-old female Shih Tzu puppy was first presented for one-week history of dyschezia. Clinical and radiographic examination revealed that the dog had atresia ani type I and secondary megacolon (colonic diameter to L7 vertebral body: 3.8). Before surgery, vaginoscopy was performed to rule out recto-vaginal fistula. One ventral longitudinal incision was realized and the ventral border of the anus was gently dissected and pulled ventrally. It was sutured to the regional skin in a simple interrupted pattern, using a 4-0 monofilament synthetic absorbable suture material (polydioxanone). A 1 cm diameter of the anus was obtained.

Results: The dog started passing dry, small feces a few hours after surgery. No feces were seen in the descending colon after 3 days on radiographic exam. The patient was discharged after 7 days with lactulose and gastrointestinal diet. After 12 days, the anoplasty site was healed and sutures were removed, but a mild prolapse of the rectal mucosa was seen. Also, fecal incontinence during night time was reported. The owners complained of recurrence of clinical signs after one month due to diet change. Megacolon was present on X-ray exam (colonic diameter to L7 vertebral body: 1.7). No stricture of the anus was observed. The megacolon was successfully managed conservatively with gastrointestinal diet and an increase in lactulose.

Conclusion: Atresia ani type I is less frequently diagnosed than type II and a few treatments guidelines are encountered in literature. We consider surgical anoplasty and diet to be a better approach for the young patients as repeated procedures are not necessary.

Keywords: anal abnormalities, anoplasty, atresia ani type I, surgical treatment

RETROSPECTIVE STUDY ON THE PREVALENCE OF GASTROESOPHAGEAL REFLUX IN BRACHYCEPHALIC AND NON-BRACHYCEPHALIC DOGS ANESTHETIZED FOR CT EXAMINATION

Vlad Traian LUPU^{1,2}, Iulia Gabriela PUȘCOI² and Nicolae TUDOR^{1,*}

¹*Faculty of Veterinary Medicine Bucharest, Romania*

²*Link-vet Veterinary Clinic, Bucharest, Romania*

*Corresponding author, e-mail: nghtudor@yahoo.com

Introduction: Gastroesophageal reflux is the return of gastric contents in the esophagus, phenomenon that can be identified in dogs under general anesthesia, but also in dogs without anesthesia, due to disorders of the distal esophageal sphincter. The occurrence of gastroesophageal reflux in dogs is influenced by several factors, such as anesthetics, age, size and position of the animal, as well as increased negative intrathoracic pressure associated with increased inspiratory effort.

Aims: The aim of the present study was to evaluate the prevalence of gastroesophageal reflux in brachycephalic and non-brachycephalic dogs, without gastrointestinal pathologies and using identical anesthesia and positioning protocols.

Materials and Methods: In order to carry out the study, the CT examinations performed to diagnose some spinal pathologies were evaluated, targeting a number of 98 brachycephalic and non-brachycephalic dogs. Patients identification data were collected, including breed, age, sex, and weight. The animals in this study underwent a standardized anesthetic protocol, and the CT examination was performed using a General Electric Revolution (USA) machine.

Results: Forty-six dogs belonged to the brachycephalic breeds (38 French Bulldog, 5 English Bulldog, 3 Mops), 19 females and 27 males, and 52 dogs belonged to the non-brachycephalic breeds (Crossbreed), 29 females and 23 males. Following the analysis of the acquired CT images, it was found that gastroesophageal reflux was present in 31 brachycephalic dogs (31/46; 67.39%), 13 males and 18 females, respectively in 9 non-brachycephalic dogs (9/52; 17.31%), 4 males and 5 females.

Conclusion: The present study highlights a higher predisposition of brachycephalic breeds compared to non-brachycephalic breeds regarding the occurrence of gastroesophageal reflux, using identical anaesthesia and positioning protocols.

Keywords: brachycephalic dogs, non-brachycephalic dogs, CT, gastroesophageal reflux.

RETROSPECTIVE STUDY ON RADIOGRAPHIC DIAGNOSIS OF ESOPHAGEAL FOREIGN BODIES IN DOGS

Vlad Traian LUPU^{1,2} and Niculae TUDOR^{1,*}

¹ Faculty of Veterinary Medicine, Bucharest, Romania

² Link-vet Veterinary Clinic, Bucharest, Romania

*Corresponding author, e-mail: nghtudor@yahoo.com

Introduction: Foreign bodies ingested and blocked in the esophagus are a medical emergency, because they can have serious life-threatening consequences. Usually, they can be regurgitated or swallowed, reaching the gastrointestinal tract. However, in some cases, they may become blocked in the esophagus causing mechanical obstruction, accompanied by a wide range of signs, including gagging, restlessness, hypersalivation, regurgitation, repeated attempts to swallow, coughing, and/or cervical discomfort.

