

University of Agronomic Sciences and Veterinary Medicine of Bucharest

FACULTY OF BIOTECHNOLOGY



International Conference "Agriculture for Life, Life for Agriculture"

# **BOOK OF ABSTRACTS**

# Section 6 BIOTECHNOLOGY

2025 BUCHAREST

# UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE OF BUCHAREST

FACULTY OF BIOTECHNOLOGY

International Conference "Agriculture for Life, Life for Agriculture"

# **BOOK OF ABSTRACTS**

# Section 6 BIOTECHNOLOGY

2025 Bucharest

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# ORAL PRESENTATIONS

# O.1. MICROBIAL DIVERSITY OF STRAWBERRY FRUITS: FROM FARM TO TABLE FOR ENHANCED FOOD SAFETY

### Gabriela Nicoleta TENEA

## Universidad Técnica del Norte, 17 de Julio Avenue, Ibarra, Ecuador

Corresponding author email: gntenea@utn.edu.ec

#### Abstract

This study investigates the bacterial diversity of strawberry fruits (Fragaria × ananassa var. Monterey) at different ripeness stages from the field to retail markets. Using 16S rRNA metagenomic analysis, the research identifies diverse bacterial communities on the fruit exocarp, with significant differences between field-collected and market-ready strawberries. In field samples, Pseudomonas spp. dominated (>70%), regardless of ripeness stage, while market samples were enriched with Serratia spp. (>60%) and exhibited the highest microbial diversity overall, including opportunistic pathogens like Shewanella putrefaciens. Pathogenic bacteria such as Escherichia coli and Salmonella enterica were found in both field and market samples, suggesting postharvest contamination. Alpha and beta diversity analyses revealed significant differences (P < 0.05) in bacterial composition within mature fruits, emphasizing the influence of postharvest handling on microbial load. The study highlights the need for improved safety measures to mitigate microbial risks in strawberries. While metagenomic techniques have provided a comprehensive view of strawberry-associated microbial communities, further efforts are required to translate this knowledge into effective food safety strategies.

Key words: metagenomics, 16S amplicon, strawberris, food safety, diversity.

# O.2. EVOLUTION OF PHYSICOCHEMICAL PARAMETERS AND PHENOLIC CONTENT DURING THE RIPENING OF FETEASCĂ NEAGRĂ VAR. GRAPES IN THE TERASELE DUNĂRII VITICULTURAL AREA

## Bogdan BOCĂNEALĂ, Oana Emilia CONSTANTIN, Nicoleta STĂNCIUC, Iuliana APRODU, Gabriela RÂPEANU

Faculty of Food Science and Engineering, "Dunărea de Jos" University of Galați, 111 Domnească Street, 800201, Galați, Romania

Corresponding author email: gabriela.rapeanu@ugal.ro

#### Abstract

The ripening process of Fetească Neagră grapes is a critical determinant of wine quality, particularly in regions with varying climatic conditions. This study evaluates the technological and phenolic maturity of Feteasca Neagra grapes over three consecutive years (2021-2023) in the Terasele Dunării wine-growing region. The analysis focused on sugar accumulation, total acidity, pH, nitrogen availability, anthocyanin content, and the Total Polyphenol Index (TPI), alongside the implications of different harvest strategies and maceration techniques. The results indicate significant variations among the three vintages, largely driven by climatic factors. 2021 presented favourable conditions, allowing for extended ripening and balanced phenolic development, while 2022 exhibited an accelerated maturation due to water deficits, necessitating early harvests. 2023, marked by extreme drought, led to a compressed ripening window and lower anthocyanin accumulation, influencing wine color stability and requiring an advanced maceration strategy. Additionally, nitrogen availability fluctuated significantly between years, potentially affecting fermentation dynamics and having multiple technological and sensory implications. These findings underscore the importance of adaptive harvesting decisions and enological interventions in maintaining wine quality under varying climatic conditions. The study highlights the need for real-time monitoring of grape maturation and the application of targeted maceration techniques to optimize phenolic extraction and balance wine composition.

*Key words*: Fetească Neagră, technological maturity, phenolic maturity, harvest strategies, maceration, climatic influence, nitrogen management.

# O.3. CONSTRUCTION OF A BACTERIAL ARTIFICIAL CHROMOSOME (BAC) LIBRARY TO CONFIRM THE *Rvi2* GENE IN SOME APPLE VARIETIES RELEASED IN ROMANIA

## Adina Floricica IANCU<sup>1, 2</sup>, Mădălina MILITARU<sup>2</sup>, Sina COSMULESCU<sup>3</sup>

<sup>1</sup>Doctoral School of Plant and Animal Resources Engineering, Faculty of Horticulture, University of Craiova, 13 A. I. Cuza Street, 200585 Craiova, Romania <sup>2</sup>Research Institute for Fruit Growing Pitești-Mărăcineni, 402 Mărului Street, 110006, Pitești, Romania <sup>3</sup>Department of Horticulture & Food Science, Faculty of Horticulture, University of Craiova, 13 A. I. Cuza, Street, 200585 Craiova, Romania

Corresponding author email: adinafloricica@yahoo.com

#### Abstract

The aim of this study was to construct a bacterial artificial chromosome (BAC) library to confirm the presence and structure of the Rvi2 gene, which provides resistance to apple scab caused by Venturia inaequalis, in several apple cultivars developed in Romania. This approach is intended to aid in detailed genetic analysis to improve apple breeding programs–The clones were sequenced and the results were compared with the sequence of the Rvi2 gene registered in the "National Center for Biotechnology Information" database (locus "AY626824"). BLAST analysis confirmed the presence of the Rvi2 gene in all 20 varieties: 'Alex', 'Bistritean', 'Cezar', 'Ciprian', 'Dany', 'Discoprim', 'Delicios de Voinesti', 'Estival', 'Ionaprim', 'Luca', 'Pomona', 'Redix', 'Remar',', 'Romus 3', 'Romus 4', 'Romus 5', 'Salva', 'Starkprim', 'Voinea' and 'Voincel'. Query identity ranged from 94.6% to 100% for the forward primer and from 95.39% to 100% for the reverse primer, with query coverage ranging from 85% to 92% for the forward primer and 80% to 93% for the reverse primer. The results confirm the presence of the Rvi2 gene, demonstrating high sequence identity and coverage.

*Key words*: breeding; competent cells, bacterial artificial chromosome, BLAST, resistance, Rvi2.

# **O.4. UNVEILING THE BIOLOGICAL PROPERTIES OF MUSHROOM-DERIVED EXTRACELLULAR VESICLES**

## Gaia CUSUMANO

## University of Perugia, Via del Giochetto, Perugia, Italy

Corresponding author email: gaia.cusumano@dottorandi.unipg.it

#### Abstract

Mushroom-derived extracellular vesicles (MDEVs) are gaining attention for their potential therapeutic and biotechnological applications. These vesicles carry proteins, lipids, and bioactive components, contributing to significant biological effects, including antioxidant and anti-inflammatory activities. This study aimed to compare the biological properties of two different fractions (40K and 100K) of MDEVs purified from Pleurotus eryngii by ultracentrifugation method and then characterized using scanning electron microscopy (SEM) and nanoparticle tracking analysis (NTA). MDEVs 40K and 100K were subsequently tested for their antioxidant effect through DPPH, ABTS, FRAP, and CUPRAC assays, and for their enzymatic inhibition capacity against Acetylcholinesterase (AChE), Butyrylcholinesterase (BChE), Tyrosinase, Amylase, and Glucosidase. The 40K and 100K MDEVs fractions were also compared for their cytotoxic effect on the THP-1 cell line and their antioxidant activity under H2O2-induced cellular stress in the THP-1 cell line and their potential anti-inflammatory effects. The results showed that the two fractions had comparable effects across all tests performed; however, the 40K fraction demonstrated a slightly more pronounced effect in terms of antioxidant activity.

*Key words*: *extracellular vesicles, mushroom derived extracellular vesicles, antioxidant, antiinflammatory.* 

# O.5. UNLOCKING THE PHOTOTOXIC POTENTIAL OF ALOE-DERIVED EXTRACELLULAR VESICLES AS NATURAL DRUG CARRIERS

## **Eleonora CALZONI**

## University of Perugia, Via del Giochetto, Perugia, Italy

Corresponding author email: eleonora.calzoni@unipg.it

#### Abstract

The increasing interest in plant-derived bioactive molecules has led to a renewed focus on plants in the pharmaceutical field. Plant-derived extracellular vesicles (PDEVs) are emerging as promising drug delivery systems due to their ability to concentrate and release bioactive molecules. These vesicles, ranging from 30 to 1000 nm, play a vital role in cross-kingdom communication between plants and humans. PDEVs have shown potential in treating diseases like cancer, liver disease, and inflammatory bowel disease, though more research is needed to explore their full therapeutic potential. This study investigates the phototoxic effects of extracellular vesicles (EVs) from Aloe arborescens, Aloe barbadensis, and Aloe chinensis on the human melanoma cell line SK-MEL-5, focusing on their anthraquinone content, natural photosensitizers. The phototoxicity of Aloe EVs is linked to reactive oxygen species (ROS) production, causing oxidative stress in melanoma cells, as confirmed by metabolomic analysis. These findings suggest that Aloe-derived EVs could serve as photosensitizers, offering potential for use in photodynamic therapy for cancer treatment.

*Key words*: plant-derived extracellular vesicles, aloe, photodynamic therapy, oxidative stress, metabolomics.

# O.6. EXPLORING THE THERAPEUTIC POTENTIAL OF PLANT-DERIVED EXTRACELLULAR VESICLES IN EPITHELIAL-TO-MESENCHYMAL TRANSITION: TARGETING HEPATOCELLULAR CARCINOMA *IN VITRO* MODEL

### **Agnese BERTOLDI**

University of Perugia, Via del Giochetto, Perugia, Italy

Corresponding author email: agnese.bertoldi@dottorandi.unipg.it

#### Abstract

This study investigates the impact of plant-derived extracellular vesicles (PDEVs) on key biological processes, particularly epithelial-to-mesenchymal transition (EMT), using in vitro models of human hepatocellular carcinoma (HCC), a highly metastatic and aggressive cancer with a high mortality rate. The primary objective is to explore the potential antitumor properties of PDEVs, employing a multidisciplinary approach that integrates biochemical, molecular, biophysical, and advanced spectroscopic techniques. PDEVs were isolated and characterized from different plant species, including Capparis spinosa and Rosa canina, chosen for their high quercetin and antioxidant metabolite content, as well as from callus tissue induced in species such as Solanum lycopersicum and Cakile maritima. The use of callus tissue offers a sustainable, homogenous and sterile source for PDEV isolation. The study aims to assess the effects of these PDEVs on EMT in HCC cells, identify molecular targets through omics approaches, and explore their therapeutic potential in cancer and fibrotic diseases.

