Joint Event

International Conference on

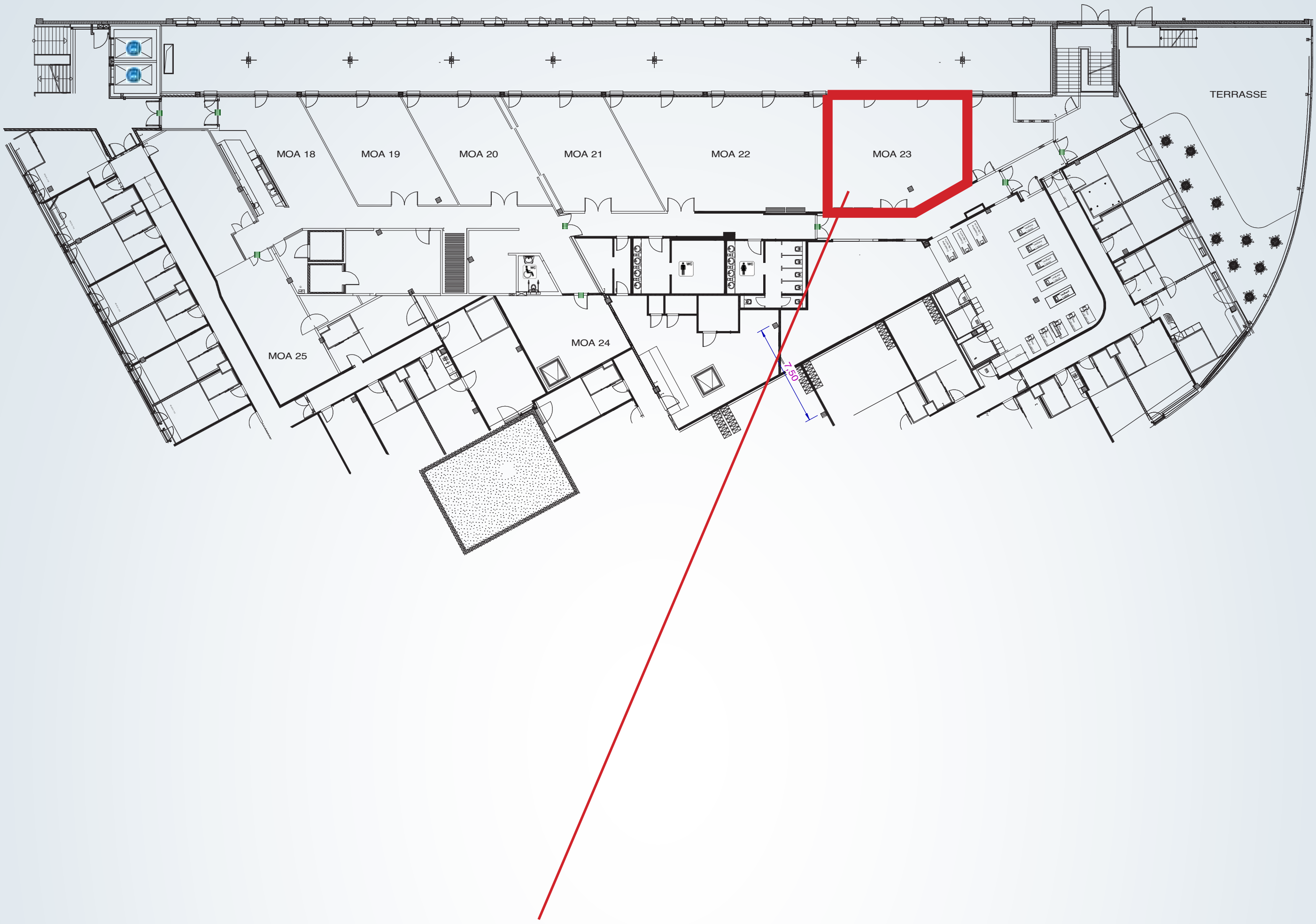
Agriculture Engineering
&
Plant Science

June 23-24, 2025 | Berlin, Germany

Contact us:
Contact: +1-770-832-7291
Whatsapp: +1-404-759-9729

Scisynopsis LLC
Atlanta, GA 30326
USA

Floor Map



Conference Hall - MOA 23

Wifi Details

Username: Moa Berlin
Password not required - Open Wi-Fi

Speaker Representations

Conference Programme

Day 1

23rd June

Session Chairs

Mohammad Zare, Leibniz Institute of Agricultural Engineering and Bio-Economy, Germany

Łukasz Szałata, Wroclaw University of Science and Technology, Poland

Conference Programme

Day 1, June 23, 2025	
Meeting Hall @ MOA 23	
8.00 - 8.45	**Registrations**
8.45 - 09.00	**Introduction**
Keynote Presentations	
09.00 - 09.40	**Mohammad Zare, Leibniz Institute of Agricultural Engineering and Bio-Economy, Germany**
Title: Integrating Climate Data and Technology for Resilient Ecosystem Restoration and Agricultural Drought Mitigation	
09.40 - 10.20	**Łukasz Szałata, Wroclaw University of Science and Technology, Poland**
Title: Aspects of the Rearing and Production of Pigs and Poultry" Commission Administrative Decision (EU) 2017/302 of 15 February 2017 Establishing the Best Techniques (BAT) Conclusions for the Concerted Practice of Rearing Poultry or Pigs in Accordance with Directives 2010/75/EC of the European Parliament and of the Council	
Networking and Refreshments : 10.20 - 10.40 @ MOA 21	
10.40 - 11.20	**Clairmont Clementson, North Dakota State University, USA**
Title: Optimizing Post-Harvest Processes to Enhance Product Quality for Processors and Consumers	
Oral Presentations	
Session Chair	**Mohammad Zare, Leibniz Institute of Agricultural Engineering and Bio-Economy, Germany**
Session Chair	**Łukasz Szałata, Wroclaw University of Science and Technology, Poland**
Sessions: Climate Smart Agriculture | Digital Agriculture | Food Safety and Quality Engineering | Principles of Water and Soil Engineering | Agricultural Sciences | Plant Genetics and Genomics | Sustainable Agriculture Practices | Plant Biotechnology | Plant Ecology | Farm Machinery and Equipment | Agronomy	
11.20 - 11.45	**Stefan Gandev, Fruit Growing Institute, Bulgaria**
Title: Propagation of Apple, Pear, Plum, and Sweet Cherry by the Method of Hot Callus with Two Grafting Techniques	

11.45 - 12.10	**Mateusz Jedrusik, Jotachem, Poland**
Title: From Lab to Field - Role of in vitro Plant Techniques in Building a Sustainable Future	
12.10 - 12.35	**Raminta Antanyniene, Lithuanian Research Centre for Agriculture and Forestry, Lithuania**
Title: Transcriptome Analysis of Genes Involved in Defence Response in European Plum with *Monilinia fructigena* Infection	
12.35 - 13.00	**Norrizah Jaafar Sidik, Universiti Teknologi MARA, Malaysia**
Title: Temporary Immersion Bioreactor for the Cultivation of Dendrocalamus as per Bamboo Species	
Group Photo: 13.00 - 13.10	
Lunch @ Restaurant: 13.10- 14.00 @ MOA Eat (1st Floor)	
14.00 - 14.25	**Ewa Szwajczak, University of Silesia in Katowice, Poland**
Title: Biostimulants in Agriculture – Differential Response of Cultivated and Wild Plants among Various Functional Groups to Glycine Betaine	
14.25 - 14.50	**Rokas Antanynas, Lithuanian Research Centre for Agriculture and Forestry, Lithuania**
Title: Assessing the Effect of Intercropped Grain Legume Service Crops on Winter Wheat and Soil Processes	
14.50 - 15.15	**Seun Nubi, Sustainable Solutions Services Limited, UK**
Title: Life Cycle Sustainability Assessment of Waste to Energy Systems in the Developing World: A Review	
15.15 - 15.40	**Ishaya Musa Dagwa, University of Abuja, Nigeria**
Title : Design Modification and Performance Evaluation of a Multipurpose Seed Planter for Smallholder Farmers in Sub-Saharan Africa	
Poster Presentations 15.40 - 16.00	
Poster Judge	**Marijana Pešakovic, Fruit Research Institute, Serbia**
Poster Judge	**Cheng-Wei Yu, National Taiwan University, Taiwan**

PP- 01	**Marijana Pešakovic, Fruit Research Institute, Serbia**
Title: Biocontrol Potential of *Bacillus spp*. for Sustainable Postharvest Management and Quality Enhancement in Agriculture	
PP- 02	**Tanakarn Monshupanee, Chulalongkorn University, Thailand**
Title: Mimicking Lichen Symbiosis: Erythromycin-Mediated Co-Flocculation of Microalgae and Fungi in Liquid Culture Facilitates Biomass Harvesting for CO_2 Capture and Protein Production.	
PP- 03	**Cheng-Wei Yu, National Taiwan University, Taiwan**
Title: A Multi-Scale Approach to Mitigate Agricultural Pollution in Deji Reservoir: Evaluating Low-Impact Development Strategies Using SWAT and SWMM Models	
PP- 04	**Yun Ji Park, Changwon National University, South korea**
Title: Effect of Light Intensity on Growth and Volatile Compound Content of *Valeriana fauriei* Cultivated in a Walk-in Growth Chamber	
PP- 05	**Carla Marusic, ENEA, Italy**
Title: Expression of A Recombinant Human Granzyme B (GrB) in *Nicotiana benthamiana* Plants for Tumour-Targeting Applications	
Networking & Refreshments: 16:00 - 16:30 @ MOA 21	
16.30 - 16.55	**Lisa Scramoncin, University of Ferrara, Italy**
Title: Local Adaptation and Phenotypic Plasticity Shape the Response to Climate Warming but Drought Hinders Resilience to Heat Waves of the Arctic-Alpine Herb *Viscaria alpina*	
16.55 - 17.20	**Er Jeet B Chand, Ministry of Agriculture & Livestock Development, Nepal**
Title: Climate Change and Water Balance Nexus for Rice-Based Farming System in Nepal	
Video Presentation	
VP01	**Christeldah Mkhonto, University of Mpumalanga and Agricultural Research Council, South Africa**
Title: Population and Distribution of *Mimusops zeyheri* Sond in Two Agroecologies: A Comparative Study of Ehlanzeni, and Vhembe Districts of South Africa	

E- Poster Presentation	
EP001	**Mohammed El Khasmi, Ben M'Sick Faculty of Sciences ,Hassan II University of Casablanca, Morocco**
Title: Evaluation of the Antioxidant Effect of Black Seed Oil on Blood and Meat in Rabbits Exposed to Heat Stress	
Day-1 Concludes followed by Certificate Distribution	

Day 2

24^{th} June

Session Chairs

Marcello Donini, ENEA, Italy
Łukasz Szałata, Wroclaw University of Science and Technology, Poland

Day 2 - June 24, 2025	
Meeting Hall @ MOA 23	
Keynote Presentations	
09.00 - 09.40	**Avinash M Tope, Kentucky State University, USA**
Title: Helping Small-Scale and Socially Disadvantaged Farmers with Irrigation Water Quality	
09.40 - 10.20	**Marcello Donini, ENEA, Italy**
Title: Improving the Penetration of a Tumor-Targeting Plant-produced Monoclonal Antibody in Glioblastoma Neurospheres by Electroporation	
10.20 - 11.00	**Łukasz Szałata, Wroclaw University of Science and Technology, Poland**
Title: Impact of Implementing a Deodorisation System on the Functioning of a Waste Management Plant	
Oral Presentations	
Session Chair	**Marcello Donini, ENEA, Italy**
Session Chair	**Łukasz Szałata, Wroclaw University of Science and Technology, Poland**
Sessions: Food Safety and Quality Engineering | Plant Biotechnology | Environmental Impact Agriculture | Sustainable Agriculture Practices | Principles of Water and Soil Engineering | Plant Biochemistry | Agriculture Business | Plant and Environment | Digital Agriculture | Irrigation and Drainage System | Climate Smart Agriculture | Plant and Environment | Plant Ecology	
11.00 - 11.25	**Elena Zolotareva, M.G.Kholodny Institute of Botany, Ukraine**
Title: Various Forms of Soluble Leaf Carbonic Anhydrase in C3 Plants and Their Inhibition by Heavy Metal Ions	
Networking and Refreshments: 11.25 - 11.45 @ MOA 21	
11.45 - 12.10	**Petra Andrade Hoyos, National Institute of Forestry, Agricultural and Livestock Research, Mexico**
Title: Selection of Rice Parents with Resistance to Emerging Diseases Influenced by Climate Change	
12.10 - 12.35	**Martin Bauknecht, University Hohenheim, Germany**
Title: Farmers Willingness to Contribute to Realize an Electricity Self-Sufficient Village using Agrivoltaics. Results of a Survey	

12.35 - 13.00	**Mohamed Arame, University Mohamed VI Polytechnic, Morocco**
Title: Hyperspectral Imaging for Early Detection of Chickpea Fungal Infections: A Preliminary Study on *Ascochyta blight*	
Lunch @ Restaurant: 13.00 - 14.00 @ MOA Eat (1st Floor)	
14:00 - 14:25	**Dimitris K. Papanastasiou, University of Thessaly, Greece**
Title: Agriculture Stress Under Climate Change Scenarios	
14:25 - 14:50	**Anastasia Poupkou, Academy of Athens, Greece**
Title: Adaptation Measures to Reduce the Vulnerability of the Greek Agricultural Sector in Terms of Crops Water Stress and Livestock Thermal Stress under Climate Change Scenarios	
14:50 - 15:15	**Chilipa Lorraine, University of Zambia, Zambia**
Title: Screening for Locally Available Entomopathogenic Nematodes for Potential Biological Control of Fall Armyworm, *Spodoptera frugiperda*, in Maize in Zambia	
15:15 - 15:40	**Yashoda Gaire, Tribhuvan University, Nepal**
Title: Formation of Saponin from Korean Herbal Plant using Mushrooms Enzyme	
15.40 - 16.05	**Arnab Bandyopadhyay, North Eastern Regional Institute of Science and Technology, India**
Title: Coupled Hydrologic and Hydraulic Modelling for Predicting Soil Moisture: A Case Study	
Networking and Refreshments : 16.05 - 16.30 @ MOA 21	
16.30 - 16.55	**Aditi Bhadra, North Eastern Regional Institute of Science and Technology, India**
Title: ArcRUSLE: A User-Friendly GIS Tool to Estimate Soil Erosion using Remote Sensing Images	
Day-2 Concludes followed by Certificate Distributions and Vote of Thanks	

Virutal Prsentation

Day 1 June 23, 2025, (09.30 BST)	
Oral Presentations	
09:30-09:55	Kanwal Shazadi, The University of Queensland, Australia
Title: Does Late Water Deficit Induce Root Growth or Senescence in Wheat?	
09:55-10:20	Vijayan Gurumurthy Iyer, Bihar Institute of Public Administration & Rural Development (BIPARD), India
Title: Life Cycle Assessment (LCA) Process of the Seed- Cotton (or Kapas)	
10:20-10:55	Rajesh J. Panchal, College of Agriculture, Madhav University, Rajasthan
Title: Loop Mediated Isothermal Amplification (LAMP)	
10:55-11:20	Nezha Kharraz, Hungarian University of Agriculture and Life Sciences, Hungary
Title: Integrated Logistic Growth Model for Resource Efficient Smart Agriculture	
11:20-11:45	Terefe Taye, SNV, Ethiopia
Title: Innovations in Dairy Extension for Low- and Middle-Income Countries: Enhancing Productivity and Adoption by Synchronizing Smart Dairy Farming Practices with Lactation Stages	
Keynote Presentations	
11:45-12:25	Narendra VG, Manipal Academy of Higher Education Manipal, India
Title: Soft Computing Applications in Agricultural and Biological Engineering	
12:25-13:05	Sergio Molinari, Inst of Sustainable Plant Protection-National Council of Research (IPSP-CNR), Italy
Title: Microbiome-Assisted Agriculture for Plant Protection	
13:05-13:45	VP Ramani, Gujarat Natural Farming Science University, India
Title: Natural Farming: A Sustainable Path to Agricultural Resilience	