Aims: The present study followed the clinical and imaging description of a series of dogs with esophageal foreign bodies.

Materials and Methods: The medical records of dogs with clinical signs compatible with mechanical esophageal obstruction, registered in the Link-vet Veterinary Clinic, in the period 2018-2021 were reviewed. We included in the study patients who had at least one radiographic image of the cervico-thoracic region (using an Examion Laurus Rad radiological machine). Patient identification data were recorded, including breed, age and sex, as well as clinical signs expressed by patients.

Results: A number of 11 dogs were included in this study, represented by Crossbreed (n = 5), Dobermann (n = 2), Pekingese (n = 2), Shih-tzu (n = 1), West Highland White Terrier (n = 1). Of the total, 7 were male and 4 were female. The age of the animals was between 6 months and 14 years, with an average of 4.95 years. The location of esophageal foreign bodies varied, of which 2 cases in the cervical segment, 9 cases in the thoracic segment (4 cases were located precardiac, 2 cases supracardiac and 5 cases in the postcardiac segment). The foreign bodies were represented by bones (fragments of pig vertebral body - 4 cases; chicken bones - 6 cases) and metal bodies (fishing lead - 1 case).

Conclusion: Radiographic evaluation allows easy identification of esophageal foreign bodies, demonstrating their different location, and the highest prevalence was recorded in Crossbreed patients.

Keywords: esophageal foreign bodies, dogs, radiographic exam

A SURVEY ON ANALGESIA PRACTICE IN DOGS AND CATS AMONG VETERINARIANS IN CLUJ-NAPOCA

Iulia MELEGA^{1*}, Mădălina Florina DRAGOMIR¹, Dia-Hortenzia CIUNTU,
Liviu Ioan OANA¹ and Cosmin Petru PEȘTEAN¹

¹*Faculty of Veterinary Medicine, University of Agronomic Sciences and
Veterinary Medicine Cluj-Napoca, Romania*

*Corresponding author: iulia.melega@usamvcluj.ro

Introduction. Alleviating pain represents an ethical obligation for the veterinary practitioner; however, inadequacies in pain relief remain today in all veterinary hospitals and clinics.

Objective. This study aimed to overview the current analgesia practice in dogs and cats among veterinarian professionals working in Cluj-Napoca.

Materials and method. Veterinarians were surveyed based on a 31-item questionnaire. The questionnaire included demographic questions and two sections addressing knowledge regarding pain control and analgesic use. Responses to the questionnaire were collected anonymously through Google Documents Form. Survey results are expressed as a percentage of responses.

Results. In total, 36 veterinarians completed the questionnaire (response rate of 76.6%). All the respondents had graduated from UASVM of Cluj-Napoca, of which 83.3% had participated in continuing education programs. A majority (52.8%) consider their knowledge of pain recognition to be good (4/5); however, only 2.8% use pain scoring tools. Many (83.3%) agree that cats are more resistant to pain than dogs, while 58.3% consider that pain is good in some circumstances. For routine surgeries, the most popular analgesic is butorphanol (80.6%), followed by nonsteroidal anti-inflammatory (NSAID) drugs (69.4%). The most used NSAID is represented by meloxicam (94.4%), while steroids are preferred over NSAIDs during major surgeries (38.9%). Most respondents (72.2%) consider that the owner is willing to invest more for superior analgesia in their pet.

Conclusions. All veterinarians demonstrate a level of interest in pain control. However, excessive confidence in their personal experience to recognize pain and their ideological conviction often results in underestimation, under-medication and mismanagement of the patients in pain.

Keywords: analgesia, practice, online survey, cats, dogs.

ASPECTS OF INDUCED EXPERIMENTAL PERIODONTITIS IN RATS

Ștefana MUREȘAN¹, Alexandra DREANCĂ^{1,*}, Sidonia BOGDAN¹, Călin REPCIUC¹,
Cosmina DEJESCU¹, Andras NAGY¹ and Liviu OANA¹

¹*Faculty of Veterinary Medicine, University of Agricultural Sciences and
Veterinary Medicine Cluj-Napoca, Romania*

*Corresponding author, e-mail: alexandra.dreanca@usamvcluj.ro

Introduction: Periodontitis is known as an infectious disease represented by a chronic inflammation of the periodontum in the presence of a disturbed bacterial biofilm with the development of alveolar bone loss as a main complication. Thereby, the aim of this study is the induction of a local inflammatory response by induced periodontitis demonstrated by histological aspects.