*Key words*: plant-derived extracellular vesicles (PDEVs), hepatocellular carcinoma (HCC), epithelial-to-mesenchymal transition (EMT), antitumor properties, callus tissue.

# O.7. EXPLORING THE ANTIMICROBIAL POTENTIAL OF CELL-PENETRATING PEPTIDES

## Dana COPOLOVICI<sup>1</sup>, Cristian MOISA<sup>1</sup>, Andreea LUPITU<sup>1</sup>, Andreea GOSTĂVICEANU<sup>1, 2</sup>, Lucian COPOLOVICI<sup>1</sup>

<sup>1</sup>Aurel Vlaicu University, 2 Elena Dragoi Street, Arad, Romania <sup>2</sup>University of Oradea, 1 Universității Street, 410087, Oradea, Romania

Corresponding author email: dana.copolovici@uav.ro

#### Abstract

Cell-penetrating peptides (CPPs) are notable for their ability to traverse cellular membranes, making them valuable tools for studying membrane structure and function. Their diversity contributes to understanding biological processes and offers potential therapeutic applications. Cationic CPPs provide solutions for challenges in medicine, such as targeted drug delivery and overcoming cellular barriers, by transporting various molecular payloads, including drugs and nucleic acids. We developed ten newly designed CPPs/antimicrobial peptides, which show low toxicity to normal human cells and strong antimicrobial activity against various bacterial strains, suggesting innovative treatment strategies. Investigating CPPs with antimicrobial properties shows significant potential for developing innovative therapeutic strategies to address infections, cancer, and challenges in drug administration [1]. Acknowledgements: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS - UEFISCDI, project number PN-III-P4-PCE-2021-0639, within PNCDI III. Reference: 1. Gostăviceanu A., Gavrilaş S., Copolovici L., Copolovici D.M., Pharmaceutics, 2023, 8:2091.

*Key words*: cell-penetrating peptides, antimicrobial peptides, peptide synthesis, antimicrobial agents.

# O.8. ROLE OF BIOTECHNOLOGICAL INTERVENTIONS IN THE MANAGEMENT OF CANINE DEMODECOSIS USING AMITRAZ THERAPY

## Gurtej SINGH, Akshat KUMAR, Parampreet Singh SIDHU

Uttarakhand Council For Biotechnology, Haldi, Pantnagar, US Nagar, Rudrapur, India

Corresponding author email: singhgurtejd180@gmail.com

#### Abstract

Abstract Three dogs of different ages with symptoms including persistent itching, hair loss, and an unpleasant odor. Despite previous treatments for dermatitis providing temporary relief, the condition had returned in all cases. Microscopic examination of deep skin scrapings confirmed an infestation with Demodex mites. The dogs underwent a treatment protocol involving weekly topical applications of amitraz lotion for four weeks. Prior to each application, the dogs were bathed with benzoyl peroxide shampoo a day earlier to cleanse the skin. To address secondary bacterial infections, cephalexin was administered orally at a dose of 22 mg/kg body weight for 10 days. Additionally, the animals received oral supplements of Omega-3 and Omega-6 fatty acids for one month to promote skin health and recovery. Follow-up deep skin scrapings, conducted one week after the final amitraz application, showed no evidence of mites, confirming the successful resolution of the infestation.

Key words: amitraz, demodicosis, benzyl peroxide, cephalexin.

# O.9. OPTIMIZATION OF AGROBACTERIUM RHIZOGENES -MEDIATED HAIRY ROOT INDUCTION IN SALVIA OFFICINALIS

## Behnaz RAHMANIFAR<sup>1</sup>, Oana-Alina BOIU-SICUIA<sup>1</sup>, Oana LIVADARIU<sup>1</sup>, Niculina IONESCU<sup>2</sup>, Călina Petruța CORNEA<sup>1</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, 11464, Bucharest, Romania <sup>2</sup>National Agricultural Research and Development Institute Fundulea, 915200 Fundulea, Călărași County, Romania

Corresponding author email: sicuia\_oana@yahoo.com

#### Abstract

Sage (Salvia sp.) is a key medicinal plant from the Lamiaceae family. Recently, the mass production of hairy roots has become important for producing plant secondary metabolites, offering fast growth and stable bioactive compound production, making them ideal for transgenic research. In this study, the optimization of hairy root induction conditions by Agrobacterium rhizogenes in Salvia officinalis, has been evaluated. For this purpose, the effect of 3 different times of bacterial co-culture (24, 48, 72 h) with explants (whole seedling, leaf, stem and petiole) was investigated. The 48h co-culturing interval was considered the most suitable time. The highest rate of success in hairy root production (88.4 %) belonged to the leaf explants. In order to evaluate the stability and quantity of hairy roots, liquid 0.5X MS medium with 3 treatments of IBA (0, 0.5, 1 mg/L) were used. The highest percentage of growth was observed in liquid 0.5X MS and at the hormone level of 1 mg/L. Transgenic hairy roots produced were confirmed by PCR.

*Key words*: hairy root, secondary metabolites, salvia officinalis, agrobacterium rhizogenes, *PCR*.

# O.10. THE EFFECT OF ARBUSCULAR MYCORRHIZAL FUNGI AND MYCORRHIZAL HELPER BACTERIA DOSES ON *IN VITRO* POTATO PLANTLET PROPAGATION

## Anne NURBAITY<sup>1</sup>, Adellya SAFITRI<sup>1</sup>, Rossita FAUZIAH<sup>1</sup>, Erni SUMINAR<sup>2</sup>, Noor ISTIFADAH<sup>3</sup>

 <sup>1</sup>Universitas Padjadjaran, Department of Soil Science and Land Resources, Faculty of Agriculture, West Java, Indonesia
 <sup>2</sup>Universitas Padjadjaran, Department of Agronomy, Faculty of Agriculture, West Java, Indonesia
 <sup>3</sup>Universitas Padjadjaran, Department of Plant Pests and Diseases, Faculty of Agriculture, West Java, Indonesia

Corresponding author email: a.nurbaity@unpad.ac.id

#### Abstract

The procurement and distribution of certified seed potatoes, which have not met the demand, is one of the challenges in potato production. In vitro culture propagation is one of the methods that can produce high-quality potato seeds. Potato seedling propagation can be optimized through maintenance using biological fertilizers Arbuscular Mycorrhizal Fungi (AMF) and Mycorrhizal Helper Bacteria (MHB). The study aims to see the growth response of several doses of FMA and MHB in the propagation of potato seedlings in vitro. The experiment used a factorial completely randomized design (CRD) with 9 treatments repeated three times. AMF application consisted of doses without AMF, 2.5 g AMF, and 5 g AMF. MHB application consisted of doses without MHB, MHB  $1 \times 10^9$  cfu ml<sup>-1</sup>, and MHB  $1 \times 10^{11}$  cfu ml<sup>-1</sup>. The result showed no interaction between AMF and MHB on plant height, number of leaves, and number of shoot buds. The doses of AMF and MHB given in the study were not effective because they could not increase plant growth.

Key words: mycorrhiza, in vitro, helper bacteria, potato.

# O.11. POPULATION GENETIC STUDIES ON CALAMUS NAGBETTAI R.R. FERNALD & DEY. IN WESTERN GHATS REGION OF KARNATAKA

## Umesh MADAR<sup>1</sup>, Rajendra PUJAR<sup>1</sup>, Devarajan THANGADURAI<sup>1</sup>, Jeyabalan SANGEETHA<sup>2</sup>, Pavitra CHIPPALAKATTI<sup>1</sup>, Smita SHINDE<sup>1</sup>

<sup>1</sup>Karnatak University, Department of Botany, Dharwad, Karnataka, India <sup>2</sup>Central University of Kerala, Department of Environmental Science, Kasaragod, Kerala, India

Corresponding author email: umeshkmsep05@gmail.com

#### Abstract

Calamus nagbettai R.R. Fernald and Dey are spiny climbing palms belonging to the family Arecaceae which are mainly used for making furniture products and handcrafts. DNA markers have been employed to estimate the level of genetic diversity and distinguish the distribution patterns of genetic deviation within the populations. Studies on the genetic dissimilarity in twenty-six populations of Calamus nagbettai have been assisted by the development of molecular markers. Seven Random Amplified Polymorphic DNA (RAPD) markers were utilised to evaluate genetic diversity and genetic relationships between twenty-six accessions of Calamus nagbettai. The primers OPA-03 produced the maximum amount of amplicons (260 amplicons), whereas OPA- 06 produced the least number of loci (75 amplicons). The molecular weight of the primers lies between 200 to 2200 bp. Genetic similarity coefficients among 26 wild populations of C. nagbettai ranged from 0.9 to 1.00 which was calculated using Jaccard's similarity coefficient. The dendrogram constructed using RAPD data for the accessions which formed 2 major clusters of 26 accessions of Calamus sp. The study concludes that RAPD is a potential molecular marker to evaluate the genetic diversity of C. nagbettai species.

*Key words*: Calamus nagbettai, genomic DNA, genetic diversity, palms, RAPD markers, rattans, western ghats.

# POSTER PRESENTATIONS

# SUBSECTION I: AGRICULTURAL BIOTECHNOLOGY

# P.I.1. ECOLOGICAL CONTROL OF POWDERY MILDEW OF CUCUMBER BY POTASSIUM PHOSPHATE AND NEEM OIL AND THEIR EFFECTS ON CONTENTS OF CHLOROPHYLLS IN LEAVES

## Vladimir ROTARU, Vladimir TODIRAŞ

Institute of Genetics, Physiology and Plant Protection, Moldova State University, 60 Alexei Mateevici Street, Chisinau, Republic of Moldova

Corresponding author email: rotaruvlad@yahooo.com

#### Abstract

Powdery mildew, caused by Sphaerotheca fuliginea is a widespread disease affecting cucumber plants causing yield losses worldwide. A greenhouse experiment was carried out to evaluate the effects of the ecological plant protection products of monopotasium phosphate, dipotasium phosphate and Neem oil on powdery mildew disease severity. The study, also, evaluated the changes of photosynthetic pigments contents in leaves in relation to treatments. All treatments resulted in a significantly lower mildew infection development than untreated control plants (water spray). The application of Neem oil emulsion alone recorded the lowest efficacy rate. The most significant disease severity reduction was registered in the treatment with integrated use of dipotasium phosphate (1%) and Neem oil (0.5%) compared to the other treatments. The foliar application of the tested compounds improved the status of photosynthetic pigments in leaves and no phytotoxicity was observed on the plants. This research demonstrated that the integrated application of potassium phosphates and Neem oil had fungicidal activity against powdery mildew.

