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AGRICULTURE AND HORTICULTURE

April 14-15, 2025

Rome, Italy

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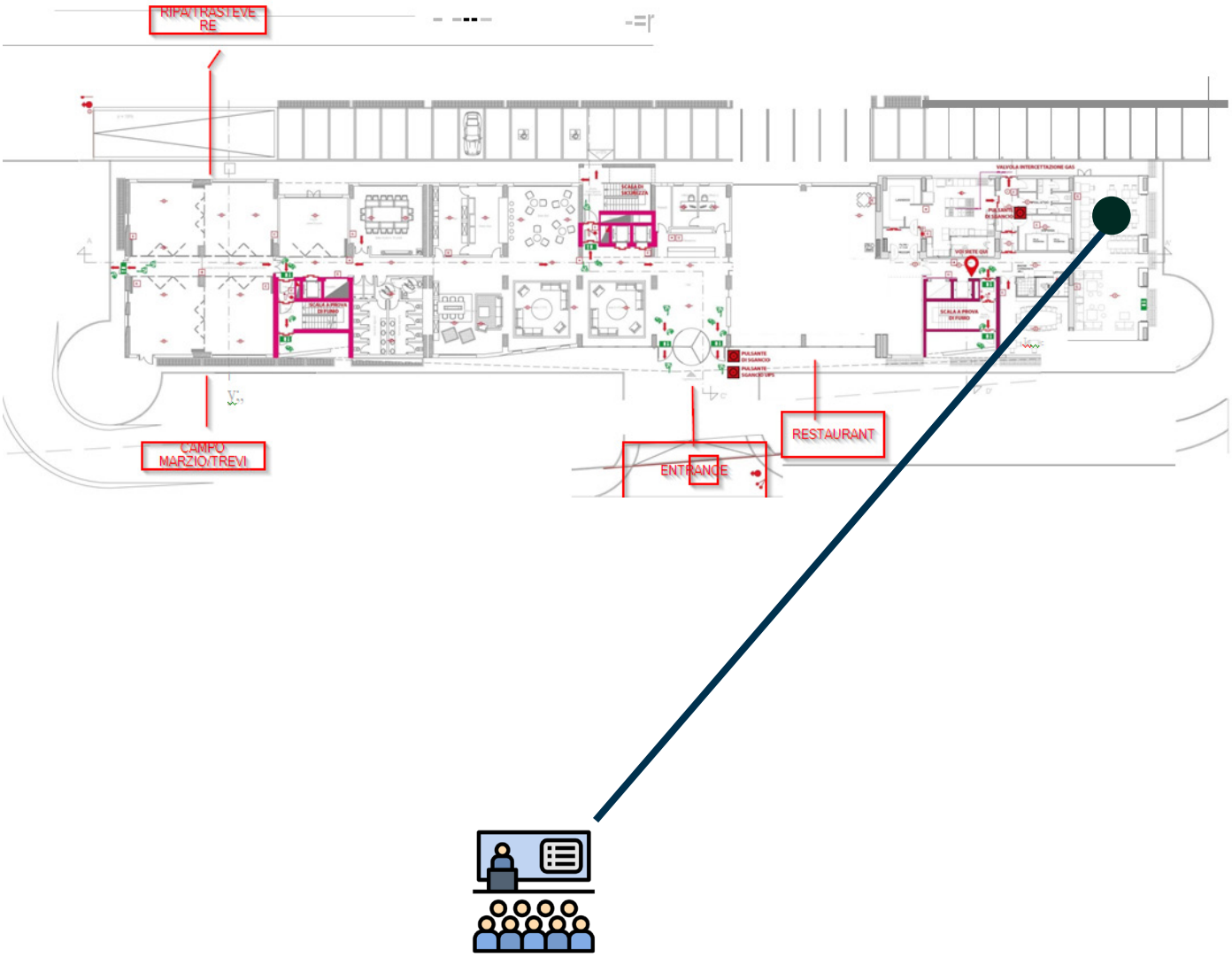

#ConferenceHall - Prathi

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SCIENTIFIC PROGRAM #DAY 1 - April 14, 2025

Meeting Hall: Prathi

9.00 - 9.45 Registrations

Moderator

Laszlo Szabados, Institute of Plant Biology, Hungary

9.45 - 10.00 Introduction

Keynote Presentations	
10.00 - 10.45	**Title:** Macrophyte *Fucus vesiculosus* Habitats and Oxidative Stress, the Baltic Sea
Elmira Boikova, University of Latvia, Latvia	
10.45 - 11.30	**Title:** Policy Recommendations for Accelerating and Mainstreaming a Circular Rural Bioeconomy in the EU
Dimitris Michas, Institute for Bio-Economy and Agri-Technology (IBO), Greece	
11.30 - 11.45	**Networking and Refreshments @ Lobby Bar**
11.45 - 12.30	**Title:** New Ecosystems, New Solutions: Sustainable Management and Utilization of Invasive Plants
Danijela Poljuha, Institute of Agriculture and Tourism, Croatia	
Oral Presentations	
Session Chair: **Carmen Simon-Mateo,** Centro Nacional de Biotecnología, Spain	
Sessions: Plant Biotechnology | Plant Genetics and Genomics | Forest Science and Silviculture | Organic Agriculture | Agriculture Production Systems | Plant Sciences and Research | Plant Science | Agricultural Biotechnology and Genome Editing | Plant Tissue Culture | Forest Science and Silviculture | Plant and Environment	
12.30 - 12.55	**Title:** PEG-Triggered Osmotic Stress Generates Large-Scale Transcriptional and Epigenetic Responses in Rapeseed (*Brassica napus L.*)
Laszlo Szabados, Institute of Plant Biology, Hungary	
12.55 - 13.15	**Group Photo**
13:15 - 14.00	**Lunch @ Ristorante**
14.00 - 14.25	**Title:** Winter Camelina Seeds: A Promising Raw Material for Erucic Acid-Free Oil Production
Katarzyna Rzyska-Szczupak, Poznan University of Life Sciences, Poland	

14.25 - 14.50	**Title:** Quality of Sunflower Hybrid's Seeds Grown in Latvian Conditions
Vita Sterna, Institute of Agroresources and Economics, Latvia	
14.50 - 15.15	**Title:** Unlocking the Biotechnological Potential of Bacterial Toxin-Antitoxin Modules in Plants
Carmen Simon-Mateo, Centro Nacional de Biotecnología, Spain	
15.15 - 15.40	**Title:** Singular and Interactive Effect of 6-Benzylaminopurine (BAP) on Sweet Potato *in vitro* Micropropagation
Gideon Adu Donyina, University of Szeged, Hungary	
15.40 - 16.05	**Title:** Pioneer Plants and Pioneer Scientists: Resilience in the Environmental Changes
Francesca Marinangeli, Council for Agricultural Research and Economy Analysis, Italy	
16:05 - 16.35	**Refreshments @ Lobby Bar**
Poster Presentation @ 16.35 - 17.30	
Poster Judge: **Elmira Boikova,** University of Latvia, Latvia	
P01	**Title:** Possibilities of Growing Sunflowers in the Practice of Organic Farming in Latvia
Inga Jansone, Institute of Agricultural Resources and Economics, Latvia	
P02	**Title:** *Cytisus scoparius* (L.) Link: A Promising Source of Valuable Compounds
Bianca Albuquerque, Instituto Politécnico de Bragança, Portugal	
P03	**Title:** Stable Isotope Ratio Analysis for Assessing the Authenticity of Table Olives Produced in Poligiros Area in Greece
Anastasios Zotos, University of Patras, Greece	
P04	**Title:** DNA Damage and Repair in the Background of Edaphic Adaptation in Wild Wheat
Raskina Olga, University of Haifa, Israel	
P05	**Title**: Application of Stable Isotope Analysis on Verification of Central Macedonian Rice Authenticity
Angelos Patakas, University of Patras, Greece	
P06	**Title:** Impact of Water Availability on the Hysteresis Between Sap Flow and VPD in Grapevines (*Vitis vinifera L.*)
Efthymios Kokkotos, University of Patras, Greece	
P07	**Title:** Unraveling the Role and Interactions of the NF-Y Transcription Factor in Tomato Plants through Genome Editing and Yeast Two-Hybrid
Christina Emmanouilidou, Institute of Applied Biosciences (INAB), Greece	

Day 1 Concludes followed by Award Felicitation

SCIENTIFIC PROGRAM #DAY 2 - April 15, 2025

Meeting Hall: Prathi

Moderator

Laszlo Szabados, Institute of Plant Biology, Hungary

Keynote Presentations	
10.00 - 10.45	**Title:** Advancing Plant Fine Root Research: A Sub-Sampling Approach to Reduce Processing Time
Mattia Terzaghi, University of Bari Aldo Moro, Italy	
Oral Presentations	
Session Chair: **Danijela Poljuha,** Institute of Agriculture and Tourism, Croatia	
Sessions: Plant and Environment | Plant Science | Plant Tissue Culture | Plant Biology | Organic Agriculture | Agriculture & Food Security | Precision Agriculture and Smart Farming | Agricultural Biotechnology and Genome Editing	
10.45 - 11.10	**Title:** Endophytic Fungi: From Isolation to Cultivation Case Studies on their Effects on the Development of Arabidopsis and Tomato Plants
Francesco Dovana, University of Bari Aldo Moro, Italy	
11.10 - 11.35	**Title:** Enhancing Bioeconomy Education in Rural Areas: Insights from the Relief Erasmus + Pilot Testing
Dimitris Michas, Institute for Bio-Economy and Agri-Technology (IBO), Greece	
11.35-11.50	**Networking and Refreshments @ Lobby Bar**
11.50 - 12.15	**Title:** Assessment of the Sorption Capacity of Lignocellulosic Materials in Removing Bisphenol A from Water Systems
Anna Przybylska-Balcerek, Poznan University of Life Sciences, Poland	
12.15 - 12.40	**Title:** Enhancing Sweet Potato Production: A Comprehensive Analysis of the Role of Auxins and Cytokinins in Micropropagation
Gideon Adu Donyina, University of Szeged, Hungary	
12.40 - 13.05	**Title:** Antioxidant and Wound Healing Potential of Extracts Obtained from Typical Mediterranean Foods
Chourouk Joumaa, University of Genoa, Italy	
13.05 - 14.00	**Lunch @ Ristorante**

14.00 - 14.25	**Title:** Economic Evaluation of a Combined Conservation and Precision Agriculture Wheat Production System in Greece
Myrto Kosti, Institute for Bio-Economy and Agri-Technology, Greece	
14.25 - 14.50	**Title:** Innovative Methods of Adsorption of Bisphenol A from Forest Watercourses in Poland
Lidia Szwajkowska-Michalek, Poznan University of Life Sciences, Poland	
14.50 - 15.15	**Title:** Exploring the Impact of Sound Waves on Plant Biology
Mario Pagano, National Research Council (CNR), Italy	
Video Presentation	
VP-001	**Title:** Large-Scale Discovery of Non-conventional Peptides in Maize and Arabidopsis through an Integrated Peptidogenomic Pipeline
Liuji Wu, Henan Agricultural University, China	
E-Poster Presentation	
EP01	**Title:** Histopathological Investigation and Risk Factors of Coccidiosis in Camels (*Camelus dromedarius*), Algeria
Razika Boukert, Saad Dahleb University, Algeria	

Day 2 Concludes followed by Awards Ceremony & Vote of Thanks

VIRTUAL PROGRAM #DAY 1 - April 14, 2025

09.45 - 10.00 Introduction

Oral Presentations	
Sessions: Organic Agriculture and Agroecology | Agronomy and Crop Sciences | Agricultural and Biological Engineering | Plant Genetics and Genomics | Plant Nutrition and Soil Sciences | Plant Science	
10.00 - 10.25	**Title:** A Reliable Molecular Diagnostic Tool for CA90 (*Castanea sativa* × *Castanea crenata*) Hybrid Identification Through SSR
Toufiq Soale Yussif, Instituto Politecnico de Braganca, Portugal	
10.25 - 10.50	**Title:** Assessment of the Chemical, Antioxidant, and Antimicrobial Properties of Various Solvent Extracts from Wild Olive Leaves (*Olea europaea subsp. europaea var. sylvestris*)
Falek Wahiba, University of Constantine, Algeria	
10.50 - 11.15	**Title:** Strategic Environmental Assessment (SEA) Process for Agriculture and Horticulture
Vijayan Gurumurthy Iyer, Bihar Institute of Public Administration & Rural Development (BIPARD), India	
11.15 - 11.40	**Title:** Taxonomic Diversity of Medicinal Herbal Plants used in the Northern Community, Saudi Arabia
Fatma A. Hamada, Aswan University, Egypt	
11.40 - 12.05	**Title:** Enhancing Quinoa Yield and Quality Through Different Levels of Irrigation and Vermicompost Application
Gholamreza Heidari, University of Kurdistan, Iran	
12.05 - 12.30	**Title:** Comparative Study on Antioxidant Activity and Phenolic Content in Roots, Leaves and Fruits of *Gaultheria mucronata* (L.f.) Hook. & Arn
Carlos Alberto Schneider Barrera, Universidad de Concepcion, Chile	
12.30 - 12.55	**Title:** Unveiling the Molecular and Metabolic Landscape of Chickpea Chlorotic Dwarf Virus in Luffa Cylindrical L
Sana Khalid, Lahore College for Women University, Pakistan	
12.55 - 13.25	**Eye Relaxation**
13.25 -13.50	**Title:** Artificial Intelligence for a Greener Tomorrow: Transforming Plant Science and Molecular Biology
Rakibul Hasan, Westcliff University, USA	
Day 1 Concludes followed by Vote of Thanks	

Keynote

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MACROPHYTE *FUCUS VESICULOSUS* HABITATS AND OXIDATIVE STRESS, THE BALTIC SEA

E. Boikova, I.Kulikova, V.Licite and A.Vilks
University of Latvia, Latvia

Abstract

The Baltic Sea is an ecosystem subject to multiple stressors of both anthropogenic and natural origin. This unique ecosystem is characterized by low salinity and biodiversity, making it particularly fragile. Additionally, there is a lack of studies focusing on marine species in comparison to freshwater macrophytes. In the Gulf of Riga, the Baltic Sea, a long-term research monitoring of macrophyte communities under different eutrophication impacts has been ongoing from 1999 till 2024. As part of the international Baltic Sea Bonus program, the first attempt was made to assess the health of Fucus vesiculosus, which is a key species in various coastal habitats (the Bothnian Bay, the Gulf of Finland, and the Gulf of Riga), by measuring oxidative stress through enzymes glutathione – S transferase, glutathione reductase (GST, GR) activities.

Biography

Elmira Boikova has a multidisciplinary environmental and natural resources background. Her specialties are the Baltic Sea ecology of microbial food web components, ecotoxicology, coastal zone marine systems and macrophytes, eutrophication.
Elmira started her doctoral studies at the institute of Cytology in Sankt-Petersburg and completed PhD in 1991 at the institute of Oceanology, Russia Academy of Science with thesis “Protozoans as the biomonitors of the Baltic Sea”. After Elmira has caried out international projects in collaboration with the Baltic Sea countries and Latvian Scientific Council projects. She is the ILTER (international long term ecological research) network marine site manager.

E. Boikova
University of Latvia, Latvia

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POLICY RECOMMENDATIONS FOR ACCELERATING AND MAINSTREAMING A CIRCULAR RURAL BIOECONOMY IN THE EU

Dimitris Michas, Bas Paris, Athanasios Balafoutis and Ioannis Thermos
Institute for Bio-Economy and Agri-Technology (IBO), Greece

Abstract

This paper provides policy recommendations and policy briefs for accelerating the transition towards a circular rural bioeconomy within the EU. The development of an integrated circular bioeconomy in the EU is crucial to achieving the medium- and long-term sustainability targets laid out in EU policy. The prepared policy recommendations originate out of the key outputs and findings of the Horizon Europe project "BioRural" including: a review of the current status of the EU bioeconomy, survey results from over 400 bioeconomy stakeholders on the drivers and barriers to the adoption of biobased solutions, grassroots stakeholder opinions from 42 workshops organised in 14 countries across the EU, expert opinions from key stakeholders and existing circular businesses. The policy recommendations are synthesized and presented in the form of 15 policy briefs split into three main categories: general recommendations that are applicable to the EU Bioeconomy Strategy and the overall concept of the bioeconomy; horizontal recommendations that apply across the entire bioeconomy, cutting across multiple sectors; and specific recommendations tailored to particular bioeconomy sectors or themes, such as food and agriculture, forestry, aquatic resources, bioenergy, and biomaterials as well as recommendations that are mainly related to specific parts of biobased value chains.

Biography

Dimitris Michas is a researcher at CERTH-IBO. He studied in Faculty of Agriculture of the department of Faculty of Agriculture, Forestry and Natural Resources in Aristotle University of Thessaloniki, and he has a master in the Department of Natural Resources and Agricultural Engineering of the Agricultural University of Athens. His research interests focus on the following: a) Bioeconomy in the Rural Sector, b) Circular economy in the Rural sector, c) Biomass estimation and precision agriculture. He has worked for CERTH-IBO since December 2022. Also, he has a publication, "A Review of the Current Practices of Bioeconomy Education and Training in the EU" on 2022 and he is a member of the Geotechnical Chamber of Greece (GEOTEE).

