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**In-Person Session****FRONTIERS IN ECO-INNOVATIVE TECHNOLOGIES  
FOR ADVANCED WATER QUALITY MONITORING  
AND SUSTAINABLE REMEDIATION**

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The increasing challenges related to water pollution and resource sustainability require the development of efficient and environmentally friendly monitoring and treatment solutions. The AQUAMAT project, coordinated by the National Institute for Research and Development in Chemistry and Petrochemistry – ICECHIM, focuses on the development of integrated technologies for water quality assessment and remediation. The project aims to combine advanced sensing systems with innovative treatment approaches, including functional nanomaterials, membrane-based processes, adsorption techniques, and advanced oxidation methods. This multidisciplinary approach enables the design of modular and adaptable systems for efficient removal of contaminants from various water sources.

The results obtained so far highlight the successful development of sensitive detection platforms and high-performance materials, as well as the integration of hybrid treatment solutions. The outcomes are expected to contribute substantially to the advancement of water resource management, supporting both scientific innovation and technological transfer. AQUAMAT thus represents a relevant model for sustainable environmental protection, aligning with current European priorities in eco-innovation and circular resource management.

**Acknowledgments**

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## FULL HIGH ADDED VALUE RECOVERY OF AGRICULTURAL GREEN RESIDUAL BIOMASS TO PROMOTE CIRCULAR BIOECONOMY

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Tree pruning represents an important source of biomass. Citrus fruits, for example, cultivated on more than 10 million hectares worldwide, produce each year around 25 million tonnes (an average of 2.5 t/ha) of low-value lignocellulosic biomass. This biomass constitutes an excellent raw material for recovering and producing high-value by-products for multiple uses. In this respect, our valorising research focused on a deep phytochemical characterisation of its polyphenolic and flavonoid contents and antioxidant activities. Using GC-MS we were able to identify and evaluate the bioactivity of several compounds such as quinic acid, alpha-linolenic acid and alpha-amyrin known for their wide range of applications. We studied the fragrant aromatic composition of petitgrain essential oil, a promising natural source used in the development and formulation of functional foods and pharmaceuticals, in flavours, liqueurs, perfumes and medication. On the other hand, for the purpose of complete valorisation, we demonstrated an anti-fungal and anti-oxidant potential of the hydro-distillation effluent fraction.

Finally, our results demonstrated the efficiency and profitability of the complete valorisation of agricultural residual biomass, based on an integrated zero-waste approach, for the production of high added-value molecules, paving the way for green biorefineries and a sustainable circular bioeconomy.

**INVENTORY OF CLERIDS (COLEOPTERA: CLERIDAE)  
FROM THE ENTOMOLOGICAL COLLECTIONS OF THE  
REPUBLIC OF MOLDOVA****Svetlana BACAL<sup>1</sup>, Galina BUȘMACHIU<sup>1\*</sup>**<sup>1</sup>Moldova State University, Institute of Zoology,  
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The inventory of Cleridae species from the entomological collections in Chisinau city allowed the identification of 22 species of coleoptera, of which 9 species and 43 specimens from the Republic of Moldova. Most of the species were collected from abroad (15 species and 42 specimens) from Azerbaijan, Iran, Kyrgyzstan, Russia, Tajikistan, Ukraine and Uzbekistan. The majority of species are present in collections with single specimens, being rare.

A new species for the country, *Tillus elongatus* was recently collected in the „Plaiul Fagului” Reserve. This saproxylic species is a valuable indicator of the quality of well-preserved forest habitats and old-growth deciduous forests.

**Acknowledgments**

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**EFFICACY AND ENVIRONMENTAL RISKS OF  
CHEMOTHERAPEUTIC AND ANTIPARASITIC  
APPLICATIONS IN AQUACULTURE: THE CASE OF  
TÜRKİYE**

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Türkiye has significant potential in aquaculture, and the sector has shown steady growth in recent years. Aquaculture activities carried out in freshwater, marine, and coastal pond systems involve a variety of species, particularly rainbow trout, sea bream, and sea bass. However, the increasing intensity of production has led to a higher incidence of diseases in aquatic organisms, making effective disease management essential for sustainable production.

Intensive farming conditions increase the risk of bacterial, viral, fungal, and particularly parasitic diseases. Therefore, various chemotherapeutic agents are used for disease control. In the management of parasitic infections, numerous antiparasitic chemicals containing different active substances are widely applied. When used appropriately, these compounds contribute to maintaining fish health and reducing production losses.

However, the release of antiparasitic chemicals into aquatic environments may lead to significant ecological impacts. At the cellular level, these substances can induce oxidative stress, genotoxicity, and disruptions in enzymatic systems. At the individual level, physiological stress and growth impairment may occur. At the population level, reduced reproductive success and increased mortality can be observed. Furthermore, at the community and ecosystem levels, alterations in trophic interactions, changes in species composition, and reductions in biodiversity may occur. In this context, this study examines in detail the efficacy and environmental impacts of antiparasitic chemicals used in aquaculture in Türkiye. Therefore, the responsible use of antiparasitic chemicals

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and the monitoring of their environmental impacts are crucial for ensuring sustainable aquaculture practices.

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**INVESTIGATION OF NEW FUNGAL STRAINS WITH  
ENTOMOPATHOGENIC POTENTIAL ISOLATED FROM  
THE MICROFLORA OF THE POTATO PEST  
*LEPTINOTARSA DECEMLINEATA* (SAY) (COLEOPTERA:  
CHRYSOMELIDAE).**

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Potato (*Solanum tuberosum* L.) is an extensively cultivated crop worldwide. Like any economically important crop, its yield can be drastically reduced by pests. The Colorado potato beetle, *Leptinotarsa decemlineata* Say, 1824 (Coleoptera, Chrysomelidae), is one of the most damaging pests of the potato crop. The study aimed to investigate new fungal strains isolated from the microflora of the Colorado potato beetle in the Republic of Moldova to be developed as biological control agents. Dead insects (adults and larvae) were collected from potato fields in the central region of the Republic of Moldova. Specimens with visible signs of fungal infection were used for isolation of the pure fungal cultures. The morphological characteristics of the fungal culture were studied using the agar block and lactophenol cotton blue staining technique. All strains have been identified as belonging to the genus *Beauveria*. Preliminary pathogenicity screening has been conducted on adults of *L. decemlineata*. Mortality rates ranged within 0-100% on day seven after treatment. To harness their entomopathogenic potential and select the strains most resistant to environmental factors, research will focus on insecticidal activity assessment and identifying physiological characteristics under laboratory and field conditions.

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## NEST PARAMETERS AND EGG–HATCHLING RELATIONSHIPS OF THE AFRICAN SOFTSHELL TURTLE (*TRIONYX TRIUNGUIS*) ON BELEK BEACH, TÜRKİYE

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The African softshell turtle (*Trionyx triunguis*) is critically endangered in the Mediterranean Basin, and information on its nesting biology is very limited. This study examined nest characteristics, incubation parameters, and egg–hatchling relationships on Belek Beach, one of the most important nesting sites for the species in Türkiye.

Field surveys were conducted during the 2020 breeding season at the freshwater mouths of the Aksu, Köprüçay, and Niğit rivers. A total of 82 emergences were recorded, 33 of which resulted in successful nests. Mean incubation duration was  $60.3 \pm 5.6$  days and mean hatching success was  $66.2 \pm 28.0\%$ . Average nest depth was  $41.0 \pm 10.6$  cm, and the mean distance to vegetation was  $2.2 \pm 2.0$  m. Incubation duration was positively related to distance from vegetation and negatively related to nest depth, with distance to vegetation identified as the strongest predictor.

A total of 1383 eggs were recorded. Egg mass and diameter showed significant relationships with hatchling morphology. These findings provide the first quantitative data on the nesting ecology of *T. triunguis* at Belek Beach and offer an important baseline for habitat management and conservation planning of this critically endangered species.

**COLEOPTERA FROM THE SOUTHERN PART OF THE  
REPUBLIC OF MOLDOVA AS BIOINDICATORS OF THE  
STATE OF STEPPE ECOSYSTEMS****Sorina ISTRATI <sup>1,\*</sup>, Anna MOLDOVAN <sup>1</sup>**<sup>1</sup>Moldova State University, Institute of Zoology, Laboratory of Systematics and Molecular Phylogeny, 1 Academiei Str., MD-2028, Chisinau, Republic of Moldova\* Corresponding author: [istratorina98@gmail.com](mailto:istratorina98@gmail.com)

Biodiversity is essential for the proper functioning and sustainability of natural ecosystems. It provides a wide range of ecosystem services that maintain the ecological balance on Earth. As the impact of negative anthropogenic activities on ecosystems increases, assessing environmental quality and its changes over time can be achieved through the use of bioindicators. Various organisms are used as bioindicators in assessing environmental status, including beetles. Beetles are universal components of ecosystems and their abundance, diversity, and sensitivity to environmental changes make them a priceless indicator of ecosystem health. In this research, we aimed to study the diversity of Coleoptera in the southern region of the Republic of Moldova, as bioindicators of the state of the steppe ecosystems. Biological material was collected from May to October 2023 and 2024 using Malaise traps in the steppe ecosystems of the southern part of the Republic of Moldova. The collection container was changed weekly and the samples were stored in fresh ethanol at -20°C until morphological identification. A total of 71 samples were collected and representatives of the 27 families of Coleoptera were identified. The most numerous families are Coccinellidae, Chrysomelidae, Mordellidae, Melyridae, and Curculionidae. Peak abundance was recorded in June. The presence of steppe species and the diversity of identified beetles demonstrates the need to

implement protective measures in the steppes from the south of the Republic of Moldova.

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**PROMOTING SUSTAINABLE FARMING THROUGH CAP  
ECO-SCHEMES (2023–2027):  
IMPLEMENTATION REQUIREMENTS, FARMER  
ENGAGEMENT, AND STRATEGIC INTEGRATION**

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In order to improve the sustainability of agricultural systems, it is necessary to apply measures and technologies in accordance with the principles of sustainable development and environmental protection. European agricultural policies for the period 2023 - 2027 support the implementation by farmers of eco-schemes for Promoting Sustainable Farming. For the plant sector, Romanian CAP Strategic Plan 2023-2027, provides for 4 eco-schemes related on grass on the interrows, traditional farms or environmentally beneficial practices applicable in arable land. To access these eco-schemes, farmers must meet specific requirements and are subsequently compensated by granting payments in this regard. These eco-schemes for the crop sector can be seen as integrated strategies at the farm level. The findings suggest that the implementation of eco-schemes represents a strategic approach that can bring environmental and financial benefits to the agricultural holding.