Key words: chlorophylls, cucumber, Neem oil, potassium phosphates, powdery mildew.

# P.I.2. SUSTAINABLE AGRICULTURAL SOLUTIONS APPLIED TO BUCKWHEAT COVER CROP IN 2024

## Mirela DRĂGAN<sup>1</sup>, Andrei PETRE<sup>1</sup>, Silvana Mihaela DĂNĂILĂ-GUIDEA<sup>1, 2</sup>, Ștefana JURCOANE<sup>1, 2, 3</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania
 <sup>2</sup>Microbial Biotechnology Centre - BIOTEHGEN, 59 Mărăști Blvd, District 1, Bucharest, Romania
 <sup>3</sup>Academy of Romanian Scientists, 54 Splaiul Independenței, District 5, 050094, Bucharest, Romania

Corresponding author email: mirela.dragan78@yahoo.it

#### Abstract

In the context of the climate challenges of 2025, characterized by prolonged drought, buckwheat stands out as a sustainable solution for agriculture in Stupina Cornetu in Ilfov County, Romania. This plant, used as a cover crop, offers multiple benefits, including improving soil quality, reducing water loss and supporting biodiversity, while also being a valuable source of pollen for bees. Buckwheat sowing was carried out in June, in drought conditions, by using seeds of an adapted variety (Fagopyrum esculentum L. "Zita"), characterized by a short vegetation period and high tolerance to water deficit. The cultivation scheme included the use of technological links of minimal soil preparation in order to conserve moisture. The results obtained contributed to the creation of a sustainable agricultural ecosystem through the cultivation of buckwheat plants. This culture can thus become a key component in adapting to climate change and supporting a sustainable agriculture in Romania.

*Key words*: cover-crop plants, climate change, agricultural ecosystem, honey base, sustainable agriculture.

# P.I.3. AMINO ACIDS AS REGULATORS OF MORPHOGENESIS AND RESVERATROL SYNTHESIS IN GRAPE REGENERATING PLANTS *IN VITRO*

## Yuliia KOLOMIIETS, Artur LIKHANOV, Valeria BONDAR

National University of Life and Environmental Sciences of Ukraine, 13 Heroiv Oborony Street, Kyiv, Ukraine

Corresponding author email: klepko@nubip.edu.ua

#### Abstract

Resveratrol, piceoid, and viniferin are polyphenolic antioxidants actively synthesized in grape tissues under stress and have stilbenoid nature. Stilbenoids are formed in grape cells in vitro under the influence of chitosan and salicylic acid. Adding casein hydrolysate to the basic MS medium promoted resveratrol synthesis in the Podarok variety cells. To find out which amino acid or their complex is key in inducing the synthesis of valuable polyphenols, individual amino acids (aspartic and glutamic acid, valine, leucine, lysine, proline, serine) were added to the culture medium at concentrations 20-35 mg/l, as well as amino acids in the complex. It was found that individual amino acids' effect on the morphogenesis of grape regenerating plants differs from their action in the complex. It has been shown that the induction of resveratrol and other stilbenoid synthesis in grape leaves is caused by adding lysine (30 mg/l) to the culture medium. Individual exogenous amino acids in low concentrations acted differently on plant organisms than in complex, which may indicate amino acids` ability to function as signaling molecules and secondary metabolism regulators.

Key words: polyphenolic antioxidants, amino acids, grape, polyphenol synthesis, regulators.

# P.I.4. COMPARATIVE *IN VITRO* AND *IN VIVO* EFFECTS OF SOME MICROBIAL INOCULANTS FOR THE ORGANIC SWEET POTATO

Oana-Alina BOIU-SICUIA<sup>1, 2</sup>, Daniel-Nicolae COJANU<sup>2, 1</sup>, George COTEȚ<sup>3</sup>, Alina-Nicoleta PARASCHIV<sup>3</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, District 1, Bucharest, Romania
<sup>2</sup>Research Development Institute for Plant Protection, 8 Ion Ionescu de la Brad Blvd, District 1, Bucharest, Romania
<sup>3</sup>Research Development Station for Field Crops on Sandy Soils - Dăbuleni, 217 Petre Baniță Street, Dăbuleni, Romania

Corresponding author email: sicuia\_oana@yahoo.com

#### Abstract

Growing sweet potato (Ipomoea batatas L.) in organic system triggers the need to identify efficient agronomic inputs for plant protection and nutrition, as well as appropriate application methods. This study aimed to identify some beneficial microorganisms, bacteria and fungi, efficient in preventing sweet potatoes from pests and diseases. In vitro studies revealed the antifungal effects of a Romanian native Bacillus amyloliquefaciens strain in reducing the growth of Alternaria sp. and Fusarium spp., some common phytopathogens for sweet potato. Similar results were seen in Beauveria bassiana, which additionally express insecticidal potential. The shoot-immersion inoculation technique applied with these microorganisms on sweet potato, revealed comparative yields to the conventional production system, as well as pest and diseases management, only when the two beneficial microorganisms were inoculated as mixed treatment.

Key words: Bacillus amyloliquefaciens, Beauveria bassiana, Ipomoea batata.

# P.I.5. RESPONSE OF THE REPRODUCTIVE SYSTEM MORPHOLOGY TO CHANGES IN THE PITUITARY-OVARIAN AXIS CONTROL IN DIFFERENTLY SELECTED HEN STRAINS DURING EGG-LAYING CYCLE

## Ivona Maria ZĂBAVĂ, Tudor Andrei KACENCO, Mădălina DEGENARO, Nicolae DOJANĂ

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăsti Blvd, District 1, Bucharest, Romania

Corresponding author email: zabava ivona@yahoo.ro

#### Abstract

The biotechnology of producing egg-laying hen hybrids requires a high genetic selection pressure upon the origin inbred strains. The selection may affect the response of the reproductive system to the pituitary-ovarian axis control. In this work, we investigated the changes of ovarian and oviductal histomorphology response to the control exerted by the pituitary-ovarian axis in Lohmann and Leghorn hybrids, versus Sussex hens that has not been subjected to any selection pressure. Determinations were performed on 32-week-old hens, a key-age during the laying cycle. The results revealed differences between the hybrid hens and Sussex hens regarding the blood levels of gonadotropin follicle-stimulating hormone, luteinizing hormones (P<0.01), estrogen (P<0.05), triiodothyronine and tetraiodothyronine, and higher values of egg-laying frequency in hybrids versus Sussex. The number of different types of ovarian follicles (white follicles, small yellow and large yellow follicles), the structure of the follicle perivitelline membrane, and structure of the yolk was also modified in hybrids versus Sussex. Differences in epithelium histology of the infundibulum, magnum, isthmus and shell gland as well as histochemical particularities of these structures were also identified.

Key words: egg-laying hybrid hen, pituitary control, ovary histology, oviduct histology.

# P.I.6. QUALITY CHARACTERISTICS OF OLIVE OIL AND BY-PRODUCTS FROM OIL MECHANICAL EXTRACTION PROCESS

## Adina NICHITA<sup>1</sup>, Luigi DAIDONE<sup>2</sup>, Ilenia DOTTORI<sup>2</sup>, Gianluca VENEZIANI<sup>2</sup>, Gabriela BUTNARIU<sup>1</sup>, Mona Elena POPA<sup>1</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania <sup>2</sup>University of Perugia, Department of Agricultural, Food and Environmental Sciences, 1 Piazza dell'Università, 06123, Perugia PG, Italy

Corresponding author email: nichitaadina1979@gmail.com

#### Abstract

The paper presents the characterization of four olive oil samples, originating from olives from the Mediterranean area, to which a set of analyses were applied. The identification of the merceological parameters and their reporting to the specialized literature, leads to the classification of the quality of the olive oil samples. Determination of parameters regarding the quality and/or phenolic composition of the samples leads to the subsequent analysis of byproducts from the mechanical extraction process such as olive pomace and the production of phenolic powder obtained from mill waste water. Multiphase decantation for industrial olive oil extraction generates large quantities of a new by-product called olive paste, which consists of wet pomace pulp, which can be utilized.

Key words: antioxidant activity, olive oil, olive powder, polyphenols, sustainability.

# P.I.7. IMPORTANCE OF ZINC COMPOUNDS AND ZINC NANOPARTICLES IN DEVELOPMENT OF PLANTS

## Evelina GHERGHINA, Gabriela LUȚĂ, Daniela BĂLAN

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania

Corresponding author email: balan.dana@gmail.com

#### Abstract

Global warming, plant diseases and environmental issues such as excessive use of pesticides and fertilizers have affected the production yield in the agricultural sector. Promoted in the last decade or so, nanotechnology has been offering sustainable solutions to conventional agriculture, having a major impact on improving crop productivity and nutrient supply by increasing and regulating the availability of minerals in the soil. Thus, zinc oxide nanoparticles are widely used in agriculture, due to the multiple roles of zinc in the plant cell, such as the involvement in regulating the metabolism of the proteins, lipids, sugars, and nucleic acids, its enzymatic cofactor activity for some enzymes involved in photosynthesis, or being key element in cellular biomembranes. Although the widespread use of nanoparticles can lead to phytotoxicity phenomena, the research direction in recent years is focused on balancing positive and negative effects. Therefore, the aim of this paper is to update the informations about the applications and the effects of zinc compounds and zinc oxide nanoparticles in agricultural practices.

*Key words*: agricultural practices, development of plants, nanotechnology, zinc oxide nanoparticles.