13:45-14:25	**Yanal Alkuddsi, Lithuanian Research Centre for Agriculture and Forestry, Lithuania**
Title: A Dynamic Framework for Cross-Sectoral Impact Assessment of Modern Technologies on Sustainable Development Goals in Forestry	
14:25-15:05	**Ahmad Ali, Florida Agricultural & Mechanical University, USA**
Title: Enhancing Garlic Nutrition with Selenium and *Arbuscular mycorrhizal* Fungi (Amf): A Sustainable Approach to Biofortification in Horticultural Production	
Oral Presentations	
15:05-15:30	**Paola Leonetti, Inst. of Sustainable Plant Protection-National Council of Research (IPSP-CNR), Italy**
Title: Biotechnological Approaches in Microbiome-Assisted Plant Protection	
15:30-15:55	**Wojciech Simon Waliszewski, Colegio Bolivar, Colombia**
Title: How To Develop Interest in the Plant Sciences; Lessons from An International School. The Agricultural Plant Science Elective and Bolivar Garden at Colegio Bolivar, Cali, Colombia	
15:55-16:20	**Yana Mizrahi, Volcani Institute, Israel**
Title: Climate Resilience in Olive Cultivars: Effects of Elevated Temperatures on Productivity and Oil Quality	
16:20-16:45	**Dave White, Climate Change Truth Inc. USA**
Title: The Essential Role of Photosynthesis in Defining Net Zero Carbon Dioxide Emissions for Equilibrium Calculations	
16.45 - 17.10	**Shirin Ghatrehsamani, Penn State University, USA**
Title: Application of Digital Twing and Virtual Reality to Enhance Safety in Agricultural Equipment	
Program Concludes followed by Vote of Thanks	

Day 1

Agritech & Plant Science

Keynote presentations

INTEGRATING CLIMATE DATA AND TECHNOLOGY FOR RESILIENT ECOSYSTEM RESTORATION AND AGRICULTURAL DROUGHT MITIGATION

Mohammad Zare
Leibniz Institute of Agricultural Engineering and Bio-economy E.V. (ATB), Germany

Abstract:

Climate change and human activities are intensifying droughts and degrading vital ecosystems such as peatlands, which are crucial for carbon sequestration, water regulation, and biodiversity. This degradation poses a significant threat to global sustainability, impacting both natural environments and human livelihoods. To address these challenges, a pioneering initiative harnesses the power of cutting-edge technologies including hydrological modeling, artificial intelligence, remote sensing, robotics, and crowdsourced data to revolutionize drought management and ecosystem restoration. At the core of this initiative lies the development of real-time monitoring systems that provide invaluable insights into the state of ecosystems and the extent of drought conditions. By employing predictive models and risk indices such as the Peatland Health Index (PHI), the project enables decision-makers to receive early warnings about potential crises, allowing for timely interventions. These capabilities enhance adaptive management strategies that can mitigate the adverse effects of droughts and restore degraded ecosystems effectively. Moreover, this approach adopts an interdisciplinary framework that bridges the gap between scientific research and practical application. By aligning with various Sustainable Development Goals (SDGs), the initiative not only contributes to environmental sustainability but also fosters economic growth and social equity. Scalable solutions are developed to enhance community resilience, protect vital natural resources, and support sustainable agricultural practices that are resilient to climate variability. By integrating sophisticated technologies with community engagement and scientific expertise, this initiative stands as a beacon of hope in the fight against climate-induced challenges, ultimately paving the way for a sustainable future that benefits both ecosystems and societies worldwide. This innovative approach not only addresses immediate threats but also builds a foundation for long-term ecological health and societal well-being.

Biography

Mohammad Zare is currently working as a Scientist at the Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Potsdam, Germany. He has been working on a lot of subjects, basically covering the whole field of hydrology, climate change and application of data science in precision agriculture. He got his MSc. in water resources engineering and having completed his PhD in Civil Engineering at the University of Kassel, Germany in July 2017. he has worked in both academia and private R&D over the past years: Postdoc fellow at ATB, Potsdam (Won European Commission's ERA-NET scheme in the framework of ICT Agri Food, 2017-2019); R&D Scientist (Won The industrial fellowship from Luxembourg National Research Fund, 2020-2022); University lecturer (Statistics and Data Science, IU International University of Applied Sciences, Berlin, 2021-2022). Moreover, he has been active in editorial duties and publishing i.e. he acting as a keynote speaker of international conferences, scientific advisory (Postdoc, PhD and MSc. students), reviewing of journals and writing publications in the form of a book, peer-reviewed papers, proceedings, book chapters and scientific project reports.

ASPECTS OF THE REARING AND PRODUCTION OF PIGS AND POULTRY" COMMISSION ADMINISTRATIVE DECISION (EU) 2017/302 OF 15 FEBRUARY 2017 ESTABLISHING THE BEST TECHNIQUES (BAT) CONCLUSIONS FOR THE CONCERTED PRACTICE OF REARING POULTRY OR PIGS IN ACCORDANCE WITH DIRECTIVES 2010/75/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

Łukasz Szałata
Wroclaw University of Science and Technology, Poland

Abstract:

In this presentation, the author will discuss the BAT implementation system for animal husbandry and breeding in accordance with Aspects of the rearing and production of pigs and poultry" Commission Administrative Decision (EU) 2017/302 of 15 February 2017 establishing the best techniques (BAT) conclusions for the concerted practice of rearing poultry or pigs in accordance with Directives 2010/75/EC of the European Parliament and of the Council. Particular attention will be paid to the issues of compliance with BAT, the environmental management system will be discussed, including the odour management plan and the issues of feeding and keeping animals in the aspect of reducing the impact on the environment (reducing odour nuisance).

The summary will present good practices used in breeding.

Biography:

Łukasz Szałata, MBA – has been employed at the Wrocław University of Science and Technology since 1.10.2010. He has been the President of the Branch of the Scientific Society of Organization and Management in Wrocław since 2022. A long-time expert in the field of engineering, protection, and economics and environmental management, reports, environmental impact assessments, integrated IPPC permits, technological and environmental consulting for installations that potentially, always significantly affect the environment and renewable energy sources, a court mediator in the field of environmental protection, including, among others, technologies for reducing odorous/odorous impact, and a member of advisory bodies in the field of broadly understood environmental protection, and is also a court mediator in the field of environmental protection. Co-author of the study commissioned by the Ministry of the Environment "List of chemical substances and compounds that cause odor nuisance" adopted on November 7, 2016. Author of the monograph "Proecological dialogue for the sustainable development of Lower Silesia" published in December 2015 and co-author of the monograph "Green city: in care for the life and health of the inhabitants of Lower Silesia" (2017), as well as Nature-based solutions: handbook (2018) and co-author of the monograph "Identification of malodorous compounds in atmospheric air and microbiological diagnostics around real objects (2024). Research and teaching assistant at the Department of Environmental Biology and Atmosphere Protection at the Faculty of Environmental Engineering, Wrocław University of Science and Technology. In the years 2016-2022 he also represented the University of Environmental and Life Sciences in Wrocław, implementing a grant from the European Commission as part of the project "Grow Green - Green Cities for Climate and Water Resilience, Sustainable Economic Growth". He was the deputy coordinator of the research and innovation program within Climate KIC. He also conducts postgraduate studies at the University of Economics "Environmental Protection Manager" and "Production Process Management" and at the Wrocław University of Science and Technology "Water, Sewage and Waste Technology". He also holds the position of President of the Management Board of the EKO-BIEGŁY® Association based in Wrocław since 22.02.2011, which carries out tasks aimed at protecting the natural environment and striving for eco-development, by developing environmental impact assessments and comprehensive implementation of projects: research, studies and analyses concerning various areas of environmental protection. He is the author and co-author of many environmental impact assessments of projects, integrated permits and expert opinions in the field of environmental protection. He cooperates closely with the Regional Administration Authorities responsible for the state of the environment in Lower Silesia. Author of 75 publications in conference materials, industry journals in the field of economics, management, engineering and environmental protection, author and co-author of 5 scientific monographs and an educational film in the field of air protection developed in cooperation with the Provincial Fund for Environmental Protection and Water Management in Wrocław.

OPTIMIZING POST-HARVEST PROCESSES TO ENHANCE PRODUCT QUALITY FOR PROCESSORS AND CONSUMERS

Clairmont Clementson
North Dakota State University, USA

Abstract:

The quality of agricultural products post-harvest is influenced by a range of operations designed to maintain their freshness, safety, and nutrient value. These operations, which may include drying, cleaning, storage, and packaging, are integral to the value chain, affecting both the end-product quality for consumers and the processing efficiency for manufacturers. However, many conventional post-harvest practices often lack the precision needed to fully preserve the nutritional and functional attributes of products, leading to significant losses in quality and nutrient density. This presentation explores innovative post-harvest strategies aimed at optimizing product quality across the value chain, with a particular focus on cereals, legumes, and oilseeds.Key areas discussed include advanced drying technologies that precisely manage moisture levels, minimizing degradation and preventing microbial contamination; optimized storage solutions that reduce nutrient losses and prolong shelf life; and the application of sorting and grading technology to ensure uniform quality and maximize market value. Emphasis is placed on recent developments in digital and automation technology, such as sensors and AI-driven quality control, which offer enhanced control over these operations. These technologies not only streamline processing but also improve food safety and consistency, reducing waste and energy costs.

This research also evaluates the economic impact of adopting these practices, providing data on potential cost savings, increased product lifespan, and improved consumer satisfaction. The goal is to inform stakeholders in agricultural production, processing, and supply chain management about practical and sustainable strategies for maximizing product quality post-harvest, ultimately benefiting processors, consumers, and the environment through better resource efficiency and reduced waste.

Biography

Clairmont Clementson is an Assistant Professor in the Department of Agricultural and Biosystems Engineering at North Dakota State University. He holds a Ph.D. in Agricultural Engineering from Purdue University, an M.S. in Agricultural Engineering from the University of Illinois, and a B.S. in Mechanical Engineering from the University of Guyana, Turkeyen, Guyana.With a focus on granular material handling, particle technology, bioprocessing, and the storage and processing of biological materials, Dr. Clementson's research aims to address key challenges in agricultural engineering. His teaching responsibilities make up 40% of his role, while research constitutes 60%.In addition to his academic responsibilities, Dr. Clementson is a licensed Professional Engineer (PE) and a Project Management Professional (PMP). He is an active member of the American Society of Agricultural and Biological Engineers (ASABE), contributing to the advancement of agricultural engineering through both practice and research.

Day 1

Agritech
&
Plant Science

Oral Presentations

PROPAGATION OF APPLE, PEAR, PLUM, AND SWEET CHERRY BY THE METHOD OF HOT CALLUS WITH TWO GRAFTING TECHNIQUES

Stefan Gandev, Plamen Ivanov and Angel Dimitrov
Fruit Growing Institute, Plovdiv, Agricultural Academy, Bulgaria

Abstract:

In horticultural practices, maintaining the genetic integrity and phenotypic traits of parent stock is essential for successful propagation strategies. The season and grafting methodologies are particularly influential in determining the success rates of grafting for certain genotypes. Various techniques can be employed to enhance the nursery production system and address associated challenges, tailored to the specific species under consideration. Vegetative propagation is a significant production method utilized in the cultivation of numerous fruit species and rootstocks, as it holds substantial economic importance. The aim is to investigate the possibility of propagating the fruit species of apple, pear, plum and sweet cherry in an installation with a hot callus using different propagation techniques.The study focused on the propagation of pome species, specifically apples and pears, as well as stone species, which include plums and sweet cherries. The methodology employed a hot callus technique facilitated by a hot water system. Grafting was conducted using both the 'cleft grafting' and 'whip-and-tongue' techniques. The key findings of the experiment are as follows: The apple, pear, and plum fruit species demonstrated a higher percentage of callus formation, adaptation, and successful production of planting material compared to the sweet cherry. The highest percentage of plants that successfully formed callus was observed in apples, ranging from 88.6% to 96.3%. This was followed by plums, which had a success rate of 78.8% to 94.4%, and pears, with a range of 73.8% to 86.9%. In contrast, the sweet cherry, a stone fruit species, exhibited the lowest percentage, with callus formation rates between 58.8% and 68.8%.The experimental results have important practical implications. They indicate that utilizing a hot water system during the winter dormancy of fruit species such as apple, pear, and plum promotes successful propagation. Therefore, this method is highly recommended for these species in practice.

Biography

Stefan Gandev is a professor, PhD, and DSc. in the field of fruit growing. He is the author of 108 publications and a co-author of 4 monographs. He has also developed technology for walnut propagation and is a co-breeder of two new walnut cultivars. Professor Stefan Gandev is the Chairman of the Scientific Council for Fruit Growing and Viticulture at the Agricultural Academy, a member of the editorial board of the journals 'Plant Sciences', 'Journal of Mountain Agriculture on the Balkans', and 'Acta Horticulturae' issues 1139 and 1259, member of the Advisory Board on fruit growing to the Minister for Agriculture and Food of the Republic of Bulgaria and member of the Management Board of Agricultural Academy. He has been a convener of an international symposium and has been a moderator and member of the scientific committee of a number of other international symposia. Prof. Stefan Gandev is a member of the 'Plant Genetic Resources' and 'Pome and Stone Fruits' commissions of the International Society for Horticultural Science.

FROM LAB TO FIELD - ROLE OF *IN VITRO* PLANT TECHNIQUES IN BUILDING A SUSTAINABLE FUTURE

Mateusz Jędrusik
Independent Researcher, Poland

Abstract:

The growing need for food security, biodiversity conservation, and sustainable agriculture in the context of climate change calls for the development of innovative plant-based technologies. *In vitro* plant techniques such as tissue culture, somatic embryogenesis, micropropagation, and synthetic seed production have become powerful tools to address these global challenges. This presentation will explain the contribution of *in vitro* methodologies to sustainable practices, genetic conservation, and improved crop resilience. Micropropagation enables the rapid, large-scale production of disease-free, genetically uniform planting material, vital for boosting agricultural productivity. Somatic embryogenesis facilitates the propagation of elite and recalcitrant species, aiding the conservation of endangered plants and ecological restoration. *In vitro* selection under stress conditions (e.g., salinity, drought, or heavy metals) allows for the development of tolerant lines suited for climate-adapted agriculture. Cryopreservation and synthetic seed technologies further support long-term preservation of plant genetic resources. Recent advances, including the integration of gene-editing tools with *in vitro* systems, have accelerated the development of plant varieties with improved tolerance to biotic and abiotic stresses. *In vitro* platforms also play a growing role in the production of high-value bioactive compounds and plant-derived pharmaceuticals, contributing to the green economy and reducing reliance on synthetic chemicals. Despite significant promise, challenges such as cost, somaclonal variation, and limited scalability remain. Future directions include the development of automated propagation systems, bioreactor applications, and integration with beneficial microbiomes to enhance plant performance. *In vitro* plant technologies are a foundational element of sustainable and resilient plant-based solutions, with wide-reaching implications for addressing urgent agricultural and environmental needs worldwide.