Dimitris Michas
Institute for Bio-Economy and Agri-Technology (IBO), Greece

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NEW ECOSYSTEMS, NEW SOLUTIONS: SUSTAINABLE MANAGEMENT AND UTILIZATION OF INVASIVE PLANTS

Danijela Poljuha
Institute of Agriculture and Tourism, Croatia

Abstract

Invasive alien plant species present a dual challenge and opportunity: while they contribute to ecological and economic harm, they also offer significant potential as sources of bioactive phytochemicals. Climate change has further accelerated the spread of these species, raising pressing questions about their role in emerging ecosystems. The research project "Nature as an ALLY: Alien Invasive Plants as Phytopharmaceuticals – NATURALLY" (IP-2020-02-6899), funded by the Croatian Science Foundation, seeks to answer these questions, by exploring how invasive plant species can serve as providers of new ecosystem services. This presentation will provide insights into the phytochemical potential of four invasive species—Ailanthus altissima (Mill.) Swingle, Robinia pseudoacacia L., Helianthus tuberosus L., and Solidago canadensis L.—in the Istria region (Croatia). LC-MS phytochemical screening and biological activity testing of leaf and flower extracts revealed that all tested species are rich in bioactive phenolic compounds, with 116 specialized metabolites detected. The extracts exhibited antioxidant effects in vitro, assessed using standard ABTS, DPPH, and FRAP tests. Cytotoxic and genotoxic effects were evaluated using the MTT and Comet test, showing no adverse effects on human liver cells at concentrations below 1 mg/mL. At 1 mg/mL, the extracts demonstrated antitumor properties, as evidenced by their effect on glutathione S-transferase (GST) activity in HEPG2 cells and culture media. Future research will focus on further exploring the pharmaceutical potential of these species, assessing their viability as sources of novel drugs or therapeutic preparations. By presenting these results, we aim to raise awareness of the importance of invasive species management, thereby contributing to the broader understanding of the significance of global climate change's impact and highlighting the need to enhance resilience and adaptability in response to these consequences. By exploring the complex interplay between ecological disruption and bioprospecting, this research offers a new perspective on managing invasive species in a changing world.

Biography

Danijela Poljuha graduated from molecular biology at the Faculty of Science, University of Zagreb, Croatia, where she also holds a PhD degree in natural sciences in the field of biology. She has worked as a researcher at the Faculty of Science, University of Zagreb, The Institute of Agriculture and Tourism Poreč, and The Materials Research Centre METRIS Pula. She has participated in numerous national and international projects and has published over 50 scientific papers. She is the founder of two laboratories and a Biotechnical Department. Her research interests are focused on invasive plants' phytochemistry, plant genetics, and molecular markers' application in the conservation of plant genetic resources. She is also involved with the popularization of science.

Danijela Poljuha
Institute of Agriculture and Tourism, Croatia

SPEAKERS

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PEG-TRIGGERED OSMOTIC STRESS GENERATES LARGE-SCALE TRANSCRIPTIONAL AND EPIGENETIC RESPONSES IN RAPESEED (*BRASSICA NAPUS* L.)

László Szabados[1], Melvin Prasad[1], Prateek Shetty[1], Avik Kumar Pal[2], Gábor Rigó[1], Kamal Kant[1], Laura Zsigmond[1], István Nagy[3] and P. V. Shivaprasad[2]

[1]*Institute of Plant biology, Hungary*
[2]*National Centre for Biological Sciences (NCBS-TIFR), India*
[3]*Seqomics Kft, Mórahalom, Hungary*

Abstract

Drought hinders growth, development, and productivity of higher plants. While physiological and molecular background of plant responses to drought have been extensively studied, the role of epigenetic modifications in response to dehydration remains largely unknown. In this study, we deciphered genome-wide transcriptomic and epigenetic responses of rapeseed (*Brassica napus* L.) to dehydration. High-throughput transcript profiling (RNA-seq) and chromatin immunoprecipitation followed by sequencing (ChIP-seq) of PEG-treated rapeseed plants revealed genome-scale changes in transcription and histone methylation patterns, focusing on histone H3 lysine 4 trimethylation (H3K4me3) and histone H3 tri-methylated lysine 27 (H3K27me3). We have identified large gene sets with altered transcript profiles and changed histone methylation marks in response to osmotic stress, revealed a close correlation between gain or loss of histone methylation and activation or repression of gene expression. Significant epigenetic regulation of Delta 1-Pyrroline-5-Carboxylate Synthetase (P5CS) genes, which control the key step in proline synthesis, was discovered as several PEG-induced *Bn*P5CSA genes displayed enhanced H3K4me3 and/or H3K36me3 marks. Targeted bisulphite sequencing revealed that one *Bn*P5CSA gene has stress-dependent gene body DNA methylation also. By integrating physiological, transcriptional and epigenetic data, our study facilitates better understanding drought response control in higher plants.

Biography

László Szabados is group leader in the Institute of Plant Biology of the Biological Research Centre of the HUN-REN network in Hungary. Having educated in Hungary, Dr. Szabados was postdoctoral scientist in International Centre for Tropical Agriculture (CIAT), Cali, Colombia and in the Max-Planck Institute für Züchtungsforschung, Cologne, Germany. Since 1990 he is senior scientist in the BRC, Szeged, Hungary, where he directs a successful research unit. His main interest is the regulation of responses of higher plants to environmental stresses such as salinity, osmotic and oxidative stresses. His contribution to understanding the regulation and function of proline metabolism in adverse conditions is widely recognized.

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WINTER CAMELINA SEEDS: A PROMISING RAW MATERIAL FOR ERUCIC ACID-FREE OIL PRODUCTION

Katarzyna Rzyska-Szczupak, Danuta Kurasiak-Popowska, Małgorzata Graczyk and Kinga Stuper-Szablewska
Poznań University of Life Sciences, Poland

Abstract

Background/Objectives: Camelina (*Camelina sativa* L. Crantz) is an oilseed crop gaining attention for its high adaptability, short growing season, and oil rich in polyunsaturated fatty acids. Historically, it has been used as a source of oil for food, biofuels, and industrial applications. In recent years, interest in camelina oil has increased due to its favorable fatty acid profile, which includes omega-3 fatty acids and tocopherols that enhance oxidative stability. However, the presence of erucic acid, a long-chain monounsaturated fatty acid, is undesirable in edible oils due to its potential negative effects on human health, including concerns about cardiac toxicity and lipid metabolism disruption.

Previous studies on camelina have shown significant variation in erucic acid content across different genotypes, with some spring varieties exhibiting higher levels. However, limited data exist on winter camelina genotypes and their potential as a source of low-erucic acid oil. Identifying genotypes with minimal erucic acid content is crucial for developing varieties suitable for human consumption and industrial use.

Methods: A field experiment was conducted in Poland between 2016 and 2018 to analyze the erucic acid content in different camelina genotypes. The study included 65 spring and 9 winter genotypes of camelina. To determine erucic acid content, two chromatographic techniques were used: ultra-performance liquid chromatography with diode-array detection (UPLC-DAD) and gas chromatography-mass spectrometry (GC-MS). These methods ensured accuracy and comparability of results.

Results: The analysis showed a clear difference in erucic acid content between the studied genotypes. The average percentage of erucic acid in the spring genotypes was 3.432%, whereas in the winter genotypes, it was significantly lower, averaging only 0.1%. Both chromatographic methods provided consistent results, confirming the reliability of the findings.

Conclusions: This three-year study indicates that selected winter camelina genotypes can serve as a valuable source of erucic acid-free oil. The significantly lower erucic acid content in winter

Biography

Katarzyna Rzyska-Szczupak, MSc Eng. (ORCID: 0009-0004-5960-069X), graduated in 2021 from the Faculty of Chemical Technology at Poznań University of Technology. She is a chemical and environmental protection technologist. Since 2022, she has been a PhD candidate at the Department of Chemistry, Faculty of Forestry and Wood Technology at Poznań University of Life Sciences. Her research focuses on plant-based insecticides and their potential application in pest control. She is particularly interested in bioactive compounds derived from plants and their role in sustainable plant protection strategies.

genotypes compared to spring genotypes highlights their potential for human consumption and industrial applications. These findings support the cultivation and breeding of winter camelina as a sustainable and healthier alternative for oil production.

CARINA - CARinata and CamelINA to boost the sustainable diversification in EU farming systems. This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement No. 101081839.

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QUALITY OF SUNFLOWER HYBRID'S SEEDS GROWN IN LATVIAN CONDITIONS

Vita Sterna, Sanita Zute, Margita Damskalne and Inga Jansone
Institute of Agroresources and Economics, Latvia

Abstract

Sunflower (*Helianthus annuus* L.) is one of the main oil-producing plants in the world. Cultivation of this species allows obtaining the largest amount of oil per unit area. Sunflower oil production corresponds to 12% of the world's vegetable oil production. The major sunflower – growing countries are Russia and Ukraine, together they produced more than 53% of the world's sunflower oil. In the context of climate change, thinking about reducing GHG emission, we start to grow sunflowers in Latvia, including them both as a valuable component in seed mixtures for catch crops and growing them in pure form.

The aim of the study is to gain knowledge about the possibilities of growing and quality of sunflower hybrids seeds in Latvian conditions.

During the feasibility study, a hypothesis was put forward that genotypes with short vegetation period (about 80days of vegetation) should be selected first. It is also desirable to choose sunflower hybrids hybryds with an increased oleic acid content in the oil (up to 70%). Important physical indicators are grain density and 1000-seed weight. The thousand seed weight for all evaluated varieties was significantly higher, if plants are grown at a distance of 30cm from each other. Comparing all six sunflower varieties, the MC variety had the coarsest seeds (98,7g), a relatively high it was also recorded for the MY and MX hybrid varieties – 66.4 and 61.1g, respectively. In this study, the protein content in conventionally grown sunflower seed samples was determined to be between 13.7% and 22.02%, which was wider range compared to 2023, when these indicators ranged from 16.7% to 21.1%. In the 2023, the oil content in the samples was determined to be 40 – 48%, with the highest oil content in the seeds of the MS variety, while the MC variety also had the lowest oil content last year - 28.7%. The vitamin E content was determined to be 33.1 – 52.4mg/100g, which averages 41.0mg/100g – lower than last year's average of 42.4mg/100g. It was concluded that sunflower seeds grown in Latvia contain vitamin E in line with other studies (35-70mg/100g) and less saturated fatty acids 9.8-10.8%) compared to literature data (15%).

Biography

Vita Sterna in 2005 has completed her PhD from Latvia University of Agriculture, the faculty of Food technology. She was performer of projects of Research institute of Biotechnology and Veterinary medicine "Sigra" of Latvia University of Agriculture 2005-2013. She is the leading researcher of Institute of Agroresources and Economy, department of Crop science since 2013. She has published more than 40 papers in reputed journals, including 26 of them incorporated in the Scopus or *Web of science* data bases and she has been serving as an editorial board member of repute. 2013 to date Expert of Latvia Council of Science – Food science – milk, meat, eggs, grain composition and technological processes.

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UNLOCKING THE BIOTECHNOLOGICAL POTENTIAL OF BACTERIAL TOXIN-ANTITOXIN MODULES IN PLANTS

Carmen Simon-Mateo[1], Xiaofei Cheng[2], Juan Antonio García[1] and Bernardo Rodamilans[1]

[1]*Centro Nacional de Biotecnología, Spain*
[2]*Northeast Agricultural University, China*

Abstract

Bacteria encode hundreds of toxin-antitoxin (TA) modules that play critical roles in various cellular processes, particularly under stress conditions. These systems are typically organized as two-component operons, where both components are expressed sequentially. The antitoxin neutralizes the toxin by direct protein-protein interaction, forming a harmless complex. However, when the antitoxin is not expressed, the free toxin induces cell death, a feature that has been harnessed for diverse biotechnological applications, such as DNA cloning, phage resistance, drug development, and tools for anticancer and antiviral therapies. Despite their wide potential, their application in plants has been relatively limited. In this work, we investigate two previously tested TA modules in plants—MazEF from *Escherichia coli* and YefM-YoeB from *Streptococcus pneumoniae*—and identify intriguing differences likely associated with their mechanisms of action. We engineer these systems into molecular switches that are activated upon expression of a viral protease, leading to a necrotic phenotype in the affected cells. Finally, we explore their antiviral potential using the Plum pox virus as a proof of concept.

Biography

Carmen Simon-Mateo studied Biology at the Autonomous University of Madrid and specialized in Biochemistry and Molecular Biology. Her PhD on animal viruses at the Severo Ochoa Center for Molecular Biology (CSIC) received the UAM Extraordinary Award. She continued her postdoctoral training at the Flanders Institute for Biotechnology (Ghent, Belgium) and has conducted research stays at Mount Sinai Hospital (New York, USA) and the University of Cambridge (UK). She is Assistant Professor at the National Center for Biotechnology (CSIC), where she leads the research group "Plant-Pathogen Interaction in Viral Infections" since 2003. and Specialization Department at CSIC (2018-2024) and she has been founder and President of the association "Apadrina la Ciencia" since 2014.

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SINGULAR AND INTERACTIVE EFFECT OF 6-BENZYLAMINOPURINE (BAP) ON SWEET POTATO *IN VITRO* MICROPROPAGATION

Gideon Adu Donyina[1], Vincent Agyemang Opoku[2], Adrienn Szarvas[1], Szilárd Czóbel[1] and Tamás Monostori[1]

[1]*University of Szeged, Hungary*
[2]*University of Cape Coast, Ghana*

Abstract

Sweet potato (*Ipomoea batatas*) remains a significant root tuber, owing to its economic and health benefits. However, poor planting materials are a significant factor that hinders the economic productivity of the crop globally. In vitro micropropagation remains a cheaper and highly effective technique for rapidly producing healthy propagules in a relatively short time. However, the efficiency of micropropagation is contingent on various factors of which plant growth regulators are prominent. In this study, nodal segments from regenerated shoots of three different sweet potato genotypes (Asothalmi 12, Purple, and Bayou) were cultured on Murashige and Skoog (MS) media supplemented with four different concentrations of 6-benzylaminopurine (BAP) (0 mg/l, 1 mg/l, 2 mg/l, and 4 mg/l) under in vitro micropropagation technique. Data on morphological parameters were recorded 28 days after culturing. The results revealed a significant ($p < 0.001$) variation in morphological parameters among sweet potato genotypes in response to BAP treatment. Optimum plant regeneration was recorded from plants grown on MS medium supplemented with 1 mg/l BAP. The findings of this research could contribute to the development of innovative techniques for enhanced sweet potato micropropagation.

Biography

Gideon Adu Donyina is currently a PhD student at the Doctoral School of Environmental Sciences, University of Szeged, Hungary. His research focuses on sweet potato micropropagation and ecophysiology. He is also an Assistant Lecturer at the Faculty of Agriculture, belonging to the same University. Outside the academic environment, he performs his ministerial duties as the National Pastor of the Deeper Life Bible Church, in Hungary.

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PIONEER PLANTS AND PIONEER SCIENTISTS: RESILIENCE IN THE ENVIRONMENTAL CHANGES

Francesca Marinangeli[1] and Mauro Roberto Cagiotti[2]
[1]*Council for Agricultural Research and Economy Analysis, Italy*
[2]*University of Perugia, Italy*

Abstract

Background: Natural environmental changes have given plants and humans the ability to adapt and evolve since the beginning of life on Earth. In certain extreme conditions, plants are the mainly inhabitants.

Methods: Through the review of the scientific bibliography and the opinion of experts in geobotany, it was highlighted how various factors can determine the resilience of plants to environmental changes. Several limiting factors were considered. The limiting factors that emerged are air temperature, water, salinity, light, soil structure and nutrients, pollutants, CO2 concentration. In the context of the ontogenetic cycles of the species, investigations were carried out at an autoecological and synecological level, through survey methods such as floristic views, auto and synecological surveys and permanent squares. The works are the overview synthesis of a large period of investigation of 30 years (1995-2025) in various natural, semi-natural and anthropic environments of Central-Southern Italy.

Results: From the various researches carried out, some emblematic plants have emerged and been highlighted for their tolerance to the considered limiting factors, particularly plastic at population level, and therefore also adaptable to future variations. The tolerance ranges for plants can define the characteristics shared by pioneer plants capable of resisting the most extreme soil-climatic conditions: they are resilient plants. Since the ability to adapt can be considered synonymous with intelligence, it can be said that resilient plants are the smartest. The families of plants with different genera pioneering in opposite environments (e.g. *Robinia pseudoacacia, Leontopodium nivale subsp. alpinum* or *Launaea bellidifolia*), such families have a particular capacity for coevolution, knowing how to adapt plastically to environmental extremes. The impacts that plants and humans determine on the other inhabitants of the planet have also been considered as an important evaluation factor. Resilient plants determine the possibility of continuity of life on earth and contribute fundamentally to making the world livable for humans.

Biography

Francesca Marinangeli graduated in 1998 with 110/110 cum laude in Agricultural Sciences at the University of Perugia, PhD in Applied Botany. She lives in Italy; she is married and mother of three sons. Professional agronomist for 16 years. Since 2015, she has been hired as Researcher at the Council for Agricultural Research and Analysis of Agricultural Economics, Policy and Bioeconomy Research Center. Expert on nature restoration ecology, pastures, allergenic plants, geobotany. She participates in working group for Forest Therapy, Invasive plants, Organic Agriculture. She won many regional, national and international awards in educational and nature photography. Writer of over 160 scientific publications.