# P.I.8. PRELIMINARY STUDY REGARDING THE REINTRODUCTION OF ANCESTRAL WHEAT IN THE BAKERY INDUSTRY

## Sabina-Andreea BOBEA<sup>1, 2</sup>, Livia APOSTOL<sup>2</sup>, Cristian FLOREA<sup>2</sup>, Filofteia Camelia DIGUȚĂ<sup>1</sup>, Alexandru Constantin ALDEA<sup>1</sup>, Mihai-Bogdan NICOLCIOIU<sup>2</sup>, Claudia ZOANI<sup>3</sup>, Călina Petruța CORNEA<sup>1</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, 011464, Bucharest, Romania
 <sup>2</sup>National Research & Development Institute for Food Bioresources, IBA Bucharest, Dinu Vintilă Street, District 2, 021102 Bucharest, Romania
 <sup>3</sup>Divisione Sistemi Agroalimentari Sostenibili (SSPT-Agros), Public Research Institute for New Technologies, Energy and Environment (ENEA CR Casaccia), Via Anguillarese 301, 00123, Roma, Italy

Corresponding author email: alexandru.aldea@bth.usamv.ro

#### Abstract

In our efforts to reintroduce ancestral wheat varieties into the bakery industry, we studied using Einkorn wheat flour in the sourdough bread-making process. The analysis yielded several sourdough variants developed using the spontaneous microflora present in the flour. These variants were evaluated from chemical and microbiological perspectives over 72 hours. The optimal sourdough was combined with type 650 white flour and a mixture of type 650 white flour with Einkorn flour to produce four distinct bread variants. From both nutritional and sensory perspectives, the bread incorporating Einkorn wheat flour was the best option. Sixteen yeast strains were isolated from sourdough samples. PCR-RFLP analysis revealed that most yeast isolates (50%) belonged to Saccharomyces cerevisiae. The remaining isolates were primarily identified as Wickerhamomyces anomalus (37.5%), followed by Hanseniaspora valbyensis (6.25%) and Cryptococcus terreus (6.25%). Several strains exhibited notable characteristics based on functional characterization analysis, including glucose assimilation, low pH tolerance, acetic acid production, enzymatic pattern, antibacterial activity, and hemolytic profile. These findings warrant further investigation into incorporating these yeast strains and improving sourdough-based baked goods' quality and nutritional value.

Key words: ancient grains, Einkorn, yeast, lactic acid bacteria, sourdough, bread.

# P.I.9. KNOWLEDGE, SKILLS, AND ATTITUDE OF THREE OF EUROPEAN UNIVERSITIES IN CONNECTION WITH ADVANCED AGRICULTURAL TECHNOLOGIES UNDER THE CONTEXT OF CLIMATE CHANGE

## Zina PARASCHIV<sup>1</sup>, Nicoleta RADU<sup>1</sup>, Jesica Maiara SODER WALZ<sup>2</sup>, Adrian SILVA<sup>3</sup>, Narcisa Elena BĂBEANU<sup>1</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, District 1, 011464, Bucharest, Romania
 <sup>2</sup>University Autonoma de Barcelona, 08193, Bellaterra, Barcelona, Spain
 <sup>3</sup>University du Porto, 4099-002 Praça de Gomes Teixeira, Porto, Portugal

Corresponding author email: nicoleta.radu@biotehnologii.usamv.ro

#### Abstract

The European Green Deal aims to transform agriculture into a more sustainable and environmentally friendly sector, requiring farmers to adapt to advanced technologies. In this regard, survey studies were conducted in Spain, Portugal, and Romania, in which respondents answered questions such as: a) the connection between smart agriculture and digital technologies, b) the connection between Green Agriculture policies and food security, or c) the connection between agriculture, food production systems, genomics, bioinformatics, and big data. The survey results indicated that precision agriculture, automation, AI-driven analytics, and sustainable farming techniques - such as organic farming, biodiversity preservation, and climate-smart agriculture are essential in the context of climate change. The EU's Common Agriculture Policy is central to the EU Green Deal & its Farm to Fork and Biodiversity strategies.

Key words: organic Agriculture, biodiversity, EU Green Deal.

# P.I.10. ASSESSING THE PHYLOGENY AND GENETIC VARIABILITY OF *OROBANCHE CUMANA* WALLR. POPULATIONS USING ISSR MARKERS

### Maria DUCA, Ina BIVOL

## Moldova State University, 60 Mateevici Street, Chisinau, MD-2009, Republic of Moldova

Corresponding author email: bivolinga@yahoo.com

#### Abstract

This study investigates the genetic differentiation and phylogeny of the parasitic weed Orobanche cumana Wallr. using ISSR markers in 33 populations from Serbia, Moldova, Romania, Bulgaria, Turkey, and China, representing E, G, and H physiological races. Phylogenetic relationships were analysed using Nei's standard genetic distance and the Neighbour-Joining method in POPTREE2. The results of the phylogenetic analysis indicated the presence of three distinct groups. The first clade included populations from Serbia, Turkey, and China. The second clade comprised populations from Moldova and Romania, and the third clade included Bulgarian populations, forming a separate branch. Genetic variation analysis of O. cumana populations at both country and race levels showed that all physiological races and the Moldavian populations exhibited high interpopulation diversity. In contrast, the primary genetic differentiation exhibited by the Bulgarian, Serbian, Turkish, and Chinese populations occurred principally within their respective populations. This genetic diversity is influenced by factors such as the expansion of sunflower production, agricultural development, and climate change. Furthermore, distinct evolutionary adaptations among O. cumana races were evident. The results obtained demonstrate the complex evolution and dispersal mechanisms of this parasitic species and offer crucial insights into effective management strategies for the production of sunflowers.

Key words: Orobanche cumana, sunflower, genetic differentiation, ISSR, phylogeny.

## P.I.11. AGROECOLOGY AND BIODIVERSITY UNDER THE CURRENT CLIMATE EMERGENCY

## Mario X. RUIZ-GONZÁLEZ, Adrián SAPIÑA-SOLANO, Monica BOSCAIU, Oscar VICENTE

Polytechnic University of Valencia, 14 Camino de Vera, Valencia, Spain

Corresponding author email: ovicente@upvnet.upv.es

#### Abstract

Agricultural systems are at a crossroads, facing unprecedented challenges from the climate emergency, biodiversity loss, and increasing global food demand. Agroecology integrates ecological principles into agricultural practices, emphasising biodiversity to enhance ecosystem services and promote sustainable farming. This paper reviews the current state of agroecology, focusing on the impacts of climate change – such as rising temperatures, altered precipitation patterns, and soil salinisation – on agricultural biodiversity and economic outcomes. Additionally, it examines plant-microbe interactions within agroecosystems and their role in mitigating climate-induced stresses. The discussion highlights strategies to nurture ecosystems through diversified cropping systems and soil health management to build resilient agricultural landscapes. The review concludes by advocating for interdisciplinary collaboration to harness biodiversity as a cornerstone for thriving agricultural ecosystems.

Key words: abiotic stress, agrodiversity, agroecology, plant-microbe interactions.

# SUBSECTION II: FOOD BIOTECHNOLOGY

# P.II.1. EXPLORING THE BACTERIOCINOGENIC PROPERTIES OF *LACTOCOCCUS LACTIS* R152 ISOLATED FROM A TRADITIONALLY MADE CHEESE

## Ecaterina-Teodora CHIREA, Emanuela-Cătălina IONETIC, Iulia-Roxana ANGELESCU, Silvia-Simona GROSU-TUDOR, Cristina PURCAREA, Medana ZAMFIR

Institute of Biology Bucharest, 296 Splaiul Independentei, District 6, Bucharest, Romania

Corresponding author email: chireacatiteo@yahoo.com

#### Abstract

Lactococcus lactis R152 was isolated from a traditionally made cheese and identified through 16S rRNA gene sequencing. This strain exhibited antibacterial activity against five bacterial strains, including four potential pathogenic strains. In this study, we investigated the nature of the inhibition and characterized the active compound. The pH neutralization of the culture supernatant did not affect the inhibitory activity against Lactobacillus delbrueckii subsp. bulgaricus LMG6901<sup>T</sup>, but this was lost after proteinase K treatment, indicating that the antibacterial compound is proteinaceous, likely a bacteriocin. Ammonium-sulfate precipitation of the culture supernatant increased the activity from 1,600 AU/ml to 12,800 AU/ml. Tricine-SDS-PAGE analysis indicated an estimated molecular mass of the presumptive bacteriocin of less than 6,500 Da. This compound was resistant to heat (preserving activity after autoclaving) and to pH variation in the pH 1 and 9 interval. These findings, combined with the identification of nisin A gene in the bacterial genome, suggest that Lact. lactis R152 produces nisin A, a bacteriocin with potential applications in the food industry.

Key words: antimicrobial activity, bacteriocin, food-borne pathogens, Lactococcus lactis.

## P.II.2. EXPLORING THE ROLE OF NUTRITION IN ENHANCING MENTAL AND EMOTIONAL WELL-BEING

## Mihaela GEICU-CRISTEA<sup>1</sup>, Elisabeta Elena POPA<sup>1</sup>, Paul-Alexandru POPESCU<sup>1</sup>, Mihaela Cristina DRĂGHICI<sup>1</sup>, Ion NIŢU<sup>1</sup>, Adriana Georgiana STERIAN<sup>2</sup>, Amalia Carmen MITELUŢ<sup>1</sup>, Mona Elena POPA<sup>1</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania <sup>2</sup>Van Hall Larenstein University of Applied Sciences, 26a Larensteinselaan, Velp, Netherlands

Corresponding author email: elena.eli.tanase@gmail.com

#### Abstract

The relationship between nutrition and mental health has garnered increasing attention in recent years, with emerging evidence highlighting the profound impact of dietary choices on emotional and psychological well-being. This review explores the intricate links between nutrition and mental health, focusing on the roles of macro- and micronutrients in regulating mood, cognitive function, and stress resilience. Nutritional deficiencies, such as those involving omega-3 fatty acids, B vitamins, and magnesium, have been associated with an increased risk of depression, anxiety, and other mood disorders. Conversely, diets rich in whole foods, such as fruits, vegetables, whole grains, and lean proteins, promote better mental health outcomes by supporting gut-brain axis communication, reducing inflammation, and enhancing neuroplasticity. The article also examines the emerging field of nutritional psychiatry, emphasizing personalized dietary interventions to improve mental health. By integrating nutritional strategies into mental health treatment plans, healthcare professionals can offer a holistic approach to fostering emotional resilience and cognitive well-being. This study underscores the need for further research and public awareness to optimize nutrition as a tool for enhancing overall mental health.

Key words: nutrition, mental health, emotional well-being.