Biography

Mateusz Jędrusik works at the intersection of plant biotechnology and applied research, with a focus on in vitro techniques such as tissue culture and micropropagation. Currently engaged in the development and support of plant-based agricultural products at Jotachem, he combines lab-based skills with field-level insight, aiming to improve the reliability, quality, and efficiency of plant production systems. His interests include low-cost propagation methods, stress-tolerant plant material, and practical uses of biotechnology in small- and mid-scale agricultural contexts. Through his experience in both scientific and commercial settings, he has gained a broad perspective on how technical solutions are translated into usable outcomes. He's particularly interested in the challenges of scale, consistency, and integration of lab innovations into real-world growing environments.

With a background in plant science and hands-on experience in product development and technical support, he offers a practical view on how in vitro tools can contribute to more sustainable and efficient crop production. His approach is shaped by curiosity, experimentation, and a strong respect for the complexities of plant systems.

TRANSCRIPTOME ANALYSIS OF GENES INVOLVED IN DEFENCE RESPONSE IN EUROPEAN PLUM WITH *MONILINIA FRUCTIGENA* INFECTION

Antanyniene Raminta, Kurgonaitė Monika and Frercks Birutė
Lithuanian Research Centre for Agriculture and Forestry, Lithuania

Abstract:

One of the most important criteria for European plum (*Prunus domestica*) breeding is disease resistance. However, the most prevalent disease for plums in Europe is caused by the fungal *M. fructigena* pathogen. Plum fruit resistance to brown rot disease depends on constitutive defensive mechanisms. A higher knowledge of plum resistance mechanisms to fungal infection, at the genetic level would be beneficial for identifying resistant plant resources for *M. fructigena* infection. The genes of the European plum, involved in the defence response to fungal *M. fructigena* infection have yet to be identified. Fruits of the 'Victoria' plum (moderately susceptible to brown rot) and *M. fructigena* fungi were collected at the Institute of Horticulture of the Lithuanian Research Centre for Agriculture and Forestry (LRCAF) orchards in 2024. The fruits were sterilized, wounded and artificially injected with the pathogen. In this study, 18 samples (including 3 biological replicates) of the plum control and plum fruit infected with *M. fructigena* at three sampling points: 24, 48 and 72 h post-infection (hpi) were analyzed by transcriptome sequencing. The highest number of differentially expressed genes (DEGs) in plum during fungal infection was observed after 72 hpi when the highest number of activated and suppressed genes were found. During the infection, 41 DEGs were identified as responsible for defence response. The highest gene expression of pathogenesis-related group genes was observed after 48 hpi, and MLO-like group genes after 72 hpi. The results indicate the highest response to fugal *M. fructigena* pathogen in the European plum pulp is after 48 h post-infection. The transcriptomic analysis of plum allows us to understand the genetic mechanisms of interaction between host plant and pathogen. This knowledge is essential for pathogen- resistant cultivars development.

Biography

Raminta Antanyniene has bachelor's and master's degrees in Life Sciences, Biology and Genetics, and Molecular Biology and Biotechnology programs, respectively. Currently, she is a PhD student in the Agronomy program at the Department of Orchard Plant Genetics and Biotechnology, Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry (LAMMC). Topics degrees she aimed to research the main fungal disease of orchard plants - brown rot blossom blight caused by Monilinia spp. pathogens, by analyzing host plants and fungi at molecular and genetic levels. She has molecular biology and genetics expertise, focusing mainly on genotyping species. Moreover, she is interested in the applicability of next-generation sequencing technologies such as Oxford Nanopore Technology's platform. She is active in project preparation and is open to international collaboration.

TEMPORARY IMMERSION BIOREACTOR FOR THE CULTIVATION OF *DENDROCALAMUS ASPER* BAMBOO SPECIES

Norrizah Jaafar Sidik, Wan Nurfarzana Wan Mohamad Zani, Mohd Khairi Nordin and Noraliza Alias
Universiti Teknologi MARA, Malaysia

Abstract:

The utilization of temporary immersion bioreactors (TIB) in micropropagation has gained significant attention recently due to the advantages they offer over traditional micropropagation methods. As a result, many TIB designs are being commercialised and sold in the market. However, commercialized TIB are often expensive, which can be addressed by constructing custom-designed TIBs. In this study, a TIB was designed and assembled to culture *Dendrocalamus asper*, a bamboo species which provides numerous significant benefits to the economy. Since previous studies have not reported the culture of this bamboo in a bioreactor, optimization of the immersion time was necessary to determine the period that produced the best morphological response. The explants were cultured in the TIB at different immersion periods of 2, 5 and 10 minutes for four weeks in Murashige and Skoog (MS) media supplemented with 4 mg L_{-1} BAP and 0.5 mg L_{-1} IBA. The number and length of shoots, number of leaves, number and length of roots, and percentage of water content were recorded at the end of the experiment. The 2-minute immersion period resulted in the highest response in terms of number of shoots, number of roots and length of roots. Meanwhile, the highest shoot length, number of leaves and water content percentage was recorded in 5-minute immersion period. Overall, shorter immersion periods were more favourable for *in vitro* culture of *D. asper* in TIB. In future studies, optimization of immersion frequency per day should be conducted to determine the most effective immersion cycle for *in vitro* culture of *D. asper* in TIBs.

Biography

Norrizah Jaafar Sidik has her expertise in plant biotechnology, plant physiology, biological activities and phytochemicals. Her research focused on plant tissue culture, bioreactor, and elicitation, enhancing the secondary metabolites in vitro of various plants species.

BIO STIMULANTS IN AGRICULTURE – DIFFERENTIAL RESPONSE OF CULTIVATED AND WILD PLANTS AMONG VARIOUS FUNCTIONAL GROUPS TO GLYCINE BETAINE

Ewa Szwajczak, Michał Ludynia and Edyta Sierka
University of Silesia in Katowice, Poland

Abstract:

With the growing challenges of environmental stress, agriculture requires sustainability to ensure crop stability and food security. Ecological practices, despite its potential, can affect wild plants and biodiversity through substances used in weed management, which raises concerns about long-term impact on ecosystems. Plant resilience to abiotic stress can be increased by using bio stimulants such glycine betaine (GB). The purpose of this study was to determine the effect of GB on the response cultivated and wild species in agricultural conditions. A field experiment was conducted on pairs of wild and cultivated species: grasses (*Avena strigosa, Triticum aestivum), dicotyledons (Camelina alyssum, Linum usitatissimum*), and legumes (*Vicia angustifolia, Lens culinaris*) to examine GB across plant functional groups. Plots with crops intercropped with wild species were established for each group and two treatment variants were applied: control (water) and 0.4% GB solution. Drought and elevated temperature were the dominant abiotic stress factors. Following GB treatment an increase in chlorophyll content in all species, especially in legumes, was observed, as well as a decrease in anthocyanin and flavonoid content. Gas exchange parameters varied between groups and wild and cultivated species after treatment. With the exception of *A. strigosa*, transpiration (E) decreased, although an increase in intercellular CO_2 concentration of leaves (Ci) in legumes and *A. strigosa* suggested improved water use efficiency. Some increases in photosynthetic apparatus efficiency were indicated by the chlorophyll a fluorescence index: higher FM for *V. angustifolia*, lower Fo for *A. strigosa* and *C. alyssum*, improved Fo/Fm, Fv/Fm, Fv/Fo, Fm/Fo for *A. strigosa*, *C. alyssum* and *L. usitatissimum*. In conclusion, GB had a favorable but differential effect on species under study, especially by functional group. Compared to cultivated plants, wild plants responded more pronounced to GB than crop species, indicating that their reactions to agricultural chemicals can be less predictable.

Biography

Ewa Szwajczak completed her bachelor's and master's degrees in biotechnology (2019) and plant biotechnology (2021) at the University of Silesia in Katowice. Working in the Department of Plant Physiology, she studied plant growth, physiological and stress responses of tomato plants after exposure to non-steroidal anti-inflammatory drugs. Subsequently, she continued her research, collaborating with the Institute of Chemistry, on the application of 1,3-dioxolanes in biological sciences and reducing the environmental load of herbicides. She is currently expanding the use of 1,3-dioxolanes in a PhD program at the University of Silesia in Katowice, Poland, which aims to promote plant species in agroecosystems using betaine and dioxolanes. The research interest aims go beyond simply elucidating the response of wild plants to agroecosystem interventions; they are equally involved in strengthening crop and wild species against environmental stressors, promoting biological diversity, in turn ensuring sustained crop productivity.

ASSESSING THE EFFECT OF INTERCROPPED GRAIN LEGUME SERVICE CROPS ON WINTER WHEAT AND SOIL PROCESSES

Antanynas Rokas, Šarūnaitė Lina and Aušra Arlauskienė
Lithuanian Research Centre for Agriculture and Forestry, Lithuania

Abstract:

Incorporating legumes as a service crop in intercropping systems can enhance soil quality and improve wheat grain performance. However, the effects on soil processes and the stability of winter wheat yields remain insufficiently understood. This study assesses the relay intercropping system of winter wheat and grain legumes under organic farming conditions. A field experiment was conducted in two consecutive years, 2023 and 2024, at the Lithuanian Research Centre for Agriculture and Forestry, Institute of Agriculture. Winter wheat (*Triticum aestivum*) was sown in autumn, followed by different legumes: pea (*Pisum sativum L.*), lentil (*Vicia lens L.*), and Egyptian clover (*Trifolium alexandrium L.*) sown before the resumption of wheat vegetation. The yield of winter wheat was evaluated in both 2023 and 2024, while soil chemical properties, specifically mineral nitrogen at depths of 0-30 cm and 30-60 cm, were analyzed. Soil samples for nitrogen analysis were taken after the legume harvests in the autumns of 2023 and 2024. In the autumn of 2023, significantly the highest mineral nitrogen concentrations at the 0-30 cm depth were observed in spring peas (11.853 mg kg$_{-1}$) and lentils (11.543 mg kg$_{-1}$) grown as sole crops. A similar trend was observed at the 30-60 cm depth, with the highest nitrogen concentrations found in spring peas (5.527 mg kg$_{-1}$) and lentils (5.113 mg kg$_{-1}$). In the autumn of 2024, during the second experiment, the mineral nitrogen concentration at the 0-30 cm soil depth in intercropped wheat with peas was significantly higher (9.957 mg kg$_{-1}$) compared to the sole pea crop (6.880 mg kg$_{-1}$). In both experiments, the highest wheat grain yield (2798.1 kg ha$_{-1}$) was recorded in the sole wheat treatment. However, the quality parameters of the winter wheat grain, including protein, gluten, sedimentation, and starch content, were significantly higher in the intercropped compared to the sole wheat crop.

Biography

Rokas Antanynas has a bachelor's in Agribusiness technologies, studying in Kaunas college. He has a master's degree in life sciences studying agroecosystems at Vytautas Magnus University. He has 5 years of professional experience in Lithuanian agricultural advisory service in consulting farms. Currently, he is a PhD student in the Agronomy program at the Department of Plant Nutrition and Agroecology, Institute of Agriculture, Lithuanian Research Centre for Agriculture and Forestry (LAMMC). His PhD topic is "Management of agroecological niches by incorporating cover and catch crops". He is working with intercrops by analyzing different legumes impact for soil properties in agroecology conditions. He is actively involved in international project consortiums and carries out activities within the LIFE and HORIZON EUROPE programme projects, focusing on sustainable water management, environmental conservation, and the integration of innovative practices in agriculture and farming systems.

International Conference on
Agriculture Engineering & Plant Science
June 23-24, 2025 | Berlin, Germany

LIFE CYCLE SUSTAINABILITY ASSESSMENT OF WASTE TO ENERGY SYSTEMS IN THE DEVELOPING WORLD: A REVIEW

Oluwaseun Nubi, Richard Murphy and Stephen Morse
Sustainable Solutions Services Limited, UK

Abstract:

The global move towards a circular economy, as well as that of achieving the United Nations Sustainable Development Goals (SDGs), has necessitated the search for several sustainable solutions in various sectors. Given this, the provision of sustainable waste management and electricity systems constitute a significant part of the SDGs, and the waste-to-energy (WtE) concept has recently become a key topic given that it can potentially help reduce the dependence on fossil fuels for energy generation, as well as minimizing the need to dispose of waste in landfill. However, to date, the sustainability assessments of WtE generation technologies have been limited in scope concerning the three-dimensional sustainability framework (economic, environmental, and social). Life Cycle Sustainability Assessment (LCSA) has been proposed as a potential approach that could comprehensively address these three pillars of sustainability simultaneously based on life cycle thinking. LCSA, as a holistic method, could also potentially deal with the complexity associated with decision-making by allowing for the consideration of a full range of possible sustainability consequences. LCSA is an analytical tool that integrates the Life Cycle Assessment (LCA), Life Cycle Costing (LCC), and Social Life Cycle Assessment (sLCA) methodologies, which already exist and continue to be developed. Individually, these life-cycle approaches tend to be used to point out particular 'hotspots' in product or service systems, and hence focus on direct impacts in a given sustainability domain, neglecting the indirect ones. LCSA aims for a more holistic sustainability perspective and seeks to address the associated challenge of integrating these three pillars of sustainability into an overall and more comprehensive sustainability assessment. This need for harmonization within the LCSA methodology is a major challenge in its operationalization. In recent years there has been steady progress towards developing and applying LCSA, including for WtE. The aim of this paper is to review the most recent trends and perspectives in developing countries, especially regarding how LCSA could help inform decision-making. The paper also analyses the LCSA literature to set out the theoretical and practical challenges behind integrating the three methods (LCA, LCC, and sLCA). The review was conducted via a search of keywords such as LCSA, waste, and energy in the Web of Science databases, resulting in the selection of 187 publications written in English. Of those, 13 articles operationalized LCSA in specific waste and WtE related case

studies. The review provides a review of the application of LCSA for researchers, technological experts, and policymakers through published findings and identifies perspectives on new research. These include uncertainty, subjectivity in weighting, double-counting, the low maturity of sLCA, and the integration of the interconnection between the three dimensions (environmental, economic, and social dimensions) of LCSA results in decision-making. In addition, gaps (such as the integration of the interconnection between the three dimensions) that need to be addressed via further research are highlighted to allow for a better understanding of methodological trade-offs that come from using the LCSA analytical approach to assess the sustainability of WtE generation technologies, especially in developing countries.It is hoped that this study will be a positive contribution to environmental and energy policy decisions in developing countries faced with the dual problems of waste management and electricity supply along with their sustainable development goals.

Biography

Nubi, BSc., BEng., MSc., PhD, is an independent researcher and consultant and is the founder and CEO of Sustainable Solutions Services Limited, a research and consultancy startup company that focuses on providing innovative and sustainable solutions to industries, governments, international organizations and educational institutions using a life cycle approach. He holds a PhD in Environment and Sustainability from the Centre of Environment and Sustainability, University of Surrey with an Engineering Physics and a Chemical/ Processing Engineering degree background. His research and Consultancy Interests include Sustainability, Waste Management, Environment Management and Energy systems.