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## INTEGRATIVE ANALYSIS OF miRNA EXPRESSION PROFILES IN MULTIPLE CANCER TYPES FOR ANOIKIS RESISTANCE DURING ANCHORAGE-INDEPENDENT GROWTH

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Anoikis resistance the ability of cancer cells to evade apoptosis upon detachment from the extracellular matrix is a fundamental prerequisite for metastatic progression. This study aimed to characterize the expression profiles of several candidate miRNAs and evaluate their contribution to anoikis resistance in a broad panel of cancer cell lines. Metastatic cell lines representing lung, colon, breast, ovarian, prostate, liver, and gastric cancers were cultured under suspension conditions for up to 8 days. Normal epithelial counterparts were used as controls. Cell viability was assessed via Resazurin and Trypan Blue assays, while miRNA expression was quantified using qRT-PCR. Metastatic cancer cells demonstrated substantial resistance to anoikis, with the most aggressive breast cancer models maintaining survival rates as high as 94% after eight days in suspension. qRT-PCR analysis revealed that while several miRNAs exhibited tissue-specific fluctuations, miR-145 was consistently and significantly downregulated across all malignant cell types specifically during anchorage-independent growth. Our findings demonstrate that miR-145 acts as a critical regulator of anoikis resistance across multiple malignancies, including colon, breast, lung, prostate, ovarian, liver, and gastric cancers. These results suggest that miR-145 downregulation is a common adaptive mechanism for metastatic survival, highlighting its potential as a broad-spectrum therapeutic target for inhibiting cancer dissemination.

**EFFECTS OF DIFFERENT PARTICLE FILM COATINGS  
APPLIED FOLIARLY TO APPLE TREES****Oğuz SAĞLAM<sup>1</sup>, Ercan YILDIZ<sup>1,\*</sup>, Mehmet YAMAN<sup>1</sup>**<sup>1</sup>Erciyes University, Faculty of Agriculture, Department of Horticulture, Kayseri/TURKEY\* Corresponding author: [ercanyildiz@erciyes.edu.tr](mailto:ercanyildiz@erciyes.edu.tr)

Particle film coatings are materials that form a thin layer on the plant surface, reflecting some of the solar radiation and thereby reducing leaf and fruit surface temperatures. Due to these properties, they are used to protect plant performance, especially in regions experiencing abiotic stress conditions such as high temperature, intense light, and water stress. This paper evaluates literature findings on the effects of particle film coating applications on sunburn, physiological characteristics, yield, and fruit quality in apple cultivation. The research results show that kaolin-based particle film applications reduce fruit and leaf surface temperatures, decrease sunburn, and positively affect physiological processes such as photosynthesis and gas exchange. In addition, it was determined that chlorophyll content, membrane stability, and water relations improved under restricted irrigation and high temperature conditions; and that quality characteristics such as fruit weight, firmness, water-soluble dry matter, and color formation were not negatively affected in most cases, and even increased in some studies. It has also been reported that particle film applications can reduce weight loss in the post-harvest period and maintain storage quality. In conclusion, particle film coatings are considered an effective and viable cultural method that reduces sunburnt, alleviates plant stress, and preserves yield and quality, especially in arid and semi-arid climatic conditions. Therefore, particle film applications are considered an important alternative practice for sustainable apple cultivation under increasing temperature and drought conditions due to climate change.

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**EVALUATION OF MORPHOLOGICAL DIVERSITY BASED ON LEAF AND FRUIT TRAITS IN ROSEHIP (*ROSA* SPP.) GENOTYPES USING PRINCIPAL COMPONENT ANALYSIS****Halit ALKAN<sup>1</sup>, Ercan YILDIZ<sup>1\*</sup>, Ahmet SÜMBÜL<sup>2</sup>,  
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This study aimed to evaluate the morphological and biochemical variation among rosehip (*Rosa canina* L.) genotypes based on leaf and fruit characteristics using multivariate statistical approaches. A total of 31 genotypes were assessed using 28 selected morphological and biochemical traits related to leaf and fruit features. The obtained data were analyzed using correlation analysis, Principal Component Analysis (PCA), and hierarchical clustering (UPGMA) to determine relationships among traits and to classify genotypes based on their similarities. Correlation analysis revealed significant positive and negative relationships among the examined traits. Strong positive correlations were observed particularly among fruit and leaf size parameters, while fruit color traits generally showed negative correlations with size-related characteristics. PCA results indicated that 11 principal components with eigenvalues greater than 1 explained 84.59% of the total variation, with the first three components accounting for 37.29%. These components highlighted the most discriminative traits contributing to genotype differentiation. UPGMA cluster analysis grouped the genotypes into two main clusters, demonstrating clear morphological divergence among certain genotypes. Some genotypes showed high similarity within subgroups, whereas others were distinctly separated, indicating their potential value in breeding programs. Overall, the findings demonstrated considerable morphological and biochemical diversity among the evaluated genotypes. The combined use of

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multivariate analyses proved effective in identifying key traits and selecting promising genotypes, providing a valuable basis for future breeding and genetic improvement studies.

**THE STRATEGIC IMPORTANCE AND  
CONTEMPORARY APPROACHES OF MOLECULAR  
MARKER USAGE IN COMMON BEAN  
(*PHASEOLUS VULGARIS* L.) BREEDING**

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The utilization of molecular markers in the breeding of common bean (*Phaseolus vulgaris* L.), one of the most significant sources of plant-based protein worldwide, is the most critical element in modernizing the process and overcoming the limitations of conventional breeding methods. In traditional breeding, reliance solely on phenotypic selection often leads to the masking of genetic potential by environmental factors and extends the breeding cycle up to 10–12 years. However, molecular markers analyze the genetic structure (genotype) at the seedling stage by focusing directly on variations within the DNA sequence. This enables the selection of desired traits through **Marker-Assisted Selection (MAS)** with 100%

reliability, independent of environmental conditions, and significantly accelerates the process.

Molecular markers play a vital role, particularly in integrating resistance genes against major pathogens threatening bean production, such as Anthracnose, Rust, and Common Bacterial Blight. Through a method known as "**Gene Pyramiding**," multiple resistance genes can be incorporated into a single cultivar to provide durable resistance; a process that is virtually indistinguishable through visual observation alone. Furthermore, the mapping of **Quantitative Trait Loci (QTL)** for complex traits controlled by multiple genes, such as yield, cooking quality, and drought tolerance, maximizes genetic gain in bean breeding. Consequently, modern marker systems like **SSR** and **SNP** not only provide time and cost efficiency but also represent a strategic necessity in developing high-yielding, climate-resilient new varieties.

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**EMBRYO ABORTION IN STONE FRUIT SPECIES****Muhammed Ali KÖSE<sup>1\*</sup>, Mehmet YAMAN<sup>2</sup>,  
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Embryo abortion in stone fruit species (*Prunus* spp.) represents a major physiological and genetic constraint, leading to significant yield losses in commercial production and constituting a critical post-zygotic barrier in breeding programs. This complex phenomenon is primarily associated with developmental asynchrony between maternal (fruit) and zygotic (seed) tissues, particularly in early-ripening cultivars where embryo development lags behind fruit growth. Additionally, severe nutrient deficiency (starvation) resulting from endosperm and chalazal haustorium dysfunction, along with the activation of programmed cell death (PCD), plays a central role in embryo degeneration. Genetic factors, including gametophytic self-incompatibility, inbreeding depression, and interspecific hybridization barriers, further exacerbate embryo abortion.

The most effective biotechnological strategy to overcome this limitation is embryo culture (embryo rescue), in which embryos are isolated prior to loss of viability and cultured under in vitro conditions. The success of this technique largely depends on optimal timing of embryo excision (PF  $\approx$  0.5), the use of appropriate culture media (e.g., half-strength MS or WPM), and the optimization of plant growth regulator balance. Furthermore, the integration of embryo rescue with somatic embryogenesis and synthetic seed technologies enables clonal propagation of rare hybrids and supports advanced molecular breeding applications.

In conclusion, embryo abortion in stone fruit species is a multifaceted physiological and genetic challenge. A comprehensive understanding of its underlying mechanisms, coupled with the effective application of biotechnological approaches, is essential for reducing yield losses and enhancing the efficiency of modern fruit breeding programs.

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## ENHANCED PHYTOREMEDIATION OF SOIL CONTAMINATED WITH CHLORPYRIFOS BY LACTUCA SATIVA

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Chlorpyrifos is an organophosphate pesticide that acts like acetylcholinesterase inhibitor and was extensively used to control insect pests on various crops and in stored grain. Because of its adverse effects on health and environment, it was listed in 2025 as banned chemical under Stockholm Convention. In this study, we explored the potential of *Lactuca sativa* to phytoremediate chlorpyrifos-contaminated soil. Using 80 mL of aquatic solutions of two different concentrations, chlorpyrifos was spiked in about 500 g of soil packed in ceramic pots at concentrations of 0.03 and 0.3 µg/g, respectively. The experiment was performed using twelve replicates for each pesticide concentration. Upon spiking, seedlings of *Lactuca sativa* were added in six of replicates for both concentrations, while the other six replicates served as controls. The experiment setup was completed by adding six blanks containing *Lactuca sativa* planted in about 500 g of uncontaminated soil. All the pots containing soils were watered at regular intervals and the soil humidity was monitored using a sensor. The experiment was run for 75 days in a green house. At regular intervals, the soil was sampled from the control pots around the roots of *Lactuca sativa*. Soil samples were analysed for chlorpyrifos and its metabolites by Soxhlet extraction and by ultrasound extraction using triphenyl phosphate (TPP) as internal standard. The target compounds were analysed using an Agilent 7890 B gas chromatograph (GC) coupled to Agilent 7010 triple quadrupole mass spectrometer (Agilent Technology, Palo Alto,

USA) operated in positive electron ionization (EI) mode (70 eV) and configured in multiple reaction monitoring (MRM). The results will show an attenuation of chlorpyrifos concentration due to the processes occurring during phytoremediation. Overall, this study is an advancement in the field of phytoremediation of soil contaminated with chlorpyrifos and other organophosphate pesticides.

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## VALIDATION OF THE ROMANIAN VERSION OF THE PERCEIVED STRESS QUESTIONNAIRE

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As stress is a common presence in our daily lives and it impacts our health, well-being and daily functioning, a lot of scientists have sought the proper way to measure it. Three main directions have been followed: measuring major life events a person faces, measuring daily hassles and uplifts and, finally, simply measuring the way people perceive stress in their lives. This latter approach was followed by Professor Susan Levenstain and her associates in developing The Perceived Stress Questionnaire (PSQ), a useful research tool for psychosomatic medicine. PSQ is a self-report measure that includes 30 items, originally grouped into seven scales (Worries, Tension, Lack of joy, Overload, Harassment, Irritability and Fatigue), items referring to the subjective, cognitive components of stress, such as perceptions of constraints or being under pressure, tired or tensioned. Since its development, in 1993, the PSQ was translated and adapted in numerous countries – Germany, Spain, Greece, Sweden, China, Norway, France. The purpose of our research was to translate and adapt PSQ for the Romanian population. Our sample was composed of 424 people, mostly women (nearly 85%); their mean age was 34 years (SD =12.52). Our respondents filled out the Romanian form of the PSQ and also the State-Trait Anxiety Inventory (STAI, Spielberger et al., 1983). Analyzing the distribution of scores for the scales, we have found them approximately normal, with mean scores indicating moderate levels of stress and anxiety, an expected result for a nonclinical sample like ours. The analysis of the items included in PSQ revealed strong inter-item correlation and a high internal consistency of the

whole scale (Cronbach Alfa =.95). Exploratory Factor Analysis, PCA – Varimax rotation revealed the tendency of the items to group into four factors (subscales), which we have named Emotional Distress, Overload and Pressure, Fatigue and Lack of Joy. The Cronbach Alfa coefficient varied between .76 and .89 for the subscales. The results of the factor analysis support the construct validity of PSQ. Correlations between scores on PSQ and STAI were positive and high, offering evidence for concurrent validity. An independent samples t-test showed that men, compared to women, have slightly lower levels of stress ( $t = -4.23$ ,  $p < .01$  for the total PSQ score). Age correlated negatively with the Emotional Distress scale ( $r = -.20$ ,  $p < .01$ ).