# P.II.3. THE RHEOLOGY, TEXTURE, AND MOLECULAR DYNAMICS OF PLANT-BASED HOT DOGS

## Hanna Maria BARANOWSKA<sup>1</sup>, Krzysztof SMARZYNSKI<sup>2</sup>, Jacek LEWANDOWICZ<sup>3</sup>, Paweł JEŻOWSKI<sup>4</sup>, Millena RUSZKOWSKA<sup>2</sup>, Martyna Maria WRBÓEL<sup>2</sup>, Piotr KUBIAK<sup>5</sup>, Miroslava KAČÁNIOVÁ<sup>6</sup>, Przemysław Łukasz KOWALCZEWSKI<sup>5</sup>

 <sup>1</sup>Poznan University of Life Sciences, Department of Physics and Biophysics, 28 Wojska Polskiego, Poznan, Poland
 <sup>2</sup>Gdynia Maritime University, Gdynia, Poland
 <sup>3</sup>Prof. Waclaw Dabrowski Institute of Agriculture and Food Biotechnology -STI, Poznań, Poland
 <sup>4</sup>Poznan University of Technology, Poznań, Poland
 <sup>5</sup>Poznań University of Life Sciences, Poznań, Poland
 <sup>6</sup>Slovak University of Agriculture in Nitra, Nitra, Slovakia

Corresponding author email: hanna.baranowska@up.poznan.pl

#### Abstract

This study investigates the rheological and textural properties, as well as proton molecular dynamics, of hot dog-type plant-based sausages (PBSs) and batters used in their production. Various formulations were analyzed to understand how different ingredients and processing methods affect the characteristics of the final products. Our findings reveal that the incorporation of specific plant proteins and hydrocolloids significantly influences the rheological behavior and texture profile of sausages. The hardness of the samples ranged from 4.33 to 5.09 N/mm and was generally higher for the products with inorganic iron sources. Regarding the viscoelastic properties, all the samples showed larger values of the storage modulus than the loss modulus, which indicates their solid-like behavior. Additionally, the study utilized advanced proton nuclear magnetic resonance (NMR) techniques to elucidate the molecular dynamics within plant-based matrices, providing insights into water distribution and mobility. Key findings highlight the impact of different plant proteins and additives on the texture and stability of sausage analogs.

*Key words*: vegan sausages, potato protein, low-field nuclear magnetic resonance, plant-based food.

# P.II.4. POTATO PROTEIN-BASED VEGAN BURGERS ENRICHED WITH DIFFERENT SOURCES OF IRON AND FIBER: NUTRITION, SENSORY CHARACTERISTICS, AND ANTIOXIDANTS BEFORE AND AFTER *IN VITRO* DIGESTION

## Przemyslaw Lukasz KOWALCZEWSKI<sup>1</sup>, Martyna Maria WRÓBEL<sup>2</sup>, Krzysztof SMARZYŃSKI<sup>2</sup>, Joanna ZEMBRZUSKA<sup>3</sup>, Mariusz ŚLACHCIŃSKI<sup>3</sup>, Paweł JEŻOWSKI<sup>3</sup>, Aneta TOMCZAK<sup>1</sup>, Bartosz KULCZYŃSKI<sup>1</sup>, Magdalena ZIELIŃSKA-DAWIDZIAK<sup>1</sup>, Karina SAłEK<sup>4</sup>, Dominik KMIECIK<sup>1</sup>

<sup>1</sup>Poznań University of Life Sciences, Poznań, Poland
 <sup>2</sup>Gdynia Maritime University, Gdynia, Poland
 <sup>3</sup>Poznan University of Technology, Poznań, Poland
 <sup>4</sup>Heriot-Watt University, Edinburgh, United Kingdom

Corresponding author email: przemyslaw.kowalczewski@up.poznan.pl

#### Abstract

The novel plant-based burgers (PBBs) - based on potato protein, with high content of iron and appropriately selected fats - were characterized in terms of their nutritional and bioactive properties both before and after the in vitro digestion process. It was found that the produced burger was characterized by high protein content. It was also shown to have a high dietary fiber content. The main fraction of dietary fiber in the tested samples was insoluble fiber, which accounted for approximately 89% of the total fiber content. In addition, noteworthy is the high digestibility of the protein, reaching approximately 95% for the potato fiber used in the formulation, and about 85% for the oat fiber. Produced PBBs also provide significant amounts of iron, with the use of an organic iron source greatly increasing its quantity in the final product. The analyzed antioxidant properties before and after the digestion process showed a tenfold increase in biological activity after digestion, indicating that the examined PBBs may counteract oxidative stress. It has been also shown that PBBs received the highest attractiveness ratings among respondents.

*Key words*: plant-based burgers, bioactive compounds, amino acid profile, fatty acid composition, consumer acceptance.

# P.II.5. CHARACTERIZATION OF FUNCTIONAL GLUTEN-FREE BREADSTICKS WITH CUMIN IMPROVED BY ADDITION OF CRUCIFEROUS EXTRACT

## Elena-Claudia STOICAN (GRADEA)<sup>1</sup>, Ionuț MORARU<sup>2</sup>, Angela MORARU<sup>2</sup>, Mircea-Cosmin PRISTAVU<sup>2</sup>, Florentina ISRAEL-ROMING<sup>1</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania <sup>2</sup>SC Laboratoarele Medica SRL, 11 Frasinului Street, 075100, Otopeni, Ilfov, Romania

Corresponding author email: claudia.stoican@bioresurse.ro

### Abstract

People suffering from celiac disease must exclude gluten products from their diet. The lack of gluten in bakery products causes both technological problems for processors and nutritional deficiencies for consumers. The purpose of this paper is to obtain functional gluten-free breadsticks with cumin improved by the addition of cruciferous extract. The 3xBiotics commercial extract was used for the experiments, which is a mixture of fermented cruciferous powders. In addition to the gluten-free breadsticks with cruciferous extract, two control samples were made: gluten-free breadsticks with cumin whithout cruciferous extract and breadsticks with gluten and cumin improved by the addition of cruciferous extract. All the samples were evaluated from microbiological point of view to determine the shelf life, from physico-chemical point of view to determine the nutritional value and from sensory point of view, using a panel of consumers, to characterize the sensorial attributes. Following the comparison with the control samples, it was found that the energy value for functional gluten-free breadsticks with cumin and cruciferous extract was higher compared to the control samples.

*Key words*: bakery products, technological process, shelf life, nutritional values, sensory analysis.

# P.II.6. VARIATION OF FLAVOPROTEIN CONCENTRATION AFTER SWEETENING IN A GREEN-TEA BASED FOOD SUPPLEMENT

## Alexandra-Ioana IONESCU, Constantin BUTOI, Viorel SCHIOPU, Georgeta POPESCU

University of Life Sciences "King Mihai I" fromTimișoara, IRVA Doctoral School, 119 Calea Aradului Street, Timișoara, Romania

Corresponding author email: butoiconstantin@yahoo.com

#### Abstract

Flavoproteins are proteins that contain a nucleic acid derivative of riboflavin. Flavoproteins removes the free radicals that contributes to oxidative stress and have an important role in DNA repair. The raw material used, is free from plant growth hormones and pesticides, helping to maintain high levels of nutrients in the finished product. The objective of this paper work is to identify the variant with the highest concentration of flavoproteins following the green tea sweetening process, in order to produce the most effective product for an innovative food supplement. The results of this phase of research have identified the variant with the highest concentration of flavoproteins process. The best variant obtained at this stage of research is characterized by sensory improvements and minimal changes in chemical composition compared to the unsweetened variant.

Key words: enzyme, flavoprotein, green tea, sweeteners.

# P.II.7. INFLUENCE OF NATURAL AND SYNTHETIC SWEETENERS ON FLAVOPROTEINS FOUND IN BLACK TEA

## Constantin BUTOI, Alexandra Ioana IONESCU, Viorel SCHIOPU, Georgeta POPESCU

University of Life Sciences "King Mihai I" from Timişoara, IRVA Doctoral School, 119 Calea AraduluiStreet, Timişoara, Romania

Corresponding author email: ialexandra\_08@yahoo.com

#### Abstract

Black tea is a very popular drink and is consumed worldwide for its flavor and health benefits. Due to its powerful antioxidant compounds, drinking black tea has health benefits for the consumer. Flavoproteins are one of the most widely studied families of enzymes - proteins that contain a nucleic acid derivative of riboflavin. Flavoproteins have either FMN (flavin mononucleotide) or FAD (flavin adenine dinucleotide) as a protein group or cofactor. The majority of flavoproteins, carry out redox reactions. This work paper aims to study the sweetener-induced changes in flavoproteins. The results showed very significant changes induced by honey ( $V_3$ ) and saccharin ( $V_4$ ) on the concentrations of the active forms of flavoprotein in black tea.

Key words: antioxidant, black tea, FAD, flavoproteins, FMN.

# P.II.8. RESEARCH ON THE VALORISATION OF PLANT-BASED BY-PRODUCTS TO PRODUCE FOOD LINKED TO THE CIRCULAR ECONOMY CONCEPT

## Ervin COZMA<sup>1</sup>, David QUINTÍN MARTÍNEZ<sup>2</sup>, Presentacíon GARCÍA GÓMEZ<sup>2</sup>, Jose FERNANDEZ CALATAYUD<sup>2</sup>, Florentina ISRAEL-ROMING<sup>1</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania
 <sup>2</sup>National Technological Centre for the Food and Canning Industry, CTNC, C. Concordia, s/n, 30500 Molina de Segura, Murcia, Spain

Corresponding author email: ecozma07@yahoo.com

#### Abstract

Circular economy is a sustainable approach that can help reduce waste, by valorising byproducts and other materials for obtaining new products or for obtaining value added compounds. The aim of this study is to present a potential valorisation of various plant byproducts through the brewing of kombucha teas. This approach not only contributes to reducing food waste but also encourages the creation of more sustainable food systems by promoting resource efficiency. The plant-based kombuchas were prepared separately using grape, lemon, broccoli, green tea and apple by-products. After the required aerobic fermentation process, the obtained samples showed regular pH values (3.3-3.5), Brix values (5.6-10.9), ethanol levels (<3g/100 mL) and acidity levels (<0.8% acetic acid). All of the samples, which were sterilised at 75 and 98°C respectively, showed no signs of any bacteria (Enterobacteriaceae and Listeria monocytogenes colonies) or fungi (yeasts and molds colonies). The results showed that discarded plant by-products have the potential to be used to obtain refreshing and natural kombucha drinks.

Key words: circular economy, valorisation, food residues, kombucha tea, plant by-products.