DESIGN MODIFICATION AND PERFORMANCE EVALUATION OF A MULTIPURPOSE SEED PLANTER FOR SMALLHOLDER FARMERS IN SUB-SAHARAN AFRICA

Ishaya M. Dagwa, Adedeji Aremu, Nathan Williams, Enock K. Misali, Isaac Dalbuto Abba and David Manassa
University of Abuja, Nigeria

Abstract:

For sometimes now, the smallholder farmers in sub-Saharan Africa have been depending on the importation of Agricultural machineries from overseas. One of the prevalent machines is the multipurpose seed planter. However, arising from the field experience, some of these machines are faced with challenges of short life span owing to failure of the planter parts. This has led to low productivity and high maintenance cost. The alleged cause of plant failure is associated with lack of adequate design data on the soil conditions in sub-Saharan Africa. The paper therefore aims to modify the design of a multipurpose seed planter based on field data collected from Northeastern part of Nigeria in order to address the specific problems drum, spike teeth, springs and so on. In this study, major modifications include the use of locally available materials, enhancement of structural integrity though finite element analysis and topology optimization based on specific regional data, and development of mechanisms for different seed and soil types within the region. For instance, the moisture content ranged from 6.3% to 14.9%, and penetration force reached 323.2 Newton, which is the maximum in Northeast. And the Penetration resistance values varied across states, with the highest in Gombe (29.127 kg/cm²) and the lowest in Adamawa. The modified seed planters showed significant improvement in operational efficiencies, which is profitable to the farmers.

Biography

Ishaya Musa Dagwa, Professor of Manufacturing Engineering obtained his B. Eng (Mechanical Engineering) 1990 from the University of Maiduguri and M. Eng and Ph.D. Degrees in Manufacturing Engineering from the University of Benin in 1995 and 2003/2004 respectively. He started his working career as Assistant Lecturer in September, 1991 at the Federal Polytechnic, Mubi Adamawa state and rose through the ranks to Principal Lectureship position in 2006. Thereafter, he transferred his services to the University of Abuja in April, 2007 where he held several positions and earned his promotion to the rank of a professor in 2016. He has served as External Examiner to several universities and has published more than 55 scientific articles in local and international journals. He is a registered Mechanical Engineer with COREN and Fellow, N.I.Prod.E among others. He has won several research grants. Also, he is an Awardee of the Royal Academy of Engineering, UK..

LOCAL ADAPTATION AND PHENOTYPIC PLASTICITY SHAPE THE RESPONSE TO CLIMATE WARMING BUT DROUGHT HINDERS RESILIENCE TO HEAT WAVES OF THE ARCTIC-ALPINE HERB VISCARIA ALPINA

Lisa Scramoncin, Lisa Brancaleoni, Renato Gerdol Andrea Mondoni, Simone Orsenigo, Carla Lambertini, Chiara Cianferoni and Thomas Abeli
University of Ferrara, Italy

Abstract:

Climate change is causing a temperature rise that threatens different arctic-alpine plants with extinction. However, plants can react to this with mechanisms involving variation of genetic traits and phenotypic plasticity. To evaluate the potential response to global warming, we selected plants of the arctic-alpine species Viscaria alpina from four European populations, two from northern regions in Scandinavia and two from southern areas in Italy. In both regions, one population was from a cooler site, and the other was from a warmer site. We cultivated plants from the collected seeds using two different thermal treatments, one mimicking temperature conditions at the warmest site and the other mimicking heat wave conditions. Growth in length, mortality and ecophysiological variables such as net photosynthesis, stomal conductance, chlorophyll content and water use efficiency were analysed for all the plants. We also assessed genetic variation in the four populations based on plastid-DNA sequences. Our results show that the plants from the northern sites grew more than those from the southern sites and mortality was low under warm temperatures but strongly increased in the plants exposed to the heat wave simulation. Although V. alpina plants generally performed overall well during heat spells, the Swedish population plants exhibited the highest phenotypic plasticity. These plants displayed an increase in net photosynthesis and water use efficiency resulting in higher biomass levels under heat wave conditions. This outcome was associated with the genetic variation found in the Swedish population which had the highest number of haplotypes among the four populations. We conclude that plants of V. alpina populations from different geographic regions are generally able to face global warming but exposure to heat spells and drought can negatively affect plants, increasing mortality.

Biography

Lisa Scramoncin is a PhD student based at the University of Ferrara, Italy. She is attending my third year of the PhD course in Environmental Health Sciences. Her project focuses on the ecology of conservation of habitats and endangered plant species. Her research explores different aspects from the study of the ecological niche and plant population and community composition of wild orchids to the mechanisms used by plants to adapt to the ecological changes of habitats. She is also working on studying the urban.

CLIMATE CHANGE AND WATER BALANCE NEXUS FOR RICE-BASED FARMING SYSTEM IN NEPAL

Jeet Chand and Nilam Thapa
Ministry of Agriculture & Livestock Development, Nepal

Abstract:

This study evaluated the impact of climate change on irrigation requirement and water balance of major cereal crops in Chandra Canal Irrigation System which is the oldest irrigated agriculture scheme in Nepal. A mixed-method case study approach was undertaken to conduct historical trend analysis based on climatic meteorological data using linear regression, Mann-Kendall test and Sen's Slope Estimator. Findings indicated that the average annual rainfall was increased by 16.1 mm, while non-monsoon precipitation was found to be decreased by 0.69 mm/year. Maximum and minimum temperature both raised at the rate of 0.028°C/year and 0.023°C/year respectively. This research also projected future precipitation and temperature using the statistical downscaling model under two climate scenarios (SSP245 and SSP585) which showed more significant changes in SSP585 compared to SSP245. The study found that water requirements of monsoon paddy varied annually, with the highest value 573 mm in 2009 which was, however, within the range suggested by FAO for rice. The net irrigation requirement of paddy was increased consistently which was, however, satisfied by the existing water supply although it was found to be affected from climate change. Looking to 2100 AD scenarios, a projected water surplus was expected from June to December, while January to May anticipated a deficit, highlighting the need for climate-smart drought tolerant variety and water saving irrigation management strategies if spring rice would be cultivated. This study recommends smart water management in dry season to ensure year-round irrigation and building of storage type irrigation system rather than the existing runoff-the river- scheme so that cereals in addition to off-season high-valued cash crops could be cultivated throughout the year.

Biography

Jeet B Chand is a Senior Agricultural Engineer at Nepal's Ministry of Agriculture & Livestock Development, working on the Prime Minister Agriculture Modernization Project. He holds a PhD and Master's in Water Resources Engineering & Management from the University of South Australia, and a Bachelor's in Agricultural Engineering from Tribhuvan University. Chand has authored three books and over 15 international journal articles. He has served as Editor-in-Chief of the Journal of Agricultural Technology and reviews for top journals like Springer Nature and Elsevier. He developed courses on Precision Agriculture and Irrigation Engineering and supervises graduate students regularly. He received the Outstanding International Alumni Award (2022) from the Government of South Australia and the Outstanding Young Australian Alumni Award (2014).

Day 1

Agritech & Plant Science

Poster

BIOCONTROL POTENTIAL OF BACILLUS SPP. FOR SUSTAINABLE POSTHARVEST MANAGEMENT AND QUALITY ENHANCEMENT IN PLUM PRODUCTION

Marijana Pešakovic, Jelena Tomić, Ivana Glišić, Boris Rilak, Aleksandra Korićanac, Jovana Todorović and Tamara Krstić Tomić
Fruit Research Institute, Serbia

Abstract:

Postharvest losses, primarily due to fungal pathogens, pose a significant challenge to agriculture worldwide. Traditional chemical fungicides have been the mainstay for controlling postharvest decay, but their growing restrictions in many regions call for innovative and sustainable alternatives. Bacillus species have emerged as a promising biocontrol solution, with demonstrated antagonistic effects against pathogens like *Monilinia laxa*, making them highly relevant in agricultural engineering innovations.This study investigates the biocontrol potential of *Bacillus spp*. for managing postharvest rot in plums, focusing on their physiological and biochemical properties, such as resistance to extreme environmental conditions and their ability to produce plant growth-promoting enzymes. The most effective Bacillus isolate (MEI) was selected for field trials to evaluate its impact on the quality and storability of plums, which is crucial for improving agricultural productivity and reducing postharvest losses.Field experiments with Čačanska Lepotica plums inoculated with Monilinia laxa demonstrated that the preventive application of MEI reduced postharvest rot incidence by approximately 6.67% on day 3 and 13.33% on day 5, while the curative treatment achieved a 12.45% reduction compared to Aleox, a 3.76% increase compared to Neon, and a 37.15% reduction compared to the Control (distilled water). In terms of fruit quality, preventive MEI treatments significantly enhanced both antioxidant capacity (up to 44.72% compared to Aleox) and total phenolic content (up to 36.00% compared to Neon), demonstrating the potential of *Bacillus spp*. to not only control postharvest diseases but also improve the nutritional quality of the produce.These findings suggest that Bacillus spp. offer an innovative biocontrol strategy that addresses the practical challenges of postharvest disease control and enhances fruit quality, supporting the broader goals of sustainable and efficient agricultural practices.

Biography

Marijana Pešaković is a Principal Research Fellow and Assistant Director at the Fruit Research Institute in Čačak, Serbia, where she has worked since 2007. She is the founder and Head of the Institute's Laboratory for Microbiological Testing, where she has pioneered research in the application of biofertilizers and plant-associated microbial communities in fruit production systems.

Her work focuses on engineering innovative microbiological and ecological solutions for sustainable fruit farming, including the reduction of synthetic inputs and the enhancement of soil and plant health. She has contributed significantly to the advancement of microbial-based nutrient management and the development of biotechnological strategies for optimizing phytochemical composition in fruit crops. Pešaković has authored and co-authored over 200 scientific publications, including peer- reviewed journal articles, book chapters, and technical papers. She is a co-author of a verified technical solution based on vermicompost-based microbial formulations and has contributed to several internationally recognized scientific monographs.She has mentored PhD students and served as editor for national monographs. She has coordinated and participated in numerous national and international R&D projects, including bilateral collaborations and programs funded by the Ministry of Science of Serbia. Notably, she is a participant in the European COST Action CA22142 "ROOT-BENEFIT", which focuses on root-associated microorganisms for sustainable agriculture. Through her interdisciplinary and practice-oriented research, Dr. Pešaković actively contributes to cultivating innovation in agricultural engineering, promoting eco-friendly solutions for the future of sustainable fruit production.

MIMICKING LICHEN SYMBIOSIS: ERYTHROMYCIN-MEDIATED CO-FLOCCULATION OF MICROALGAE AND FUNGI IN LIQUID CULTURE FACILITATES BIOMASS HARVESTING FOR CO2 CAPTURE AND PROTEIN PRODUCTION

Tanakarn Monshupanee, Panutchaya Pichaiyotinkul, Jidapa Leksingto, and Janine Kaewbai-ngam
Chulalongkorn University, Thailand

Abstract:

Photoautotrophic microalgae offer a promising avenue for bioproduct production via CO_2 capture. However, efficient cell harvesting from liquid cultures remains a challenge. Bio-flocculation presents a potential solution. This study found that co-flocculation between the microalga Synechocystis sp. PCC 6803 and naturally occurring fungal contaminants occurred in the presence of erythromycin (EM), but not in the absence of EM. Isolation of the contaminating fungi revealed five species, dominated by Purpureocillium lilacinum and Aspergillus protuberus (71%). Optimal co-flocculation (248 ± 28 mg/L co-flocculated biomass from 560 ± 35 mg/L total biomass, 44 ± 2% efficiency) was achieved with 10 μM EM and 5 days of the co-cultivation between the fungi and Synechocystis. Notably, under 10 μM EM, Synechocystis cells within the co-flocculate maintained normal coloration, while axenic Synechocystis cultures exhibited chlorosis, suggesting a protective effect of co-flocculation against EM-induced chlorosis. The co-flocculated biomass has protein contents ranging from 37-56 % of dry weight. Transcriptomic analysis indicated that EM-mediated co-flocculation involves downregulation of minor pilin genes and upregulation of genes related to pilin regulation, cell attachment signaling, and abiotic stress responses. Furthermore, a single fungal species, isolated from another contaminant community, induced complete Synechocystis-fungi flocculation with 5 μM EM, yielding up to 2158 ± 156 mg/L flocculated biomass. This fungal species is currently under further investigation and will be discussed. These findings suggest that EM treatment can induce co-flocculation between cyanobacteria and fungi, potentially facilitating biomass harvesting for applications such as carbon capture and animal feed production, given the high protein content of the biomass.

Biography

Tanakarn Monshupanee's research focuses on using photosynthetic algae to convert CO2 and solar energy into proteins, bioplastics and bioenergy. His work investigates the production of proteins, bioenergy (polyglucan and lipids) and the biopolymer PHB within algal cells. Additionally, his lab is developing a system for auto-co-flocculation between algae and fungi for CO2 capture, with the resulting biomass targeted for use as animal feed.

A MULTI-SCALE APPROACH TO MITIGATE AGRICULTURAL POLLUTION IN DEJI RESERVOIR: EVALUATING LOW-IMPACT DEVELOPMENT STRATEGIES USING SWAT AND SWMM MODELS

Cheng-Wei Yu
National Taiwan University, Taiwan

Abstract:

Nonpoint source pollution from agricultural activities is a significant contributor to water quality degradation in reservoir catchments, with phosphorus recognized as the primary factor driving eutrophication in Deji Reservoir, Taiwan. Jin-yuan Creek, a key tributary within the Deji Reservoir catchment, receives substantial nutrient and sediment runoff from surrounding agricultural lands. Addressing this challenge requires effective management strategies that balance agricultural productivity with environmental conservation. However, implementing nonpoint source pollution control plans presents practical challenges, particularly in determining the size or number of required control facilities. This difficulty is exacerbated by the variable and random nature of rainfall events that generate nonpoint source pollution, making quantification and mitigation complex. To identify the primary contamination sources and prioritize intervention areas, this study first employed the Soil and Water Assessment Tool (SWAT) model to simulate the entire Deji Reservoir catchment. Based on the results, high pollution "hotzones" were identified, particularly within agricultural regions prone to nutrient runoff. Building on this, the Storm Water Management Model (SWMM) was then used for a finer-scale simulation, assessing the impact of installing low-impact development (LID) practices, specifically bioretention facilities and vegetated swales, within the identified hotzones. The SWMM simulations revealed that these LID strategies can effectively reduce total phosphorus (TP) runoff by approximately 264 g/ha per year, demonstrating their potential to mitigate nutrient pollution and address a critical driver of eutrophication in the reservoir. This research highlights the importance of integrating a multi-scale modeling approach, from broad-scale simulations with SWAT to site-specific interventions with SWMM, to optimize pollution control measures. By focusing on targeted LID practices in high-pollution areas, the study provides practical insights into sustainable land management strategies for improving water quality in agricultural catchments.

Biography

Cheng-Wei Yu is an Assistant Professor in the Department of Bioenvironmental Systems Engineering at National Taiwan University (NTU), where he has been teaching since August 2022. His research focuses on river hydraulics, particularly at the full-catchment scale, utilizing Saint-Venant simulations for river network modeling. He is also interested in the application of river hydraulics in bioenvironmental engineering. Yu completed his Ph.D. at the University of Texas at Austin in the School of Architecture, where he studied from August 2014 to August 2020. Afterward, he held a postdoctoral position at the same university from August 2020 to May 2022 before joining NTU. Yu's academic contributions are supported by his extensive publications and research projects, and his work can be found in various academic databases like Scopus and ORCID.