Conclusions: Probably, we will find that plants are better and more efficient than humans. Nevertheless, some pioneering scientists, explorers of unknown environments, have played an important role in discovering and classifying plants: increasing research in the fields of adaptation, climate change mitigation and nature restoration becomes increasingly important in the face of future challenges that await us.

POSTERS

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April 14-15, 2025 | Rome, Italy

POSSIBILITIES OF GROWING SUNFLOWERS IN THE PRACTICE OF ORGANIC FARMING IN LATVIA

Inga Jansone, Sanita Zute, Vita Sterna and Antra Millere
Institute of Agricultural Resources and Economics, Latvia

Abstract

The range of agricultural crops grown on farms can be supplemented with new species of field crops, which have been considered economically unprofitable until now, but currently the start of their cultivation is motivated by the observed climate changes in the Baltic region. Farmers are ready to accept challenges and to include in the crop rotation also such field plant species, which until now have been considered unsuitable for the conditions of the region, such as soybeans, sunflowers, etc. In 2023, the first studies with sunflower hybrids from Ukraine and France were started at the AREI Stende Research Center. The obtained data show that the practice of organic farming allows obtaining a sunflower yield of 0.8 to 3.2 t ha-1. In Latvian conditions, the challenge is to find the optimal sowing time, because the meteorological conditions in spring can be very variable. This can significantly affect sunflower germination in the field. The spread of diseases, especially in the pre-harvest period, is of great importance in the preservation of the seed crop. The wet and cool climate provokes the development of various diseases, especially white rot (Sclerotinia sclerotiorum). Therefore, it is very important to select early, disease-resistant genotypes so that sunflowers can be harvested on time.

Biography

Inga Jansone, leading researcher, project manager in the Department of Plant Breeding and Agroecology, more than 15 years of experience in field crop cultivation in organic farming system, research on the quality of the harvest for processing and the effectiveness of field crop cultivation technologies, adaptation of new crop species in Latvian farms, interaction of productivity, environment and technology

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

CYTISUS SCOPARIUS (L.) LINK: A PROMISING SOURCE OF VALUABLE COMPOUNDS

Bianca Albuquerque[1], Virginie Xavier[1], Tiane C. Finimundy[1], Tânia C.S. P. Pires[1], Filipa Mandim[1], Irene Mediavilla[2], Luis Saúl Esteban[2], Werner Gerwin[3], Steffi Schillem[3], Sandrina A. Heleno[1,2] and Lillian Barros[1]

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[2]*CEDER-CIEMAT, Spain*
[3]*Research Center Landscape Development and Mining Landscapes, Germany*

Abstract

Cytisus scoparius is a Mediterranean shrub with a high proliferation across diverse ecosystems, being found within six continents and classified as an invasive species. Due to its ability to adapt to challenging conditions and its role as a nitrogen fixer, capable of altering soil chemical composition, it has been suggested as a candidate for cultivation on marginal lands.

Traditionally, *C. scoparius* has been used for its medicinal properties, including as a sedative, hypnotic, anti-diabetic, and diuretic. As part of the BeonNat project, which aims to create a value chain for underutilized plants with potential for cultivation on marginal lands, this study focused on analyzing the chemical composition of *C. scoparius* collected in Bluno, Germany, with a particular emphasis on phenolic compounds. The phenolic composition of *C. scoparius* extracts obtained by three extraction methodologies, namely maceration (ME), microwave-assisted extraction (MAE), and ultrasound-assisted extraction (UAE), were analyzed by HPLC-DAD-ESI/MS. Additionally, the bioactive potential of the extracts was evaluated through cell-based antioxidant assays (i.e., cellular antioxidant activity (CAA) and thiobarbituric acid reactive substances (TBARS)) and antimicrobial assays, including antibacterial and antifungal activity determined using the microdilution method.

Regarding phenolic extraction, MAE proved to be the most effective methodology, yielding the highest extraction efficiency (7–10%) and phenolic concentration (38.7–42.6 mg/g extract). The phenolic profile revealed 22 identified compounds, with emodin-*O*- glucoside, 7-*O*-methylgenistein, and chrysoeriol-C-hexoside being the most abundant.

The extracts obtained through UAE demonstrated the highest potential to neutralize reactive oxygen species (8–55%) via the CAA assay. Conversely, the extract obtained by MAE was the one that exhibited the highest capacity to inhibit lipid peroxidation

Biography

Bianca Albuquerque holds a PhD in Pharmaceutical Sciences and is a research associate at CIMO and SUSTEC at the Instituto Politécnico de Bragança. Her work focuses on the obtaining of natural bioactive compounds derived from natural sources, such as plants and fruit bioresidues, with potential applications in pharmaceuticals, cosmetics, and other industries. Currently, she is a postdoctoral research fellow in the BeonNat project, an initiative that aims to explore tree and plant-based bioresources to develop innovative bioproducts. By utilizing underexploited biomass, BeonNat contributes to the advancement of a circular bioeconomy, promoting sustainability and innovation in bioproduct development.

(EC_{50} =34.5 µg/mL) in the TBARS assay. Regarding antibacterial activity, extracts inhibited the growth of eight foodborne and eight clinical bacterial strains. Notably, extracts from MAE and ME showed significant activity against *Staphylococcus aureus* (Minimum Inhibitory Concentration [MIC] = 1.25 mg/mL), while extracts from UAE demonstrated strong antibacterial activity against *Enterococcus faecalis* (MIC = 2.5 mg/mL). Regarding the antifungal activity, UAE extracts exhibited the highest efficacy against *Aspergillus brasiliensis* and *Aspergillus fumigatus*, with a MIC value of 5 mg/mL for both fungi. The results of this study indicated that *C. scoparius* can be an interesting source of bioactive compounds. However, the extraction method employed may significantly influence the phenolic profile of its extracts, as well as their bioactivities.

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April 14-15, 2025 | Rome, Italy

STABLE ISOTOPE RATIO ANALYSIS FOR ASSESSING THE AUTHENTICITY OF TABLE OLIVES PRODUCED IN POLIGIROS AREA IN GREECE

Anastasios Zotos, Eleni C. Mazarakioti, Anna-Akrivi Thomatou, Efthymios Kokkotos, Elena Adam, Angelos Patakas and Athanasios Ladavos
University of Patras, Greece

Abstract

Olive products and particularly table olives, are highly valued for their nutritional and economic significance, playing a crucial role in the economy of the Mediterranean countries. The verification of the geographical origin of olives is necessary to ensure product authenticity, as regional environmental factors influence their composition, quality, and traceability. '*Chalkidiki*' is a domestic table olive variety which is cultivated mainly in the area of Poligiros (40°22′N, 23°26′E) located in the peninsula of Chalkidiki, Greece, with unique quality characteristics related to the soil-climatic 'context' of the region. These high-quality characteristics and reputation of the produced olives in the above-mentioned area make them vulnerable to adulteration and mislabeling. Thus, the implementation of methods capable to determine the geographical origin of these olives is a critical issue that significantly affects the competitiveness of olive production in this area. Stable isotope analysis which leads to the determination of the "*isotopic fingerprint*" is a widely used method for the discrimination of agricultural products. In that frame, the aim of this study was to evaluate the characteristic isotopic footprint of Chalkidiki olives (*Olea europaea* L., cv. *Chalkidiki*), which can be used for origin verification. Olive samples were collected from different fields in the Poligiros area during the cultivation period of 2023 and 2024. A detailed sampling methodology based on soil and microclimatic parameters was implemented to ensure the representativeness of the samples collected. Isotope Ratio Mass Spectrometry (IRMS) was used to measure the stable isotope ratios of carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and sulfur ($\delta^{34}S$) respectively, while proper chemometric techniques were used to analyze and interpret datasets. The results indicate that isotope ratios of N and S could not be accurately determined due to the very low concentration of these elements in olives. On the other hand, the mean value of the isotopic ratio of C was $\delta^{13}C_{V\text{-}PDB}$ = −29.93‰ which is significantly different from the corresponding value of another table olive variety (*Olea europaea* L., cv. *kalamon*) also cultivated in Greece ($\delta^{13}C_{V\text{-}PDB}$ = −28,37‰). These findings provide evidence that IRMS methodology could be effectively used for discriminating table olive varieties based on their isotopic composition.

Biography

Anastasios Zotos is an Assistant Professor at the Department of Sustainable Agriculture, University of Patras, with great experience in wetland vegetation and the productivity of agricultural ecosystems under abiotic stress conditions. In recent years, his research interest has also focused on the development of methodologies for the determination of the geographical origin of agricultural products using isotopic and multielement fingerprinting techniques. He has published a significant number of scientific papers in international peer-reviewed journals and conference proceedings and he has also participated in a significant number of national and international research programs.

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April 14-15, 2025 | Rome, Italy

DNA DAMAGE AND REPAIR IN THE BACKGROUND OF EDAPHIC ADAPTATION IN WILD WHEAT

Raskina Olga
University of Haifa, Israel

Abstract

Present-day wild wheat *Triticum dicoccoides* Körn. (*Poaceae*, Triticeae) has evolved in the Near East Fertile Crescent across multiple geographic ranges and ecological habitats, resulting in broad physical and biotic heterogeneity of natural populations and high adaptive genetic diversity. The impact of edaphic factors on DNA damage and repair in plants from two adjacent geologically and edaphically contrasting microsites, with humid basalt and dry terra rossa soil types, in the Tabigha population (Upper Galilee, Israel) was investigated. The results showed that, in plants of the water-deficient Terra Rossa microsite, the amount of DNA double-strand breaks (DSBs) in interphase nuclei increases significantly, and the expression of genes that play a key role in the DNA Damage Response (DDR), Non-Homologous End Joining (NHEJ), and Mismatch Repair (MMR) pathways is lower compared with that in plants of the humid Basalt microsite. The mean contribution of Homologous Recombination (HR) to DSB repair in both microsites seems to be similar; however, the average values mask genotype-dependent differences in the level of gene expression. Immunodetection of γH2AX (DSBs), RAD51 (HR pathway), and LigIV (NHEJ pathway) on condensed chromosomes indicates that both DSB repair pathways, HR and NHEJ, operate during the M-phase; nevertheless, a significant quantity of DSBs remain unresolved in late mitosis. Furthermore, γH2AX-associated RNA polymerase II (RNAPII) and S9.6 foci are revealed on condensed chromosomes, suggesting post-interphase R-loop formation that is a potential source of chromosome aberrations, posing a threat to genome stability. Taken together, these results demonstrate the influence of edaphic factors on DNA damage and repair processes in the wheat genome adapted to contrasting environments. *Reference*: Raskina et al. 2023. The Influence of Edaphic Factors on DNA Damage and Repair in Wild Wheat *Triticum dicoccoides* Körn. (*Poaceae*, Triticeae) https://doi.org/10.3390/ijms24076847.

Biography

Raskina Olga is a Senior Scientist, Laboratory of Plant Molecular Cytogenetics, Department of Evolutionary and Environmental Biology, Institute of Evolution, University of Haifa, Israel

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

APPLICATION OF STABLE ISOTOPE ANALYSIS ON VERIFICATION OF CENTRAL MACEDONIAN RICE AUTHENTICITY

Angelos Patakas, Anna-Akrivi Thomatou, Eleni C. Mazarakioti, Efthymios Kokkotos, Elena Adam, Anastasios Zotos and Athanasios Ladavos
University of Patras, Greece

Abstract

Rice (*Oryza sativa* L.) plays a crucial role in the diet of the global population, with its nutritional value making it essential in diverse dietary patterns. The geographical origin of rice is an essential factor affecting its quality, taste and authenticity. Environmental parameters such as soil composition, climate, and water availability contribute to the prevalence of unique quality characteristics related to the cultivation region of the product. Nowadays, adulteration of high-value agricultural products such as rice is a critical issue worldwide for consumers and industries. Identifying geographical origin can be useful for preventing food fraud and increasing supply chain assurance. In this frame, isotope ratio mass spectrometry (IRMS) methodology is increasingly used worldwide for food origin verification. Thus, the aim of this study was, is the determination of the characteristic '*isotopic fingerprint*' of rice cultivated in the areas of Xalastra (40°37′N, 22°44′E) and N. Malgara (40°36′N, 22°40′E) Central Macedonia, Greece, using IRMS methodology. Experimental design includes sample collection from different fields of the above-mentioned areas during the cultivation periods of 2023 and 2024. A detailed sampling methodology based on soil and microclimatic parameters was implemented to ensure the representativeness of the samples. Thereafter, stable isotope ratios of C, N, and S were measured using Isotope Ratio Mass Spectrometry (IRMS), and the results obtained were analyzed using chemometric techniques. According to the results, the mean values of stable isotope ratio for rice cultivated in the study area were $\delta^{15}N_{AIR}$ = 5.91‰, $\delta^{13}C_{V\text{-}PDB}$ = −27.95‰, and $\delta^{34}S_{V\text{-}CDT}$ = 4.04‰ for N, C and S respectively, which constitutes the characteristic "*isotopic fingerprint*" for the rice cultivated in Central Macedonia area.

Biography

A. Patakas has a long-time research experience in plant physiology and especially in precision agriculture. The recent years his research activity has also orientated to the implementation and assessment of different methodologies capable of geographical origin verification of agricultural products. The specific interest in the above-mentioned work fields resulted in the participation in many EU and nationally funded research projects and the publication of a great number of research papers.

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

IMPACT OF WATER AVAILABILITY ON THE HYSTERESIS BETWEEN SAP FLOW AND VPD IN GRAPEVINES (*VITIS VINIFERA* L.)

Efthymios Kokkotos, Anastasios Zotos and Angelos Patakas
University of Patras, Greece

Abstract

Sap flow methods are widely used to estimate transpiration and water use in vineyards, providing critical insights into plant water relations under varying environmental conditions. In this study, sap flow measurements were conducted on the grapevine variety 'Thompson Seedless' (Vitis vinifera L. cv. Thomson Seedless) over two consecutive years, 2023 and 2024, to assess the effects of different water availability on plant water dynamics. In 2023, the grapevines were grown under rainfed conditions, whereas in 2024, they were subjected to constant irrigation. Sap flow was measured using heat-based sensors (heat ratio method), and microclimatic variables, including air temperature, relative humidity, and vapor pressure deficit (VPD), were recorded concurrently from a meteorological station installed in the experimental vineyard. The relationship between sap flow and VPD was analysed to quantify the degree of hysteresis, which describes the temporal lag and variation in transpirational fluxes in relation to atmospheric demand. A comparison between years revealed that the hysteresis loop area was significantly larger in 2023 than in 2024, indicating stronger stomatal regulation under rainfed conditions. In 2023, the hysteresis loop size showed a significant positive correlation with maximum daily VPD and solar radiation suggesting that these environmental factors played a key role in modulating sap flow dynamics. However, in 2024, when irrigation was applied, most correlations between hysteresis loop size and microclimatic variables were weaker or non-significant. In particular, loop size was positively correlated with maximum daily VPD and 24-hour average VPD, implying that under well-watered conditions, VPD remained a dominant driver of sap flow hysteresis. These findings indicate that irrigation alters the temporal response of sap flow to atmospheric demand due to absence of water stress which differentiates stomatal control. Moreover, the size of the hysteresis loop in grapevines appears to be influenced by atmospheric dryness and water availability. These results provide new insights into grapevine water relations and contribute to the development of optimized irrigation strategies for viticulture, particularly in water-limited regions, improving water use efficiency and sustaining productivity under variable climatic conditions.

Biography

Efthymios Kokkotos, Ph.D., is a postdoctoral researcher at the Laboratory of Plant Production, University of Patras, Greece, specializing in ecophysiology and plant water relations. His research focuses on advancing precision agriculture through innovative methodologies to assess hydrodynamic and ecophysiological processes in key perennial crops, including olives, grapes, and peaches. Dr. Kokkotos has contributed to multiple research projects aimed at optimizing water use efficiency and sustainability in agriculture. He has published nine peer-reviewed articles in international journals and has delivered oral presentations at 14 National and International conferences.

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

UNRAVELING THE ROLE AND INTERACTIONS OF THE NF-Y TRANSCRIPTION FACTOR IN TOMATO PLANTS THROUGH GENOME EDITING AND YEAST TWO-HYBRID

Christina Emmanouilidou, Nestor Petrou, Nikoleta Tsigarida and Zoe Hilioti
Institute of Applied Biosciences (INAB), Greece

Abstract

The NF-Y transcription factor (TF) family plays a crucial role in regulating diverse developmental pathways in plants. In tomato (Solanum lycopersicum), this family is composed of several homologous genes corresponding to the NF-YA, NF-YB, and NF-YC subunits. This study investigates the function of the NF-YA8 subunit in tomato using a combined approach of genome editing and yeast two-hybrid (Y2H) screening. Disruption of the NF-YA8 gene using zinc finger nucleases (ZFNs) resulted in specific developmental phenotypes, underscoring its importance in embryogenesis and morphogenesis. Furthermore, Y2H assays were employed to identify interacting partners of NF-YA8, including the L1L4 (NF-YB subunit). These findings contribute to our understanding of the complex regulatory networks governing tomato development and highlight the crucial role of NF-YA8 in these processes. Potential interacting partners identified from tomato fruit and yeast cDNA libraries will be presented.