Aims: This experimental framework was implemented in order to test a novel therapy represented by a biomaterial enriched with a photosensitizer and essential oil extract that has the potential of reversing the associated clinical and pathological symptoms

Materials and Methods: 5 Wistar, male's rats were used for the induction of experimental periodontitis. In the first day a 5-0 cotton thread ligature was placed on the first superior molar on the left side in the submarginal position. This stage was preceded by tooth scaling, root planning and soft movements of the molar in order to create an accumulation of plaque, flattening and the displacement of the gingival tissue, thus provoking an inflammatory response. After 7 days the ligatures were removed in all 5 rats.

Results: The results obtained showed macroscopical aspects of periodontitis and histological lesions as well, installed in the periodontum. Microscopically, an inflammatory response, neutrophils, bone necrosis, rarefaction and alveolar bone loss was observed.

Conclusion: The tested procedure is able to provide all the key biological factors present in periodontal disease, whereas representing the adequate features for biomaterial testing domain.

Keywords: chronic inflammation, periodontium, alveolar bone loss, biomaterial

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AN UPDATED REVIEW ON ANTIFUNGAL ACTIVITY OF ESSENTIAL OILS AGAINST *MALASSEZIA PACHYDERMATIS*

Carla PAVLOV^{1*}, Mihai MAREȘ¹, Andra-Cristina BOSTĂNARU¹, Adriana TRIFAN²

¹Laboratory of Antimicrobial Chemotherapy, University of Life Sciences, Iași, Romania

²Faculty of Pharmacy, “Grigore T. Popa” University of Medicine and Pharmacy, Iași, Romania

*Corresponding author, e-mail: pavlov.carla@gmail.com

Introduction: In recent years, the lipophilic yeast *Malassezia pachydermatis* is considered to be the most significant opportunistic secondary pathogen associated with dermatitis and otitis externa in veterinary medicine. At the same time, various findings have shown the capacity of clinical isolates to acquire azole-resistance, therefore the development of new alternative treatment strategies are highly demanded.

In the last decade, plant-based antimicrobials have known a resurrection, and special attention was given to essential oils (EOs). EOs are complex mixtures of small lipophilic molecules, of which one up to three compounds constitute the main phytochemical markers. EOs have generated impressive reports in the scientific literature as they exhibit significant antimicrobial effects. Thus, EOs arose as candidates for the alternative treatment of *Malassezia*-related diseases.

Aims: This review highlights the antifungal potential of EOs and their bioactive compounds against *M. pachydermatis* based on literature reports (*in vitro* and *in vivo* retrospective studies).

Material and methods: A search was conducted using three databases (PubMed, Web of Science, Google Scholar), and all relevant articles from the period 2015-2021 were extracted.

Results: The findings showed most of EOs had significant antifungal activity against *M. pachydermatis*, especially through bioactive compounds such as monoterpenes and sesquiterpenes, on their own or by synergism with conventional antifungal drugs or other compounds, such as fluconazole and Tween 80. EOs with promising antifungal activity against *M. pachydermatis* include winter savory, lemongrass, oregano, cinnamon and oregano.

Conclusion: The review emphasizes the importance of EOs as novel antifungal agents. EOs could be considered as an alternative to conventional antifungals, as they act concurrently towards different fungal targets due to their multicomponent nature. Therefore, the development of EOs-based antifungals could represent a viable approach for the efficient management of *M. pachydermatis* infections.

Keywords: antifungal, essential oils, *Malassezia pachydermatis*

CRYPTOSPORIDIOSIS IN SHEEP IN BELGRADE AREA

Ivan PAVLOVIĆ^{1*}, Nemanja ZDRAVKOVIĆ¹, Ksenija NEŠIĆ¹, Jovan BOKOVSKI²,
Vileta CARO-PETROVIĆ³, Dragana RUŽIĆ-MUSLIĆ³ and Renata RELIĆ⁴