EFFECT OF LIGHT INTENSITY ON GROWTH AND VOLATILE COMPOUND CONTENT OF *VALERIANA FAURIEI* CULTIVATED IN A WALK-IN GROWTH CHAMBER

Yun Ji Park, Yong Gu Kim, Su Min Jeong and Yeseul Kim
Chanwon National University, South Korea

Abstract:

Valeriana fauriei infusion is provided as a sedative and to treat nervous system disorders. The roots and rhizomes, known for their bitter taste and distinct aroma, serve therapeutic purposes, whereas the upper tissues are consumed as food. Light serves as an energy source and provides developmental signals for plants, influencing crop physiology and biochemistry. We examined the effect of various light intensities (100, 400, 800 μmol·m^{-2}·s^{-1}) on V. fauriei using walk-in growth chamber growth system. The light intensity influenced the growth of plants, biomass, photosynthetic pigments, and the volatile compounds production in this plant. The higher light intensities of 400 μmol·m^{-2}·s^{-1} and 800 μmol·m–2·s^{-1} resulted in reduced plant height while increasing the number of branches and overall biomass. In accordance with the SPAD value results, chlorophyll a and b levels were significantly higher under the 100 μmol·m^{-2}·s^{-1}, and the chlorophyll content decreased as light intensity increased. It has been revealed that isovaleric acid is the main volatile component in *V. fauriei*, along with bornyl acetate and valeric acid. Furthermore, changes in light intensity have been shown to influence volatile compounds levels, with optimal production of bornyl acetate and isovaleric acid occurring at 400 μmol·m^{-2}·s^{-1}, whereas valeric acid production in maximized at 800 μmol·m^{-2}·s^{-1}. It suggests that modifying ambient light conditions offers a viable approach for optimizing the production of desired compounds. Overall, the findings indicate that a light intensity of 400 μmol·m^{-2}·s^{-1} is the ideal in walk-in growth chamber, improving plant biomass, minimizing photoinhibition effect, and maximizing volatile compound production, compared to other light intensities. To determine the optimal light cultivation conditions for maximizing volatile compound production in *V. fauriei* within a walk-in growth chamber, further study will focus on exploring individual light factors such as photoperiod, intensity, and quality.

Biography

Yun Ji Park is a plant scientist specializing in the biosynthesis and functional enhancement of bioactive compounds derived from medicinal and functional crops Her research focuses on unraveling the molecular mechanisms regulating secondary metabolites production, particularly through the characterization of key genes involved in biosynthetic pathways. She employs high-throughput RNA-Seq and transcriptomic profiling to identify gene expression patterns associated with metabolite accumulation and plant physiological responses.

She also contributes to the development of standardized raw material cultivation strategies for smart farming systems, offering sustainable alternative to conventional agricultural practices. Her work in plant tissue culture includes optimizing media conditions to improve plant regeneration efficiency and establishing transformation protocols for genetic improvement Furthermore, she is involved in the development of functional materials using natural products, with emphasis on the identification and quantification of pharmacologically active secondary metabolites. Her multidisciplinary approach integrates molecular biology, bioinformatics, and plant biotechnology to support the innovation of plant-based materials for health and industry applications.

EXPRESSION OF A RECOMBINANT HUMAN GRANZYME B (GRB) IN NICOTIANA BENTHAMIANA PLANTS FOR TUMOUR-TARGETING APPLICATIONS

Carla Marusic, Giovannini D, Triggiani D, Camera F, Merla C and Donini M
ENEA, Italy

Abstract:

We have previously shown the efficient production in plant (Plant Molecular Farming) of the monoclonal antibody H10 (mAbH10) specifically recognizing the C domain of Tenascin-C, a tumor marker of the extracellular matrix of solid tumors, particularly glioblastoma. This work aims to produce in plants an antibody-drug conjugate to specifically target the tumor, inducing cell death. As a drug conjugate, the granzyme B could be an ideal candidate since serine protease granzymes are normally found in the granules of natural killer cells and cytotoxic T cells, and its secretion, along with the pore forming protein perforin, mediates apoptosis in target cells. Moreover, it has been shown that the Heat shock protein Hsp70, which is found on the cell surface of a large variety of human tumor cell types, including U87 cells of glioblastoma, acts as a receptor mediating GrB entry without the need of perforin. Therefore, an H10-GrB conjugate could be used to target glioblastoma cells, inducing tumor cell death. In this work we produced a functionally active Grb in plants using a rapid transient expression system. To this aim, a synthetic gene encoding for the human Grb fused to the Fc portion of a swine Fc was designed to stabilize the protein but also to facilitate purification. The recombinant enzyme was produced in its inactive form with an N-terminal DDDDK peptide that can be cleaved after purification using an enterokinase. The recombinant GrB-Fc was cloned into a plant expression vector and produced in Nicotiana benthamiana plants. Western Blot analysis showed that GrB-Fc successfully accumulates (2-4 mg per Kg of leaves) and assembles in its dimeric form (about 105 kDa) in plant cells. Preliminary in vitro experiments, using U87 cells, revealed the functional activity of the recombinant GrB-Fc. Furthermore, a novel construct was designed to express the active granzyme directly fused to the recombinant scFvH10 antibody. The future perspective is to use this recombinant molecule in antibody-mediated drug delivery applications against tumors.

Biography

Carla Marusic is Senior Scientist at the ENEA-Casaccia Biotechnology Division, her research area of expertise, since 1999, is focused mainly in “Plant Molecular Farming”. Her research focuses on the use of plants as biofactories for producing pharmaceutical compounds, including antibody for immunotherapeutic purposes and antigens. Notably, she has contributed to the development of plant-based production platforms for neutralizing antibodies and antigens. This innovative approach offers a rapid and cost-effective alternative to traditional cell-based production systems, potentially enhancing the response to pandemic emergencies. Marusic's expertise encompasses nanobiotechnology and plant biotechnology. She has published several research papers on the use of plant viruses as vectors of neutralizing epitopes derived from human viruses (such as HIV-1) or as nanoparticles for drug delivery. She is currently involved in projects aimed at the production of recombinant antigens and antibodies in plants (Molecular Farming) for human and veterinary applications.

Day 1

Agritech & Plant Science

Video

POPULATION AND DISTRIBUTION OF *MIMUSOPS ZEYHERI* SOND IN TWO AGROECOLOGIES: A COMPARATIVE STUDY OF EHLANZENI, AND VHEMBE DISTRICTS OF SOUTH AFRICA.

Christeldah Mkhonto, Peter Tshepiso Ndhlovu, Luambo Jeffrey Ramarumo, Mthobisi Dhladhla, Hintsa Araya, Wilfred Otang Mbeng and Salmina Ngoakoana Mokgehle
University of Mpumalanga and Agricultural Research Council, Vegetable and Ornamental Plants, South Africa

Abstract:

Mimusops zeyheri Sond., a valuable indigenous tree species with ecological and ethnobotanical significance, is distributed across diverse agroecological regions in South Africa. This study assessed the distribution, abundance, and morphological variations of *M. zeyheri* populations in two distinct agro-ecologies, Mpumalanga (Ehlanzeni district) and Limpopo (Vhembe district) Provinces of South Africa. Population structure was categorized into size-class distribution (circumference and height) and analysed statistically, while ecological health was analysed using disturbance modelling and an ecological scoring system. Results demonstrate significant variation in tree size across the study sites. Furthermore, results showed a high statistical significance difference (P=0.000031; F=31.98) between the circumferences of individuals of M. zeyheri distributed in the Ehlanzeni region of the Mpumalanga and Nzhelele region of the Limpopo Province, South Africa. The comparison in terms of the target plant heights and the distribution distance between the two studied regions also show high statistical significance (P=0.017813 and P=0.01005), respectively. The disturbance assessments classified Limpopo tree populations within the "moderately to severely disturbed" category (50–100% disturbance index), while trees in Mpumalanga exhibited a comparatively lower ecological degradation falling within pristine levels (0<5%).These findings suggest that *M. zeyheri* populations in Limpopo are subjected to higher environmental pressures, possibly due to land-use changes, harvesting practices, and limited regeneration success. The observed structural variations underscore the necessity for site-specific conservation strategies to mitigate anthropogenic impacts and ensure the sustainable utilization of this ecologically and culturally significant species. Future research should focus on seedling establishment, recruitment patterns, and habitat restoration efforts to enhance population resilience in degraded landscapes.

Biography

Christeldah Mkhonto is a PhD in Science candidate, an ethnobotanist, and a researcher passionate about bridging Indigenous knowledge with scientific work. She holds a Master of Science degree where she focused on the antifungal efficacy of 4 selected medicinal plants against Rhizoctonia solani, a major root rot pathogen affecting staple crops. Her research aimed to develop environmentally friendly, plant-based fungicides as sustainable alternatives to synthetic chemicals. With expertise in crop protection, plant phytochemistry, ethnobotany and plant ecology, Christeldah is dedicated to combating the effects of climate change through the integration of Indigenous knowledge, particularly the use of Indigenous plants, into scientific research. She is also actively involved in transdisciplinary research through the Transdisciplinary International Learning Laboratory (TILL), collaborating with experts from various fields to develop sustainable solutions for environmental and social challenges. Beyond her scientific contributions, Christeldah is a committed human rights advocate. She actively promotes sexual and reproductive health rights for adolescent girls and young women and is a strong proponent of education advocacy, empowering young women to pursue and remain in school as a tool for challenging harmful societal norms and driving change.

Day 1

Agritech & Plant Science

E-Poster

EVALUATION OF THE ANTIOXIDANT EFFECT OF BLACK SEED OIL ON BLOOD AND MEAT IN RABBITS EXPOSED TO HEAT STRESS

Mohammed El Khasmi, Rachchad Khadija and Farh Mohamed
Hassan II University of Casablanca, Morocco

Abstract:

Heat stress (HS) is a crucial environmental factor that affects both the welfare and the production and reproductive performance of livestock, causing alterations in their homeostasis and meat quality. The objective of this study was to evaluate the protective effect of oil extracted from black seed (*Nigella sativa* L.) (NO) on the antioxidant status of blood and meat in rabbits exposed to heat stress. Four groups of five male New Zealand rabbits were used. Group 1 (control) was maintained at 22-24°C without any NO treatment, while groups 2, 3 and 4 were subjected to heat (33-35 °C) for 90 days. Group 2 was not treated with NO, while Groups 3 and 4 received NO orally at doses of 1 ml/kg and 3 ml/kg of body weight, respectively. At the end of the treatment, the animals were sacrificed and blood and muscle (*Longissimus dorsi*) were collected to analyze Hematocrit (Htc), Hemolysis (Hs), Neutrophile/Lymphocyte ratio (NLR), Cortisol, Glucose, Urea, Creatinine and Transaminases (ASAT, ALAT) in blood, Ultimate pH, Drip Loss (DL), Cooking Loss (CL) and sensory profile in meat, and malondialdehyde (MDA), carbonyls, and catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px) activities in blood and meat. In heat-stressed animals, NO treatment (3 ml/kg) reduced significantly ($P < 0.05$) Hs, Glucose, Cortisol, ASAT, ALAT, NLR, MDA, DL, CL and carbonyls, and increased significantly ($P < 0.05$) CAT, SOD and GSH-Px, in blood and/or meat, compared to untreated stressed animals. The sensory score of meat from NO-treated and untreated animals showed no significant difference. In conclusion, NO revealed promising antioxidant potential capable of mitigating the effects of HS on meat homeostasis and quality in rabbits.

Biography

El Khasmi Mohammed is a professor in the Department of Biology at the Faculty of Sciences Ben M'Sik of Hassan II University of Casablanca in Morocco. He obtained his doctorate on phosphocalcic (MP) and bone (MO) metabolism during lactation and postnatal development in dromedaries and has more than 30 years of experience in research, teaching and community services. His main interests are metabolism, physiological and endocrine regulations, and the impact of stress and oxidative stress induced par the pre-slaughter handling of camels on their homeostasis and meat quality. He has published numerous articles (100) in renowned journals and presented the results of his research (200) in national and international conferences and workshops. He has supervised a large number of master and doctoral students. He was Director of Physiopathology and Molecular Genetics during 2017-2024, and now he is a member of Laboratory of Ecology and Environment and the International Society for Camelid Research and Development.

Day 2

Agritech & Plant Science

Keynote Presentation

HELPING SMALL-SCALE AND SOCIALLY DISADVANTAGED FARMERS WITH IRRIGATION WATER QUALITY

Avinash M Tope and John Thomas
Kentucky State University, USA

Abstract:

More than 75% of farmers in Kentucky have produce sales of less than $25,000 per year; a threshold that is below which growers are strongly encouraged to implement the Produce Safety Rule (PSR) of the Food Safety Modernization Act (FSMA). Many growers use surface water sources for irrigation that can lead to pathogenic *Escherichia coli* (*E. coli*) contamination of produce. The purpose of this project is to improve income and economic opportunities for small and socially disadvantaged farmers by helping develop tools for improving water quality and improve produce safety and thereby increase grower production. Since November 2022, water samples were collected from farms and tested for presence and enumeration of coliform bacteria along with E. coli. Testing was performed using an IDEXX Colilert Test using Quanti-Tray/2000 system using Most Probable Number Method (quantitative, MPN/100ml); a test approved by United States Food and Drug Administration's (FDA) 21 CFR 112 method. As of July 2024, 279 individual tests have been performed, from 87 different producers across 13 counties throughout the Commonwealth of Kentucky. Overall, 77.1% of samples were detected with E. coli counts within the permissible limits of <126 CFU/100ml, of which 60.9% were groundwater and 16.1% were surface water sources. The remaining 22.9% of samples had E. coli counts >126 CFU/100ml, with 0.7% being groundwater and 22.2% surface water. This project provides technical support for small- and mid-sized producers to become compliant with regulatory and buyer specifications and standards to increase their direct market opportunities.

Biography:

Avinash M. Tope is an Associate Professor in the Division of Food and Animal Science at Kentucky State University, located in Frankfort, Kentucky. His academic work focuses on sustainable agriculture, food systems, and animal science, with the aim of advancing agricultural practices and improving food security. Dr. Tope has made significant contributions to these fields through his research, which has been published in over 12 articles in international journals. His work has received numerous citations and is highly regarded for its practical applications and impact on the field.Tope is also actively involved in academic service, serving as an author, editor, and reviewer for several prestigious journals. He has a strong commitment to mentoring students and guiding future leaders in agricultural sciences. In addition to his teaching and research roles, Dr. Tope engages in outreach activities, helping to promote sustainable farming practices and enhance community awareness of agricultural issues.With a deep passion for sustainability and food systems, Dr. Tope continues to influence both academic and practical aspects of agriculture, contributing to the development of more environmentally responsible and efficient agricultural practices.