Biography

Christina Emmanouilidou is an Agriculturist with a degree from the School of Agriculture, Faculty of Agriculture, Forestry, and Natural Environment at Aristotle University of Thessaloniki, Greece. She holds a master's degree in Biology with specialization in Molecular Development and Gene Regulation from Wageningen University, the Netherlands. Since January 2024, she has been serving as a Special Technical Scientist at the Institute of Applied Biosciences (INAB) under the Centre for Research and Technology Hellas (CERTH). She has conducted research in various organisms, such as fish, the yeast Saccharomyces cerevisiae, the chikungunya virus, potato (Solanum tuberosum) and tomato (Solanum lycopersicum).

DAY - 2
Keynote

Joint Event on
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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

ADVANCING PLANT FINE ROOT RESEARCH: A SUB-SAMPLING APPROACH TO REDUCE PROCESSING TIME

Mattia Terzaghi, Maria Letizia Gargano, Cecilia Lasorella and Raimondo Pardi
University of Bari Aldo Moro, Italy

Abstract

Quantifying fine plant roots is a crucial step in various plant ecology and soil science studies, as it provides essential data on belowground plant dynamics. However, the extensive time required for this process often poses a significant obstacle to research efficiency, limiting the number of samples that can be processed and potentially delaying experimental outcomes. This study aims to assess and introduce an optimized method that reduces root collection time while preserving data accuracy and reliability relative to conventional techniques. The Sub-sample Approach (SA) involves extracting fine roots from a smaller sub-sample and using calculated estimations to determine total root traits—mass, length, and length distribution by diameter—within a soil core. To evaluate its efficiency, root processing times were compared between SA and the Conventional Approach (CA), which involves meticulous and labour-intensive root cleaning. Additionally, both methods were tested across diverse environments, including grasslands, oak forests, and biochar-treated olive orchards, ensuring that the findings are applicable to a wide range of ecological conditions. The CA demonstrated considerable variation in processing time, ranging from 2.6 to 27.6 hours per sample, depending on site characteristics and root density. In contrast, SA significantly reduced processing time, with a narrower range of 37 to 112 minutes per sample, making it a much more efficient alternative. Notably, root trait measurements obtained through SA closely matched those from CA, confirming the method's validity. Overall, SA presents a substantial advantage over CA by markedly decreasing the time required for root collection from soil core samples, which can ultimately enhance the feasibility of large-scale root studies. Additionally, it reduces variability in time-consuming processes across different study sites while maintaining both qualitative and quantitative data consistency, making it a valuable tool for researchers working with fine root systems.

Biography

Mattia Terzaghi is a researcher at the University of Bari Aldo Moro, where he teaches General Botany. His career began in 2008 with a PhD in Environmental Science at the University of Insubria, Varese, focusing on fine-root growth dynamics in natural and managed forests. After his PhD, he held several postdoctoral positions at Insubria, studying root systems in trees and crops, as well as seed germination and root anatomy. In 2017, he collaborated with the USFS Rocky Mountain Research Station in Moscow, Idaho, on tree root architecture. In 2019, he moved to the University of Salerno to study biochar in olive groves. In 2022, he joined the University of Bari, where his research now focuses on plant root responses to biochar-amended substrates and root communication, both intra- and interspecific.

Mattia Terzaghi
University of Bari Aldo Moro, Italy

DAY - 2
Oral

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April 14-15, 2025 | Rome, Italy

ENDOPHYTIC FUNGI: FROM ISOLATION TO CULTIVATION CASE STUDIES ON THEIR EFFECTS ON THE DEVELOPMENT OF ARABIDOPSIS AND TOMATO PLANTS

Francesco Dovana[1] and Marco Mucciarelli[2]
[1]*University of Bari Aldo Moro, Italy*
[2]*University of Torino, Italy*

Abstract

Background: Endophytic fungi are microorganisms that live within the tissues of plants without causing any apparent disease. These fungi play a crucial role in promoting plant health and resilience, as they improve nutrient uptake, promote growth, and offer protection against pathogens and herbivores. Their ability to produce a great variety of bioactive compounds, such as alkaloids and terpenoids, contributes to their host plants' medicinal properties or can influence their organoleptic characteristics. Research has demonstrated that these relationships often lead to increased resistance to biotic and abiotic stresses. Furthermore, studies on the biodiversity of endophytic fungi have highlighted their potential applications in agriculture. For instance, some endophytic species have shown antifungal properties that can be used for plant protection.

Objectives: The objective of the studies conducted is to evaluate the impact of endophytic fungi on plant growth, specifically examining alterations in biomass accumulation and root system development.

Methods: The isolation of endophytic fungi was achieved through the sterilization of plant surfaces, followed by the culture of various isolates under laboratory conditions. Subsequently, the fungi were inoculated onto plants utilizing different techniques. In addition, extracts from several endophytic fungi were evaluated on tomato plants. Maximum likelihood phylogenetic analysis using ITS sequences was performed for the molecular identification of our four isolated specimens.

Results: The various endophytes tested were capable of influencing plant growth by either enhancing or reducing biomass development. Many fungi demonstrated the ability to modify root system development, both in terms of root length and the number of lateral roots.

Conclusions: The effects of individual endophytes can vary across different plant species. Research on endophytic fungi represents a

Biography

Francesco Dovana Currently, a researcher in systematic botany at the University of Bari, specifically at the Department of Biosciences, Biotechnology and Environment (DBBA). I hold a degree in Agricultural Sciences and subsequently obtained a PhD in Environmental Sciences, focusing on the study of interactions between endophytic fungi and plants. My research has concentrated on the study of endophytic fungi and the systematics of fungi. In my investigations I use both morphological and molecular approaches.

particularly promising field; however, challenges related to the identification of these fungi and the selection of inoculation techniques and cultivation methods are crucial phases in the experimental process.

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April 14-15, 2025 | Rome, Italy

ENHANCING BIOECONOMY EDUCATION IN RURAL AREAS: INSIGHTS FROM THE RELIEF ERASMUS+ PILOT TESTING

Dimitris Michas[1], Bas Paris[1], Athanasios Balafoutis[1], Ioannis Thermos[1] and Polina Kontodiakou[2]

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[2]*Olympic Training and Consulting, Greece*

Abstract

The RELIEF project, an EU-funded Erasmus+ initiative, aims to enhance knowledge and skills in bioeconomy for rural areas, targeting both Higher Education Institutions (HEIs) and Vocational Education and Training (VET). A key phase of the project involved pilot testing and evaluating across different partner countries, project developed innovative Learning Units (LUs) tailored to bioeconomy education. The pilot testing was conducted in four partner countries, involving students, educators, and farmers. Each country tested different Learning Units covering critical bioeconomy topics such as sustainable resource management, circular economy practices, and innovative agricultural techniques. The participants engaged in a mix of theoretical training, hands-on demonstrations, and digital learning resources, ensuring a comprehensive and practical learning experience. The testing phase also incorporated feedback loops where students and educators assessed the relevance, effectiveness, and applicability of the materials.

Following the pilot phase, four national reports were compiled, providing a detailed analysis of the results. The key findings from these reports highlight that the Learning Units were well-received, with students and educators finding them highly engaging and relevant. The pilot testing also facilitated stronger collaboration between educational institutions and bioeconomy stakeholders, reinforcing industry-education linkages. However, differences in learning needs across countries required localized adaptations to address specific policy, economic, and industry conditions. Some regions prioritized topics such as precision agriculture, while others emphasized bio-based product development. Additionally, the process helped identify areas for improvement, including the need for enhanced digital resources, more interactive content, and better alignment with existing HEI and VET curricula.

The insights gained from this process will be instrumental in finalizing the RELIEF educational framework, ensuring that the project delivers high-quality, adaptable, and impactful learning materials. The successful pilot phase demonstrates the growing need for bioeconomy-focused education and the potential of EU collaboration in bridging knowledge gaps in rural areas.

Biography

Dimitris Michas is a researcher at CERTH-IBO. He studied in Faculty of Agriculture of the department of Faculty of Agriculture, Forestry and Natural Resources in Aristotle University of Thessaloniki, and he has a master in the Department of Natural Resources and Agricultural Engineering of the Agricultural University of Athens. His research interests focus on the following: a) Bioeconomy in the Rural Sector, b) Circular economy in the Rural sector, c) Biomass estimation and precision agriculture. He has worked for CERTH-IBO since December 2022. Also, he has a publication, "A Review of the Current Practices of Bioeconomy Education and Training in the EU" on 2022 and he is a member of the Geotechnical Chamber of Greece (GEOTEE).

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

ASSESSMENT OF THE SORPTION CAPACITY OF LIGNOCELLULOSIC MATERIALS IN REMOVING BISPHENOL A FROM WATER SYSTEMS

Anna Przybylska-Balcerek[1], Przemysław Bartczak[2], Joanna Zembrzuska[2] and Kinga Stuper-Szablewska[1]

[1]Poznan University of Life Sciences, Poland
[2]Poznan University of Technology, Poland

Abstract

During this study, the first method of BPA adsorption using lignocellulosic adsorbents was developed. The aim of the study was to determine the sorption capacity of selected, previously untested lignocellulosic biomaterials in removing BPA from water (activated carbon, barley straw, camelina straw, oak sawdust and acorn stalks, flax and hemp dust). The effect of the contact time of the adsorbate with the adsorbent, the effect of the adsorbent mass and the effect of the pH of the system were examined. The model tests carried out showed that lignocellulosic adsorbents are excellent adsorbents of selected organic pollutants. The highest efficiency of the adsorption process was found in the case of oak sawdust, acorn stalks and camelina in all tested variants of the sorbent mass. In turn, oak sawdust and acorn stalks showed very high process efficiency regardless of pH. The paper proposes the use of waste raw materials as sorbents for BPA removal. Lignocellulosic waste materials are widely available and are produced in various industrial processes. Their use as sorbents has ecological and economic potential, as it enables waste management and at the same time removal of harmful substances from water.

Biography

Anna Przybylska-Balcerek, I am an assistant professor at the University of Life Sciences in Poznań (Poland), where I conduct research in the field of analytical chemistry. She defended her doctorate in 2021, specializing in the analysis of bioactive plant substances. My research focuses on developing and improving analytical methods for detecting and characterizing organic compounds present in various plant materials. I also participate in international research projects and cooperate with scientific institutions in the field of chemical analysis of plant extracts. In my work, I combine modern chromatographic techniques with spectroscopic analysis, which allows me to obtain precise results in research on the complex chemical composition of plant materials.

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April 14-15, 2025 | Rome, Italy

ENHANCING SWEET POTATO PRODUCTION: A COMPREHENSIVE ANALYSIS OF THE ROLE OF AUXINS AND CYTOKININS IN MICROPROPAGATION

Gideon Adu Donyina, Adrienn Szarvas, Vincent Agyemang Opoku, Edit Miko, Melinda Tar, Szilárd Czóbel and Tamás Monostori
University of Szeged, Hungary

Abstract

Ipomoea batatas (L.) Lam., or sweet potato, is a robust, nutritious, and adaptable crop traditionally propagated through conventional methods. These techniques, however, have limitations, prompting the adoption of micropropagation as an efficient alternative for producing healthy, cost-effective plantlets in reduced time. This review critically evaluates the influence of auxins and cytokinins, the most frequently utilized plant growth regulators (PGRs), in enhancing sweet potato micropropagation protocols. The study examines the crop's origins, distribution, and cultivation practices, as well as the morphophysiological effects of PGRs on sweet potatoes. Our analysis reveals that 6-benzylaminopurine (BAP) and N6-benzyladenine (BA) are the predominant cytokinins, while naphthaleneacetic acid (NAA) and indole-3-butyric acid (IBA) are the primary auxins employed in sweet potato micropropagation. The review also proposes strategies for increasing production, particularly in Africa, and identifies areas requiring further investigation to understand better how these growth regulators impact the physiological development and response of sweet potatoes. This comprehensive assessment contributes to the expanding knowledge base on sweet potato micropropagation and offers valuable insights for researchers and practitioners in the field.

Biography

Gideon Adu Donyina is currently a PhD student at the Doctoral School of Environmental Sciences, University of Szeged, Hungary. His research focuses on sweet potato micropropagation and ecophysiology. He is also an Assistant Lecturer at the Faculty of Agriculture, belonging to the same University. Outside the academic environment, he performs his ministerial duties as the National Pastor of the Deeper Life Bible Church, in Hungary.

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April 14-15, 2025 | Rome, Italy

ANTIOXIDANT AND WOUND HEALING POTENTIAL OF EXTRACTS OBTAINED FROM TYPICAL MEDITERRANEAN FOODS

Chourouk Joumaa[1], Hawraa Zbeeb[1,2], Lama Zeaiter[1,2], Mohamad Khalil[3], Hala Khalifeh[4], Giulia De Negri Atanasio[1] and Laura Vergani[1]

[1]*University of Genoa, Italy*
[2]*Istituto Italiano Tecnologia, Italy*
[3]*University of Bari Aldo Moro, Italy*
[4]*Lebanese University, Lebanon*

Abstract

In the last years, interest in plant-based foods has grown due to their primary prevention potential. Plants are a rich source of bioactive compounds, including polyphenols (PPs), with beneficial effects on human health. Extra-virgin olive oil (EVOO) and nuts (i.e., almonds) are basic components of the Mediterranean diet (MD), one of the healthiest and famous dietary habit. Also, Za'atar, an ancient and popular Lebanese herbal mixture containing *Origanum syriacum*, *Thymbra spicata*, *Rhus coriaria* and *Sesamum indicum*, disclosed relevant therapeutic potential. This study aimed to provide a comprehensive chemical characterization of the phytochemical composition of the solvent extracts (methanol/water) from these plants, and to investigate there *in vitro* antioxidant activities and wound healing potential. Chemical characterization revealed the highest PP content in the EVOO and za'atar extracts, whereas almond extract exhibited a rather low content of PPs, but is extremely rich in fats and carbohydrates. Antioxidant activity was measured through cell-free assays, including ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)) and FRAP (ferric reducing antioxidant power). In parallel, we conducted cell-based assays utilizing the H2DCF-DA probe to quantify reactive oxygen species (ROS) levels and the Griess assay to measure nitric oxide production as markers of oxidative stress. The wound healing potential was assessed using an *in vitro* scratch assay to quantify cell migration. The results show for all extracts a significant antioxidant activity, with EVOO showing the most potent effects. Additionally, all the extracts promoted the wound repair by leading to a stimulation of cell proliferation and migration.

These findings emphasize the beneficial activity and therapeutic potential of the three foods of the MD and highlight the therapeutic potential of Mediterranean plant-based products in managing metabolic disorders and inflammation, thus offering promising avenues for regenerative medicine and metabolic disease prevention.

Biography

Chourouk Joumaa is a PhD student in Biology Applied to Agriculture and Environment (STAT) in the DISTAV Department at the University of Genova. My main research activity focuses on the extraction, characterization, and functional investigation of plant foods typical of the Mediterranean diet, aiming to explore their potential as novel nutraceuticals that can positively affect cell metabolism. Mediterranean plants are known for their rich content of natural compounds like polyphenols, which have antioxidant, anti-inflammatory, and metabolic potential.

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April 14-15, 2025 | Rome, Italy

ECONOMIC EVALUATION OF A COMBINED CONSERVATION AND PRECISION AGRICULTURE WHEAT PRODUCTION SYSTEM IN GREECE

Kosti M.[1], Cavalaris C.[3], Moraitis M.[1], Giouvanis V.[2], Karamoutis C.[2], Kyparissis A.[2], Zamidis A.[4], Lampropoulos C.[5] and Balafoutis A.T.[1]

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[2]*University of Thessaly, Greece*
[3]*Campus AUTH School of Agriculture, Greece*
[4]*Agromet Georgiou Katechaki Greece,*
[5]*Lampropoulos Charisios-Producer, Greece*

Abstract

The project PreConAgri combines precision and conservation agriculture practices to improve farmers' profit and environmental sustainability. The project started in 2022 by establishing four pilot fields with cereal crops in Greece, two in the region of Thessaly, and two in West Macedonia. Each pilot was split into 4 plots containing the following treatments: 1. Conservation Agriculture (CA), 2. Precision Agriculture (PA), 3. Conservation and precision agriculture combined (CPA) and 4. Control (C). The conservation agriculture included the application of no-tillage and constant soil covering by mulches and crops. Precision agriculture included variable rate application of nitrogen fertilizers using two technologies, the first with an AI sensor (Augmenta technologies Ltd) placed on the top of the tractor cabin, reading the crop status and deciding in real time the dose of the fertilizer and the second, by downloading fertilizer maps obtained from satellite data from commercial services such as OneSoil, FarmB and others. Precision Agriculture also included the adoption of best travel paths in the field obtained by an algorithm developed specifically for the project. The adoption of the novel technologies of PA and CA involves investment in contemporary technologies such as the Augmenta sensor, a variable rate spreader, a GNSS navigation system, an advanced no-till planter etc. The scope of the present study is to evaluate, in economical terms, the profitability for using the alternative practices proposed. We registered all the farm inputs and operations during the growing period and measured the final yield on each plot. We used the FarmEcon platform developed by the Laboratory of Farm Mechanization of University of Thessaly to estimate both fixed and variable operational costs and gross and net profit. We examined two different scenarios, one with the actual farm size of the holdings and one considering a hypothetical large farm of 500ha.