# P.II.9. GLOBAL TRENDS AND RESEARCH EVOLUTION IN FLOUR AND BAKERY PRODUCT FORTIFICATION: A BIBLIOMETRIC ANALYSIS

## Monica ȚUȚUIANU<sup>1, 2</sup>, Lavinia-Mariana BERCA<sup>2</sup>, Dănuț CIMPONERIU<sup>1, 3</sup>, Florentina ISRAEL-ROMING<sup>1</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania
 <sup>2</sup>National R&D Institute for Food Bioresources – IBA Bucharest, 6 Dinu Vintila Street, District 2, Bucharest, Romania
 <sup>3</sup>Department of Genetics, University of Bucharest, 91-95 Splaiul Independentei, District 5, Bucharest, Romania

Corresponding author: danut.cimponeriu@bio.unibuc.ro

#### Abstract

This Scopus-based bibliometric study evaluates global trends and the impact of wheat and bakery product fortification on public health. The search query (flour AND fortification\*) OR (bakery AND products AND fortification\*) yielded 1,917 articles, from which 1,239 Englishlanguage publications were selected for in-depth analysis in the domains of Agricultural and Biological Sciences and Medicine. Publications date back to 1942, although the volume of papers surged markedly post-2000. The most pertinent sources were Food and Nutrition Bulletin, Food, and Food Chemistry. Most authors were associated with institutions in the USA, India, and Brazil, whereas the most frequently cited publications were produced in the USA, Canada, and India. Frequently identified keywords in abstracts included "flour", "female", "article", "human", and "folic acid". Trend analysis since 2002 revealed a rapid diversification of research topics, reflecting the dynamic evolution of fortification research. Although articles span eight decades, the and most impactful research directions emerged after 2014. In conclusion, this bibliometric analysis evaluates global trends, key research areas, and the impact of flour and bakery product fortification.

Key words: flour, female, article, human, folic acid.

# P.II.10. RECENT INSIGHTS IN VACUUM IMPREGNATION APPLICATION ON MINIMAL PROCESSED FRUITS AND VEGETABLES

## Elisabeta Elena POPA, Mihaela GEICU-CRISTEA, Amalia Carmen MITELUȚ, Mihaela DRĂGHICI, Paul-Alexandru POPESCU, Ion NIȚU, Roxana ALECU, Mona Elena POPA

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania

Corresponding author email: mihaela.geicu@usamv.ro

#### Abstract

Recently, the consumer demand has increased in respect to minimally processed food, with health-promoting values and desirable sensory attributes. Fruit and vegetables are characterized with numerous health advantages such as low calorie content, high dietary fiber content and abundancy of nutritional components including vitamins and minerals, being considered essential in human diet. Vacuum impregnation (VI) combined with drying could be an interesting alternative to obtain a wide range of natural functional products. VI is a technique that uses pressure gradients to incorporate functional active components into the structural matrix of porous fruits and vegetables without substantially modifying the organoleptic properties. Therefore, the aim of this study is to present the mechanism of action and recent application of VI on fruits and vegetables. The results show great functional properties of minimally processed fruits and vegetables following the application of vacuum impregnation technology.

Key words: minimal processing, vacuum impregnation, functional properties, fruits, vegetables.

# P.II.11. THE LATEST DEVELOPMENT OF RADIO-FREQUENCY APPLICATIONS IN THE FOOD INDUSTRY: ADVANTAGES AND DRAWBACKS

## Amalia Carmen MITELUȚ<sup>1</sup>, Georgiana APOSTOL<sup>2</sup>, Elisabeta Elena POPA<sup>1</sup>, Mihaela GEICU-CRISTEA<sup>1</sup>, Mihaela DRĂGHICI<sup>1</sup>, Paul-Alexandru POPESCU<sup>1</sup>, Mona Elena POPA<sup>1</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania <sup>2</sup>Technological Highschool "Constantin Istrati", 91 Griviței Street, Câmpina, Romania

Corresponding author email: stefanoiu.georgiana@yahoo.com

#### Abstract

The quest for innovative processing solutions that meet both food safety and quality standards and sustainability goals (in terms of processing, preservation, and consumption) has led to a growing interest in technologies like radiofrequency (RF) technology. Although the mechanisms behind this technology have been thoroughly explained and are well-documented in the literature, and its advantages for industrial applications are recognized in several studies, the widespread adoption of RF technology for various agri-food products thermic treatment, remains limited due to unsolved issues. One of the main challenges in applying RF technology on a large scale is the need to adapt equipment and technology according to the specific characteristics of the product (e.g. raw material, finished product, liquid, semi-liquid, solid, packaged, unpackaged) and the intended purpose (e.g., processing, preservation, sanitization). This paper aims to review recent findings in this area, highlighting both the benefits and challenges of RF technology application for different food products thermal processing. Addressing these challenges requires continued scientific research in various directions within this field.

Key words: benefits and challenges, food processing, RF technology.

# P.II.12. DEVELOPMENT, OPTIMIZATION, AND VALIDATION OF A QUECHERS METHOD FOR DETERMINING THE POLYCYCLIC AROMATIC HYDROCARBONS IN CEREALS, OIL, AND THEIR DERIVATIVES BY GC-MS/MS

## Mioara NEGOIȚĂ, Adriana Laura MIHAI, Alina Cristina ADASCĂLULUI, Laurențiu Mihai PALADE

National Research & Development Institute for Food Bioresources – IBA Bucharest, 6 Dinu Vintilă Street, District 2, 02110, Bucharest, Romania

Corresponding author email: mihai laura21@yahoo.com

#### Abstract

A modified d-SPE QuEChERS technique combined with GC-MS/MS was developed and validated for the determination of the 4 EU priority polycyclic aromatic hydrocarbons (PAHs): benzo(a)anthracene, chrysene, benzo(b) fluoranthene, benzo(a)pyrene from cereals (C), oilseeds (O) and their processed derivatives (CD/OD). Several parameters were studied: the type/amount of solvents/salts/sorbents, the amount of sample/water used, the volume of extract to be purified by d-SPE QuEChERS, etc., to obtain good recoveries and minimize the amount of co-extractive residues. The procedure established for each matrix category was validated with satisfactory results: good linearities on both standard solutions ( $R^2$ = 0.9925-0.9999) and food matrices ( $R^2$ = 0.9881-0.9992); recovery rates between 74.12-119.39% for different fortification levels, with RSD values below 15%. LOQs were between 0.22-0.64 µg/kg for C and CD, and 0.85-8.70 µg/kg for O and OD. No matrix effects were recorded, the values being <± 20%. The method validation was applied on spiked samples of wheat, wheat semolina, pasta, breakfast cereals, sunflower seeds, sunflower oil, margarine, and vegetable mayonnaise. The samples analyzed were free of PAHs or showed values below the LOQ.

Key words: cereals, oilseed, polycyclic aromatic hydrocarbons, PAH, QuEChERS.

# P.II.13. HIGHLIGHTING THE INFLUENCE OF BROCCOLI MICROPLANTS (*BRASSICA OLERACEA* VAR. *ITALICA*) ADDITION TO VEGAN YOGHURT ON THE FINAL CONSUMER PURCHASING PREFERENCES

## Oana LIVADARIU, Alexandra ADAM

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Biotechnologies, 59 Mărăști Blvd, District 1, 011464, Bucharest, Romania

Corresponding author email: alexandra.adam@bth.usamv.ro

#### Abstract

Microplants (microgreens/sprouts) = MMS, are used for their culinary versatility and potential health benefits. By nutrient composition and bioactive compounds, MMS are considered edibles with significant contribution in modulating oxidative stress and inflammation in the human body. This paper explores the theoretical and practical aspects of incorporating broccoli MMS into vegan yoghurt to assess their influence on consumer purchasing preferences. The study outlines an effective protocol for cultivating and integrating broccoli MMS with comestible substrate into plant-based yoghurt formulations. The experimental process included sensory evaluations of the final products conducted by a trained panel and an on-line consumer survey. The results, presented through detailed charts and analysis, highlight the sensory attributes, consumer acceptance, and purchasing behaviours influenced by the addition of broccoli MMS. This study provides valuable insights into the potential market appeal of functional vegan yoghurt enriched with broccoli MMS and its implications for consumer preferences.

Key words: broccoli; vegan yoghurt; microplants (microgreens/sprouts).

# P.II.14. A CROSS-COUNTRY CONSUMERS' STUDY ON THE ACCEPTANCE OF GRISSINI ENRICHED WITH WHEY

## Denisa Eglantina DUȚĂ<sup>1</sup>, Gabriela Daniela CRIVEANU-STAMATIE<sup>1</sup>, Cristian FLOREA<sup>1</sup>, Mihaela ANGHEL (MULŢESCU)<sup>1</sup>, Adriana Laura MIHAI<sup>1</sup>, Claudia ZOANI<sup>2</sup>, Nastasia BELC<sup>1</sup>, Michael RYCHLIK<sup>3</sup>

<sup>1</sup>National Research & Development Institute for Food Bioresources – IBA Bucharest, 6 Dinu Vintilă Street, District 2, 021102, Bucharest, Romania <sup>2</sup>Department for Sustainability of Production and Territorial Systems, Biotechnologies and Agro-Industry Division, Casaccia Research Center, ENEA, Italian National Agency for New Technologies, Energy and Sustainable Economic Development, 76 Lungotevere Thaon di Revel, 00196, Rome, Italy <sup>3</sup>Department of Life Science Engineering, Chair of Analytical Food Chemistry, TLIM School of LifeSciences, Technical University of Munich

Chemistry, TUM School of LifeSciences, Technical University of Munich, 85354, Freising, Germany

Corresponding author email: denisa.duta@bioresurse.ro

#### Abstract

The study aimed to valorize the whey resulting from dairy technology by its incorporation in grissini food products. It aimed to evaluate the consumers' acceptability of the new product and the market potential through a cross-country trial and survey conducted in parallel in Romania and Italy. Whey ultrafiltration concentrate used in the grissini recipe had high protein, fat, and sugar content. Grissini obtained by replacing water with whey were characterized by a higher protein content, total phenolic content, and antioxidant activity than the control sample made with water. Acceptance of the new product obtained was assessed with 100 panelists in Italy and 102 in Romania, respectively. Respondents answered a questionnaire and tested the grissinis. When it came to the acceptability of the samples made with whey, in both countries, the consumers showed a higher appreciation than for the control sample. A similar percentage of respondents (50% in Italy and 48% in Romania) were willing to pay 1.5 euro (8 lei)/100 g product. In general, participants in the study are keen to pay for innovative products at the same price as for conventional products.