IMPROVING THE PENETRATION OF A TUMOR-TARGETING PLANT-PRODUCED MONOCLONAL ANTIBODY IN GLIOBLASTOMA NEUROSPHERES BY ELECTROPORATION

Marcello Donini, Triggiani D, Giovannini D, Simonelli F, Camera F, Merla C, Marusic C

Division of Biotechnologies, ENEA, Italy

Abstract:

The objective of this project is the development of targeted treatments of solid tumors using electroporation. The strategy involves the production in plant (Plant Molecular Farming) of the monoclonal antibody H10 (mAb H10) specifically recognizing the tumor the C extra-domain of Tenascin-C (C-TNC), a tumor marker presents in the extracellular matrix of solid tumors such as glioblastoma. This aggressive brain tumor is characterized by the overexpression of C-TNC which takes part in tumor proliferation, stem cell maintenance, and pro-angiogenic effects within the tumor microenvironment. The mAb H10 was successfully produced in Nicotiana benthamiana plants using a transient expression system (agroinfiltration), enabling the rapid and cost-effective production of milligram quantities of the recombinant molecule. The antibody was purified from the plant extract and characterized from a biochemical point of view, also testing its binding capacity to recombinant C-TNC. Moreover, the antibody was conjugated with a fluorescent molecule to conduct in vitro studies. The targeting efficacy of mAb H10 was tested on a glioblastoma spheroid model (using U87 human glioblastoma cells) and different electroporation protocols were assayed to enhance the antibody's ability to penetrate the neurospheres. Spheroids were selected as the primary model due to their relevance in mimicking the tumor architecture. Even in the absence of electroporation, mAb H10 was able to partially penetrate the neurospheres, suggesting an intrinsic permeability of the spheroid structure and a specific binding of the antibody to C-TNC present in the extracellular matrix. Moreover, electroporation was shown to facilitate the entry of mAb H10 into the spheroid matrix, resulting in a more homogeneous and widespread green fluorescence within the treated neurospheres compared to non-electroporated controls. These preliminary results demonstrated that electroporation-assisted delivery of mAb H10 into glioblastoma spheroids is a promising method for enhancing targeted therapy. Future research should focus on further optimizing electroporation conditions and evaluating the therapeutic potential of this strategy by conjugating the antibody to a cytotoxic molecule and testing the efficacy of antibody-mediated drug delivery.

Biography:

Marcello Donini is Senior Research Scientist at Biotechnology Laboratory ENEA Casaccia Research Center ENEA, (Rome, Italy), he is conducting research on Antibody engineering, expression of tumors targeting recombinant proteins in plants (Molecular Farming), and Proteomics. During these years he has published several research papers on the characterization of plant produced tumour-targeting and anti-viral antibodies focusing on two different issues related to antibody expression such as proteolysis and glycosylation. In this field we devised novel expression systems based on glyco-engineered plants and root cultures that allowed to accumulate a glyco-optimized versions of mAbs with a very homogeneous glycan profile lacking fucose residues with the aim of potentiating biological activity by enhancing both antibody dependent cell cytotoxicity (ADCC) and complement dependent cytotoxicity (CDC).

IMPACT OF IMPLEMENTING A DEODORISATION SYSTEM ON THE FUNCTIONING OF A WASTE MANAGEMENT PLANT

Łukasz Szałata
Wroclaw University of Science and Technology, Poland

Abstract:

This article/ presentation is an analysis of the impact of implementing technical and technological solutions in the form of a deodorization system, which was carried out on the basis of a case study in the years 2015 and 2019 of an existing waste management plant named located in the region of Lower Silesia. The method for determining the impact was based on an analytical method for estimating changes in plant operation parameters in relation to the emission of Oduor compounds, determined at selected reference points, during a period of normal operation before and directly after the implementation of the deodorisation system. The purpose of this work is the evaluation of the impact of the deodorisation system on the parameters determining the functioning of the plant – a mechanical-biological waste treatment facility in order to determine sustainability factors and their relative changes.

Biography:

Łukasz Szałata, MBA – has been employed at the Wrocław University of Science and Technology since 1.10.2010. He has been the President of the Branch of the Scientific Society of Organization and Management in Wrocław since 2022. A long-time expert in the field of engineering, protection, and economics and environmental management, reports, environmental impact assessments, integrated IPPC permits, technological and environmental consulting for installations that potentially, always significantly affect the environment and renewable energy sources, a court mediator in the field of environmental protection, including, among others, technologies for reducing odorous/odorous impact, and a member of advisory bodies in the field of broadly understood environmental protection, and is also a court mediator in the field of environmental protection. Co-author of the study commissioned by the Ministry of the Environment "List of chemical substances and compounds that cause odor nuisance" adopted on November 7, 2016. Author of the monograph "Proecological dialogue for the sustainable development of Lower Silesia" published in December 2015 and co-author of the monograph "Green city: in care for the life and health of the inhabitants of Lower Silesia" (2017), as well as Nature-based solutions: handbook (2018) and co-author of the monograph "Identification of malodorous compounds in atmospheric air and microbiological diagnostics around real objects (2024). Research and teaching assistant at the Department of Environmental Biology and Atmosphere Protection at the Faculty of Environmental Engineering, Wrocław University of Science and Technology. In the years 2016-2022 he also represented the University of Environmental and Life Sciences in Wrocław, implementing a grant from the European Commission as part of the project "Grow Green - Green Cities for Climate and Water Resilience, Sustainable Economic Growth". He was the deputy coordinator of the research and innovation program within Climate KIC. He also conducts postgraduate studies at the University of Economics "Environmental Protection Manager" and "Production Process Management" and at the Wrocław University of Science and Technology "Water, Sewage and Waste Technology". He also holds the position of President of the Management Board of the EKO-BIEGŁY® Association based in Wrocław since 22.02.2011, which carries out tasks aimed at protecting the natural environment and striving for eco-development, by developing environmental impact assessments and comprehensive implementation of projects: research, studies and analyses concerning various areas of environmental protection. He is the author and co-author of many environmental impact assessments of projects, integrated permits and expert opinions in the field of environmental protection. He cooperates closely with the Regional Administration Authorities responsible for the state of the environment in Lower Silesia. Author of 75 publications in conference materials, industry journals in the field of economics, management, engineering and environmental protection, author and co-author of 5 scientific monographs and an educational film in the field of air protection developed in cooperation with the Provincial Fund for Environmental Protection and Water Management in Wrocław.

Day 2

Agritech & Plant Science

Oral Presentations

VARIOUS FORMS OF SOLUBLE LEAF CARBONIC ANHYDRASE IN C3 PLANTS AND THEIR INHIBITION BY HEAVY METAL IONS

Elena Zolotareva, Nataliia Topchiy and Victoria Dadyka
M.G. Kholodny Institute of Botany, Ukraine

Abstract:

Carbonic anhydrase (CA) is a ubiquitous zinc-metal enzyme that accelerates the interconversion of CO_2 and HCO_3- ions, which occurs very slowly in a non-enzymatic process. In the leaves of higher plants, CAs are the second most abundant enzyme after RuBisCo. Plant CAs are classified into three families: α-type CAs, β-type CAs, and γ-type CAs. Most leaf CAs belong to the β family. The zinc ion in βCA is mainly coordinated by two Cys and one His residues in contrast to three His residues in active sites of αCAs and γCAs. βCAs form oligomers - dimers, tetramers, hexamers and octamers, some of which may be present simultaneously in leaves. CAs are stress-responsive enzymes that are sensitive to the toxic effects of heavy metals (HMs). Due to their high abundance and ease of analysis, CAs have potential as bioindicators of environmental pollution. However, extant research examining the HMs impact on the activity of plant CAs is limited.The objective of this study was to identify catalytically active CA isoforms in the soluble protein fractions isolated from the leaves of several C3 plants. The plants selected for this study were common spinach (*Spinacia oleracea*), New Zealand spinach (*Tetragonia tetragonioides*), and the weedy plant Chenopodium album. Using a protonography method, 5 CA isoforms in *T.tetragonioides*, 4 sources of CA activity in S.oleracea and 3 isoforms in *C. album* were identified. The effect of some HMs on CA activity of the protein fractions was studied. The inhibitory effect of Hg_{2+} and Ag_{+} was observed in the submicromolar range. Cu_{2+} and Cd_{2+} exhibited a suppressive effect on CA activity at concentrations 10-50 μM. Zn_{2+} ions exhibited a weaker inhibitory effect, with an IC50 ≈ 200 μM. Notably, Pb2+ demonstrated no effect on enzyme activity even at concentrations as high as 0.5- 1 mM. The obtained data confirm the potential of employing the plant CAs as a biomarker in the environmental biological monitoring.

Biography

Elena Zolotareva, PhD, DrSc, serves as the Head of the Phytochemistry Department at the M.G. Kholodny Institute of Botany, Ukrainian Academy of Sciences, in Kyiv. Her research interests include plant biochemistry, bioenergetics, photosynthesis, and the enzymatic systems of plants for decarbonization. In 2008, she obtained her DSc degree in the field of plant biochemistry from the Karazin National University in Kharkiv, Ukraine. The author possesses considerable expertise in the domain of microalgae research, with a particular focus on the impact of carbon nutrition on the biochemical composition and the synthesis of valuable metabolites. In recent work, her research group has examined the potential of plant enzymes to enhance the capture of atmospheric carbon dioxide. This process aims to create a sustainable, secure, and consistent method for carbon sequestration. Presently, she is employed at the Kholodny Institute of Botany as the deputy director.

SELECTION OF RICE PARENTS WITH RESISTANCE TO EMERGING DISEASES INFLUENCED BY CLIMATE CHANGE

Petra Andrade-Hoyos, Leonardo Hernández-Aragón, Leticia-Tavitas-Fuentes, Roberto de la Cruz Díaz-Juárez, Miguel Angel Villalobos-López, Sergio Gavino Ramírez-Rojas, Edwin Javier Barrios-Gómez and Eduardo Molina-Gayosso
National Institute of Forestry, Agricultural and Livestock Research (INIFAP), Mexico

Abstract:

In recent years, climate change has affected rice-growing areas globally, altering the vulnerability of rice varieties and the virulence of pathogens. This study aimed to assess 230 rice genotypes to identify parents resistant to Burkholderia glumae, Bipolaris oryzae, Bipolaris panici-miliacei, Curvularia pseudobrachyspora, and Daldinia eschscholtzii, thereby contributing to the genetic improvement programme for developing new rice varieties for rice-growing regions in Mexico. A total of 230 genotypes from the National Rice Germplasm Bank at INIFAP were selected as rice parents. After 45 days of transplanting, the plants received an inoculation of 0.5 mL (1 × 107 CFU) of a standard strain of the bacteria B. glumae along with 1 mL (1 × 107 CFU) of a solution containing four types of fungi. After inoculation, symptoms of plant rot, browning of leaf sheaths in rice plants, and vascular discoloration caused by B. glumae were observed. Interestingly, 3 genotypes (WAB45024-2-3P33HB, FLO2768-2P-6-4P-1P-M-1P and Orona A17-3) were selected, demonstrating promising resistance with a severity of 0.3%, whereas 13 genotypes were identified, showing tolerance with severities ranging from 4% to 5% against bacterial blight caused by B. glumae. During the evaluation of fungal resistance, three genotypes were identified as resistant to the fungal complex consisting of B. oryzae, B. panici-miliacei, C. pseudobrachyspora, and D. eschscholtzii. These genotypes are: Orona A17-3, FLO2768-2P-6-4P-1P-M-1P, and WAB45024-2- 3P33HB. The chosen rice genotypes will serve as parents to introduce resistance into rice varieties, such as the Morelos type (A-2010, A-2016), Milagro Filipino (Nayarita-22, Silverio), and Sinaloa (Azteca, INIFLART RT).

Biography

Petra Andrade Hoyos specializes in selecting disease-resistant plants, focusing on horizontal or global resistance to key local pathogens. She has a strong interest in isolating and identifying virulent pathogens, and she collaborates with native Trichoderma endophytes for biological disease control. Her background in research and experience teaching at universities, along with working with producers across various regions of Mexico, has shaped her holistic understanding of agro systems management.

FARMERS' WILLINGNESS TO CONTRIBUTE TO REALIZE AN ELECTRICITY SELF-SUFFICIENT VILLAGE USING AGRIVOLTAICS. RESULTS OF A SURVEY

Martin Bauknecht
University Hohenheim, Germany

Abstract:

The framework of the Renewable Energy Sources Act (EEG) has enabled the successful expansion of solar energy to date. But is the rigid model with a fixed feed-in tariff still up to date? A decentralized energy system is modeled to create an electricity self-sufficient village using agrivoltaics. Energy sharing among citizens, commercials, municipalities, and farmers creates a self-managed energy community. Farmers play a key role in this dual land use. This article examines the central research question of farmers' willingness to contribute to an electricity self-sufficient village using agrivoltaics. The study draws on a survey of 215 German farmers. The survey results show a trend toward local, self-sufficient electricity generation supported by local actors. It is interesting to examine the extent to which farmers in the village are motivated and understand their role. Several policy implications can be formulated to support the realization of an electricity self-sufficient village using agrivoltaics. In the first step, electricity self-sufficiency is aimed in the sunny months from March to October, until cross-seasonal storage media are available and ready for series production.

Biography

Martin Bauknecht is a PhD student at the University Hohenheim, Germany. His major field is the realization of an electricity self-sufficient village using agrivoltaics.

HYPERSPECTRAL IMAGING FOR EARLY DETECTION OF CHICKPEA FUNGAL INFECTIONS: A PRELIMINARY STUDY ON ASCOCHYTA BLIGHT

Mohamed Arame, Issam Meftah Kadmiri, Francois Bourzeix and Yahya Zennayi
Mohammed VI Polytechnic University (UM6P), Moracco

Abstract:

Fungal diseases such as ascochyta blight represent major threats to chickpea cultivation, significantly reducing yield if not detected and treated early. Conventional detection methods like visual inspection or molecular assays are often time-consuming, subjective, and ineffective at identifying infections during the critical early stages when intervention is most impactful. This study explores the application of hyperspectral imaging (HSI), combined with machine learning, for early, non-destructive detection and classification of fungal infections in chickpea leaves. The key novelty lies in demonstrating the feasibility of early-stage disease detection specifically on chickpea plants, which has been underexplored in previous research. Hyperspectral data in the 400–1000 nm range were acquired under controlled laboratory conditions from artificially infected chickpea plants. Two classification approaches were evaluated: (1) spectral feature-based classification, where pixel-level spectral signatures were reduced via PCA and KPCA and classified using a random forest model, yielding over 82% accuracy in distinguishing healthy, ascochyta-infected leaves; and (2) vegetation index (VI)-based classification, where indices like NDVI, EVI, and GNDVI were used with SVM and random forest classifiers, achieving over 80% accuracy with less computational demand. Results demonstrate that HSI can capture subtle physiological changes in leaves before visible symptoms appear, offering a reliable and scalable tool for precision agriculture. This study contributes a promising step toward AI-powered early disease detection in chickpea farming, enabling timely interventions, reducing fungicide use, and supporting sustainable crop protection strategies. Future work will target real-field deployment and cost-effective integration into existing monitoring systems.

Biography

Mohamed Arame has his expertise in plant and microbial biotechnology and a passion for advancing sustainable agricultural practices. His research focuses on plant growth-promoting rhizobacteria, biological nitrogen fixation, and biofertilizers, contributing to improved soil microbiology and crop resilience. His open and applied biotechnological approach creates new pathways for enhancing agricultural productivity. He has built this expertise after years of experience in research, innovation, and leadership within renowned scientific institutions, including the Moroccan Foundation for Advanced Research Science and Innovation (MAScIR) and Mohammed VI Polytechnic University.