Biography

Myrto Kosti work as an associate researcher at the Institute for Bio-economy and Agri-technology (iBO)/ Center for Research and Technology Hellas (CERTH)/Greece. She holds an MSc Agronomist, graduate of the Department of Crop Science of Agricultural University of Athens, with specialization in plant protection and environment. She also holds a Master in Business Administration (MBA) and specifically in Agribusiness Management of the Department of Agricultural Economics and Rural Development in Agricultural University of Athens.

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International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

INNOVATIVE METHODS OF ADSORPTION OF BISPHENOL A FROM FOREST WATERCOURSES IN POLAND

Lidia Szwajkowska-Michałek[1], Anna Przybylska-Balcerek[1], Przemysław Bartczak[2], Joanna Zembrzuska[3] and Kinga Stuper-Szablewska[1]

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[2]Poznan University of Technology, Poland

Abstract

During the research, an alternative method for removing BPA from water was developed to SPE. Lignocellulosic adsorbents are waste products in the wood industry or agriculture, therefore finding an alternative way to manage these raw materials is justified in the context of the cyclical economy. Lignocellulosic adsorbents are biodegradable, which means they can be successfully used in the natural environment. One of the sources of BPA contamination important for forest ecosystems are intra-forest watercourses, such as ponds, lakes, streams, etc., located in forested areas. The presence of BPA significantly affects not only the fauna that pollutes watercourses, but also forest animals that use these water sources as a watering hole. It is therefore important to find solutions to ensure the safety of forest and aquatic fauna by using natural lignocellulosic raw materials that are an integral part of the environment. In connection with the above, the aim of this research was to assess the sorption capacity of lignocellulosic sorbents of selected pollutants (BPA) from forest watercourses.

Biography

Lidia Szwajkowska-Michalek is a graduate of the Poznań University of Technology, in 2000 I obtained a master's degree in chemical technology. Since 2001, I have been working at the Poznań University of Life Sciences in the Department of Chemistry as an assistant and since 2008 as an assistant professor. In 2008 I obtained a PhD in forestry sciences in the discipline of forest phytopathology. As part of my scientific and research activities I have participated in projects in the field of analysis of bioactive compounds in plant material, pathogen-plant interactions and analysis of mycotoxins in plant material. I am also conducting research on finding alternative methods of removing BPA from water.

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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

EXPLORING THE IMPACT OF SOUND WAVES ON PLANT BIOLOGY

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[2]*University of Florence, Italy*

Abstract

Scientific research suggests that sound waves can influence plant growth and development, although the underlying mechanisms remain under investigation. Studies have shown that certain sound frequencies can enhance vital physiological processes in plants, such as stimulating seed germination, improving nutrient absorption, and increasing resistance to environmental stress. Additionally, sound vibrations appear to contribute to optimizing essential functions like photosynthesis and root development. For example, research indicates that the expression of the GUS gene is significantly affected by sound frequencies, showing an increase at 250 Hz and a decrease at 50 Hz. Another study demonstrated that exposing *Cucumis sativus* to a frequency of 0.4 Hz and a Sound Pressure Level (SPL) of 106 dB led to notable physiological changes, including enhanced germination, increased stem elongation, a more efficient root system, and improved cell membrane permeability. Furthermore, sound vibration treatments have been associated with higher relative water content and improved stomatal conductance in *Oryza sativa*. Additional findings suggest that exposure to 4 kHz frequencies may enhance drought resistance in plants. Similarly, sound waves at 0.5 and 0.8 kHz have been linked to an increase in osmotic potential, indicating their possible role in regulating water balance. A promising technique known as Plant Acoustic Frequency Technology (PAFT) has been successfully applied to cotton plants, leading to notable improvements in growth parameters. Observed benefits include greater plant height, increased size of the fourth leaf from the top, a higher number of fruit-bearing branches, more bolls, and greater individual boll weight. These findings collectively highlight the potential impact of sound waves on plant biology. Further research into this phenomenon could pave the way for innovative, sustainable agricultural practices, reducing reliance on chemical fertilizers while naturally enhancing crop productivity.

Biography

Mario Pagano is a Permanent Researcher at the National Research Council of Italy (CNR-IRET). He obtained his PhD in Agrobiotechnology for Tropical Production from the University of Florence in 2012. His research primarily revolves around plant biophysics, with a specific focus on plant physiology and spectroscopic applications. He is the author of over 40 national and international scientific papers and holds a patent for a novel technology that enables non-invasive measurements of plant physiological parameters. He is a Corresponding Academic at the Italian Academy of Forest Sciences (Florence, Italy) and a full member of the Royal Society of Biology (London, UK).

DAY - 2
Video

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April 14-15, 2025 | Rome, Italy

LARGE-SCALE DISCOVERY OF NON-CONVENTIONAL PEPTIDES IN MAIZE AND ARABIDOPSIS THROUGH AN INTEGRATED PEPTIDOGENOMIC PIPELINE

Liuji Wu[1], Shunxi Wang[1,4], Lei Tian[1,4], Haijun Liu[2,4], Xiang Li[2], Jinghua Zhang[1], Xueyan Chen[1], Xingmeng Jia[1], Xu Zheng[1], Shubiao Wu[3], Yanhui Chen[1] and Jianbing Yan[2]

[1]*Henan Agricultural University, China*
[2]*Huazhong Agricultural University, China*
[3]*University of New England, Armidale, Australia*

Abstract

Peptides, typically composed of 2–100 amino acid residues, represent small biological molecules with important roles in biology. Studies over the past few decades have mainly focused on conventional peptides (CPs) derived from annotated coding sequences (CDSs) or conventional open reading frames (ORFs). Recently, a novel class of peptides, now defined as non-conventional peptides (NCPs) in this study, has caught significant attention as functionally important endogenous peptides in various organisms. NCPs are derived from previously unannotated CDSs, such as intergenic regions, untranslated regions (UTRs), introns, and various types of junctions, as well as different reading frames from annotated CDSs, which play critical roles in fundamental biological processes. In this study, we developed an integrated peptidogenomic pipeline using high-throughput mass spectra to probe a customized six-frame translation database and applied it to large-scale identification of NCPs in plants. A total of 1993 and 1860 NCPs were unambiguously identified in maize and Arabidopsis, respectively. These NCPs showed distinct characteristics compared with conventional peptides and were derived from introns, 3' UTRs, 5'UTRs, junctions, and intergenic regions. Furthermore, our results showed that translation events in unannotated transcripts occur more broadly than previously thought. In addition, we found that dozens of maize NCPs are enriched within regions associated with phenotypic variations and domestication selection, indicating that they potentially are involved in genetic regulation of complex traits and domestication in maize. Taken together, our study developed an integrated peptidogenomic pipeline for large-scale identification of NCPs in plants, which would facilitate global characterization of NCPs from other plants. The identification of large-scale NCPs in both monocot (maize) and dicot (Arabidopsis) plants indicates that a large portion of plant genome can be translated into biologically functional molecules, which has important implications for functional genomic studies.

Biography

Liuji Wu received her PhD degree from Zhejiang University in 2009, and later conducted collaborative research as a visiting scholar at Huazhong Agricultural University and the University of California, San Diego. She is currently a professor at Henan Agricultural University, focusing on the discovery and functional characterization of non-canonical proteins and peptides, particularly in maize stress resistance. Dr. Liuji Wu has published more than 35 research articles as the first or corresponding author in high-impact SCI journals, providing new insights into plant proteome diversity and novel mechanisms of plant stress resistance.

DAY - 2
E-Poster

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April 14-15, 2025 | Rome, Italy

HISTOPATHOLOGICAL INVESTIGATION AND RISK FACTORS OF COCCIDIOSIS IN CAMELS (*CAMELUS DROMEDARIUS*), ALGERIA

Razika Boukert
Saad Dahleb University, Algeria

Abstract

Coccidiosis in dromedaries is an intestinal protozoan infection caused by apicomplexan parasites belonging to the genus *Eimeria*. A prospective examination was conducted at two slaughterhouses in southern Algeria. The primary objective of this investigation was to ascertain the prevalence of intestinal parasites in camels, elucidate the associated microscopic lesions, and identify the risk factors contributing to this infestation. In pursuit of this, we procured four segments of the intestines from 31 dromedaries that appeared healthy and displayed no symptoms. Subsequently, these samples were collected, preserved, subjected to routine processing, and subsequently stained with haematoxylin and eosin (H&E). Intestinal parasitic infection showed an incidence rate of 45.16% (14 out of 31). Specifically, two types of parasites were discerned in the intestinal specimens through microscopic examination, namely *Eimeria* (41.93%; 13 out of 31) (p-value = 0.046) and Taenia (3.22%; 1 out of 31) (p = 0.001). *Eimeria cameli* was observed in the ceacum (41.93%; 13 out of 31), jejunum (12.90%; 4 out of 31), and in one instance in the duodenum (3.22%; 1 out of 31). Furthermore, numerous development stages of coccidia were identifed, including gamonts, schizonts and oocysts. Deep microscopic lesions attributed to *Eimeria cameli* were detected, such as enteritis, eosinophilic infltration and inflammation. In addition, associated risk factors were identifed. Tis study has furnished valuable insights into parasitic infestations affecting dromedaries, particularly *Eimeria cameli*. Te molecular studies are needed to delineate the diverse variations within *Eimeria* strains. Effective parasite control strategies specifc to dromedary camels need to be developed.

Biography

Razika Boukert is an Assistant Professor at the Institute of Veterinary Sciences, University of Blida 1 (Saad Dahleb), located in Blida, Algeria. She specializes in infectious diseases, microbiology, and the health and production of dromedaries (camels)

Dr. Boukert has contributed significantly to research in her field. Notably, she co-authored a study titled "Determination of vitamin B12 content in dromedary serum in Algeria" in 2020, highlighting her focus on camel health.

In addition to her research, Dr. Boukert has co-authored the book "Classification des races canines" with Dr. Dahia Saidj. This work aims to compile essential data on canine breeds, serving as a valuable resource for veterinary students, practitioners, animal scientists, and dog owners.

Virtual Abstracts

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

A RELIABLE MOLECULAR DIAGNOSTIC TOOL FOR CA90 (CASTANEA SATIVA × CASTANEA CRENATA) HYBRID IDENTIFICATION THROUGH SSR

Toufiq Soale Yussif, Nadine Evora da Cruz, Valentim Coelho, Eugénia Gouveia and Altino Branco Choupina
Instituto Politécnico de Bragança, Portugal

Abstract

Chestnut trees are an essential source of both food and timber. However, the severe threats from invasive pests and diseases compromise their existence and productivity. In Europe, chestnut hybridization programs were initiated to produce resilient rootstocks in response to ink disease. A gap persists in identifying chestnut hybrids. This study introduces a methodology to distinguish chestnut hybrids from varieties using microsatellite (SSR) markers and bioinformatics tools. The method is particularly useful for identifying CA90 (Castanea sativa × Castanea crenata), a hybrid clone resistant to Phytophthora cinnamomi. The molecular tool will enhance breeding efficiency, conservation efforts, and scientific research on chestnut genetic diversity. The presentation will provide a detailed overview of the methodology, validation process, Results, and the broader applications of this diagnostic approach in the sustainable management of chestnut resources. Future research could refine this technique and extend its application to other chestnut hybrid combinations.

Biography

Toufiq Soale Yussif is a Biotechnologist and researcher specializing in molecular plant sciences, bioinformatics, genomics, plant-microbe interactions, and biocontrol strategies. His work is dedicated to improving plant disease management in agriculture through cutting-edge molecular techniques. Toufiq holds a Master's in Biotechnological Engineering from the Polytechnic Institute of Bragança, Portugal, and a BSc in Biotechnology and Molecular Biology from the University for Development Studies, Ghana.

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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

ASSESSMENT OF THE CHEMICAL, ANTIOXIDANT, AND ANTIMICROBIAL PROPERTIES OF VARIOUS SOLVENT EXTRACTS FROM WILD OLIVE LEAVES (OLEA EUROPAEA SUBSP. EUROPAEA VAR. SYLVESTRIS)

Falek Wahiba[1], Hanani Mohamed Nadjib[2] and Douadi Khelifi[2]
[1]*University of Constantine 1, Algeria*
[2]*National Higher School of Biotechnology Constantine, Algeria*

Abstract

Recently, the extraction, separation, and determination of phenolic compounds has become a challenging and important analytical task due to the large number of phenolic compounds with similar structures as well as the complexity of the samples involved. We recall that the main objective of this work is the extraction, separation, phytochemical screening. To determine the total phenolic levels and antioxidant activities carried out by two methods of ABTS and DPPH and antimicrobial assays of different solvent extracts of the leaves of the wild olive tree (*Olea europaea subsp. europaea var. sylvestris*) harvested at different sites of Constantine region- Algeria, to discover new natural antioxidants.

The method of extraction and the solvent used are the main factors that determine the extraction yields of plant extracts. Where, the three methanol (65.31%), hydromethanol (62.7%) and ethanolic (60.18%) extracts represent the best extraction efficiencies followed by chloroformic (42.05%), acetonic (37.09%), hydroacetonic (35.38%) and ethyl acetate (34.26%). Phytochemical screening and CCM demonstrated the presence in significant quantities of flavonoids, tannins and sterols. As well as the presence of coumarines, free quinones, glycosides and saponosides. However, alkaloids were absent in all extracts of the various solvents used. We obtained the separation of the spots for chloroformic, ethyl acetate and methanol extracts with only the second and third solvent system before and after UV revelation. The ethyl acetate, ethanolic extracts from the Soxhelt extraction of wild olive leaves have the highest levels of phenolic compound, flavonoids and the greatest antioxidant activity in the DPPH and ABTS assays followed by the hydroacetonic, hydromethanol, methanol extracts then the acetonic, hexanic, petrol ether extracts and last the chloroformic. The most certified antibacterial extracts are methanol, ethanolic, petrol ether and ethyl acetate respectively. This shows that the nature of the solvent influences the effectiveness of the antibacterial activity. It seems that our extracts are more effective on bacterial Gram+(*Staphylococcus*

Biography

Wahiba Falek, born on January 12, 1984, in Khenchela, Algeria, is a prominent researcher and educator in food sciences and biotechnology. She holds degrees in Nature and Life Sciences, Nutrition, Agro-Food Technologies, and Food Sciences from the University Fr. Mentouri Constantine and a PhD in Biotechnology from the National Higher School of Biotechnologies (ENSB). Dr. Falek has over 14 years of teaching experience, specializing in food characterization, biochemistry, and analytical chemistry. Her research includes food biotechnology and wild plant ecology, with notable publications on corn germ valorization and wild olives conservation. She is fluent in multiple languages. Her ORCID ID is 0000-0002-6132-5250.

aureus, Bacillus cereus), than bacterial Gram-(*Pseudomonas aeruginosa, Escherichia coli, Enterobacter cloacae* and *Klebsiella pneumoniae*).

Wild olive leaves could be a potential natural source of antioxidants and could be of greater importance as a natural antioxidant capable of slowing down or preventing oxidative stress.

Keywords: Wild Olive Tree, Leaves, *Different Solvents, Extracts, Phytochemical, Activity, Antioxidant, Antimicrobial, Algeria*.