¹ Scientific Veterinary Institute of Serbia, Belgrade, Serbia

² Faculty of Veterinary Medicine, University in Belgrade, Serbia

³ Institute for Animal Husbandry, Zemun-Belgrade, Serbia

⁴ Faculty of Agriculture, University of Belgrade, Serbia

*Corresponding author, e-mail: dripavlovic58@gmail.com

Introduction: Cryptosporidiosis is a parasitic disease caused by apicomplexan parasites belonging to the genus *Cryptosporidium* spp. Molecular investigations have identified nearly 40 species and over 50 genotypes. In sheep are the most common *C. parvum*, *C. ubiquitum* (previously *C. cervine* genotype) and *C. xiaoi* (previously *C. bovis* genotype), while *C. hominis*, *C. andersoni*, *C. bovis*, *C. scrofarum*, *C. suis*, *C. fayeri* and *C. canis* have been sporadically reported (Parau and Chartier, 2012). Sheep appear to harbour zoonotic species suggesting epidemiologically significant reservoirs for human infection. Sheep cryptosporidiosis at young animals had high morbidity and mortality rate (Pavlović et al., 2010).

Aims: The aim of this study was to determine the prevalence of cryptosporidiosis in sheep in the spread Belgrade area.

Materials and Methods: Our examination we performed in period 2018-2019, in 152 flocks of sheep originated from 35 villages from 6 Belgrade district. Total of 1450 faeces samples were examined using routine coprological methods and faecal smears stained by modified Ziehl-Neelsen. By post-mortem examination we examined 73 sheep and lambs. Molecular identification of parasites has not been done, so they are listed as *Cryptosporidium* spp.

Results: During our examination cryptosporidiosis was established at 31 flocks. The age of the animals has a great influence on the frequency of the isolation of *Cryptosporidium*. The highest prevalence is reported on lambs aged between 8 and 14 days old. Symptoms of acute cryptosporidiosis include lack of appetite, weight loss, and diarrhea which is usually yellow to yellowish-brown in color and of a creamy texture. Mortality rates in lambs can reach from 12 to 23%. In contrast, we found sporadic diarrhoeic in ewes, and only 0.7–0.9% of adult sheep. At necropsy, pathological changes were present in the small intestine in the form of thickening, edema, hyperemia of the caecal mucosa and colon.

Keywords: Belgrade, *Cryptosporidium* spp., sheep

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QUALITY EVALUATION OF GILTS AND SOW'S OOCYTES DURING *IN VITRO* MATURATION BASED ON MITOCHONDRIA DISTRIBUTION

Iuliu TORDA¹, Irina Ioana SPĂȚARU¹, Gabriel OTAVĂ¹, Simona MARC^{1*}, Oana BOLDURA¹, Ioan HUȚU¹, Bianca LUNGU¹, Beatrice TUDOR¹,
Ovidiu GEORGESCU¹ and Călin MIRCUI¹

¹ Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine of Banat "The King Michael I of Romania", Timisoara, Romania

*Corresponding author: simona.marc@usab-tm.ro

Introduction: Mitochondria is the most frequently studied cell organelle in relation to development competence of the oocytes both *in vivo* and *in vitro*. Developmental competence of oocyte is crucial for embryonic development, the molecular activity until the activation of the embryonic genome being based on the maternal reserves stored in the oocyte.

Aims: Study was designed to qualitatively evaluate pig oocytes according to the distribution of mitochondria after IVM.

Materials and Methods: Ovaries were obtained from slaughterhouse. Maturation medium was TCM-199 supplemented with cysteine (0.57 mM), 10% FCS (fetal calf serum), 10% porcine follicular fluid and 10 U.I/ml hormones (PMSG and hCG). Only class I (C1) and II (C2) oocytes were used. Evaluation of mitochondrial distribution was performed by staining with 1 μM Rhodamine 123 after IVM of COC.

Results: Regarding mitochondrial distribution the percentage of oocytes that had a homogeneous distribution around the germinal vesicle was higher in group C1 than C2 and also higher in sow oocytes than in gilts oocytes. For class 1, the difference was 10.58% in favor of sows, the same trend is maintained for C2, the difference being 4.37%. The results are confirmed by morphological examination, where C1 sow's oocytes matured 26.09% more, compared to gilts oocytes, a difference maintained for C2 oocytes, being 27.4% more sow's oocytes IVM compared to gilts.

Conclusion: Based on mitochondrial distribution we observed that the stage of sexual development of females influences the IVM of oocytes. For pig's IVF it's recommended to use C1 sow oocytes.

Keywords: mitochondria, swine oocytes, IVF

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Calea Mănăştur 3-5, 400372 Cluj-Napoca, Romania
Phone: +40 264.596.384, fax: +40 264.593.792