AGRICULTURE STRESS UNDER CLIMATE CHANGE SCENARIOS

Papanastasiou Dimitrios[1], Papadopoulos Georgios[2], Katsoulas Nikolaos[}], Elvanidi Angeliki[3], Maletsika Persefoni[3], Gelasakis Athanasios[4], Douvis Konstantinos[5], Faraslis Ioannis[1], Poupkou Anastasia[5], Voloudakis Dimitrios[5], Kapsomenakis Ioannis[5], Progiou Athena[5], Keppas Stavros[2], Stergiou Ioannis[2] and Melas Dimitrios[2]
[1]*University of Thessaly – Department of Environmental Sciences, Greece*
[2]*Aristotle University of Thessaloniki – School of Physics, Greece*
[3]*University of Thessaly – Department of Agriculture Crop Production and Rural Environment, Greece*
[4]*Agricultural University of Athens – Department of Animal Science, Greece*
[5]*Academy of Athens – Research Centre for Atmospheric Physics and Climatology, Greece*

Abstract:

Climate change significantly affects the agricultural sector, putting food security and the sustainability of farming systems worldwide at risk. This paper studies the impact of climate change on primary production in Greece, through the assessment of the impact of future climate conditions on crops (winter wheat and olive) and livestock (cows and sheep) health in terms of water and heat stress, respectively. Crop Water Stress Index (CWSI) and Temperature Humidity Index (THI) adjusted for wind speed and solar radiation were exploited to assess crops water stress and livestock thermal stress, respectively. The Weather Research and Forecasting (WRF) model was used as a high- resolution regional climate model in order to simulate climate conditions for two decades in Greece (whole country) at 10 Km spatial resolution and 1 hour temporal resolution. WRF was applied for two emission scenarios, namely the SSP2-4.5 (intermediate) and the SSP5-8.5 (worst-case). Projections refer to the near future decade (2045–2054), while decade (2005–2014) was used as reference decade for comparison purposes. Simulations for the future period were comparatively assessed with the reference period on decade and on monthly basis. The analysis includes the calculation and mapping of differences in indices mean values, differences in the frequency of occurrence of indices classes, and differences in the percentage of stress thresholds exceedances. The cultivation of the specific crops and the breeding of the specific animals are crucial for food sufficiency and security, while affecting important sectors of the agricultural economy, as well as agricultural income. Therefore, ensuring the continuation of these agricultural activities by protecting them from climate change impacts is a serious future challenge.

Biography

Dimitris K. Papanastasiou is an Assistant Professor. His expertise is in the fields of atmospheric pollution, meteorology and air emissions, in urban and rural environment. He holds a BSc in Physics, a MSc in Environmental Physics, and a PhD in Atmospheric Pollution and Meteorology. His research interests include monitoring and analysis of atmospheric pollution levels, meteorological parameters, comfort levels of humans and animals, air quality and climatic conditions in agricultural buildings and emissions of atmospheric pollutants and greenhouse gases, environmental impact assessment, environmental education. He has significant experience in monitoring and assessing environmental parameters in urban and rural environment, including installation and use of equipment, data analysis, and evaluation of models' results. He also has many years of experience in teaching, research and administration in academic and research institutions. Currently he is the principal investigator of the AGRO FUTURE CLIMATE STRESS project.

ADAPTATION MEASURES TO REDUCE THE VULNERABILITY OF THE GREEK AGRICULTURAL SECTOR IN TERMS OF CROPS WATER STRESS AND LIVESTOCK THERMAL STRESS UNDER CLIMATE CHANGE SCENARIOS

Anastasia Poupkou
Academy of Athens, Greece

Abstract:

Climate change is expected to significantly affect the agricultural sector in Greece (livestock and crops). This paper explores how the thermal stress conditions for popular farmed animals (i.e. cows and sheep) and the water stress conditions for popular crops (i.e. wheat and olive) will evolve in the future due to climate change and proposes adaptations measures. For this reason, the Weather Research and Forecasting (WRF) regional climate model was applied at 10km spatial resolution over Greece to simulate the reference (2005–2014) and the near future (2045–2054) climate under two climate scenarios, namely the SSP2-4.5 (intermediate) and the SSP5-8.5 (worst-case). Simulations were driven by a bias-corrected dataset based on 18 models of the Coupled Model Intercomparison Project 6 (CMIP6). Animal thermal stress was expressed through the Temperature Humidity Index (THI), while water stress through Crop Water Stress Index (CWSI). The spatial distribution of the differences in the index's values between future and present climate identified geographic areas where the increase of crop and livestock stress is expected to be more pronounced. This increase was comparatively assessed with information obtained from the Hellenic Statistical Authority thatidentified the more and less popular Greek Prefectures for wheat and olive cultivation and for cows and sheep breeding. Considering this analysis, adaptation measures are recommended and good practices are presented to crop and livestock farmers for wheat and olive cultivation, and for cows and sheep breeding, respectively, to reduce impacts on food sufficiency and security, and agricultural economy and income from the climate change induced enhanced stress conditions. These include (a) for crop farmers: drip and deficit irrigation, application of precision farming techniques, application of soil moisture conservation techniques, contour farming and terracing, new water and stress tolerant varieties, adoption of agroforestry and (b) for livestock farmers: breeding heat-tolerant livestock genotypes, improvement of animal housing and shelter design, nutritional management, application of precision livestock farming techniques.

Biography

Poupkou is a Physicist. She has an MSc in Environmental Physics and a PhD in Atmospheric Physics. Her research interests are related to the study of the chemical composition of the atmosphere and the climate change. She has a many-year experience in the fields of atmospheric modeling and evaluation, atmospheric emission sources apportionment and process analysis, and anthropogenic and natural emissions estimation. She has 55 publications in international peer- reviewed journals and 58 publications in proceedings of international peer-reviewed conferences. She has participated in more than 40 competitive research projects. Currently she is the principal investigator for the Academy of Athens of the AGRO FUTURE CLIMATE STRESS project.

SCREENING FOR LOCALLY AVAILABLE ENTOMOPATHOGENIC NEMATODES FOR POTENTIAL BIOLOGICAL CONTROL OF FALL ARMYWORM, SPODOPTERA FRUGIPERDA, IN MAIZE IN ZAMBIA

Chilipa Lorraine, POY Nkunika, MN Moonga and P Kachapulula
University of Zambia, Zambia

Abstract:

Fall armyworm (FAW) *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae), is an economically important pest globally. Fall armyworm attacks many crops, especially maize and causes yield loss of above fifty percent when not controlled. Several control measures have been employed but with limited success. Therefore, there is need to explore alternative control measures. The use of entomopathogenic nematodes (EPNs) is an effective alternative control measure and it is friendly to the environment. Its application has not yet been explored in Zambia. The objective of this study was therefore to screen for locally available entomopathogenic nematodes in selected parts of Zambia for their potential as biological control agents against FAW. Soil samples for isolation of locally available EPNs were obtained from Chilanga, Chisamba (Golden Valley) and Kawambwa Districts of Zambia. The collected seventy-five soil samples were sent to THE Zambia Agriculture Research Institute for screening and isolation of EPNs for potential use as biological control agents. Baermann technique and insect-bait technique were used for screening and isolation of EPNs from soil samples. The extracted liquid containing EPNs from the Baermann experiment was then baited with FAW and after four day the FAW cadavers from the extracted liquid and those used as insect bait on soil samples were subjected to modified white trap. A microscope was then used to view presence of EPNs. From the seventy-five samples collected from Chilanga, Chisamba and Kawambwa, fifteen soil samples were confirmed positive for EPNs. Entomopathogenic nematode presence was positive in all the study sites with an overall occurrence of twenty percent. All the EPN isolates from Chilanga, Chisamba and Kawambwa were able to kill the FAW. This study highlights the potential of locally available EPNs as biological control agents against FAW and provide a foundation for developing sustainable and environmentally friendly FAW management strategy.

Biography

Lorraine N. K. Chilipa is a Senior Agricultural Researcher Officer under Zambia Agriculture Research Institute, whom through experience and quest to finding lasting cost effective, efficient and appropriate technologies to curb food insecurity, is working tirelessly with farmers and other stakeholders. Currently pursuing a PhD in Entomology at the University of Zambia, holds a Master of Science in Plant Breeding and Seed Systems obtained from the University of Zambia and a Bachelor of Science Degree from the University of Zambia. She is a hardworking and self-motivated researcher. Over the years, she has acquired knowledge in agricultural research in plant pests and diseases, potato management constraints, multiple race Inoculation as an option in breeding for resistance to C. lindemuthianum in common beans, efficacy of selected pesticides against the fall armyworm infestation in small holder maize production, effect of intercropping maize with legumes, oilseed crops and cucurbits, and perimeter cropping on fall armyworm infestation. The researcher is currently working on the potential of entomopathogenic nematodes to manage fall armyworm in maize in Zambia.

FORMATION OF SAPONIN FROM KOREAN HERBAL PLANT USING MUSHROOMS ENZYME

Yashoda Gaire and Jitendra Upadhyaya
Tribhuvan University, Nepal

Abstract:

The protopanaxadiol-type major ginsenosides such as ginsenoside (G)-Rb1, in Panax ginseng is poorly absorbed by human intestinal tract and only small amount are oxygenated by gastric juice with limited components being soluble. However, the minor ginsenosides such as G-Rg3, -F2, -Rh2 and compound K (C-K), hydrolyzed products of major ginsenosides G-Rb1 are more biologically active, more readily absorbed into the blood stream and function as active compounds than major ginsenosides but they exist either in much lower amount. Therefore, this study focused on obtaining C-K from the enzymatic transformation of G-Rb1 by enzyme preparations from cultured edible or medicinal mushroom mycelia. Out of five mushrooms (Fomitella fraxinea, Ganoderma lucidum, Phellinus Linteus, Elfvingia applanata and Pleurotus ostreatus) used in this study, only F. fraxinea gave the most remarkable formation of C-K. The optimum conditions for C-K formation in two mushroom mycelia were reaction time 72 - 96 hrs, pH 4.5 - 5.0 and temperature 40 - 50°. The pathways followed by G-Rb1, G-Rb2 and G-Rc were Rb1 Rb2 and Rc → Rd→ F2 → C-K, as major pathway and Rb2 → C-O→ C-Y → C-K and Rc → C-Mc1→ C-Mc → C-K as minor pathway and the hydrolyzed products were identified by TLC, HPLC, HPLC-MS and spectroscopic analysis. This result suggests that mushroom mycelia can be used to produce biologically active minor ginsenosides from major ginsenosides without food safety concern.

Biography

Yashoda Gaire is a dedicated educator and researcher from Buddhabhumi-01, Kapilbastu, Nepal. She currently works as a Secondary Teacher at Shree Bhanu Secondary School in Manang, a government-run institution, and also serves as a Co-Researcher with Counsel and Counsel and Tribhuvan University. Academically, she holds Master's degrees in both Sociology and English from the Central Department of Tribhuvan University, Kirtipur, and earned her Bachelor's degrees in Rural Development and English from Butwal Multiple Campus. Her commitment to education and interdisciplinary research reflects a deep passion for social progress and academic excellence.Born with a physical disability—a shortened right leg—Yashoda has overcome numerous social and professional challenges, particularly in a society where stigma around disability remains widespread. Despite these barriers, she has made significant contributions to various research projects, including curriculum evaluation at the basic level, a study on Early Childhood Education and Development (ECED) standards, and a scientific investigation into the formation of saponin from a Korean herbal plant using mushroom enzymes. Through her work, she not only advances knowledge but also champions inclusivity and resilience.

AGROECOLOGICAL POTENTIAL OF TRICHODERMA SPP. AS A BIOFUNGICIDE AND BIOFERTILIZER AGENT IN STRATEGIC CROPS IN MEXICO

Petra Andrade-Hoyos, Eduardo Molina-Gayosso, Moisés Roberto Vallejo-Pérez, Roberto de la Cruz Díaz-Juárez, Marian Guadalupe Hernández-Arenas, Edwin Javier Barrios-Gómez and Nayelí Sarahí Quiñones-Islas
National Institute of Forestry, Agricultural and Livestock Research (INIFAP), Mexico

Abstract:

Trichoderma spp. is a genus of filamentous fungi widely distributed in agricultural soils, known for its versatility as a biological control agent and biofertilizer. Arbuscular mycorrhizal fungi (AMF) optimize plant nutrition and provide protection against various types of biotic and abiotic stress. Its application in Mexican agriculture has gained relevance due to its ability to antagonize soil-borne phytopathogens, stimulate plant growth, and reduce the dependence on agrochemicals. Native species such as T. harzianum, T. asperellum, T. koningiopsis, and T. hamatum and AMF, have been identified and have demonstrated high efficacy under laboratory, greenhouse, and field conditions, particularly in avocado, peanut, chili, and strawberry crops. These fungi act through mechanisms such as mycoparasitism, competition for space and nutrients, the production of antifungal metabolites, and the induction of systemic resistance in plants. In chili (Capsicum annuum) cultivation, T. harzianum (strain TH4) achieved up to 84% inhibition of Fusarium solani growth. In strawberries, it proved effective against a broad spectrum of fungi, including Colletotrichum and Rhizoctonia. Furthermore, its combination with mycorrhizal fungi has resulted in improved nutrient uptake, increased tolerance to abiotic stress, and enhanced crop performance. Bioformulations based on Trichoderma spp., developed from native strains, offer significant agroecological benefits such as reduced use of synthetic fertilizers and pesticides, restoration of soil microbiota, and improved agricultural productivity. These findings highlight the need to strengthen biologically based management strategies tailored to Mexican agroecosystems, emphasizing sustainability and resilience in the face of climate change.

Biography

Petra Andrade Hoyos specializes in selecting disease-resistant plants, focusing on horizontal or global resistance to key local pathogens. She has a strong interest in isolating and identifying virulent pathogens, and she collaborates with native Trichoderma endophytes for biological disease control. Her background in research and experience teaching at universities, along with working with producers across various regions of Mexico, has shaped her holistic understanding of agro systems management.

COUPLED HYDROLOGIC AND HYDRAULIC MODELING FOR PREDICTING SOIL MOISTURE: A CASE STUDY

Arnab Bandyopadhyay and Sameer Mandal
North Eastern Regional Institute of Science and Technology, India

Abstract:

Soil moisture in the root zone is a critical factor in the hydrological cycle, influencing both crop selection and irrigation requirements. Changes in climate significantly affect soil moisture patterns, impacting cropping systems and necessitating the adoption of suitable mitigation strategies. This study aims to simulate current and future soil moisture levels in the root zone using the coupled MIKE SHE and MIKE+ River models. The model was driven by gridded rainfall, minimum and maximum temperature data from the Indian Meteorological Department (IMD), and river discharge data provided by NEEPCO for the period from 2009 to 2022. The observations from 2011 to 2017 were employed for model calibration, and data from 2018 to 2022 were utilized for validation. The initial data from 2009 to 2010 was used as a warm-up period. Calibration and validation for river discharge yielded satisfactory results, with Nash-Sutcliffe Efficiency (NSE) values of 0.77 during calibration and 0.72 during validation, with a consideration that the model's soil moisture outputs align well with field observations. To validate soil moisture estimates, the study utilized SMAP L3 Radiometer Global Daily Soil Moisture data, which provides measurements with a spatial resolution of 9 km. Using a lumped approach, basin-wide areal average soil moisture was calculated and compared against SMAP soil moisture data which demonstrated satisfactory correlation. There is scope for improvement in soil moisture simulation when the models are particularly calibrated for soil moisture. This study demonstrates the potential to predict future soil moisture patterns under changing climate conditions if such calibrated and validated coupled models are run with CMIP climate forcings. The findings can support policymakers in developing comprehensive mitigation and adaptation strategies for sustainable crop management and water resource planning.