**DEVELOPMENTS IN THE SYNTHESIS,  
CHARACTERIZATION AND APPLICATIONS OF  
CaTiO<sub>3</sub> FOR DEGRADATION OF POLLUTANTS IN  
WATERS**

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Calcium titanate (CaTiO<sub>3</sub>), a perovskite-type oxide, has attracted significant attention as a sustainable photocatalyst for environmental remediation due to its physicochemical stability, low cost, and non-toxic nature. This review provides a comprehensive analysis of recent developments in the synthesis, characterization, and application of CaTiO<sub>3</sub> for the degradation of aqueous pollutants.

Emphasis is placed on the relationship between crystal structure, morphology, and photocatalytic performance. CaTiO<sub>3</sub> crystallizes in an orthorhombic structure (space group Pbnm), and its properties can be tailored through synthesis methods such as sol-gel, mechanochemical processing, Pechini method, and spray pyrolysis. Controlled calcination (typically between 600 and 1000 °C) plays a critical role in phase purity and the formation of nanostructures with enhanced specific surface area, which directly influences adsorption and catalytic activity. Despite its relatively wide bandgap (~3.4 eV) and predominant UV activity, the photocatalytic performance of CaTiO<sub>3</sub> under visible light can be significantly improved through doping (e.g., B, V, La) and the formation of heterostructures (e.g.,

graphene oxide composites), which reduce electron–hole recombination and enhance charge separation.

The material has demonstrated high degradation efficiencies for various organic pollutants, including dyes and pharmaceutical compounds, primarily through advanced oxidation processes involving reactive oxygen species such as hydroxyl radicals ( $\bullet\text{OH}$ ) and superoxide radicals ( $\text{O}_2^{\bullet-}$ ).

This review highlights the structure–property–performance relationships governing  $\text{CaTiO}_3$ -based photocatalysts and discusses current challenges and future perspectives for their application in wastewater treatment.

**SHIFTING THE PROTEIN SUSTAINABILITY PARADIGM  
FROM SCARCITY TO NUTRITIONAL EFFICIENCY**

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Traditionally, diets are dominated by animal proteins (~67%) due to their satiety, nutrient density and palatability. Next major source is represented by grains (21%), with fruits and vegetables representing only about 5%, while high-quality sources like legumes and nuts represents another 5%. For decades, the global debate around protein has been framed by concerns regarding potential scarcity. However, data from Food and Agriculture Organization of the United Nations indicate that global protein availability already exceeds average human requirements. The paradox is not scarcity, but imbalance. In high-income regions, excess intake coexists with rising rates of metabolic disorders, while in other parts of the world, limited access to diverse protein sources still constrains healthy development.

This imbalance becomes visible along the food chain. Large quantities of plant protein are diverted into animal feed, with only a fraction returned as edible protein. For example, soy produced in South America is predominantly used to sustain intensive livestock systems, rather than directly nourishing human populations. This

conversion reflects not a biological necessity, but a structural inefficiency. Such biological conversion of soy into meat, comes with large losses. The process is highly inefficient, in general over 70% of the soy protein being lost when feeding chickens and over 80% when it is used for pork.

At the same time, what we eat matters as much as how much we produce. Diets dominated by highly processed protein sources or excessive red and processed meat intake have been associated with increased risks of chronic diseases. In contrast, diversified protein intake, including legumes, fermented foods, and emerging sources such as microbial proteins, may better support metabolic health and gut microbiome stability.

Reframing protein sustainability, therefore, requires moving beyond production metrics. Nutritional efficiency, defined by amino acid quality, digestibility, and physiological utilization, becomes central. The challenge is no longer to produce more protein, but to design systems that deliver the right protein, in the right context.

This shift calls for alignment between agriculture, food technology, and public health. Protein should no longer be treated as a commodity to maximize, but as a functional element within resilient, health-oriented food systems.

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## COMPARATIVE STUDY ON FRUIT QUALITY OF CURRANT CULTIVARS

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This study aimed to evaluate and compare the biometric characteristics of currant cultivars—‘Poli 51’, ‘Amethyst’, ‘Nara’, and ‘Tisel’—cultivated under the conditions of ICDP Pitești–Mărăcineni during the 2024–2025 growing season. Biometric analyses included yield per bush, average fruit weight, fruit firmness, juice pH, and soluble dry matter content (°Brix). The results revealed clear differences among the cultivars. The cultivar ‘Poli 51’ showed superior biometric performance compared to the other cultivars. The average yield per bush of ‘Poli 51’ (2.43 kg) was nearly double that of ‘Amethyst’ (1.42 kg). In addition, fruits of ‘Poli 51’ exhibited a higher average weight, significantly greater firmness, and higher soluble dry matter content, indicating better resistance to handling and enhanced sensory quality. Juice pH values were similar among all cultivars, reflecting the typical acidity of currant fruits. Overall, the findings highlight the superior agronomic and qualitative performance of the ‘Poli 51’ cultivar under the studied conditions, supporting its suitability for commercial cultivation and contributing valuable information for cultivar selection and crop management strategies in similar pedoclimatic areas.

**THE COMBINED EFFECT OF MICROELEMENTS  
AND THE PELICULOGEN ADJUVANT ON ENHANCING  
THE PRODUCTIVE POTENTIAL OF THE GRAPE VINE  
(*Vitis vinifera* L)**

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The growth and maturation of annual vine shoots are indicators of the plants' potential resistance to sub-zero temperatures, which influences the quantity and quality of the crop. Our research has shown that foliar treatment of grapevines with a complex of micronutrients combined with pelicogen adjuvants led to an increase in the average shoot length by 17.7 cm and 15.1 cm, respectively, compared to the control group. It was found that the shoot maturation process under the agroclimatic conditions of 2025 proceeded quite intensively, which led to a shoot maturity level ranging from 80% to 86%. Depending on the preparations applied, the degree of ripeness in the experimental variants increased by 1.3–7.2% compared to the control variant. At the same time, the application of fertilizer to the grapevines contributed to a better harvest. In all treatment groups, foliar fertilization increased the average grape weight compared to the control group (127.3 g), particularly in the groups treated with the micronutrient complex (167.3 g). Furthermore, an increase in grape mass was observed in the variant where the plants were fertilized with adjuvants in combination with the micronutrient complex—161.2 g—compared to the control variant—127.3 g. The purpose of this article is to analyze the influence of micronutrients and the efficacy of antioxidant-containing pelicogen adjuvants in realizing the growth and productivity potential of grapevines, highlighting the main mechanisms of action, agronomic benefits, and prospects for use in modern viticultural practices.

**PCR-BASED SCREENING OF INSECTICIDAL CRY2-TYPE GENES IN NATIVE *BACILLUS SPP.* STRAINS FROM THE REPUBLIC OF MOLDOVA**

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Agriculture is the fundamental sector of the Republic of Moldova's economy. Despite the availability of advanced technologies, the productivity of agricultural and horticultural crops remains significantly limited by biotic and abiotic stresses, with insect pests representing a major biotic constraint. Although chemical insecticides are widely used in pest control, their environmental impact and non-target effects have spurred interest in sustainable alternatives, such as biopesticides based on entomopathogenic bacteria *Bacillus thuringiensis* (*Bt*). The insecticidal properties of *Bt* strains are attributed to the production of a wide variety of crystalline proteins (Cry toxins), which exhibit specific activity against certain insect taxa. Using native entomopathogenic strains for biological plant protection offers several benefits over commercial or imported strains, owing to their better adaptation and high bioactivity against regionally important pests. Despite the extensive global research focused on the discovery of novel *Bt* isolates, data regarding the genetic diversity, distribution, and insecticidal potential of native strains in Eastern Europe, and the Republic of Moldova, particularly, remain limited. Thus, as a result of the present study, molecular characterization of novel *Bacillus spp.* strains isolated from the Republic of Moldova was performed by screening for insecticidal

genes via PCR using universal primer pairs targeting Cry2-type genes.

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**FATTY ACID PROFILE OF THE INVASIVE LIONFISH  
*PTEROIS MILES* FROM MARMARIS GULF, TÜRKİYE****Mahmut KAÇMAZ<sup>1\*</sup>, Deniz İNNAL**Department of Biology, Burdur Mehmet Akif Ersoy University,  
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The lionfish (*Pterois miles*) is one of the most successful invasive species in the Mediterranean Sea, posing serious threats to native biodiversity and ecosystem stability. Although numerous studies have examined the ecological and biological characteristics of this species, information regarding its biochemical composition and nutritional potential remains limited. In addition, *P. miles* possesses venomous spines on its dorsal, anal, and pectoral fins, which constitute a significant risk to humans. However, the restriction of toxic structures solely to the spines indicates that the muscle tissue may be considered a safe food source when properly cleaned and processed.

Despite the increasing interest in the use of lionfish as a food resource, it has been observed that the fatty acid profile of *P. miles* has not been sufficiently investigated. Determining the fatty acid composition is of great importance for evaluating the species' nutritional value, potential health benefits, and suitability as an alternative marine resource. This study aims to present preliminary fatty acid analysis results obtained from *P. miles* specimens planned to be collected from the Marmaris Gulf in the Eastern Mediterranean between November 2025 and May 2026.

The evaluation of *P. miles* in terms of human consumption may contribute both to the control of invasive species and to the diversification of seafood resources in the Eastern Mediterranean.

**EVALUATION OF THE ANTAGONISTIC POTENTIAL  
OF *BEAUVERIA SPP.* STRAINS AGAINST *FUSARIUM  
OXYSPORUM* IN DUAL CULTURE ASSAY****Arina GRINCO<sup>1\*</sup>, Anna MOLDOVAN<sup>1</sup>,**<sup>1</sup>Moldova State University, Institute of Zoology, Laboratory of Systematics and Molecular Phylogeny, 1 Academiei str, Chişinău MD-2028, Republic of Moldova\* Corresponding author: [arina.grinco2002@gmail.com](mailto:arina.grinco2002@gmail.com)

Due to the increasing need for environmentally safe plant protection methods, biological control agents against phytopathogens are receiving special attention. Entomopathogenic fungi of the genus *Beauveria* are of interest not only as insect pathogens but also as potential antagonists of phytopathogenic microorganisms. Fungi of the genus *Fusarium*, including *Fusarium oxysporum*, are widespread in agroecosystems and cause significant losses to agricultural crops. The pathogen infects the root system and spreads through the vascular tissues of plants, causing vascular wilt, which leads to a substantial reduction in yield. This study aimed to investigate the antagonistic interaction between local strains from the genus *Beauveria* and *Fusarium oxysporum* CNMN-FF-06 strain under in vitro conditions. The experimental part was based on the dual culture method on PSA medium, followed by the assessment of colony growth dynamics of the studied microorganisms. The findings demonstrated that all *Beauveria spp.* strains inhibited the mycelial growth of *Fusarium oxysporum*. The data obtained may contribute to the development of effective and environmentally friendly methods for the biological control of fungal plant diseases.