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International Conference on
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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA) PROCESS FOR AGRICULTURE AND HORTICULTURE

Vijayan Gurumurthy Iyer
Bihar Institute of Public Administration & Rural Development (BIPARD), India

Abstract

Short Description of what will be discussed during the presentation (about 250 - 500 words) The abstract discusses strategic environmental assessment (SEA) process for Indian Agriculture and Horticulture. Technical and economic factors dominance the World's Agricultural and Horticultural projects, plans, programs, policies, and legislative actions. Technical, economic and environmental factors should dominance the World's Agricultural and Horticultural projects, plans, programs, policies, and legislative actions. The objective of the study is to conceptualize Strategic Environmental Assessment (SEA) process. The sustainable design of the study is cross sectional. Environmental Health Impact Assessment (EHIA) process has been conducted for agricultural and horticultural projects to consider the safety and health impacts to mitigate environmental health impacts. Social Impact Assessment (SIA) process can be defined as the systematic identification and evaluation of the potential social impacts (effects) of proposed projects, plans, programs, or legislative actions such that social consideration is encouraged in process and to arrive at actions that are socially compatible projects. SEA process concerns to environment and sustainability effects in process and arrive at proposed projects, plans, programs, and legislative actions that are compatible with respect to environment and sustainability issues. International EIA process required multi-disciplinary approach that has been conducted for strategic environmental assessment. The paper highlights SEA process conducted for certain projects that based on operation and process approach and associated studies for sustainable development. Product and Process environmental lifecycle analysis (LCA) has been conducted for identifying and measuring the greenhouse gas impacts on the environment and sustainability by means of mass and energy balance methods. LCA considers the activities related to raw materials, transformation, ancillary materials, equipment, method, market, man power, production, use, disposal and ancillary equipment. As far as the safety is concerned and personal protective equipment and materials (PPEMs) that include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items which have to be used

Biography

Vijayan Gurumurthy Iyer IYER Vijayan Gurumurthy, b. 13 March 1965, Mayuram, India. Faculty in Bihar Institute of Public Administration & Rural Development (BIPARD), Gaya, Bihar, India; Professional Engineer and Doctor and Proprietor of Dr. Vijayan Gurumurthy Iyer Techno-Economic-Environmental-Social Study and Check Consultancy Services, GSTIN/UIN: 33AIZPG9735D1ZW, m. Shanthi. s. Venkatramanan, Education: Diploma, Mechanical Engineering, 1982; Diploma, Production Management, Annamalai University, 1988; Post Diploma, Automobile Engineering, Victoria Jubilee Technical Institute, Mumbai, 1992; AMIE, Mechanical Engineering, Institution of Engineers, India, 1990; Bachelor's General Law , B.G.L., Annamalai University, 1993, Master's, 1997, PhD, 2003, Environmental Science and Engineering, Indian School of Mines University, Dhanbad; Post-doctoral Researcher, World Scientific and Engineering Academy and Society, Greece, 2006; Post-doctoral Elaborated & SI , World Scientific and Engineering Academy and Society, Greece, 2011; Doctorate of Science and Engineering, 2010; Doctorate of Letters, 2017, Doctorate of Law , 2011, The Yorker International University, Italy, 2011, Honorary Doctorate of Literature, 2017; Master of Arts, 2014 , International Biographical Centre, Cambridge, Great Britain; Master Diploma with honour in Literature, 2012; The Letter of the Law, World Academy of Letters, ABI, 2010. Appointments: Supervisor, Indo-Matsushita Carbon Company Limited, Tada, ACE CBE.

by an individual. Such equipment is important for personal protection and for safety. It is the manager's and supervisor's responsibility to ensure that they are used. The enactment of worker's compensation law and occupational disease law shall increase materially the cost of insurance to industry. The increased cost and the certainty with which it is applied will put a premium on accident prevention work. This cost can be materially reduced by the installation of safety devices. Agricultural and Horticultural management research experience has shown that approximately 80% of all the accidents are preventable. EIA and EHIA processes have been conducted for Agricultural and Horticultural plant to consider the safety and health impacts to mitigate environmental hazards on workers and adverse impacts on flora and fauna. SEA system is a potentially useful element of good environmental management and sustainable development; however, as currently practiced in source specific (municipal) , industries, and Generic (Agricultural and horticultural) , it is far from perfection. Emphasis should be given in industries on maintaining economic viability of the operation, while in turn taking care to preserve the ecological and social stainabilities the country. International EIA process is a multi-disciplinary approach that has been conducted for agricultural and sustainability for technical, economic, ecological and social sustainability. "Environmental Health Impact Assessment can be defined as the systematic identification and evaluation of the potential health impacts of proposed agricultural and horticultural projects, plans, programs, policies or legislative actions relative to the physical -chemical, biological, radioactive, cultural, and socioeconomic components of the total environmental health. EHIA which is a specialised terminology that is divided into most significant terms, Viz., "environmental health inventory", "environmental health impact assessment" and "environmental health impact statement".

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International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

TAXONOMIC DIVERSITY OF MEDICINAL HERBAL PLANTS USED IN THE NORTHERN COMMUNITY, SAUDI ARABIA

Fatma A. Hamada
Aswan University, Egypt

Abstract

This study surveyed herbal medicine use among native and resident populations in the Ha'il region, categorized by education level and gender, exploring its role in treating various ailments (asthma, inflammation, ulcers, diabetes, gastrointestinal, dental, and eye issues, etc.). Utilizing interviews and questionnaires, the research documented the use of native, cultivated, and imported herbs (e.g., *Saussurea costus, Lawsonia inermis, Boswellia sacra, Commiphora gileadensis, Acacia nilotica, Salvia officinalis*) representing many plant families such as (*Asteraceae, Lythraceae, Burseraceae, Lamiaceae, Rutaceae, Fabaceae*). Shaped by the interplay of traditional practices, trade routes, and religious pilgrimages. Highlighting significant statistical relationships and intergenerational transmission of herbal knowledge.

Biography

Fatma A. Hamada is a botanist specializing in plant taxonomy, ecology, and conservation. After earning her Bachelor's degree in Botany, she served as a demonstrator and assistant lecturer while completing her Master's degree. She received her PhD in Botany, from Aswan University, Egypt in 2013, specializing in Taxonomy and Ecology. Dr. Hamada Subsequently held a lectureship at Aswan University before becoming an Assistant Professor at the University of Hail in Saudi Arabia, where she teaches biology and various botany and ecology courses, gaining extensive experience in teaching and research. Her research interests encompass plant taxonomy, systematics, conservation, phytochemistry, and ethnobotany.

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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

ENHANCING QUINOA YIELD AND QUALITY THROUGH DIFFERENT LEVELS OF IRRIGATION AND VERMICOMPOST APPLICATION

Gholamreza Heidari[1], Diba Sheykhi Sanandaji[1], Parviz Fathi[2], Habib Khodaverdiloo[3] and Zahed Sharifi[4]

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[2]*University of Kurdistan, Iran*
[3]*The University of Queensland, Australia*
[4]*University of Kurdistan, Iran*

Abstract

Quinoa (*Chenopodium quinoa*), a globally sought-after crop for its nutritional value and adaptability, faces increasing demands for sustainable cultivation practices. This two-year study, conducted at the Research Farm of the University of Kurdistan, Iran (2021-2022), investigated the impact of varying irrigation levels and vermicompost application on quinoa yield and seed quality, aiming to reduce chemical fertilizer dependency. The experiment utilized a split-plot based on a randomized complete block design. Four irrigation levels (50%, 75%, and 100% of quinoa's water requirement) constituted the main factor, while four vermicompost application rates (0, 5, 10, and 15 tons per hectare) formed the sub-factor. The results showed that the 100% water requirement treatment achieved the highest seed yield (1987.71 $kg.ha^{-1}$) and biological yield (4525.20 $kg.ha^{-1}$), while the 15 tons per hectare vermicompost application resulted in significant yield improvements, reaching 1784.01 $kg.ha^{-1}$ for seed yield and 4100.25 kg ha^{-1} for biological yield. Notably, the highest nitrogen concentration (2.54%) in quinoa seed was observed in the second year with 15 tons per hectare of vermicompost and 50% of the water requirement. Furthermore, the application of 15 tons per hectare of vermicompost led to a 54% increase in phosphorus, 51% increase in potassium, and a 23.79% increase in seed calcium compared to the control treatment. This study highlights the potential of vermicompost and optimized irrigation levels to significantly enhance quinoa yield and improve the nutritional profile of quinoa seeds. These findings promote sustainable agricultural practices by minimizing reliance on chemical fertilizers while optimizing resource utilization.

Keywords: Irrigation, Organic fertilizer, Seed nutrients, Seed oil

Biography

Gholamreza Heidari was born in Iran, 1973. He pursued his higher education in Agronomy at Azad University of Mahabad (Iran), earning his Bachelor's degree in 1996. He continued his academic journey by obtaining a Master's degree in Agronomy from University of Tabriz in 2003, followed by a PhD in Crop Ecology from University of Tabriz in 2008. His academic background laid a strong foundation for his future research and teaching endeavors. Dr. Heidari joined the University of Kurdistan in 2008 as an assistant professor. Throughout his tenure, he has contributed significantly to the academic community through both teaching and research. He has taught a variety of courses in agronomy and crop ecology and has been recognized for his engaging teaching style and dedication to student success. He achieved the rank of associate professor in 2017. Dr. Heidari's research interests span several areas, including sustainable agriculture, agroecology and ecological stresses. He has published numerous articles in peer-reviewed journals and has presented his work at various national and international conferences. Over the years, Dr. Heidari has authored and co-authored 70 of research papers, articles, and books, including notable publications (https://research.uok.ac.ir/~ghhaidari/en/). His work has been widely cited and has had a significant impact on agroecology. Dr. Heidari resides in Sanandaj city of Iran with his Family. In his free time, he enjoys hiking, mountain climbing and traveling with his family, further enriching his life outside the academic sphere.

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April 14-15, 2025 | Rome, Italy

COMPARATIVE STUDY ON ANTIOXIDANT ACTIVITY AND PHENOLIC CONTENT IN ROOTS, LEAVES, AND FRUITS OF *GAULTHERIA MUCRONATA* (L.F.) HOOK. & ARN

Carlos Alberto Schneider Barrera, Cristopher Martínez and Eduardo Navarrete
Universidad de Concepción, Chile

Abstract

Gaultheria mucronata, known with the common name "Chaura", belongs to the Ericaceae family and is native to Chile and Argentina. This shrub is distributed in Chile from the Maule region to the Magallanes region, at an altitude range between 0 to 2000 meters above sea level, and is able to live with high water drainage and in acidic soils, such as the volcanic soils. Abiotic stress conditions include water-related conditions of flooding and drought, thermal conditions as extremely low and high temperatures, and acidity and alkalinity of soils (Albarsi et al. 2024), and it has been observed an increase of polyphenols under acid stress (Lv et al. 2024). The phenylpropanoid biosynthetic pathway is activated under abiotic stress conditions, resulting in the accumulation of phenolic compounds in the stressed plant (Ray et al. 2024). The objective of this research was to evaluate the antioxidant effect, related to the phenolic content, of methanolic extracts from *G. mucronata*, differentiating between its fruits, leaves, and roots. *G. mucronata* was collected from a volcanic soil area on the east side of the Llaima volcano, in the Araucania region, Chile. To determine the antioxidant activity, the methods with the DPPH radical (2,2-diphenyl-1-picrylhydrazyl) and the ABTS radical (2,2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)) were used.

Results were expressed in gallic acid and trolox equivalents for DPPH and ABTS assays, respectively, and also as the IC50 values. Furthermore, the antioxidant effect of the methanol extracts during the time was done with both radicals. On the other hand, measurements were made to determine the amounts of total polyphenols using the Folin-Ciocalteu method and the concentration of total flavonoids, obtaining a greater phenol concentration on the roots of *G. mucronata*. All tests were performed in triplicate. The values obtained for the content of total polyphenols in gallic acid equivalents in roots, leaves, and fruits were 423.33 ± 7.09 mg, 343.00 ± 2.64 mg, and 180.33 ± 5.51 mg, respectively, in 1000 mg of methanolic extract. The content of flavonoids expressed in catechin was 140.94 ± 6.03 mg for the roots, 116.66 ± 1.64 mg for the leaves, and 7.12 ± 0.21 mg for the

Biography

Carlos Alberto Schneider Barrera was an assistant professor from 2009 to 2014 and an associate professor from 2015 up to now in the Departamento de Ciencias y Tecnología Vegetal, Escuela de Ciencias y Tecnologías, Universidad de Concepción. His profession is pharmacist, and his academic degrees are a Master of Chemical Sciences and a Doctor in Sciences with a mention in Chemistry. At the Universidad de Concepción, he is a professor in the subjects of general chemistry, organic chemistry, analytical chemistry, spectroscopy, and biological effects of plant extracts for the plant biotechnology engineering career. His research at the Universidad de Concepción in the laboratory of plant extracts has been about the antioxidant and antimicrobial effects of native and endemic Chilean plants placed in the centre-south of Chile.

fruits, in 1000 mg of methanolic extract. It is possible to conclude that the *G. mucronata* methanolic extracts have an antioxidant effect, and our results could be considered as a first step for the research of biological effects of *G. mucronata*, related to phenolic compounds.

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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

UNVEILING THE MOLECULAR AND METABOLIC LANDSCAPE OF CHICKPEA CHLOROTIC DWARF VIRUS IN *LUFFA CYLINDRICAL* L

Sana Khalid[1], Zaryab Khalid[1] and Muhammad Naveed Shahid[2]
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[2]*University of Education, Pakistan*

Abstract

This study examined the impact of Mastrevirus (Family Geminivirida) infection on *Luffa cylindrica* L. (sponge gourd), a vine from the Cucurbitaceae family native to tropical Asia. The virus, transmitted by whiteflies (*Bemisia tabaci*), causes symptoms like leaf curling and crumpling, leading to reduced plant growth, fewer fruits, and smaller leaves. DNA was extracted from both healthy and infected plants, and PCR amplification identified the virus as Chickpea Chlorotic Dwarf Virus (CpCDV). Phylogenetic analysis using MEGA 11 revealed that the CpCDV strain from *L. cylindrica* (TW-CpCDV-L.C) is closely related to a strain from *Cucumis sativus* in Pakistan. Recombination analysis using RDP-4 identified 20 recombination events, with JF831147 as the major parent and MF178119 as the minor parent of TW-CpCDV-L.C. Metabolic profiling using GCMS and FTIR detected differences in chemical compounds between healthy and infected plants, while XRD analysis showed altered crystallinity in infected tissues. Through GCMS, 19 compounds were detected in infected plants and 15 compounds were detected in healthy plants showing various peaks, retention time (R.T.), molecular formula, nature of compound and their structural formula. Antifungal tests indicated that infected leaves had stronger inhibitory effects against *Aspergillus niger* in certain extracts compared to healthy leaves. The study shows the CpCDV *in silico* determination and also highlights significant metabolic changes in CpCDV infected *L. cylindica*

Biography

Sana Khalid, PhD joined Department of Botany, Lahore College for Women University (LCWU), Lahore Pakistan as a Lecturer in October 2009 and later appointed as Assistant Professor in 2018. She comes to LCWU from the University of Punjab, Lahore, Pakistan where she did her PhD in Agriculture Science (Plant Pathology), M.Phil in Molecular Biology, M.Sc (Hons.) and B.Sc (Hons.) in Botany. In PhD research, she worked on Geminiviruses which is one of the largest families of Plant viruses. Her responsibilities involve target gene cloning, DNA isolation, gene transformation etc.

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International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

ARTIFICIAL INTELLIGENCE FOR A GREENER TOMORROW: TRANSFORMING PLANT SCIENCE AND MOLECULAR BIOLOGY

Rakibul Hasan
Westcliff University, USA

Abstract

In the face of climate change, food insecurity, and rapid environmental degradation, plant science and molecular biology are embracing transformative technologies to address these global challenges. This presentation explores the revolutionary role of **Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT), and Quantum Computing** in driving the next generation of innovation in plant biology and sustainable agriculture.

AI is now being applied across a wide range of plant science processes—from **automated phenotyping and disease detection to predictive modeling for crop yield optimization.** Using deep learning and computer vision, researchers can detect nutrient deficiencies, plant stress, and pathogens with unmatched accuracy and efficiency. Real-world models currently under development at **C5k LLC**, a U.S.-based tech research consultancy, will be discussed.

The integration of **CRISPR gene editing with AI models** is expediting the development of climate-resilient crops, while **IoT-based smart farming** solutions provide real-time environmental monitoring, improving decision-making at the farm level. Furthermore, **digital twin technologies** are enabling simulation of plant responses in controlled environments, optimizing greenhouse operations and reducing resource waste.

The presentation will also highlight how **Quantum AI** and advanced bioinformatics tools are contributing to faster molecular-level analysis, supporting breakthroughs in genetic sequencing, protein structure prediction, and synthetic biology.

This talk encourages interdisciplinary collaboration between life sciences and computational technologies, aiming to foster sustainable innovation and intelligent solutions for the future of plant and molecular biology.

Biography

Rakibul Hasan, IEEE Senior Member, is an entrepreneur and researcher specializing in Artificial Intelligence, IoT, and cybersecurity. He is the Founder & CEO of C5k LLC, where he leads a team delivering private research and innovative technology solutions to global clients. With over a decade of experience in IT leadership, Rakibul has authored two books—*Digital Goldmine* and *Future Tech*—and has published extensively in high-impact journals including IEEE Access, ACM, Wiley, and Emerald.

Accepted Abstracts

Joint Event on
International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

EXPLORING THE IMPORTANCE OF AERATED DRIP IRRIGATION PRACTICES

Abdul Rahim Junejo[1], Li Hao[1] and David J Midmore[2]
[1]*Chinese Academy of Agricultural Sciences, China*
[2]*CQ University, Rockhampton, Australia*

Abstract

In recent years, aerated drip irrigation (ADI) has emerged as an innovative practice for water-saving irrigation technology. It offers new approaches for the efficient and synchronized delivery of water, fertilizer, and air, thereby enhancing the economic benefits of crops and making considerable progress in the field. Most previous studies have concentrated on the impact of imposed aeration within the irrigation stream on the soil environment and crop growth; increasing oxygen content in the root zone resulting in healthy root growth in otherwise unfavourable conditions. However, the microbubbles in irrigation water generated by aeration equipment serve a dual purpose. They are involved not only in the distribution of water, fertilizer, and air through drip irrigation systems but also in altering the soil habitats in the crop root zone through various biochemical and biophysical mechanisms. Microbubble-mediated changes to the drip irrigation system and the soil microenvironment in the crop root zone may have localized effects on microbial community aggregation, leading to significant ecological consequences. This paper outlines the role of ADI in improving crop growth, soil conditions, and the resistance to clogging in drip irrigation systems. We outline the use of chemical gas filling (use of solution of peroxide directly into the rhizosphere) and mechanical gas filling devices; (air compressors, venturi injectors, twin vortices, fluid oscillators, and micro-nano bubbler (MNB) generators). We explore the key issues that need to be addressed in current ADI technology and discuss how microbubble-induced alterations in the microenvironments of both the drip irrigation system and the root zone soil can be harnessed. This approach can help manage and manipulate microbial communities, combat clogging in drip irrigation emitters, improve soil quality, and ultimately increase crop yields, resulting in a viable option for farmers world-wide.