*Key words*: grissini, protein content, total phenolic content, antioxidant activity, consumer acceptability.

# P.II.15. RESEARCH ON THE VALORIZATION OF BY-PRODUCTS AND/OR WASTES FROM *BRASSICA OLERACEA* – A REVIEW

### Alexandru SOARE, Florentina ISRAEL-ROMING

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania

Corresponding author email: florentinarom@yahoo.com

#### Abstract

Managing vegetable waste and by-products is a worldwide challenge for the agricultural sector. As a widely consumed vegetable crop, Brassica oleracea (B. oleracea) accounts for a higher volume of waste in the supply chain process, with cabbage, cauliflower, broccoli, and kale accounting for a significant share. Therefore, the sustainable and resource-efficient use of waste is essential. This review examines the potential applications of B. oleracea waste and byproducts, with particular attention to cabbage, cauliflower, broccoli, and kale in food, pharmaceutical, and other sectors. The importance of their use in value-added applications is addressed, with emphasis on key biomolecules, technologies involved in the valorisation process, and future aspects of practical applications. Cabbage, broccoli, and cauliflower produce waste and by-products that are not processed, including leaves, stems, stalks, and roots. Most of these contain high-value biomolecules, including bioactive plant proteins and phytochemicals, glucosinolates, flavonoids, anthocyanins, carotenoids, and tocopherols. Interestingly, isothiocvanates derived from glucosinolates have potent anti-inflammatory and anti-cancer properties by different interactions with cellular molecules and modulation of key cellular signalling pathways. Therefore, these B. oleracea residues can be efficiently valued using different innovative extraction and biotransformation techniques and the use of different biorefining approaches. This not only minimizes the environmental impact but also helps to develop products with high-added value for food, pharmaceutical, and other related industries.

*Key words*: Brassica oleracea, green extraction methods, phytochemicals sustainable bioconversion, waste valorisation.

# P.II.16. DETERMINATION OF BIOACTIVE COMPOUNDS AND ANTIOXIDANT ACTIVITY IN SELECTED *CUCURBITACEAE* FRUITS

## Mihaela MULŢESCU, Iulia-Elena SUSMAN

National Institute of Research and Development for Food Bioresources – IBA Bucharest, 6 Dinu Vintila Street, District 2, Bucharest, Romania

Corresponding author email: mihaela.multescu@gmail.com

#### Abstract

This study investigates the use of the photochemiluminescence (PCL) assay in two different systems - hydrophilic (ACW) and lipophilic (ACL) - along with the DPPH method to evaluate the antioxidant potential of three fruits from the Cucurbitaceae family: watermelon, yellow watermelon, and melon. The results showed that the analyzed fruits contain phenolic compounds ranging from 7.40 to 15.43 mg of Gallic Acid Equivalent (GAE) per 100 g of fresh weight (FW). Regarding flavonoid content, concentrations were approximately 1 mg Rutin Equivalent (RE) per 100 g FW, while anthocyanin content was below 1 mg cyanidin-3-glucoside equivalent (CGE) per 100 g FW. Notably, melon exhibited the highest antioxidant capacity among the fruits in both ACW and ACL systems, followed by watermelon. A strong positive correlation was found between antioxidant capacity assessed with the ACL method and the DPPH assay, with a correlation coefficient (r) of 0.9932. Furthermore, a significant correlation was also observed between the ACW system and the DPPH assay, with a correlation coefficient of 0.9752.

Key words: watermelon, yellow watermelon, melon, phenolics, antioxidant capacity.

# P.II.17. *PEDIOCOCCUS ACIDILACTICI* MI129-DERIVED POSTBIOTIC FORMULATIONS: *IN VITRO* INSIGHTS INTO APPLICATIONS FOR HEALTH IMPROVEMENT

## Mircea Cosmin PRISTAVU<sup>1</sup>, Filofteia Camelia DIGUȚĂ<sup>1</sup>, Florentina BADEA<sup>1</sup>, Alexandru Constantin ALDEA<sup>1</sup>, Anna COPALONI<sup>3</sup>, Florentina MATEI<sup>1, 2</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, District 1, Bucharest, Romania
 <sup>2</sup>Transilvania University of Braşov, Faculty of Food Industry and Tourism, 148 Castelului Street, 500014, Braşov, Romania
 <sup>3</sup>Università degli Studi di Milano, Dip. Medicina Veterinaria e Scienze Animali – DIVAS, I Milano 01, Via Festa del Perdono 7, Italy

Corresponding author email: camelia.diguta@bth.usamv.ro

#### Abstract

The skin microbiome is crucial for maintaining epidermal barrier integrity and immune homeostasis. This study was conducted to assess in vitro the efficacy of postbiotic formulations prepared from the cell-free supernatant (CFS) of Pediococcus acidilactici MI129, formulated as micellar water and dietary supplement capsules. Seven genes associated with bacteriocin biosynthesis (nis, plnN, plnEF, plnS, plnA, plnQ, and plnW) were detected in the MI129 genome. A multiplex PCR method was established and effectively applied to identify key bacteriocin genes (plnQ, plnS, plnEF, plnW). Both postbiotic formulations exhibited notable antimicrobial activity, generating clear zones of inhibition against all pathogenic indicator strains tested, and demonstrated significant antioxidant activity, indicating their potential to enhance cutaneous health. These results suggest that postbiotics from P. acidilactici MI129 may contribute to skin barrier reinforcement and microbial balance, highlighting their applicability along the skin-gut axis. Future in vivo studies are required to validate these findings and explore the dynamics of postbiotic-skin microbiome interactions.

*Key words*: *Pediococcus acidilactici, multiplex PCR, postbiotic formulations, antimicrobial activity, antioxidant activity.* 

# SUBSECTION III: MEDICAL AND PHARMACEUTICAL BIOTECHNOLOGY

# P.III.1. VALORIZATION OF THE VITICULTURE WASTE IN THE NUTRACEUTICAL INDUSTRY

## Teodora-Otilia ALEXIU, Laura-Dorina DINU

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania

Corresponding author email: laura.dinu@biotehnologii.usamv.ro

#### Abstract

The valorization of viticulture by-products (e.g., grapevine pomace and canes) in the nutraceutical industry represents a paradigm shift in sustainable resource management and innovation. Thus, recognizing the untapped potential within these residues, the nutraceutical industry has embraced them as valuable but less exploited raw materials. These wastes are characterized by a high polyphenolic composition with antimicrobial, antioxidant, anti-inflammatory, and cardioprotective effects, especially resveratrol, gallic acid, and proanthocyanidins. Therefore, this mini-review aims to update the potential of viticulture wastes for the production of polyphenol-rich nutraceuticals and nanoparticles used as bioactive molecule carriers. Additionally, the modulator effect of grape pomace on human and animal microbiota was highlighted. The viticulture waste valorization aligns with the principles of the circular economy while creating new revenue streams for wineries.

*Key words*: viticulture waste, polyphenol-rich nutraceuticals, nanoparticles, gut microbiota modulation, circular economy.

# P.III.2. NANOSYSTEMS AS VESICLES FOR DELIVERY OF SENOTHERAPEUTICS FROM NATURAL SOURCES -ADVANTAGES, LIMITATIONS, SCALABILITY, AND ECONOMIC ASPECTS

## Fawzia SHA'AT<sup>1</sup>, Anton-Liviu PETRICA<sup>2</sup>, Ramona-Daniela PAVALOIU<sup>1</sup>

<sup>1</sup>National Institute for Chemical-Pharmaceutical Research & Development – ICCF Bucharest, 112 Vitan Avenue, 3<sup>rd</sup> District, 031299, Bucharest, Romania <sup>2</sup>Bucharest University of Economic Studies – ASE, 6 Roman Square, 1<sup>st</sup> District, 010374, Bucharest, Romania

Corresponding author email: pavaloiu\_daniella@yahoo.com

#### Abstract

Leveraging senotherapeutics derived from natural sources is pivotal in advancing senotherapy, offering biocompatible and sustainable solutions to target cellular senescence and mitigate agerelated diseases. Nanosystems have emerged as versatile vesicles capable of encapsulating and delivering bioactive agents to senescent cells with high specificity and minimal off-target effects. These nanosystems leverage unique physicochemical properties, such as size, surface charge, and functionalization with targeting ligands, to optimize cellular uptake and therapeutic efficacy. Recent advancements in nanotechnology have facilitated the integration of molecular tools such as senolytics and senomorphics within these carriers, enhancing their ability to selectively clear senescent cells or modulate their secretory phenotype. This review highlights the state-of-the-art in nanosystem development for senotherapeutic applications, addressing their advantages, limitations, scalability, economic aspects, regulatory approval, and long-term effects. This work underscores the transformative potential of nanosystems in senotherapeutic delivery and advocates for continued interdisciplinary collaboration to overcome existing barriers and realize their full therapeutic potential.

Key words: senotherapeutics, nanosystems, delivery.

# P.III.3. LIPOSOMES IN REGENERATIVE COSMETICS: REVOLUTIONIZING SKIN CARE THROUGH ADVANCED NANOTECHNOLOGY

## Fawzia SHA'AT<sup>1</sup>, Ramona-Daniela PAVALOIU<sup>1</sup>, Ciprian FODOR<sup>2</sup>, Emilian ROMAN<sup>2</sup>, Mariana FODOR<sup>2</sup>

<sup>1</sup>National Institute for Chemical-Pharmaceutical Research & Development – ICCF Bucharest, 112 Vitan Avenue, 3rd District, 031299, Bucharest, Romania <sup>2</sup>SC PURE LIFE SRL, 13 Veronica Micle Street, 720217, Suceava, Romania

Corresponding author email: pavaloiu\_daniella@yahoo.com

#### Abstract

Liposomes play a vital role in the advancement of regenerative cosmetics due to their capacity to encapsulate, protect, and effectively deliver active ingredients deep within the skin. These versatile carriers mimic biological membranes, enhancing the stability and bioavailability of sensitive compounds such as peptides, growth factors, vitamins, and plant-derived bioactives. Regenerative cosmetics leverage liposomal systems to promote skin repair, boost collagen synthesis, and combat signs of aging by targeting cellular pathways with precision. This review explores the state-of-the-art advancements in liposome technology for cosmetic applications, emphasizing their role in addressing challenges such as poor solubility, rapid degradation, and limited penetration of active agents. Additionally, we examine the economic viability, scalability, and regulatory considerations associated with integrating liposome-based products into the commercial cosmetic market. Despite their transformative potential, challenges remain in ensuring formulation stability, achieving cost-effective production, and verifying long-term safety. By providing a comprehensive overview, this review underscores the potential of liposome technology to revolutionize regenerative cosmetics, paving the way for nextgeneration skincare innovations that restore, rejuvenate, and protect the skin.