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**TEMPERATURE EFFECTS ON THE *IN VITRO*  
GERMINATION OF ENTOMOPATHOGENIC FUNGAL  
STRAINS OF THE GENUS *BEAVERIA* ISOLATED FROM  
THE REPUBLIC OF MOLDOVA**

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In recent decades, the Republic of Moldova has experienced a steady increase in temperature and a higher frequency of droughts, accompanied by reduced soil moisture and changes in precipitation patterns. As part of a comprehensive approach to developing fungal-based biopesticides for use in biological control, it is essential to consider the physiological properties of the studied strains, as they directly influence their effectiveness and stability. Under these conditions, evaluating the optimal conditions for the germination, growth, and development of promising local strains of entomopathogenic fungi becomes particularly important, as temperature significantly affects their viability and level of virulence against insect pests. This study aimed to investigate the effect of temperature on conidial germination in native *Beauveria* strains recently isolated from the Republic of Moldova. Based on the average germination rate data, the optimal temperature for germination was determined to be 27 °C. The studied strains retained the ability to germinate over a wide temperature range (15–35 °C); however, the extent of this ability varied significantly. Several strains were identified, showing relatively high germination rates even at 35 °C, indicating an extended adaptive potential of the investigated isolates and highlighting the need for further study.

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aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and population well-being” (Moldova State University, Institute of Zoology).

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**THE EFFECT OF NATURAL BIOSTIMULATES ON THE  
MODIFICATION OF THE CONTENT OF  
PHOTOSYNTHETIC PIGMENTS AND PROTECTIVE  
COMPOUNDS IN THE ORGANS OF VINE PLANTS  
(*Vitis vinifera L*)**

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Photosynthesis is a complex and dynamic process based on a coordinated series of interdependent photochemical and biochemical reactions, organized into a unified functional sequence. The level of photosynthetic pigments in leaves is a fundamental indicator of the physiological status and metabolic capacity of plants during the growing season. The results of determining the content of photosynthetic pigments in grapevine leaves demonstrated an increase in total chlorophyll content (a+b) in the variants treated with natural growth biostimulants, reaching 118.9% compared to the control during the intensive shoot growth phase. Repeated foliar fertilization of grapevines after 14 days was more pronounced and demonstrated an increase in chlorophyll (a+b) content of up to 222.1%. This is explained by the fact that as the flow of micronutrients to the plant increases, transpiration intensity rises, resulting in a more complete opening of the stomata. The increase in photosynthetic intensity under these conditions can be considered a consequence of the beneficial effect of biostimulants on plant nutrition. At the same time, the use of biostimulants contributed to the accumulation and increase in the amount of carbohydrates in the leaves and shoots of the grapevine, as well as free amino acids in the leaves, buds, and sap, which contributed to increased frost resistance, amounting to 24.0% compared to the control.

**BEYOND WASTE: A REVIEW OF AGRICULTURAL  
RESOURCE VALORIZATION FOR CLIMATE ACTION**

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Agriculture plays a pivotal role in the context of climate change, acting both as a contributor to greenhouse gas emissions and as a key sector for mitigation and adaptation strategies. This review synthesizes current knowledge on the sustainable valorization of natural and agricultural resources as a pathway to enhance climate neutrality and resilience.

Recent studies highlight the importance of transitioning toward circular and resource-efficient systems, where agricultural residues and biomass are repurposed into bioenergy, bio-based materials, and other value-added products. Such approaches not only reduce waste but also contribute to lowering emissions and dependence on fossil resources. In parallel, nature-based solutions, including agroforestry, conservation agriculture, and soil carbon sequestration, are increasingly recognized for their capacity to improve ecosystem services while enhancing productivity and climate resilience.

Technological advancements, such as precision agriculture and digital monitoring tools, further support optimized resource use and reduced environmental impact. At the same time, policy frameworks

and stakeholder engagement are essential to facilitate the adoption and scaling of sustainable practices.

Overall, the integration of innovative technologies, ecological principles, and circular economy concepts provides a promising pathway toward climate-neutral agricultural systems, while supporting long-term environmental sustainability and socio-economic development.

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**FROM LABORATORY TO APPLICATION: TAILORED  
NANOMATERIALS FOR DURABLE CONSERVATION OF  
CULTURAL HERITAGE**

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In the context of current concerns regarding the use of sustainable and compatible materials for cultural heritage conservation, there is a growing need to develop advanced solutions based on multifunctional nanomaterials capable of simultaneously consolidation, self-healing, and antimicrobial protection requirements. This study proposes an integrated approach for the development and potential industrial-scale implementation of functional nanomaterials intended for the conservation of historical structures, exhibiting consolidation, self-healing, and antimicrobial properties. The strategy is built upon three synergistic directions: substrate investigation, optimization of synthesis methods, and experimental validation through testing and modeling. The characterization of substrates collected from a pilot site highlights the decisive influence of porosity, mineralogical composition, pre-existing microcracks, and degradation agents on the performance of nanomaterials. Comprehensive analysis using XRD, SEM-EDS, and FTIR/Raman spectroscopy enabled the selection of compatible

conservation materials. These materials are based on inorganic hydroxides, doped hydroxyapatite, and nanometric metallic oxides, with rigorous control over particle size, stability, and reactivity. XRD results confirm the suitability of the model materials for simulating the behavior of real substrates. The proposed approach enables the correlation between material properties and the specific requirements of historical substrates, providing a solid scientific basis for efficient and durable applications in heritage conservation.

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**SUSTAINABLE RECOVERY OF NATURAL  
SURFACTANTS FROM SELECTED PLANT SOURCES**

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The growing emphasis on healthy eating has led to increased consumption of fresh fruits and vegetables, but this trend also highlights the importance of effective cleaning practices to ensure food safety. Produce surfaces can harbor pesticide residues, microbial contaminants, and environmental pollutants that are not always removed by simple rinsing with water. Conventional washing agents may improve decontamination efficiency, yet they often raise concerns related to chemical residues and environmental impact. As a result, there is a rising need for eco-friendly washing solutions derived from natural, biodegradable sources that can effectively reduce contaminants while remaining safe for both consumers and the environment. Such sustainable approaches align with current priorities in green chemistry and public health, offering a balanced strategy for improving food hygiene without compromising ecological integrity. In this context, the aim of this study is to compare extraction yields of surfactants through two extraction methods (optimized for proper yields) and two plants (*Medicago*

*sativa* L. (1753) and *Beta vulgaris* L.) for further utilization as a washing solution for tomatoes and grapes.

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**NANOMATERIALS A PROMISING ANTIBACTERIAL  
SOLUTION FOR CONSTRUCTION MATERIALS**

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Recent progress in materials science is playing a growing role in the sustainable conservation of cultural heritage by supporting the design of multifunctional and eco-friendly materials. The aim of this paper was to evaluate the influence of hydroalcoholic plant extracts, with and without silver nanoparticles, on the characteristics of construction materials, obtained from various raw materials: cement, lime, gypsum, sand, in variable proportions. The obtained materials were characterized for their physicochemical, mechanical, and antimicrobial properties using techniques such as SEM-EDS, XRD, FTIR, and antimicrobial assays (*Bacillus subtilis*, *Pseudomonas aeruginosa* ATCC 27853, *Candida albicans* ATCC 10231, *Aspergillus niger* 103). The obtained construction materials were characterized from a physico-mechanical and freeze-thaw resistance point of view, observing the influence of the type and proportion of extract/nanoparticles on the performance of the materials.

Overall, the study highlights the promise of green nanotechnology in creating advanced, antimicrobial materials suitable for long-term preservation and innovative restoration of historic structures.

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**FROM WASTE TO VALUE: NATURAL EXTRACTS AS  
ANTIMICROBIAL AND BIOSTIMULANT AGENTS IN  
AGRICULTURE**

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The transition toward more sustainable agricultural practices has intensified the search for natural alternatives to synthetic agrochemicals. Conventional antimicrobial agents, herbicides, and growth stimulators, while effective, are often associated with environmental persistence, resistance development, and potential risks to human health. Natural formulations based on such extracts can enhance plant growth, improve resilience against pathogens, and assist in weed management, all while minimizing ecological impact. Therefore, the development and application of plant waste-derived bio-solutions offer a sustainable pathway for modern crop production systems, aligning productivity goals with environmental protection and resource efficiency. In this context, the aim of this study is to present a comparative study for the herbicidal, bio stimulant and antibacterial efficiency of plant waste extracts of *Momordica*

*charantia* L. și *Calendula officinalis* L. with potential utilization as ecological solution for same crops.

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**ORNITHOLOGICAL OBSERVATIONS IN THE AREA OF  
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PREVERNAL AND VERNAL SEASONS****Maria Denisa CONETE** <sup>1,\*</sup>, **Dănuț-Mihai MARIN** <sup>1 \*</sup>,  
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This ornithological study presents information regarding the diversity of the monitored avifauna in the area of Ștrand and Lunca Argeșului Parks (Arges County) in the prevernal and vernal seasons (2025 and 2026). The period of the prevernal season is between March and April and it concurs with the spring migration. The vernal aspect represents the entire month of May and the first half of June. Thus, in the present paper, we give information about the avifauna of the two parks, a taxonomic list, the birds' species phenology and breeding status. This year, at the end of April, we discovered a mixed-species nesting colony, consisting of Pygmy Cormorant (*Microcarbo pygmaeus*), along with Little Egrets (*Egretta garzetta*) and herons. This is the first recorded in the area. Initially, the nests were built mid-elevation sites near the tree trunk, at the junction of the branches, which probably offered protection. We also observed both vertical and horizontal stratification, with nests being built progressively higher and further from the tree trunk, as the breeding season progresses. We also mention some aspects regarding the anthropogenic influence on bird populations (threats) and measures necessary for their protection and their habitats.

**PRODUCTIVE AND BIOCHEMICAL PERFORMANCE OF SOME CORN HYBRIDS UNDER THERMO-HYDRO STRESS CONDITIONS ON ACIDIC SOILS AT ARDS PITEȘTI IN 2025**

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The present study assesses the adaptive capacity and production stability for 20 maize hybrids from INCDA Fundulea under conditions of accentuated climatic instability. The agricultural year 2025 was marked by a severe meteorological contrast, characterized by a significant rainfall in May (+80.5 mm), followed by a critical water deficit (-78 mm) and heat stress (+3.2°C) during June, a decisive period for the development of the crop. The purpose of this work was to evaluate these hybrids in relation to the average of the experience, following not only the production potential, but also their ability to maintain high quality indices (proteins, starch, oil) under the pressure of adverse climatic factors. The hybrid HSF 1142-17 recorded the highest production (7450 kg/ha), representing a statistically assured increase of 20.9% compared to the average experience (6163.65 kg/ha). Qualitative analyses revealed a protein content between 9.7% and 12.9%. In conclusion, despite the severe drought installed at the beginning of summer, certain genotypes demonstrate remarkable phenotypic stability and high efficiency of water use.