Biography

Junejo A.R. has completed his bachelor in Agricultural Engineering from faculty of Agricultural Engineering, Sindh Agriculture University, Tandojam, Pakistan. He has also served for one year in FAO project on climate resilience agriculture in Thar region of Pakistan. Currently he is studying master's degree in Agricultural water-soil engineering. During master's his research will be based on: Nanobubble coupled aerated drip irrigation.

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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

PLANT GROWTH REGULATOR EFFECTS ON *IN VITRO* REGENERATION AND MICROPROPAGATION OF *VITIS VINIFERA* L. CV. *HASTAKOT*

Gayane Melyan[1,2], Kima Dangyan[1], Andranik Barseghyan[1], Narek Sahakyan[1] and Yuri Martirosyan[3,4]

[1]Armenian National Agrarian University
[2]National Academy of Sciences of the Republic of Armenia
[3]All-Russia Research Institute of Agricultural Biotechnology, Russia
[4]N.M. Emanuel Institute of Biochemical Physics, Russi

Abstract

Grapevine (Vitis vinifera L.) is a fruit crop of immense economic and cultural significance, particularly in regions where traditional varieties have been cultivated for centuries. *Hastakot*, an ancient indigenous Armenian grape variety, is primarily found in the Meghri region, where it grows sporadically in old vineyards and is renowned for its use in producing high-quality red wine. While propagation through hardwood cuttings remains the most common method, *in vitro* micropropagation offers a powerful alternative for accelerating clonal reproduction, preserving rare cultivars like *Hastakot*, and producing healthy, disease-free planting material.

This study investigated the effect of various plant growth regulators on the micropropagation efficiency of Hastakot under controlled *in vitro* conditions. Nodal segments were collected from the Armenian National Field Genebank of grapevines, surface sterilized using 1.5% calcium hypochlorite for 10 minutes, followed by a 30-second exposure to 70% ethanol. The explants were inoculated on Murashige and Skoog (MS) medium supplemented with various concentrations of 5-benzylaminopurine (BAP), kinetin (Kin), and their combinations to optimize shoot multiplication. The most effective medium for shoot initiation was MS supplemented with 1.0 mg/L BAP, 0.5 mg/L Kin, and 1.0 mg/L gibberellic acid (GA3), which resulted in a 75% shoot initiation rate, with an average of 2.6 shoots per explant and a shoot length of 4.9 cm after five weeks of culture. For the rooting phase, the well-developed shoots were transferred to full-strength and half-strength MS media supplemented with varying concentrations of indole-3-acetic acid (IAA) and indole-3-butyric acid (IBA). The optimal rooting response—86% root initiation, 7.5 roots per shoot, and an average root length of 7.2 cm—was achieved on half-strength MS medium fortified with 0.5 mg/L IAA and 0.5 mg/L IBA. The rooted plantlets were successfully acclimatized

Biography

Gayane Melyan is a renowned scientist in agricultural and biological sciences. She graduated from the Armenian Agricultural Institute in 1988 and earned her PhD in Biological Sciences in 1992. Dr. Melyan worked as a scientific researcher at the Scientific Research Institute of Agriculture of Armenia from 1992 to 2004. From 2005 to 2019, she was Deputy Director and GeneBank Manager at the Scientific Center of Agrobiotechnology (SCA). Since 2019, she has served as Deputy Director and Head of the Department at the SCA branch at the Armenian National Agrarian University. She has authored over 90 scientific articles in national and international journals.

by transferring them to pots containing a soil mixture of perlite, forest soil, and biohumus (2:1:1), with the highest survival rate (83.6%) observed under these conditions. This study demonstrated that a carefully tailored combination of plant growth regulators significantly enhanced the *in vitro* regeneration and micropropagation of *Hastakot*, supporting its conservation, large-scale propagation, and the production of healthy, disease-free planting material for future cultivation.

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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

THE TREATMENT OF SOILS, SEEDS, SOWN FIELDS AND AGRICULTURAL STORAGES WITH WEAK NON-IONIZING NON-THERMAL PULSED ELECTROMAGNETIC FIELDS (EMF) BY TOR DEVICE SIGNIFICANTLY INCREASES THE CROP YIELD

Irina M. Kaigorodova[1] and Elena G. Kozar[2]
[1]*JSC Russian Federation, Russia*
[2]*Federal Scientific Vegetable Center, Russia*

Abstract

Seed and plant EMF treatments have a history of about half a century. A lot of agriculture practices and scientific studies support the EMF efficacy. This report presents the TOR technology, little-known to the Western scientific community, significantly stimulating soil microorganisms, seed metabolism, sprouting, higher harvests, and diminishing the losses during the crops storing. The effective range of this nature-like technology is almost a kilometer, which makes it possible to treat large areas of up to 10 hectares in 10-15 minutes. The five-year successful experience of applying the TOR technology in arid south, moderate central and arctic regions and for different crops: barley, pea, wheat, sunflower, onion, potato and others. This technology shows higher efficiency in EMF-sensitive plant varieties under severe climate conditions. EMF sensitivity can be confirmed experimentally in growth chambers within two weeks of germination before the start of a farming season. Seed diurnal rhythms contribute to the efficiency of EMF treatments since it was shown that treatment during 05am - 11am window is favourable for EMF-priming. According to experimental data, treating the seeded field gives better yields in most cases with rare exceptions than treating seeds in big bags. The nature of this phenomenon is still unclear. Trying to understand this enigmatic issue the gas chromatographic method had been chosen as a very sensitive method that has proven itself in precise physical and chemical research for a hundred years. Treated soils and seeds had statistically significant difference in hydrogen and dioxide carbon emission and oxygen consumption compared to untreated samples. That can contribute to EMF-induced early mobilization of immunity, both in planting material and soil microbiota, providing a 10-50% increase in crop yields.

Biography

Irina Kaigorodova, born in 1987, PhD in Agriculture, orcid:0000-0002-5048-8417, Senior Researcher, the Federal Scientific Vegetable Center. Area of interests: breeding and seed science of legumes, seed priming research, physical factors seed treatment. PhD theses, 2014, specialty "Breeding and seed science", author 30 scientific publications, vegetable pea varieties patent contributor, member of the Society of Plant Physiologists, married, raising a son.

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International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

THE NEOTROPICAL RAINFOREST MIMOSOID GENUS *ZYGIA* P. BROWNE DIVERSIFICATION AND EVOLUTION BASED ON PHYLOGENOMICS AND MORPHOLOGY

Julia Ferm
Royal Botanical Garden Edinburgh, UK

Abstract

A phylogeny of the Neotropical legume genus *Zygia* P.Browne based on 1311 nuclear loci is presented. The results show that *Zygia* is non-monophyletic since the species *Z. turneri* is found as more closely related to the species *Marmaroxylon magdalenae* L.Rico and the genus *Macrosamanea* Britton & Rose. *Marmaroxylon magdalenae* and Macrosamanea ocumarensis (Pittier) Ferm are sisters and in turn the sister to *Z. turneri* (McVaugh) Barneby & J.W.Grimes. *Marmaroxylon magdalenae* is shown to belong taxonomically in *Macrosamanea* and not in *Zygia*. Relationships within the core clade of *Zygia* are for the most part well-resolved but a few species are shown to be non-monophyletic. All specimens of *Zygia* collected in Central America and Mexico are found together in a clade, except for two specimens of *Z. latifolia* (L.) Fawc. & Rendle collected in Jamaica, which are nested within the South American species.

Biography

Julia Ferm is a postdoc at Stockholm University in Sweden. Julia's research interests are evolution, diversity and taxonomy of tropical legumes and her studies are currently focused on the neotropical legume genus Zygia. Julia's research is funded by the grant "International postdoc" from the Swedish Research Council, which includes two years abroad. Thus, Julia is currently based at the Royal Botanical Garden in Edinburgh, UK.

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International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

RESEARCH AND RESTORATION OF FORGOTTEN VARIETIES OF SOLANACEAE CROPS, TESTED FOR THE CONDITIONS OF ARMENIA

Sarikyan, Gohar Kirakosyan and Varduhi Vardanyan
Scientific Centre of Vegetable and Industrial Crops CJSC of the Ministry of Economy of the Republic of Armenia, Armenia

Abstract

Eggplant, pepper (sweet and chili), tomato are widely distributed in Armenia. In the 19-20 centuries, many varieties and landraces of these crops were cultivated near us. Many varieties of these crops have been forgotten and withdrawn from production over the years. However, the national population longingly remembers the local fruits of tomatoes, peppers, eggplants with the best organoleptic characteristics and wants to see them restored for cooking and processing use. Our task was to collect these samples and restore them through tests in different ecological conditions. In the conditions of climate change, studies have been carried out regarding their biological features, phenology, morphological, agronomic and biochemical properties. The best donors were selected and used in the crossbreeding list. Classic and modern selection methods were used during the selection. Pedigree, individual selection, regression, polycross, improvement methods were used. With our scientific researches, a great deal of work has been done to restore quite a number of forgotten varieties, with their participation, a number of genetic resources have been bred, the information and characteristics of which are up-to-date for use in selection works using the latest methods. Have been recovered from the forgotten landraces of tomato Tavushi local, Local large, Local very large, Aragatsotni local, Local striped, Local pink, Local ribkayip, Local big, Big red, Local plate, from the varieties: Leninakani 1, Argavandi 45, Noviy Anahit 19, Yerevan 14, Araks 322, Hrazdani 314, Etchmiadzin 360, Masisi 202, Haykakan Kangun 152, Ararat 15, Jubilee 261. Aramus 465. Yerevan local population of eggplant, Armenian long, Yerevan 3 varieties, sweet pepper: Bulgarian, Novocherkassk, hot pepper: Armenian hot, Local hot, Astrakhan varieties.

Biography

Karine Sarikyan studied Scientist Agronomost Faculty of Horticultural at the Armenian National Agrarian University and graduated as MS in 1985. She then joined the research at the Scientific Center Vegetables & Industrial Crops MoE RA. She received her PhD degree (Agronomy, Plant Industry) in 2011 at the same Scientific Center. In the 1987-2023 she worked position of Plant Breeder, Principial Investigator and Head of the Department. She has published more than 130 research articles, national reports and created 35 new sorts and hybrids of solanaceae vegetable crops. Participated in international and Union conferences and with Presentations. She is Corresponding member of WG Solanaceae and Corresponding member of WG On-farm Conservation and Management ECP/GR_ Bioveraity International. She is President <<Golden Reed>> Charitable NGO.

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International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

SELF-RELIANT IN YEAR-ROUND VEGETABLE PRODUCTION THROUGH KITCHEN GARDEN IN INDO-GANGETIC PLAINS

Kohima Noopur[1], M.A. ANSARI[2] and A.S. Panwar[2]
[1]University Of Horticulture and Forestry, India
[2]ICAR-Indian Institute of Farming System Research, India

Abstract

The government of India has long been striving to increase the food and nutritional security of rural and urban households. In this regard, kitchen/homestead gardens of limited available space can play an important role in fullfilling the demand for year-round diversified vegetable requirements. Considering the scope to self-reliant in year-round vegetable production and consumption through kitchen garden model, a field experiment was conducted for consecutive two years (2018–19) at the homestead garden of ICAR - IIFSR Modipuram Meerut. A total of 28 vegetables were selected for year-round vegetable cultivation and were planted in 15 beds varied from 2 to 8 m2. The year-round vegetable patterns under each bed were grown into 3 to 4 cropping seasons. The fifteen cropping patterns were arranged in 62 m2 net areas. The total year-round production of vegetables was 568.7 kg from 62 m2 net areas. Among the different groups of vegetables, 196 kg of root, bulb and tubers vegetables; 160.1 kg leafy and flower vegetables; 184.6 kg of fruit/vegetables and 25.8 kg of leguminous vegetables were obtained from 62 m2 net areas. In our finding, nearly 163 kg vegetable shortage to fullfills the demand of 5 members household. The shortage quantity of vegetables 163 kg can be obtained from increasing 18 m2 net areas in addition to exiting 62 m2. Notably, this model which fullfill the household demands of year-round vegetable requirements in a sustainable way as well as improve the food and nutritional security.

Biography

Kohima Noopur, born in Roorkee, Uttarakhand, has established a remarkable academic career and currently serves as an Assistant Professor in the Department of Vegetable Science at Veer Chandra Singh Gharwali Uttarakhand University of Horticulture and Forestry, Uttarakhand, India. She earned her B.Sc. in Horticulture from the College of Horticulture and Forestry at CAU, Pasighat, followed by an M.Sc. in Vegetable Science from TNAU, Coimbatore, Tamil Nadu, and a Ph.D. in Vegetable Science from SKUAST, Jammu, Jammu & Kashmir, all with first division honors. Specializing in Vegetable Biotechnology, Dr. Noopur has actively participated in 11 national and international seminars and symposiums. She has organized three international conferences and two national conferences, showcasing her commitment to advancing horticultural science. Her scholarly contributions include over 20 research papers, 15 popular articles, 10 book chapters, two authored books, and five newspaper articles. Recognized for her excellence, Dr. Noopur received the Best M.Sc. Thesis Award and the Ganga Singh Chauhan Memorial Award for Outstanding Research Contribution in Horticulture Extension for her work with hill communities. Additionally, she has been honored with five awards for best oral and poster presentations. Dr. Noopur is dedicated to enhancing food and nutritional security by promoting year-round vegetable availability at the household level, reflecting her commitment to sustainable agricultural practices.

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Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

GENETIC DIVERSITY OF DIFFERENT BEGOMOVIRUSES INFECTING TOMATO IN OMAN

Muhammad Shafiq Shahid
Sultan Qaboos University, Oman

Abstract

The metal ions well dispersed at zeolite framework are considered to be active sites of catalytic processes. Therefore, the incorporation of these metals into zeolites as isolated tetrahedral sites appears to be the important task. We have earlier shown that the incorporation of transition metal ions into vacant T-atom sites of framework zeolite is strongly favored when, in the first step, zeolite is dealuminated by treatment with nitric acid solution and then, in the second step, the incorporation of transition metal ions results in the reaction between the cationic metal species of the precursor solution and the SiO-H groups of vacant T-atom sites created by dealumination of zeolite. During my keynote talk the design of single-site zeolite catalysts with transition metal will be described and characterized by different physical techniques both at the macroscopic (XRD, BET, TPR, TEM) and molecular level (FT-IR, NMR, DR UV-Vis, XPS, EPR, XAFS). The application of metal single-site zeolite catalysts in environmental catalysis will be discussed. This two-step postsynthesis method applied in this work allowed obtaining vanadium and tantalum single-site zeolite catalysts active in different catalytic processes such as oxidative dehydrogenation of propane into propene, selective catalytic reduction of NOx to N2, production of 1,3-butadiene from renewable sources, including ethanol obtained from biomass. Their catalytic activity strongly depended on the speciation and amount of vanadium or tantalum incorporated into zeolite structure as well as their acidity.

Biography

Muhammad Shafiq Shahid is an Associate Professor in plant sciences at Sultan Qaboos University, Oman. He specializes in agricultural biotechnology and plant virology, focusing on plant virus epidemiology and plant virus host interaction. He has worked at Tokyo University of Agriculture, Japan, and the University of Arkansas, USA, on disease-resistant and sustainable fruit production. A published author in ISI journals, he is currently leading a His Majesty's Trust Fund project on tomato yellow leaf curl disease. His research aims to enhance tomato production in Oman and the GCC, contributing to regional food security.

Joint Event on
International Conference on
Plant Science and Molecular Biology
& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

DEVELOPMENT OF CHEESE ANALOGUE USING OLIVE OIL AND LACTOBACILLUS BULGARICUS

Muhammad Zulqarnain
Institute of Animal Sciences, China

Abstract

Cheese considered as a well-known dairy product which is manufactured in many varieties according to its texture and flavors. Cheese is formed by coagulation of casein and having high protein contents. Due to increase awareness of modern consumers' fortification of dairy foods including fresh cheese are in demand. Cheese analogues are made for fulfilling the demand of cheese. Cheese analogues are processed cheese-like product and enriched in nutrients. It is healthy and seems to be attractive when it is rearranged and prepared by using ingredients coming from natural source. Cheese analogue produced from olive oil is used as an alternate of cheese. Olive oil improves cardiovascular risk factors, such as endothelial dysfunction, blood pressure, postprandial hyper-lipidemia, lipid profiles, antithrombotic profiles and oxidative stress. The objective of present study is to develop cheese analogue using olive oil and Lactobacillus bulgaricus. Single step emulsification was done for fat stabilization. L. bulgaricus was isolated from yoghurt. Cheese analogue was subjected to physicochemical, microbiological and sensory analysis. Proximate analysis (moisture, pH, fat contents, ash, total solids and acidity) physicochemical analysis, sensory analysis and rheological analysis were performed. Physiochemical investigation has demonstrated that, with an increase in the olive oil level in cheese, non-significant pH, moisture, fat, total solids, total nitrogen and protein content were considerably influenced by olive oil amounts. Rheological research showed that olive oil quantity has a substantial effect on curd texture. Flavor and overall acceptance were significantly affected by days and concentration. Samples indicate more substantial results and general acceptance compared to other samples treated with minimum olive oil concentrations. The data obtained was analyzed statistically.