Key words: liposomes, regenerative cosmetics, natural ingredients, skin care.

# P.III.4. ANTIRHEUMATIC CREAM BASED ON NATURAL INGREDIENTS

## Diana GROPOȘILĂ-CONSTANTINESCU, Ioan-Nicolae RANGA, Radu-Cristian TOMA, Gabriela-Lucica MĂRGĂRIT

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania

Corresponding author email: ionut\_ranga@yahoo.com

#### Abstract

Choosing organic and natural products should be a top priority for a healthy skin. The aim of this research was to formulate and test a cream based on natural ingredients, used for skincare and also to relief rheumatic diseases. The main active ingredients used to obtain the cream were the following: burdock oil, macadamia nut oil, shea butter, ylang-ylang oil, harpagophytum oil, capsicum oil, and vitamin E. The properties of each ingredient have been taken into account in the preparation of the product, in accordance with the general methods for making creams. Organoleptic and physicochemical analyses confirmed the quality of the product, pleasant appearance and odor and a creamy consistency.

Key words: active ingredients, burdock, cream, skin.

# P.III.5. THE ANTIOXIDANT POTENTIAL OF SOME *MESPILUS GERMANICA* L. EXTRACTS

## Elena BÎRZĂ<sup>1\*</sup>, Nicoleta RUSU<sup>1</sup>, Cătălina VOAIDEȘ<sup>2</sup>, Narcisa Elena BĂBEANU<sup>2</sup>

 <sup>1</sup>National Institute of Chemical Pharmaceutical Research and Development, ICCF, 112 Vitan Avenue, District 3, Bucharest, Romania
 <sup>2</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, USAMV, 59 Mărăşti Blvd, District 1, Bucharest, Romania

\*Corresponding author email: androneelena51@gmail.com

#### Abstract

This study aimed to evaluate the antioxidant activity and mineral content of medlar fruit (Mespilus germanica L.) extracts, using different solvents to identify the most effective extraction method. Extracts were prepared using acetone, ethanol, water, and chloroform. Polyphenol content was analyzed using HPLC, minerals were determined using inductively coupled plasma mass spectrometry (ICP-MS), and antioxidant activity was assessed using chemiluminescence assays to determine  $IC_{50}$  values. The acetonic extract (MP1) had the highest polyphenol content and strong antioxidant activity (AA% of 64%). The aqueous extract (MP2) was richest in minerals. The ethanolic extract (MP3) balanced polyphenol content and antioxidant activity (AA% of 51%). The chloroform extract (MP4) showed a pro-oxidant effect (AA% of -151%). Acetone is the best solvent for extracting polyphenols, while water is ideal for mineral extraction. The ethanolic extract provides a balanced option. Chloroform extracts should be used with caution due to potential pro-oxidant effects. These findings help optimize extraction methods for health benefits, with potential applications in food and pharmaceuticals.

*Key words*: antioxidant activity, chemical composition, Mespilus germanica L., polar and non-polar extracts.

# P.III.6. STUDIES REGARDING *IN VITRO* CYTOTOXICITY OF THE YELLOW POLYKETIDES OBTAINED THROUGH BIOSYNTHESIS

## Daniela ALBISORU<sup>1</sup>, Nicoleta RADU<sup>1</sup>, Oksana MULESA<sup>2</sup>, Marinela BOSTAN<sup>3</sup>, Viviana ROMAN<sup>4</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, USAMV, 59 Mărăști Blvd, District 1, Bucharest, Romania
<sup>2</sup>Prešov University - Faculty of Humanities and Natural Sciences, Námestie legionárov 3, 080 01, Prešov, Slovakia
<sup>3</sup>Immunology Centre, Virology Institute "Stefan S. Nicolau", 285 Mihai Bravu Blvd, Bucharest, Romania
<sup>4</sup>Center of Immunology, Virology Institute "Stefan S. Nicolau", 285 Mihai Bravu Blvd, Bucharest, Romania

Corresponding author email: nicoleta.radu@biotehnologii.usamv.ro

#### Abstract

Previous studies have provided evidence of the antifungal properties of yellow microbial polyketides. More of that, in silico studies have suggested that these bioproducts are cytotoxic and suitable for the formulation of new antifungal bioproducts, more suitable for topical application. In this regard, we have made in vitro studies to assess the cytotoxicity of these biomaterials. The studies were carried out on a standardised normal human cell line by exposing the cells to yellow polyketides. The results reveal that these types of polyketides exhibit cytotoxicity for a human normal cell line, at concentrations exceeding 12.3  $\mu$ g/ml in culture media. In conclusion, our studies have confirmed the results obtained from in silico studies, indicating that yellow polyketides are more suitable as a main ingredient for topical products development, due to their cytotoxic properties.

Key words: yellow poliketides, in vitro cytotoxicity.

# SUBSECTION V: MISCELLANEOUS

# P.V.1. INVESTIGATION THE IMPACT OF *MESPILUS GERMANICA* L. LEAVES LYOPHILIZATION ON THE QUALITY OF EXTRACTABLE DNA

## Elena BÎRZĂ, Cătălina VOAIDEȘ, Narcisa Elena BĂBEANU

University of Agronomic Sciences and Veterinary Medicine of Bucharest, USAMV, 59 Mărăști Blvd, District 1, Bucharest, Romania

Corresponding author email: catalina.voaides@bth.usamv.ro

#### Abstract

This study compared the efficacy of lyophilization as a method for DNA extraction from Mespilus germanica L. leaves tissue. We conducted a comparative analysis of nonfreeze-dried and freeze-dried leaves as sources for DNA. The extraction method comparison was based on DNA quantity and quality, cost, and processing time. Samples of medlar leaves were collected in Prahova County, Ilfov County, and Bucharest, Romania, and evaluated. The DNA concentration and the ratios of 260 and 280 nm absorbances were measured using nanospectrophotometry. The results showed that the DNA was suitable as a template for PCR amplification (RAPD, ISSR). Advances in DNA technology require isolating DNA from many samples and preserving tissue samples for future use in medlar genome studies and this study proposes a method for preserving large numbers of samples using lyophilization.

Key words: medlar, DNA, lyophilization, PCR amplification.

# P.V.2. PRELIMINARY STUDIES REGARDING THE ANTIMICROBIAL PROPERTIES OF SOME BIOPRODUCTS DERIVED FROM ZINGIBER OFFICINALE AND CURCUMA LONGA

## Magdalina URSU<sup>1</sup>, Nicoleta RADU<sup>1, 2</sup>, Silvana Mihaela DĂNĂILĂ-GUIDEA<sup>1</sup>, Narcisa Elena BĂBEANU<sup>1</sup>

 <sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, 011464, District 1, Bucharest, Romania
 <sup>2</sup>National Institute of Chemistry and Petrochemistry R&D of Bucharest, 202 Splaiul Independentei Street, 060021, District 6, Bucharest, Romania

Corresponding author email: nicoleta.radu@biotehnologii.usamv.ro

#### Abstract

The study aimed to evaluate the antimicrobial activity of certain bioproducts obtained from turmeric and ginger rhizomes, respectively, four essential oils (EO) purchased from NJoy and Oleya and four bioproducts obtained through chloroform and ethanol extraction. The results showed that the EO of ginger (NJoy) exhibits moderate antimicrobial activity against E. coli and significant antimicrobial activity on S. aureus, C. albicans, and C. parapsilosis; the EO of turmeric (Oleya) exhibit moderate antimicrobial activity for E. coli and C. albicans. The bioproduct, derived from the extract of turmeric in chloroform, has a significant antimicrobial effect on C. albicans and C. parapsilopsis. The alcoholic extracts of turmeric and ginger exhibit local antimicrobial effects on E. coli and no antimicrobial activity for C. albicans, C. parapsilopsis, or S. aureus. In conclusion, the preliminary tests achieved in vitro indicate significant differences between the tested bioproducts, some of these showing high potential for specific antimicrobial applications.

Key words: Zigiber officinale, Curcuma longa antimicrobial properties.

# P.V.3. EVALUATION OF THE CYTOTOXICITY OF SOME BIOMATERIALS DERIVED FROM ALGAL POLYSACCHARIDES USING MATH MODELS

## Marian TOADER<sup>1</sup>, Nicoleta RADU<sup>1, 2</sup>, Narcisa Elena BĂBEANU<sup>1</sup>, Radu-Cristian TOMA<sup>1</sup>, Viviana ROMAN<sup>3</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, District 1, Bucharest, Romania
<sup>2</sup>National Institute of Chemistry and Petrochemistry of Bucharest, 202 Splaiul Independentei, District 6, Bucharest, Romania
<sup>3</sup>Immunology Center, Virology Institute "Stefan S. Nicolau", 285 Mihai Bravu Blvd, District 3, Bucharest, Romania

Corresponding author email: nicoleta.radu@biotehnologii.usamv.ro

#### Abstract

Marine algae-derived biomaterials may exhibit biological properties that make them promising for therapeutic applications. In light of these considerations, the present study aimed to perform predictive analyses to evaluate the cytotoxicity of eight biomaterials containing algal polysaccharides or polysaccharides enriched with gold in two tumour cell lines. Results obtained through math modelling of the data revealed that: a) For the Caco-2 cell line, the biomaterial containing polysaccharides from P. umbilicalis and gold exhibited a maximum cytotoxic effect of 45%. The biomaterial with polysaccharides obtained from U. pinnatifida showed a cytotoxicity of 51%. In the case of polysaccharides derived from C. barbata, the presence of gold resulted in a maximum cytotoxicity of 41%. Regarding biomaterials derived from Chlorella sp., cytotoxicities of 100% were observed at high concentrations of the biomaterial containing polysaccharides derived from C. barbata the presence at high concentrations of 80 $\mu$ L/mL. In conclusion, the results obtained through math modelling indicated the presence of a cytotoxic effect in six of the eight biomaterials derived from algae.

Key words: prediction cytotoxicities, algal biomaterials.