**BEHAVIOR OF SOME TRITICALE LINES IN THE  
PEDOCLIMATIC  
CONDITIONS OF ARDS PITEȘTI**

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Triticale has good adaptability to acidic soils, but the influence of climatic factors plays an important role in the final performance of the harvest. The aim of the study was to evaluate the behavior of 15 triticale lines in the pedoclimatic conditions of the agricultural years 2023-2024 and 2024-2025 within the ARDS Pitești. The analyzed parameters of the triticale lines were production (kg/ha) and protein content (%). Following the statistical analysis of production, a superiority was observed in 2025, where the 16026T1 line recorded 7687 kg/ha, while in 2024 the productions were lower, there being a negative correlation between production and quality. Protein content was significantly higher in 2024, with line 18017 recording a protein content of 15.07%, compared to 2025 which was favorable for production. In terms of stability, line 17272T1 stood out as the most stable genotype in both agricultural years.

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## THE BEHAVIOR OF SOME ROMANIAN WHEAT VARIETIES

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Wheat is one of the most important agricultural crops, standing out for its high ecological plasticity that allows it to efficiently capitalize on extremely diverse environmental conditions. The purpose of this study was to evaluate 14 Romanian wheat varieties in the agricultural years 2023-2024 and 2024-2025, respectively, analyzing the productive potential and qualitative stability under the pedoclimatic conditions within ARDS Pitesti. The genotypes were sown in the experimental field in three replicates according to the randomized block method. The data obtained were statistically processed and by the method of stability and adaptability of varieties according to environmental indices. The year 2025 proved to be more productive, with an overall average of 6902 kg/ha, compared to 6568 kg/ha in 2024. The Biharia and Lovrin 9Z varieties stood out for their productions of over 7800 kg/ha, demonstrating a high adaptability to optimal conditions. In terms of quality, the Abund variety confirmed a superior stability of protein (over 15%) and gluten, regardless of the variability of the environmental indices.

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**STUDY ON THE RESISTANCE OF SOME TRITICALE  
(*TRITICOSECALE WITTMACK*) GENOTYPES TO *PUCCINIA  
STRIIFORMIS* INFECTION IN THE 2023 CLIMATIC  
CONDITIONS AT ARDS PITEȘTI**

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Triticale (*Triticosecale wittmack*) has been considered an important crop due to its adaptability and potential resistance to various pathogens and pests, particularly through the transfer of resistance genes from rye to wheat. Although its superior resistance compared with its parent species has been debated over time, triticale remains a relatively healthy and resilient cereal crop. In the Roumania, triticale can be affected by *Puccinia striiformis*, the causal agent of stripe (yellow) rust. The study aimed to evaluate the resistance of 18 triticale varieties and 7 breeding lines to *Puccinia striiformis* under natural infection conditions at ARDS Pitești. The biological material included the varieties and lines: Plai, Titan, Stil, Haiduc, Negoiu, ODA FD, Pisc, Tulnic, Cascador, Utrifun, Vifor, Vultur, Zori, Svelt, Zaraza, FDL Ascendent, FDL Cordial, T F2 14225 T1-02, 16026 T4-1, 14187 T1, 16322 T1, 16007 T1-1, 15038 T1-1, and 15183 T1-2. The attack intensity varied between 22% (Zaraza) and 86% (Cascador), while the attack frequency ranged from 15% (Zaraza) to 97% (Tulnic). The degree of attack (A.D.) ranged from 3.3% in Zaraza to 81.7% in Cascador, indicating considerable variability in the response of the studied genotypes to stripe rust infection.

## **EFFECTS OF FERTILIZATION WITH PHOSPHATE ROCK AND BIOSTIMULANTS ON CORN**

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In the study on the hybrid maize Turda 344, the main characteristics of the cobs and the quality of the grains were evaluated. The average cob length was 20.0 cm, and the total harvest weight reached 10.55 t/ha, of which the grain weight was 8.77 t/ha, corresponding to a grain yield of 85.5%. The thousand kernel weight (KMW) was 302 g. Qualitative analysis of the grains showed a crude protein content of 11.5%, starch 70.6%, oil 4.4%, and the grain moisture was 18.7%. The results highlight the potential of the Turda 344 hybrid for high production and favorable grain quality.

## THE INFLUENCE OF APPLYING CALCIUM CARBONATE (CaCO<sub>3</sub>) IN DIFFERENT FORMS ON SOYBEAN CROP

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Given the major importance of soybean cultivation nationally and globally, it is necessary to expand the cultivation area in different growing environments. Under the pedological conditions specific to clay-iluvial soils, soybean cultivation can be promoted effectively only by optimizing the chemical properties of the soil, as the acidic reaction represents an impediment to root development. In order to achieve this objective, a research experience was initiated to evaluate and promote the latest calcium carbonate-based amendments, namely: agrocalcium (93.6% CaCO<sub>3</sub>), doloflor with CaCO<sub>3</sub> and MgO neutrosol 9 (97.5% CaCO<sub>3</sub>). Thus, compared to the unfertilized control variant, the soybean crop recorded a total biomass of 6.2 t/ha, with pod biomass ranging between 2.4 - 4.7 t/ha, and grain biomass between 1.7 - 3 t/ha. In terms of quality indices, the Isa TD variety showed a grain content of approximately 40% protein, 25% oil and 5% fiber, at a grain moisture content of approximately 10%. The data obtained confirm the favorable behavior and appropriate adaptability of the Isa TD soybean variety to the conditions in the station.

## Online Session

**GERMINATION OF SEEDS OF *ELAEAGNUS  
ANGUSTIFOLIA* USING DIFFERENT SEED  
STRATIFICATION TREATMENTS**

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*Elaeagnus angustifolia* seeds exhibit low germination capacity due to combined physical and physiological dormancy, which limits their propagation under nursery conditions. This study aimed to evaluate the combined effects of different growing media and pre-sowing treatments on seed germination and early root development. A factorial experimental design was conducted using three growing media (pumice, sand, and perlite) and six treatments: control, three bacterial inoculants (B4, B123, B143), and indole-3-butyric acid (IBA) at 2,000 and 4,000 ppm. The results showed significant differences among treatment × medium combinations. The highest germination performance was obtained with 4,000 ppm IBA in pumice (B-IBA4), with 29 germinated seeds, 5.94 cm root length, and 96.67% germination rate. Similarly, IBA applications in sand (K-IBA2 and K-IBA4) resulted in high germination rates (83.33–86.67%) and strong root development. In contrast, perlite showed the lowest performance, with some bacterial treatments reducing germination to 30.00%. Bacterial inoculants were less effective than IBA, providing only limited improvements over the control. Overall, pumice and sand outperformed perlite, and 4,000 ppm IBA significantly enhanced germination and seedling growth.

## NEW INVASIVE INSECT SPECIES IN PITEȘTI (ROMANIA)

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Two new species of invasive insects have been identified in Pitești, both of which have been recently reported in Romania: *Pulvinaria kuwacola* Kuwana in 2022 and *Hierodula tenuidentata* Saussure in 2019. The scale insect, *P. kuwacola*, reported in the middle of the country, in Brasov city, was observed in June 2023 in Pitești, a city located in the central southern region of the Wallachian hills of Romania. Females with ovisacs were present in several locations on *Hydrangea macrophylla* and *Tilia cordata* and observations showed significant damage to *Hydrangea* leaves and inflorescences, the plant viability being ensured through insecticide treatments. Regarding the giant Asian mantid *H. tenuidentata*, an adult was recorded in November 2025 in a private garden in the city center, and several oothecae were noted during November and the winter months on twigs of cherry, apple and pear trees. A voracious predator, with a greater reproductive potential than the European mantis, this allochthonous species requires more studies to understand its impact on the indigenous fauna. Under conditions of warming climate and intense trade, the expansion of the distribution area of these species is expected.

**FT-IR-BASED CHARACTERIZATION AND FUNCTIONAL PROPERTY ASSESSMENT OF APPLE BY-PRODUCTS**

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Food processing generates significant amounts of by-products that, although often treated as waste, represent valuable resources for sustainable food innovation. Apple by-products from the juice industry are particularly rich in compounds with nutritional and functional relevance, making them suitable for incorporation into ingredients designed to support a balanced modern diet.

In this study, apple by-products from different varieties (Gala, Jonathan, Golden, Idared, Idared+Florina and a mix of all varieties) were investigated using a combination of analytical approaches. FT-IR spectroscopy was applied as a rapid, non-destructive tool to obtain qualitative information on their structural composition, highlighting the presence of carbohydrates, proteins, lipids and fibers, as well as changes associated with processing.

To provide a more comprehensive evaluation, nutritional composition, mineral content, antioxidant capacity and color parameters were also determined. Drying proved to be an effective method for stabilizing and concentrating bioactive compounds, without significant degradation, leading to increased polyphenol content and enhanced antioxidant activity.

The integrated results highlight the potential of apple by-products as valuable functional ingredients. Their compositional profile, combined with favorable nutritional, mineral, antioxidant and color characteristics, supports their sustainable valorization in the

development of innovative food products tailored to current consumer needs.

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**FUNCTIONAL AND TECHNOLOGICAL IMPLICATIONS  
OF USING NATURAL ALTERNATIVES TO SYNTHETIC  
ASCORBIC ACID IN BAKERY PRODUCTS****Nicoleta Diana ZAHARESCU <sup>1\*</sup>, Simona OANCEA <sup>2</sup>**<sup>1</sup>Faculty of Agricultural Sciences, Food Industry and Environmental Protection, “Lucian Blaga” University of Sibiu, 7-9 Dr. Ion Ratiu Street, 550012 Sibiu, Romania<sup>2</sup>Faculty of Agricultural Sciences, Food Industry and Environmental Protection, “Lucian Blaga” University of Sibiu, 7-9 Dr. Ion Ratiu Street, 550012 Sibiu, Romania\* Corresponding author: [zaharescudiana@yahoo.com](mailto:zaharescudiana@yahoo.com)

Ascorbic acid is an essential micronutrient with a key antioxidant role in the baking industry, where it is used as a chemical agent that enhances dough rheology and final product quality. Traditionally, synthetic ascorbic acid is preferred due to its stability and low cost. However, the growing demand for “clean label” and functional foods has increased interest in natural sources of ascorbic acid and their associated bioactive compounds.

In dough, ascorbic acid participates in redox reactions that oxidize glutathione and strengthen the gluten network through disulfide bond formation. This improves gas retention, increases bread volume, and enhances crumb structure. The present study outlines the biochemical mechanisms involved, typical usage levels, and effects on fermentation, volume, and bread staling. It also assesses the feasibility of partially replacing synthetic ascorbic acid with natural vitamin C-rich sources.

Furthermore, the nutritional and market implications of incorporating plant extracts are discussed in relation to current clean-label product development trends.