Biography

Zulqarnain has completed his masters from University of Agriculture, Faisalabad, Pakistan. His major of study during masters was Microbiology. He has also served for 4 years in dairy industry as an assistant manager microbiologist (quality). Currently he is studying Doctorate degree (Ph.D.) in Animal Nutrition and feed sciences at Chinese Academy of Agricultural Sciences. His research work is focused on milk quality, milk products and animal dairy farm.

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International Conference on
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& Agriculture and Horticulture
April 14-15, 2025 | Rome, Italy

CLIMATE-RESILIENT AGRICULTURE - A FUTURE BUILT WITH THE HELP OF SCIENCE, NEW TECHNOLOGIES, AND PARTNERSHIP

Reji Kurien Thomas
TOL Biotech, USA

Abstract

As climate change accelerates, agriculture is experiencing some of the most significant challenges it has seen in the past, and therefore needs radical change if the world is to feed itself in future. In this address, will discuss how advanced technologies, new science, and effective polices are coming together to create a 'climate-ready' agriculture. Using updated climate model projections, we emphasise the aggravating threats to agriculture production in different parts of the world. Such data context prompts a discussion of Climate-Smart Agriculture or CSA – an innovative approach based on scientific concepts and technologies.

Trends in Agricultural Technology Artificial Intelligence & Machine Learning - Introducing the artificial intelligence and machine learning programs in weather analysis, beneficial for farmers and crop yield assessment, as well as the use of predictive analytics for efficient pest control. Genomic Innovations – Modified CRISPR, gene editing tools, and more that change crop breeding for the release of heat, drought, salinity, and temperature-resistant crops. Robotics & Automation - Technology that would allow for large-scale application of precision farming by way of robotics and automation. Vertical Farming & Controlled Environment Agriculture - Investigating option of vertical farming and controlled environment agriculture as an adaptation strategy to climate related shocks and as a tool for increasing food production in urban and resource poor areas.

Pure Science and Technological Laws Quasi-Quantum Photosynthesis- Exploring other significant advancements in raising the efficiency of photosynthesis which may redefine the crop yield. Atmospheric Water Generation - Using algorithms of data optimization and quantum mechanics for affordable direct air capture and utilizing the dehumidification techniques to provide efficient solution to the water shortage in agriculture. Nanotechnology - Exploring the possibilities of using nanotechnology in targeted

nutrient management, pest & disease control and enhancement of soil health. Sustainability and Environmental Impact Carbon Sequestration - Premium Engineered Biochar & other organic

Biography

Reji Kurien Thomas is an avid aviator and hardened veteran, his journey with a career spanning over 33 years, blends relentless academic pursuit and unwavering commitment to global betterment. He is a visionary, empowering organisations as a Global Technology & Business Transformation Leader.

Dr Thomas is a visionary pioneer of technology proliferation and passionate about innovative future sustainable technologies & policy development around United Nations Sustainable Development Goals. A STEM Leader, Marketing Doyen & Brand Ambassador with a diverse career journey in technological science & diverse streams of engineering. He was awarded the prestigious Stephen Hawking award in Jan 2024 for innovation & scientific excellence & was also recognised as the "World's Best & Emerging Leader," and awarded at the House of Lords, UK in Oct 2022.

Dr Thomas's academic journey is a testament to his insatiable thirst for knowledge. A Harvard Leader of Excellence, he is also an extremely accomplished academician having undertaken eight doctorates, post doctorates and advanced research from Universities-Institutions as distinguished as Stanford, Harvard, Wharton, Kent State USA, Oxford, IIT-Delhi India and SSBM Geneva in fields as diverse as Computer Science, Marine, Aerospace & Mechanical Engineering, Technological Science & Strategic Management. He also holds Fellowships from CASI USA in the fields of CSR & Sustainability as well as the Royal Society of Arts London & ISDS Japan.

With a distinguished career in the Indian Navy he has executed scores of critical projects in quantum science technologies, strategic communication, aviation, e-learning, intranets, satellite technology, encryption, technological sciences and engineering. He has restructured infrastructure & network security policies for Tri-services & NSA under the Prime Minister of India and was commended at the highest echelons by the Government of India & lauded for Devotion to Duty. He received the Transformation Leader Award at New Delhi in Apr 2023 for Excellence as a Transformation Leader and commendation for exemplary achievements and immense contribution to the growth of the Indian Economy.

& inorganic amendments as excellent forms of c-sinks and improving the overall quality while reducing emission. Agroforestry & Regenerative Agriculture - Including Agroforestry and Regenerative Agriculture to improve land use and support wildlife, soil health and helping create sustainable agriculture and increase its response to climate change. Policy and Global Collaboration

Tech-Driven Policy Frameworks - Supporting the strategies for investing in technologies that will enable big changes in agriculture production, increased private sector participation, and innovation. Global Data Sharing & Open Science - Stressing on the international cooperation in data sharing and use of open source technology to promote the Climate and Agricultural data. Through the integration of these technologies the agricultural sector has the capability to not only mitigate for climate change, but also to enhance food security in the future. The intention of this presentation is to help, first and foremost, the stakeholders to become active agents of change and nurture the creation for a more robust and sustainable agrifood system of the world.

Joint Event on
International Conference on
Plant Science and Molecular Biology
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April 14-15, 2025 | Rome, Italy

THE NEGATIVE IMPACT OF URBANIZATION ON THE TRANSFORMATION OF URBAN FOREST ECOSYSTEMS

Suzana Ž. Mitrović
Institute of Forestry, Serbia

Abstract

The rapid industrial and economic development of countries that are trying to reach the standard of developed countries has a huge impact on the environment. Unfortunately, this development mostly affects forest complexes, agricultural land and abandoned areas near big cities. After the Second World War, enormous efforts and numerous declarations were made to change the awareness and attitude towards forest complexes and to give them, in addition to economic functions, other multifunctional role of forests. On the territory of the former SFRY, many forest complexes that had a multifunctional character were developed and built. Numerous problems in the past, as well as the economic crisis, returned the thinking of decision-makers to the level of industrialization, when forests were treated only as an economic resource. Urbanization led to forest complexes within the city environment becoming urban forests, an important element of the green infrastructure of Belgrade. The positive impact of urban forest ecosystems on the environment, such as air quality protection, soil erosion protection, flood prevention, regulation of water basins and other multipurpose functions of forests, has been drastically reduced. Due to other negative events in the past in the Republic of Serbia (wars, economic crisis, etc.), forests, especially those located near large and industrial cities, have not been given enough attention, primarily not in the restoration and sustainability of the ecosystem. Due to the fact that they no longer had economic value, these forest complexes were not properly managed for many years, which led to their devastation. For these reasons, numerous forest complexes in the surroundings of Belgrade, instead of having an impact on mitigating climate change, in many cases are converted into construction land, the forest is cleared and green buffer zones are turned into concrete heat islands. This course of urban development and the tendency of increasing construction and land occupation and bearing in mind the current state of the environment of the city of two million people, the forest ecosystems in the narrow and wider zone of the city must regain their multifunctional priorities in accordance with the principles of sustainable development, protection and improving the quality of the environment and getting a much bigger role in the development of the country. For these reasons,

Biography

Suzana Mitrović received her PhD in Biotechnical Science from the University of Belgrade in 2016, specializing in urban ecology. From 2009 to 2017, she worked as a research assistant at the Institute of forestry in Belgrade. In 2017 she was promoted to Senior Research Associate and in 2022 she become a member of the Scientific Council of the Institute. Her research topic mainly include environmental protection, landscape architecture and design, horticulture, urban ecology, bioremediation of degraded areas, phytoremediation, vegetation analysis and the impact of professional practises on mitigation the effects of climate change.

an analysis was made of a part of the forest complex, which is part of one of the largest and most important urban forests in Belgrade, and which is located in the wider city core. Through privatization, part of the land that was considered as a devastated forest complex was sold to a foreign investor who has numerous ideas in which direction to develop this complex. A detailed analysis of the forest complex was made, suggestions and guidelines for the improvement and integration of this complex into the existing environment were given.

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MECHANISMS OF CADMIUM/ZINC HYPERACCUMULATION IN *SEDUM ALFREDII* H

Xiaoe Yang [1], Lingli Lu[1], Shenke Tian[1] and Zhenli He[2]
[1]*Zhejiang University, China*
[2]*University of Florida, USA*

Abstract

Cadmium (Cd) pollution in soils is widespread and has increased the risk of food safety in China and the world as well. While zinc (Zn) deficiency in human is one of major "hinder hungry" problem in the world. Understanding the mechanisms of Cd /Zn hyperaccumulation is of great significance for phytoremediation of Cd contaminated soils and Zn biofortification for better human health. We firstly found *Sedum alfredii* H in an old mining area in China, being an extraordinary Cd / Zn co-hyperaccumulator, which has larger biomass and wider adaptation as compared to *Thlaspi caerulescens*. A serious studies have been conducted to clarify the processes of Cd/Zn hyperaccumulation. It was revealed that Cd/Zn hyperaccumulation in *Sedum alfredii* H is mainly controlled by shoot accumulation capacity and root uptake potential with facilitation of efficient transportation system, named a mechanism of "end point control". The shoot accumulation capacity for Cd/Zn is highly associated with the processes of metal cellular and subcellular compartmentation, apoplasmic sequestration, symplamic S-metabolism and anti-oxidation. Whereas the root uptake potential related closely to faster metal absorption and translocation, efficient xylem loading, rhizospheric activation, and endophytes facilitating, etc. The hyperaccumulator *Sedum Alfredii* H has an efficient metal transportation system, including greater uptake, faster translocation as well as efficient re-translocation network, in which several membrane metal transporters like Zips, HMAs, MTPs, Nramps, ABA played critical roles. Several Endophytes and plant regulators can effectively enhance the growth and metal hyperaccumulation in *Sedum alfredii* H., thus increasing considerably phytoremediation efficiency in the field.

Biography

Xiaoe Yang is Yangtze River Scholar Professor, research leader at College of Environ and Resource Sci, Zhejiang University, China. She is ASA and SSSA fellow, Acadamican of European Academy of Natural Science, and internationally recognized as an authority on plant nutrition, phytoremediation of polluted environments, and agro/biofortification of micronutrients. Dr. Yang has authored or co-authored 2 books, 17 review papers, 360 SCI refereed journal articles. Her publications were cited over 38800 times by refereed scholarly journals, and she has a H index of 103. She supervised 108 graduate students, received 22 outstanding awards or honors, provided 18 invited keynote presentations at international conferences.

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MECHANISM OF PLANT RESOURCES RELATIONSHIP REGULATION AND AGRICULTURE HIGH QUALITY DEVELOPMENT

Zhongsheng Guo
Northwestern A & F University, China

Abstract

Since 2017, the concept of high-quality development appeared in China, so, Agriculture development had entered the new stage of Agriculture, high-quality development. Agriculture high quality development is to take some measures and methods to make the land produce the maximum output and services to meet people's yearning for a better life and the needs of agricultural production services. However, because overuse of fertilizer, pestcide and introduction of un-native plant species or vatiaries, exotic plant species or varieties, plant resources relationship has changed into unbalanced relation, which will easily resulted in soil degradation, vegetation degradation and crop failure or waste of soil water resources, and is not good for the sustainable utilization of soil resources and Agriculture high-quality development. Therefore, it is necessary to adjust the plant resources relationship and obtain the maximum yield and services to realize the sustainable utilization of resources and crops high-quality management. However, there is not a universally accepted theory to provide guidance of regulating plant resources relationship in practice.

After a couple of years research, the results show that the theories of plant water relationship regulation and Agriculture high-quality development includes the resources use limit by plants (RULP) , vegetation carrying capacity (VCC) and the critical period of plant resource relationship regulation, which includes the space resources use limit by plants (SRULP) , space vegetation carrying capacity (SVCC) and the critical period of plant space relationship regulation in soil water and soil nutrient rich regions, the soil water resources use limit by plants (SWRULP) , soil water vegetation carrying capacity (SWVCC) and the critical period of plant water relationship regulation in the water limited regions and the soil nutrient resources use limit by plants (SNRULP) , soil nutrient vegetation carrying capacity (SNVCC) and the critical period of plant nutrient relationship regulation in soil nutrient limited regions. For example, in water-limited regions, the SWRULP is the soil water resources in the maximum infiltration depth (MID) in which the soil water content in every soil layer equal to wilting coefficient, and expressed by the wilting coefficient of indicate

Biography

Zhongsheng Guo is the professor at the Northwestern A & F University. He obtained the position of Professor at Northwestern A & F University. He put forward the resources use limit by plants (RULP), vegetation carrying capacity (VCC), the critical period of plant resource relationship regulation and the new theory of soil and water conservation. Now he is the leader of "innovation China" Agricultural high-quality production and industry Service Group.

plant in a plant community.

SWVCC is the population or density of indicator plants in a plant community when the soil water supply is equal to soil water consumption in the root zone and the critical period of plant resources relationship regulation (CPPSRR), which changes with vegetation type, site condition and time. When soil water resources in the MID is equal to the SWRULP, the plant water relation enters CPPSRR. The ending time of CPPSRR is the ineffective time of plant resources relationship regulation. To get the maximum yield and service, we must select best plant species or varieties, take suitable initial planting density and effective measures or methods to ensure plant normal grow and get the cultivate goal. If the plant density is more than the VCC in the critical period of plant resources relationship regulation, plant resources relationship must be regulated based on VCC to get the maximum yield and service to realize sustainable use of soil resources and high-quality production. As for some fruit or crops, the leaf and fine fruit relation must be regulated according to the quantity of leaf when the plant density is equal to the VCC in the critical period of plant resources relationship regulation. High-quality fruit is fruit that meets the needs of the market.

Note:

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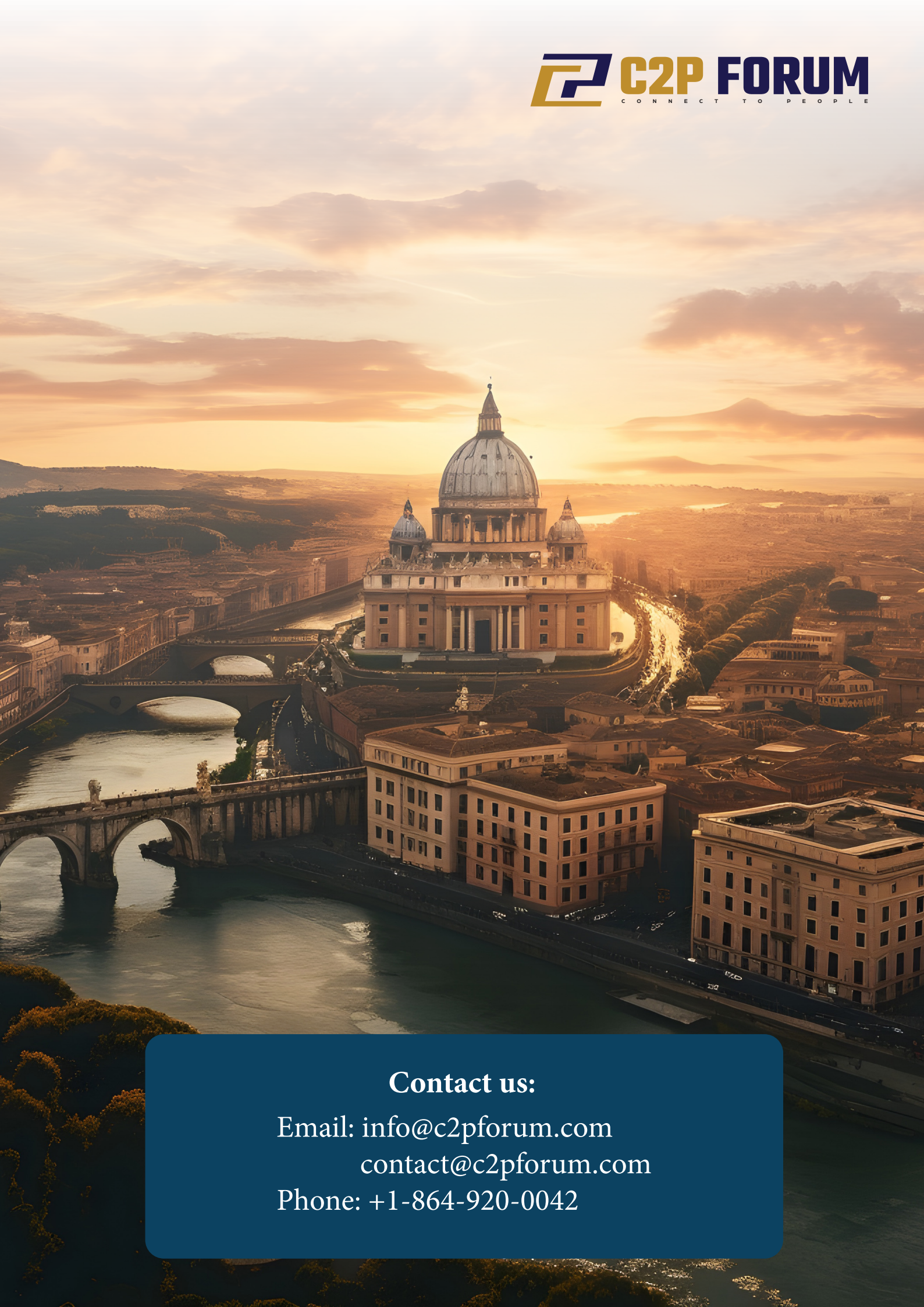

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