## ROOTING OF SOME LOCAL GRAPEVINE GENOTYPES CUTTINGS FROM KAYSERI REGION BY DIFFERENT METHODS

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*Vitis vinifera* is an economically important crop cultivated worldwide and in Türkiye for multiple purposes. Efficient utilization of genetic resources requires the propagation of regionally adapted genotypes using appropriate and scalable methods. In this study, 19 local grapevine genotypes collected from Kayseri, along with three commercial cultivars and three rootstocks, were evaluated. Five treatments were applied in a perlite medium: a control, two doses (2000, 4000 ppm) of indole-3-butyric acid (IBA), and two bacterial applications. Significant differences were observed among genotypes in terms of root number; the DEV04 genotype exhibited the highest value (37.56), followed by TAL01 (35.44). Regarding root length, the 1103P rootstock showed the greatest development (18.7 cm). Among treatments, 2000 ppm IBA (12.77) and 4000 ppm IBA (12.72) resulted in the highest root numbers. In contrast, bacterial treatments were more effective in enhancing root length, with bacteria 123 (8.26 cm) and bacteria 143 (8.02 cm) producing the best results. Overall, IBA treatments were more effective in increasing root number, whereas bacterial applications promoted root elongation. These findings indicate that different propagation treatments can be optimized to improve specific morphological parameters in grapevine genotypes.

### **Acknowledgments**

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**CLONALITY IS NOT ENOUGH: REPRODUCTIVE STRATEGY AND CONSERVATION OF *SCOPOLIA CARNIOLICA* JACQ.****Karolina TYMOSZUK-RYDZEWSKA<sup>1,\*</sup>, Bożena DENISOW<sup>2\*</sup>**<sup>1</sup>Department of Botany, Mycology and Ecology, Institute of Biological Sciences, Maria Curie- Skłodowska University, 19 Akademicka St, 20-033, Lublin, Poland<sup>2</sup>Department of Botany and Plant Physiology, University of Life Sciences in Lublin, 15 Akademicka St, 20-950, Lublin, Poland\* Corresponding author: [karolina.tymoszuk-rydzewska@mail.umcs.pl](mailto:karolina.tymoszuk-rydzewska@mail.umcs.pl); [bozena.denisow@up.edu.pl](mailto:bozena.denisow@up.edu.pl)

*Scopolia carniolica* Jacq. is a clonal perennial of the Solanaceae family, protected in Poland and considered a rare forest herb in Central Europe. Although clonal growth enables local persistence, the effectiveness of sexual reproduction is decisive for long-term population viability.

This study investigated the reproductive strategy of *S. carniolica* and its implications for conservation based on research conducted in 2018–2019 and 2023 in two populations: a cultivated population in the Botanical Garden of Maria Curie-Skłodowska University in Lublin and a natural population in the Tomaszów Lubelski Forest District. We analysed floral morphology and anatomy, flowering biology, floral rewards, pollinator assemblages, pollination efficiency and the breeding system.

Flowers exhibited movable herkogamy and incomplete protogyny, while dense non-glandular trichomes at the base of stamens likely restrict access for short-tongued insects. In both populations, the absence of pollinators resulted in complete reproductive failure. The species is obligatorily xenogamous and strongly self-incompatible. Although geitonogamy initiated fruit development, it led to late-acting self-incompatibility and production of non-viable seeds. Viable seed set occurred only after cross-pollination, with bumblebees identified as the most effective pollinators.

Our findings demonstrate that clonality alone is insufficient to maintain populations of *S. carniolica* and highlight the crucial role of pollinator conservation in ensuring sexual reproduction and long-term persistence of this rare species.

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**BIOCHAR EFFECTS ON TREE SEEDLINGS GROWTH  
UNDER PARTICULATE MATTER STRESS**

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Urban and industrial air pollution, especially particulate matter (PM), can negatively affect tree seedling growth and photosynthetic responses. Soil amendments such as biochar may modify substrate physicochemical properties and thereby influence plant responses to environmental stress. This study evaluated species-dependent responses of Norway spruce (*Picea abies* (L.) H. Karst.) and Norway maple (*Acer platanoides* L.) seedlings to foliar PM exposure and assessed the potential role of biochar in reducing pollution-induced stress.

Seedlings of two tree species were grown in open field conditions under these treatments: (1) control (no PM and biochar), (2) foliar exposure to PM, and (3) PM + 10 % biochar added to the substrate. Growth parameters (stem high, diameter) and chlorophyll a, b as indicators of photosynthetic performance were measured to determine differences in stress response between species and treatments. The results showed that PM exposure reduced seedling growth and photosynthetic performance, with the magnitude of response differing between species. Biochar amendment improved substrate conditions and partly mitigated the negative effects of PM, resulting in better growth and photosynthetic stability in treated seedlings compared to the non-amended substrate.

The findings suggest that biochar application may contribute to improved tolerance of tree seedlings to pollution stress, although

responses remain species-specific and depend on plant functional characteristics.

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## PHYSIOLOGICAL INDICATORS OF RESISTANCE TO LOW TEMPERATURES IN DIFFERENT SPECIES OF THE GENUS *ROSA* L.

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The problem of frost resistance of ornamental plants is extremely important for modern urban landscaping. Roses, as one of the most popular ornamental crops, are often planted in different climatic conditions, but their resistance to low temperatures largely depends on the physiological processes occurring in plant tissues. The study of these processes allows not only to assess the adaptive capabilities of different varieties, but also to select the optimal assortment for landscaping territories in the steppe and forest-steppe zones.

The purpose of the study was to determine the physiological indicators of resistance to low temperatures in the autumn-winter period in plants of the genus *Rosa* L. The objects of the study were *Rosa canina* L. (rose hips), Queen Elizabeth varietal roses of the grandiflora group, and hybrid tea roses Rose Gaujard and Super Star. The research was conducted in the city of Zaporizhzhia, located in southeastern Ukraine.

Two main methods were used to determine physiological indicators:

- Weight method - to determine the water content in plant shoots.
- Titrometric method – to determine the amount of ascorbic acid in tissues.

These indicators are key to assessing frost resistance because the water balance and the presence of protective substances determine plants' ability to withstand low temperatures.

More winter-hardy varieties were characterised by lower water yield, indicating their ability to retain water in cells and prevent frost-induced tissue damage.

Thus, in rose hips, the highest water content (56.7%) was observed in December, and the lowest in October (39.4%). In the Rose Gaujard

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rose, the dynamics were opposite: the maximum indicator (65.8%) in October and the minimum (35.7%) in February. In the Queen Elizabeth variety, the highest water content (67.9%) was also recorded in December, and the lowest (32.8%) in February. A similar trend was observed in the Super Star variety, with indicators of 56.3% and 32.4%, respectively.

An important factor in increasing frost resistance is the accumulation of protective substances, in particular ascorbic acid. Its maximum content in rose tissues is observed during deep dormancy. As temperature decreases, the amount of ascorbic acid increases, providing antioxidant protection for cells. During warming, its concentration decreases.

Studies conducted in November–January showed that the varieties can be arranged in the following order by ascorbic acid content: Super Star → Queen Elizabeth → Rose Gaujard → rosehip. This indicates that garden varieties have higher levels of protective substances than wild rosehips.

The results obtained indicate that:

- Frost resistance of roses is determined by the level of water yield and ascorbic acid content.
- Super Star and Queen Elizabeth varieties have higher resistance to low temperatures compared to Rose Gaujard and rosehip.
- The short dormancy period of garden roses is their weak point, because during winter thaws they quickly lose hardening.

**SOCIAL BEHAVIORAL ALTERATIONS  
IN *DANIO RERIO* FOLLOWING COMBINED EXPOSURE  
TO CEFTAZIDIME AND POLYSTYRENE  
MICROPLASTICS**

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Pharmaceuticals and microplastics are recognized as persistent pollutants in aquatic environments, posing ecological and health risks due to their persistence and bioactivity. Ceftazidime (CAZ), a third-generation cephalosporin  $\beta$ -lactam antibiotic, exhibits broad-spectrum activity, particularly against Gram-negative bacteria. Polystyrene microplastics (PS MPs) are emerging contaminants that accumulate in aquatic ecosystems and may interact with co-occurring pollutants, potentially altering the behavior and physiology of aquatic organisms.

The aim of this study was to evaluate the social behavior of *Danio rerio* following exposure to CAZ ( $50 \mu\text{g L}^{-1}$ ), PS MPs ( $1 \text{ mg L}^{-1}$ ), and their mixture ( $50 \mu\text{g L}^{-1}$  CAZ +  $1 \text{ mg L}^{-1}$  PS MPs). Parameters analyzed included time spent in the start arm, right arm, left arm, and the decision zone of a modified T-maze, where zebrafish were individually placed. Social behavior was recorded and analyzed using EthoVision XT 16 software, and statistical significance was determined by one-way ANOVA. PS MPs exposure elicited pronounced and directed hyperexploration, CAZ produced mild

behavioral alterations, and the combined treatment induced marked hyperactivity characterized by disorganized circling and impaired decision-making, demonstrating distinct, treatment-specific behavioral disruptions.

## IMPACT OF DIFFERENT CROPPING PATTERNS ON SOIL ERODIBILITY (K FACTOR)

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Soil erodibility, a critical component in the Revised Universal Soil Loss Equation, is significantly influenced by anthropogenic factors, particularly cropping management and land-use patterns. This study presents a comprehensive quantitative analysis of the K-factor across 12 districts in Tokat Province, evaluating the interplay between 36 distinct agricultural scenarios categorized by slope gradients (0-5%, 6-29%, and >30%) and varied crop rotations.

The K-factor values were determined using the standard nomograph parameters, including particle size distribution, organic matter, soil structure, and permeability. Our results show soil erodibility varies widely, with K-factors from 0.157 (Yeşilyurt, >30% slope) to 0.412 (Almus, 0-5% slope). A significant link exists between crop rotation intensity and soil susceptibility. Intensive rotations like "Sugarbeet-Tomato-Maize" in Sulusaray had high erodibility (K=0.341) with low OM (0.69%). Conversely, rotations incorporating legumes or fallow periods, such as "Wheat-Chickpea-Barley" in Turhal, showed more stable values (K=0.276-0.324) depending on topographic conditions.

Statistical analysis revealed that OM content—ranging from 0.61% to 6.72%—served as the primary modulator of erodibility, where higher OM in districts like Başçiftlik (6.72%) directly correlated with lower K-values (0.212). The findings demonstrate that intensive cropping of industrial plants without adequate organic amendments increases soil vulnerability to erosion, regardless of the slope class. This study underscores the need for site-specific conservation tillage and legume-inclusive rotations to mitigate land degradation in semi-arid Mediterranean agro-ecosystems.

**MORPHOLOGICAL CHARACTERIZATION OF PEPPER  
GENOTYPES OF KYRGYZ ORIGIN****Seda DEMIR<sup>1</sup>, Hasan PINAR<sup>2</sup>, Aydın UZUN<sup>2</sup>,  
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This study evaluated 25 pepper genotypes originating from Kyrgyzstan together with 2 standard kapyra genotypes, making a total of 27 genotypes, through morphological characterization. The research aimed to conserve local genetic resources and integrate them into pepper breeding programs. A total of 34 traits (8 vegetative and 25 fruit traits) were examined according to UPOV standards, and the data were analyzed using the NTSYS 2.1 software package. The findings revealed significant variation among genotypes in stem length, leaf morphology, fruit shape, color, and taste. Cluster analysis based on dendrograms divided the genotypes into two main groups, with genetic similarity levels ranging between 0.50 and 0.94. Notably, BY-20 and BY-24 genotypes showed the highest similarity, while BY-22 was identified as the most genetically distant genotype. The results highlight the morphological diversity of Kyrgyz pepper genotypes and provide valuable insights for regional breeding programs and the development of new varieties.

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**ENTOMOFAUNA FROM THE DECIDUOUS FORESTS  
MÂRZEȘTI AND URICANI (IAȘI COUNTY), NATURA 2000  
PROTECTED SITES****Tatiana BLAGA** <sup>1,\*</sup>,**Camil Ștefan LUNGU CONSTANTINEANU** <sup>2</sup><sup>1</sup> National Institute for Research and Development in Forestry (INCDS) "Marin Drăcea", Bacău Station, Romania<sup>2</sup> Department of Experimental and Applied Biology, NIRDBS-Institute of Biological Research Iasi, Romania\* Corresponding author: [tatiana.blaga@yahoo.com](mailto:tatiana.blaga@yahoo.com)

The evaluation of the entomofauna biodiversity in Natura 2000 protected sites was carried out in the Mârzești and Uricani forests, collecting samples from the protected area. 225 arthropods (araneids and insects) were collected, belonging to the following orders: Aranea, Collembola, Orthoptera, Thysanoptera, Heteroptera, Homoptera, Coleoptera, Lepidoptera, Diptera and Hymenoptera (Insecta). We consider interesting the presence of orders Collembola, Thysanoptera and Hemiptera, with species that can be harmful to plants but also with useful predatory species, which can be considered indicator species. 8 specimens of ichneumonids were collected, from 8 species: *Barylypa formosa*, *Agrypon flexorium*, *Cryptus viduatorius*, *Diplazon laetatorius*, *Enicospilus merdarius*, *Apechthis compunctor*, *Pimpla rufipes*, and *Theronia atalantae*, belonging to 5 subfamilies: Anomaloninae, Cryptinae, Diplazontinae, Ophioninae and Pimplinae. The pest species are defoliators, xylophagous or gallic insects belonging to the orders: Lepidoptera (families Tortricidae, Lymantriidae, Geometridae), Coleoptera (family Curculionidae - subfamilies Scolytinae, Cerambicidae), Homoptera.

**TREE SEEDLING RESPONSES TO PARTICULATE  
MATTER ALONE AND IN COMBINATION  
WITH O<sub>3</sub> AND CO<sub>2</sub>****Valentinas ČERNIAUSKAS** <sup>1,\*</sup>,  
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Particulate matter (PM) is a major urban air pollutant with well-documented impacts on human and environmental health. Urban trees mitigate ambient PM by enhancing particle deposition and retention on leaf and bark surfaces, thereby limiting the spread of pollution. However, vegetation may experience compounded stress when PM interacts with elevated ozone (O<sub>3</sub>) and carbon dioxide (CO<sub>2</sub>), potentially affecting physiological performance and growth. This study assessed seedling responses to PM-alone and combined PM–O<sub>3</sub>–CO<sub>2</sub> exposure, compared with an untreated control, to better reflect urban conditions. Seedlings of three deciduous species (*Betula pendula*, *Tilia cordata*, and *Acer platanoides*) were exposed to simulated treatments for two years, after which biochemical parameters, growth, and biomass allocation were evaluated. Combined PM–O<sub>3</sub>–CO<sub>2</sub> exposure reduced leaf chlorophyll content only in *Tilia cordata*. In contrast, *Betula pendula* showed increased total phenolic content (TPC) and total flavonoid content (TFC) under both PM-alone and combined treatments. PM-alone exposure also increased TFC and malondialdehyde (MDA) levels in *Tilia cordata* and *Acer platanoides*. Growth parameters declined significantly in *Betula pendula* and *Acer platanoides* following PM–O<sub>3</sub>–CO<sub>2</sub> exposure. Findings revealed species-specific differences in pollutant tolerance, highlighting the importance of selecting tree species for urban green infrastructure under multi-pollutant conditions.

**DETERMINATION OF THE ANTIBACTERIAL EFFECT  
OF THE METHANOLIC EXTRACT OBTAINED FROM  
*PSEUDEPHEBE PUBESCENS*, A LICHEN SPECIES WITH A  
WIDE DISTRIBUTION IN ANTARCTICA**

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Lichens are symbiotic associations formed through morphological and physiological interactions between fungi, mostly belonging to the phylum Ascomycota, and green algae and/or cyanobacteria, exhibiting characteristics distinct from those of their individual components. The unique metabolic products synthesized by lichens, known as lichen acids, have attracted attention due to their potential applications in medicine, pharmacy, and related fields. Antarctic terrestrial ecosystems host a highly diverse lichen flora; however, studies on the bioactive secondary metabolites of Antarctic lichen species remain limited.

This study investigates the antibacterial activity of the methanolic extract of *Pseudephebe pubescens*, a lichen species widely distributed in Antarctica, against selected Gram-positive and Gram-negative bacterial strains. Antibacterial activity was evaluated using standard microbiological techniques, including the disk diffusion method. The results demonstrate that the methanolic extract of *Pseudephebe pubescens* exhibits strong antibacterial effects against certain bacterial strains. These findings indicate that lichens adapted to extreme Antarctic conditions contain biologically active compounds and may represent promising sources for the discovery of novel antimicrobial agents. The study contributes to the understanding of Antarctic biodiversity in terms of its potential relevance to human health.

**FLOWERING DYNAMICS OF *NIGELLA DAMASCENA* L.****Zuzanna ŁABĘCKA\*, Bożena DENISOW\*,  
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*Nigella damascena* L. is an annual plant belonging to the Ranunculaceae family. Its main areas of occurrence include Europe, especially the Mediterranean countries, North Africa, and Western Asia. It is widely appreciated both as an ornamental plant and as a raw material for various industries due to its bioactive compounds. A distinctive feature of this species is the presence of specialized structures, identified as pseudonectaries, which are derived from modified petals. The aim of this study was to investigate the biology of flowering, pollen production, and nectar secretion of *N. damascena* during the 2024-2025 growing seasons. Seeds were sown in April. The flowering period started from late June to early July and continued until August. Anthesis of individual flowers lasted 6-7 days. Flowers exhibits a clear protandrous pattern. The male phase began on the first day, with peak pollen presentation occurring around the 3<sup>rd</sup> or 4<sup>th</sup> day. Individual flowers produced between 28 and 61 anthers, with a mean pollen mass per flower ranging from 1.53 to 4.67 mg. Stigma receptivity is delayed until the 5<sup>th</sup> day, resulting in a temporal separation of sexual functions that minimized self-pollination. Nectar secretion and sugar concentration were closely correlated with flower age. Nectar production peaked on the 5<sup>th</sup> day of flowering. Concurrently, the sugar concentration nearby doubled from the 1<sup>st</sup> day to the 5<sup>th</sup> day of flowering, followed by an approximately twofold decline during the senescence phase. Nectar consists primarily of sucrose; however the sugar profile shifted from being sucrose-dominant in the male phase to being sucrose-rich during the female phase.

## THE ROLE OF FOLIAR BIOSTIMULANTS IN OPTIMIZING FRUIT AND SEED YIELD IN TOMATOES AND EGGPLANTS

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The use of biostimulants in the cultivation of solanaceous vegetables may improve fruit production and seed yield. The aim of the present study was to evaluate the effects of foliar biostimulant applications on fruit and seed yield in tomato and eggplant. Four foliar biostimulants were tested: E-Dalgin, Kelpak, Sprintene, and Rerum. Treatments consisted of three foliar applications performed at 14-day intervals, starting from the formation of the first fruit. In tomato, fruits were harvested at physiological and technological maturity, which coincide in this species. In eggplant, treatments were applied to an equal number of plants intended either for fruit production for consumption or for seed production, as physiological maturity occurs later than the consumption stage. The biostimulants showed different effects on fruit and seed yield, influencing both the number of fruits per plant and fruit weight, with responses varying according to species. Some treatments resulted in increased yields in both tomato and eggplant. These results highlight the potential of foliar biostimulants as an effective strategy for improving productivity and seed production in solanaceous vegetable crops.

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## A HYBRID PHOTOCATALYTIC STRATEGY FOR DICLOFENAC ELIMINATION: COUPLING TIO<sub>2</sub>-BASED CATALYSIS WITH PHOTO-FENTON-LIKE REACTIONS

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The increasing presence of pharmaceutical residues such as diclofenac in aquatic environments necessitates efficient and robust treatment strategies [1]. Advanced oxidation processes (AOPs) have emerged as environmentally friendly techniques capable of removing such emerging micropollutants. In this study, diclofenac removal was investigated via a hybrid system combining photocatalysis with heterogeneous photo-Fenton-like reactions, employing a mixed metal oxide catalyst (TiO<sub>2</sub>–La<sub>2</sub>O<sub>3</sub>–Fe<sub>2</sub>O<sub>3</sub>–HA) in the presence of hydrogen peroxide [2]. This approach lies in integrating multiple catalytic functionalities within a single composite, enabling the simultaneous activation of photocatalytic and Fenton-like pathways under UV irradiation. The catalyst was synthesized and characterized by X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and thermogravimetric analysis (TGA), confirming a stable structure with suitable physicochemical properties. Photocatalytic experiments were

monitored by UV–Vis spectrophotometry, while total organic carbon (TOC) analysis assessed mineralization.

The effects of catalyst loading, hydrogen peroxide concentration, and reaction time were systematically evaluated. Control experiments were performed in the absence of the catalyst and in the absence of hydrogen peroxide, to clarify the contribution of each process.

The enhanced performance of the hybrid system is attributed to synergistic mechanisms involving improved charge separation, efficient hydrogen peroxide activation, and increased generation of reactive oxygen species ( $\cdot\text{OH}$ ), leading to accelerated degradation and mineralization of diclofenac. These results demonstrate the potential of this approach as an effective and versatile solution for treating pharmaceutical contaminants under environmentally relevant conditions.

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**DEVELOPMENT OF PILOT INTEGRATED CULTIVATION  
PROTOCOLS FOR HIGH-QUALITY FLORICULTURAL  
PRODUCTS OF THE GREEK NATIVE *TULIPA AUSTRALIS*  
AND *TULIPA ORPHANIDEA***

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Tulips (*Tulipa* spp.) are among the most important ornamental crops in the highly competitive floriculture industry, which continually seeks novel products. This study evaluated the agronomic performance of two tulip species native to Greece namely *Tulipa australis* and *T. orphanidea* compared with the commercial hybrid Île-de-France. The effects of two substrates and four fertilization treatments were assessed under open-field pot cultivation conditions on phenotypic traits relevant to cut flower production. Experiments were conducted at the Institute of Plant Breeding and Genetic Resources (IPBGR), Hellenic Agricultural Organization (ELGO) - Dimitra, Thessaloniki, Greece. Two substrates were tested: premium soil and perlite (sub-A), and peat and sand (sub-B), both in a 4:1 ratio on a gravel base. Fertilization treatments entailed chemical

fertilization (ChF), two Integrated Nutrient Management (INM) schemes, a biostimulant (BST), and a control. At full bloom, plant height, petiole diameter, leaf dimensions, inner tepal size, and number of leaves and flowers were measured. The results showed that fertilization affected the performance of the studied tulips in interaction with substrate, which on its own demonstrated a weak effect on the measured characters. In *T. australis*, plant height ranged from 18.35 ( $\pm 0.45$ ) cm in ChF/sub-A to 30.75 ( $\pm 0.25$ ) cm in INM/sub-A with additional effects of fertilization on leaf shape and internal tepal shape. In *T. orphanidea* the INM schemes showed positive effects on leaf size, petiole diameter and plant height, which ranged from 11.05 ( $\pm 0.85$ ) cm in ChF/sub-A to 22.25 ( $\pm 1.75$ ) cm in INM/sub-B. Similar responses were observed in the commercial hybrid Île-de-France, with ChF demonstrating reduced plant height, especially in sub-A, albeit with evidence of increased petiole diameter and inner tepal size. Building on these results, redesigned pilot cultivation trials are underway in the frame of the newly funded Tulipa-2 project, which leverages data from the former TULIPS.GR initiative to further enhance the value chain of Greek tulips through breeding, cultivation, and ornamental evaluation. Current experiments include expanded treatments of chemical fertilization (ChF), integrated nutrient management (INM) and biostimulants (BST), alongside three additional native tulip species. Trials are conducted under both open-field and protected (greenhouse) conditions. The overall outcomes are expected to inform the development of reliable cultivation protocols for Greek tulips, supporting a sustainable floricultural value chain stemming from Greek phylogenetic resources.

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*RESEARCH–CREATE–INNOVATE* entitled “Value chain for Greek native tulips: development of documented propagation material and integrated conservation for sustainable exploitation” (project code: T2EDK-05115; acronym: TULIPS.GR). The ongoing research is also co-financed by the European Union and Greek national funds through the Programme *Competitiveness*, under the call *RESEARCH–INNOVATE* entitled “Development of integrated *in vivo* and *in vitro* bulb production protocols, pilot cultivation and postharvest evaluation to produce high-quality floricultural products for five Greek tulip species” (project code: EKPAR03-0047592; acronym: TULIPA-2).

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Lean Management represents a strategic approach aimed at increasing organizational efficiency by eliminating waste and optimizing value streams. This paper presents the theoretical foundations of Lean, analyzes relevant literature, and proposes a practical application example in an industrial context. The results highlight the positive impact on operational performance. Lean Management is based on five fundamental principles: defining value, mapping the value stream, creating flow, establishing pull systems, and pursuing continuous improvement. These principles enable process optimization and efficiency enhancement. In a production process, Lean implementation led to reduced waiting times and improved process flow. The results demonstrated increased efficiency and reduced operational waste. The application of Lean principles improved process performance and productivity. The findings are consistent with existing literature.

Lean Management is an essential tool for modern organizations. Its implementation requires a cultural shift but delivers significant long-term benefits.

## THE IMPACT OF ARTESIAN WATER IRRIGATION ON THE EDAPHIC FAUNA OF CALCAREOUS CHERNOZEM UNDER A VINEYARD

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The content, profile vertical distributions and biodiversity of edaphic fauna in the calcareous chernozem 8-year-old irrigated by poor-quality artesian water in the Stefan-Voda region of the Republic of Moldova have been investigated in the connection with soil quality assessment. The mineralization of irrigation water was 630 mg l<sup>-1</sup>; pH = 8,35; SAR = 24; Na<sub>2</sub>CO<sub>3</sub> and NaHCO<sub>3</sub> constituted from 65 % to 72 % of the mineral composition. Irrigated chernozem is characterized by the reduction of abundance and biomass of invertebrates by 2.8 and 2.3 times, respectively, in comparison with soils without irrigation. The main content of the edaphic fauna is localized in the 0-10 cm layer, the *Lumbricidae* family - in the 0-20 cm layer. The non-irrigated chernozem contains 9 families of invertebrates, the irrigated chernozem - 6 families. The trophic pyramids in the irrigated chernozem are characterized by a very low number of saprophagous and are therefore unstable. The equilibrium between invertebrate populations is disturbed, leading to a decrease in the quality of soils irrigated with poor-quality water.

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**ELECTROCHEMICAL-SURFACE ENHANCED RAMAN  
SPECTROSCOPY METAL PHTHALOCYANINE-BASED  
BIMODAL SENSORS FOR THE DETECTION OF  
REACTIVE OXYGEN SPECIES IN PLANT-RELATED  
SAMPLES, FOR BIOSTIMULANT TREATMENT  
VALIDATION (EC-SER(O)S)**

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According to FAO, food demand will increase by 50% by 2050, of which 80% is plant-based products. This comes in contrast with crop loss accounting for up to 40% (220B \$ loss worldwide). Plant health is at high risk nowadays more than ever because of abiotic stress (performed by not-living entities like drought, heretic rainfall, saline waters, pollution, desertification, lack of nutrients etc.) and biotic stress (performed by living organisms such as pets, pathogens etc.) which give rise to plant stress molecules called Reactive Oxygen Species (ROS), that occur before any visible signs of plant damage can be observed, not only to the naked eye, even to phenotyping

technologies. This work combines Electrochemical (EC) - Surface Enhanced Raman Spectroscopy (SERS) to create metal phthalocyanine-based bimodal sensors for further detection of ROS in plant-related samples, for biostimulant treatment validation. The EC-SER(o)S sensors were characterized with SEM/EDX, XRF, FTIR and Raman and calibrated with both techniques for peroxy nitrite (one of the most oxidant reactive oxygen species present in plants during oxidative burst). Correlations between fluorescence spectroscopy (using APF labels) and the results obtained from the sensors are validated with a total of 2880 Mung Beans plants grown in greenhouse, under 12 different controlled conditions (with or without stress factors/biostimulant treatments).

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## COSTS AND BENEFITS OF HEXANOIC ACID TREATMENT AND PRIMING IN TOMATO PLANTS

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Previous studies have demonstrated that hexanoic acid (Hx) acts as an effective priming agent, inducing resistance in tomato plants against *Pseudomonas syringae*. In this study, we investigated the physiological costs and benefits associated with Hx-induced resistance. Tomato plants treated with 0.6 mM Hx showed a significant reduction in disease symptoms and bacterial populations. Biochemical analyses revealed that Hx treatment increased total protein and proline content in healthy plants, while attenuating the accumulation of proline and peroxidase activity upon infection. In contrast, PAL activity was not significantly affected by Hx treatment. Additionally, Hx enhanced chlorophyll content and improved photosynthetic parameters, including photosynthetic rate, transpiration, and stomatal conductance, indicating an improved physiological status. Long-term assays showed that Hx treatment did not negatively affect plant growth, while maintaining biomass levels comparable to control plants. Importantly, fruit production was not compromised, while fruit quality was slightly improved, as reflected by higher sugar content. These findings indicate that Hx-induced resistance involves modulation of key physiological processes without imposing significant fitness costs. Overall, Hx represents a

promising, low-cost strategy for enhancing plant immunity while maintaining or even improving plant performance and fruit quality.

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**LABORATORY METHODS FOR ASSESSING  
BIOCHEMICAL METHANE POTENTIAL (BMP) IN  
LIVESTOCK MANURE: A NARRATIVE REVIEW**

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This narrative review explores laboratory methods used to determine the biochemical methane potential (BMP) of livestock manure, with particular emphasis on manure-only substrates. A targeted set of 50 peer-reviewed papers was screened for relevance, and 16 studies published between 2009 and 2025 were retained for comparative narrative analysis. These studies covered swine, non-dairy and dairy cattle, poultry, and mixed livestock manure, with considerable variation in manure form, including fresh manure, slurry, liquid fractions, and separated solid fractions. Across the reviewed literature, major methodological differences were identified in reactor configuration, inoculum source, inoculum-to-substrate ratio (ISR) and its analytical basis, incubation temperature, mixing, gas-volume measurement, methane determination, test duration, endpoint criteria, and BMP expression or normalization. Conventional batch bottle tests were the dominant approach. However, a range of alternative techniques was also reported, including automated systems, benchtop bioreactors, manometric methods, volumetric methods, syringe-based systems, water displacement techniques, gas

chromatography, methane sensors, and carbon dioxide scrubbing-based methane determination. The results indicates that no single laboratory BMP method is universally superior for livestock manure. Instead, the reliability of results depends on the consistency of the experimental design and on the transparent reporting of key methodological details. A major limitation identified across studies is a methodological heterogeneity, which restricts direct comparison of reported BMP values and highlights the need for clearer minimum reporting standards.

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## EXPLORING PERSONAL SPACE - FROM THINKING TO PERSONAL DEVELOPMENT

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Compassion for others has been studied in association with different variables characterizing health or illness. It is considered the ability to regard people in suffering with kindness and to nurture them to ease distress. To better understand the concept, the purposes of this research were: to investigate the associations compassion may have with resilience and personal congruence (the ability to be self-aware and to express personal experiences as they are) and to demonstrate the effect that an experiential exercise focused on exploring personal space may have on congruence, compassion, and resilience. By taking the time to focus on personal space, some of the participants in the study lay the foundation for increasing congruency and for initiating actions with more compassion, leading to a more accurate awareness of the personal resources composing the resilience one has in living a quality healthy life. The exercise also helped the participants to be more open to the here and now experience and to appreciate oneself, others, and the future in a much more realistic and optimistic manner.

**EFFECT OF SWEET POTATO FLOUR ADDITION ON  
BISCUIT NUTRITIONAL AND SENSORIAL QUALITY, AND  
ACRYLAMIDE FORMATION**

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This study aimed to investigate the effect of incorporating different percentages (10-30%) of purple sweet potato flour (SPF) into biscuit recipes on physicochemical properties, nutritional quality, sensory characteristics, and acrylamide content.

By increasing the substitution level of wheat flour with SPF, the moisture, protein, and starch content decreased, while the fiber, ash, and total carbohydrates levels increased. The caloric value of fortified biscuits increased compared to that of the control sample made with wheat flour. The antioxidant activity and polyphenolic content of fortified biscuits were 1.9-4.5-fold and 1.6-3.2-fold higher than those registered for the control sample (124.14 mg Trolox/100 g; 27.72 mg GAE/100 g).

For enriched biscuits, the acrylamide content was 2.2-7.0-fold higher than that of the control sample (9.28 µg/kg), but it was below the limit of 350 µg/kg established by European legislation. The sensory analyses showed that fortified biscuits were acceptable to consumers. The results demonstrate that SPF can be used to fortify biscuits to enhance the nutritional properties.

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