Biography

Arnab Bandyopadhyay, born on September 12, 1977, is a distinguished academic and researcher in the field of water resources development and management. With a robust educational background and significant contributions to academia, he has made notable strides in his profession. Arnab completed his secondary education in 1994 and higher secondary education in 1996. He pursued a B.Tech. in Agricultural Engineering from Bidhan Chandra Krishi Vishwavidyalaya (BCKV), West Bengal, graduating in 2000. His exceptional performance earned him the Vice Chancellor's Gold Medal and the Shishubala Memorial Gold Medal as the University Topper, along with the University Merit Scholarship.Furthering his studies, Arnab obtained an MTech. in Water Resources Development and Management from the Indian Institute of Technology (IIT) Kharagpur in 2003. He was awarded the Institute Silver Medal as the Department Topper and received the prestigious GATE 2000 Fellowship (AIR 10) and DAAD Fellowship for his MTech. project at the Institute of Hydrology and Meteorology, TU Dresden, Germany. In 2008, Arnab earned his Ph.D. from

IIT Kharagpur, supported by the High Value Ph.D. Fellowship.His professional career began as a Scientist 'B' at the National Institute of Hydrology from August 2005 to January 2010. He then joined the North Eastern Regional Institute of Science and Technology (NERIST), where he served as an Assistant Professor from February 2010 to January 2015, was promoted to Associate Professor in January 2015, and has been a Professor since January 2018. He has made significant contributions to the field of agricultural engineering, particularly through his expertise and ongoing research in climate change vulnerability and impact studies, geo- and hydro-informatics. His contributions extend beyond these areas, as evidenced by his numerous publications in both national and international reputed journals. Additionally, he has mentored many master's and PhD scholars, furthering the impact of his work through his guidance and academic leadership.

ARCRUSLE: A USER-FRIENDLY GIS TOOL TO ESTIMATE SOIL EROSION USING REMOTE SENSING IMAGES

Aditi Bhadra, Munuvelu Vese and Nyigam Bole
North Eastern Regional Institute of Science and Technology, India

Abstract:

This study presents the development of a user-friendly ArcGIS python tool, named ArcRUSLE, to estimate average annual soil erosion both spatially and temporally across any area of interest based on the principles of the Revised Universal Soil Loss Equation (RUSLE) model, which estimates soil loss by integrating Remote Sensing (RS) and Geographic Information System (GIS). The tool was tested by estimating soil erosion for the Daporijo basin in Arunachal Pradesh, India and validating the results against sediment yield collected at the basin outlet by the Central Water Commission (CWC). Sediment yield was derived from the estimated soil erosion values using the Sediment Delivery Ratio (SDR) model, specifically tailored for the northern regions of India. The observed average sediment yield for the years 2017 – 2022 was 2.739 t/year, while the estimated average sediment yield values was 2.884 t/year. The results showed a good overall agreement between the observed and estimated sediment yields, validating the tool's effectiveness. The ArcRUSLE tool significantly reduces the manual effort required for data preparation, processing, and analysis. This automation streamlines the process of soil erosion estimation, enabling quicker and more reliable assessments that can support environmental planning and land management efforts.

Biography

Aditi Bhadra, born on November 12, 1977, is a distinguished academic and researcher in the field of soil and water engineering. With a robust educational background and significant contributions to academia, she has made notable strides in her profession. Aditi completed her secondary education in 1994 and higher secondary education in 1996. She pursued a B.Tech. in Agricultural Engineering from Bidhan Chandra Krishi Vishwavidyalaya (BCKV), West Bengal, graduating in 2000. Furthering her studies, Aditi obtained an MTech. in Soil and Water Conservation Engineering from the Indian Institute of Technology (IIT) Kharagpur in 2003. In 2007, Aditi earned her Ph.D. from IIT Kharagpur. She joined the North Eastern Regional Institute of Science and Technology (NERIST) as Assistant Professor in August 2006, was promoted to Associate Professor in January 2015, and has been a Professor since January 2018. She has made significant contributions to the field of agricultural engineering, particularly through her expertise and ongoing research in Impact of Climate Change on Water Resources, Hydrological modelling, Geo-Informatics, Cryosphere mapping/modelling. She has numerous publications in both national and international reputed journals and is a member of several professional societies. Additionally, she has mentored many master's and PhD scholars, furthering the impact of her work through her guidance and academic leadership.

Day 1

Agritech
&
Plant Science

Vitual Keynote Presentation

SOFT COMPUTING APPLICATIONS IN AGRICULTURAL AND BIOLOGICAL ENGINEERING

Narendra VG
Manipal Academy of Higher Education Manipal, India

Abstract:

Soft computing, characterized by its ability to handle imprecision, uncertainty, and complex problems, has gained prominence over the last three decades. Unlike conventional methods, which often struggle with cost-effectiveness and analytical completeness, soft computing techniques offer tractability and robustness.

In the realm of agricultural and biological engineering, researchers and engineers have harnessed various soft computing tools:
1.Fuzzy Logic (FL): Fuzzy logic allows us to model and analyze soil and water regimes related to crop growth. It accommodates partial truths and approximations, making it suitable for complex agricultural systems.
2.Artificial Neural Networks (ANNs): ANNs are adept at learning patterns from data. In this context, they help analyze food processing operations and support decision-making in precision farming.
3.Genetic Algorithms (GAs): Inspired by natural evolution, GAs optimize solutions by iteratively evolving populations of potential solutions. They find applications in crop management and system design.
4.Decision Trees (DTs): DTs provide a structured way to make decisions based on input features. They assist in understanding complex relationships within agricultural systems.
5.Support Vector Machines (SVMs): SVMs excel in classification tasks. In precision agriculture, they aid in decision support by identifying relevant patterns.
Future Prospects: The ongoing development and application of soft computing hold promise for addressing critical challenges in agricultural and biological engineering. Specifically, their role in soil and water management for crop health and precision agriculture remains pivotal.
In summary, soft computing bridges the gap between complexity and practical solutions, empowering researchers and practitioners to navigate intricate agricultural systems effectively.

Biography

Narendra V G, a Professor at Manipal Institute of Technology, Manipal Academy of Higher Education, India, brings a wealth of experience to the field. With 25 years in academia and a decade in research, his expertise lies in food quality evaluation using image processing and soft computing techniques. His scholarly contributions extend globally. Dr. Narendra VG has presented research papers across countries like Japan, Malaysia, New Zeeland, Vietnam, The United Kingdom, China, Indonesia, Turkey and Heraklion Greece. He boasts 25 peer-reviewed journal publications and 35 conference papers. Currently, he guided one Ph.D. student and supervises six others. His research interests revolve around Computer Vision and Soft Computing for Grading and Sorting Agricultural and Food products. Notably, he leads a funded project of cost Rs. 80.41 Lakhs and titled as '**Indian Language to Indian Language Machine Translation**' supported by the Ministry of Electronics and Information Technology, INDIA.

MICROBIOME-ASSISTED AGRICULTURE FOR PLANT PROTECTION

Sergio Molinari, Paola Leonetti
Inst. of Sustainable Plant Protection-National Council of Research (IPSP-CNR), Italy

Abstract:

Plant Microbiome is the collective communities of plant-associated microorganisms, also referred as plant second genome. Such microorganisms colonize the rhizosphere that is the zone of soil influenced by plant roots. Plant microbiome in rhizosphere can improve root architecture, enhance nutrient uptake and tolerance to environmental stresses, and stimulate plant immune system. Benefits from enrichment of soil by rhizosphere microorganisms in agricultural practices have brought to the development of more sustainable, microbiome-assisted agricultural systems. Beneficial rhizosphere microbes are naturally selected by plants. To understand the basis of this selection is the goal of our research activity. We are testing different commercial formulations of rhizosphere microorganisms or lab-produced green waste composts in their activity as biofertilizers and bio stimulants, especially after attacks of soil-borne and insect parasites. Pilot programs involve vegetable crop plants grown in pots or small plastic containers located in glasshouses under controlled environmental conditions, and single pre-treatments before artificial pest inoculation. Paramount to have an effective increase of pest resistance under our experimental conditions is the amounts of added formulations with respect to plant species, age and size. Activation of plant immune system is monitored through detection of defense gene expressions and enzyme activities. Target genes are those encoding for pathogenesis-related proteins (PR-proteins) and enzymes regulating Reactive Oxygen Species (ROS) production and degradation. Inhibitory compounds are used to select specific microorganisms and stress their role in defense activation of plant growth promotion. Evidence is accumulating that selected plant microbiome provided with commercial formulates and/or green composts enriches rhizosphere by mycorrhization and other interactions, improves plant health and primes plants against severe biotic attacks.

Biography

Sergio Molinari is a senior scientist at CNR and leader of the Biochemistry Lab. of IPSP division in Bari, Italy. He spent a couple of years abroad for researches in Molecular Biology at the Dept. of Nematology, UCR, Riverside, CA-USA and Plant Biochemistry at the Dept. of Pure and Applied Biology, Imperial College, London (UK). His present main research effort is to extend practices within the microbiome-assisted agriculture The main topic is the study of the effect of microbe commercial formulations and green composts on plant health and tolerance/resistance to soil-borne pests, such as parasitic nematodes, and mining insects. He investigate the genetic, epigenetic and metabolic mechanisms acting in resistance of plants against parasites. Plant response to biotic stresses is studied in relation with treatment doses and application procedures, plant age, water stress, soil and environmental conditions, etc. National and European Projects dealing with plant protection and aid to agro-food SMEs in the field of selection, characterization and conservation of plant genomes, and of prevention of the diffusion of economically important and quarantine pests. He published tens of papers in important International Journals (Orcid ID 0000-0002-2472-1289; WOS ID B-7754-2015)

NATURAL FARMING: A SUSTAINABLE PATH TO AGRICULTURAL RESILIENCE

VP Ramani
Gujarat Natural Farming Science University, India

Abstract:

Amongst various global issues, soil degradation is a crucial issue, impacting crop productivity, nutritional and food security, human health, and the ecosystem on planet Earth. About 33 percent of the world's soils are degraded. Further, the food systems which are rigidly focused on the maximization of yields and economic value, without much consideration for the food value. Consequently, the mineral density decreases in cereals by about 30%. Which influenced human health adversely. Of the 768.0 million undernourished people in the world is about 9.8%. If current trends continue, about 90 percent of the soils could be degraded by the middle of this century, posing a significant threat to the life of all creatures on the planet Earth.Sustainable farming practices, particularly the concept of natural farming, stand out as the most effective mitigation strategy to preserve soil for future generations. farming emerges as a transformative solution that harmonizes agricultural productivity with ecological preservation, ensuring the well-being of both the farming community and the environment.The Government of India has launched the National Mission on Natural Farming (NMNF) to promote natural farming in mission mode across the country as a standalone Centrally Sponsored Scheme under the Ministry of Agriculture & Farmers' Welfare. Rooted in the traditional knowledge inherited from their forefathers, farmers will practice Natural Farming (NF) as chemical-free farming which involves local livestock-integrated natural farming methods, diversified crop systems, etc. Natural Farming follows local agroecological principles rooted in local knowledge, and location-specific technologies and is evolved as per the local agroecology.The research conducted on various parts of the world using natural inputs reported improvements in yield attributes, yield, grain quality, soil health, etc. showing the sustainability of natural farming.Further, natural farming is directly or indirectly important to address many Sustainable Development Goals (SDGs) of the UN. SDGs connected with soil health include SDG 1 (End Poverty), SDG 2 (Zero Hunger), SDG3 (Good Health and Wellbeing), SDG13 (Climate Action), and SDG15 (Life on Land).Therefore, considering the well-being of not only human beings but all creatures on planet Earth besides sustainable good quality higher crop production for food and nutritional security in 2050, soil conservation, management, and sustainable uses are extremely

demanding accountability for researchers, policymakers, entrepreneurs, stakeholders, and all communities surrounding the farming business.

Biography

V. P. Ramani is a Resource Person at the Gujarat Natural Farming Science University, Halol, India, the world's first and only one university on natural farming science. He is former Principal of the College of Agriculture, Anand Agricultural University, Vaso, India. He has around 34 years of experience in agriculture related research/teaching/extension activities. He worked on various research projects like soil fertility management, use of sewage and sludge in agriculture, heavy metal pollution in soils and plants, organic farming, nano-fertilizers, natural farming, and soil-plant-animal-human health continuum and developed 45 technologies for good quality higher crop production. To create awareness among the farmers, researchers, students, teachers, policymakers etc., he disseminated developed technologies through various media including the television Krishi darshan programme, All India Radio, Webinar – Seminar, Short clips, farmers' meetings, print media etc. As an individual or as a team member, he received 22 awards or medals on various national and international platforms.

A DYNAMIC FRAMEWORK FOR CROSS-SECTORAL IMPACT ASSESSMENT OF MODERN TECHNOLOGIES ON SUSTAINABLE DEVELOPMENT GOALS IN FORESTRY

Yanal Alkuddsi, Marius Aleinikovas and Benas Silinskas
Lithuanian Research Centre for Agriculture and Forestry, Lithuania

Abstract:

This research introduces a revised and interdisciplinary methodology for assessing the environmental and economic impacts of biomass production from energy crops, with broader applicability to Sustainable Development Goals (SDGs) in agriculture and forestry. The study specifically explores the bioethanol potential of *Populus L*. hybrids under Lithuanian conditions, integrating dendrometric evaluation, chemical composition analysis, and life cycle assessment (LCA). A novel aspect of the research is the utilization of marginal lands for cultivating fast-growing energy crops, thereby addressing the food-vs-fuel dilemma and promoting land-use sustainability. The methodology includes statistical yield analysis, cost-benefit and feasibility assessments, and LCA modeling using tools such as R, Python, and OpenLCA. Over 100 poplar clones from eight countries are evaluated in terms of growth performance and cellulose/hemicellulose content, which are critical for bioethanol production. Results are expected to inform optimized bioenergy strategies while contributing to greenhouse gas mitigation, rural development, and energy security. This framework serves as a replicable model for evaluating technology-driven sustainability transitions across sectors and regions.

Biography

Yanal Alkuddsi is a Ph.D. (Agri) scholar at Department of Forest Resources, Economics and Policy, Lithuanian Forest Research Institute, Lithuanian Research Centre for Agriculture and Forestry, Kaunas, Lithuania (Bioethanol production, Environmental and Economic Assessment, Life Cycle Assessment). PhD (Agri), MSc (Agri) Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Bangalore Karnataka, India (Biotechnology, Genetics and Plant Breeding, Cotton Breeding, Molecular Marker). Academic Lecturer in the Bioiformatics Master Programme, Syrian Virtual University, Damascus, Syria (Advanced plant cell biotechnology). She is previously a Principal Research Scientist at Department of Biotechnology, General Commission for Scientific Agricultural Research, Damascus, Syria (Plant Breeding, Biotechnology, Nanotechnology, Plant Molecular Genetics, Genetic Engineering) and Academic Staff at Department of Drugs - Faculty of Pharmacy – Al Rasheed International University for Science and Technology, Damascus, Syria (Plant Biology, Animal Biology and Molecular Biology). She was an academic staff at Department of Biotechnology, Faculty of Applied Science, Al Kalamoon University, Rural of Damascus (Plant Biology, Animal Biology and Biotechnology).

ENHANCING GARLIC NUTRITION WITH SELENIUM AND ARBUSCULAR MYCORRHIZAL FUNGI (AMF): A SUSTAINABLE APPROACH TO BIOFORTIFICATION IN HORTICULTURAL PRODUCTION

Ahmad Ali
Florida Agricultural & Mechanical University, USA

Abstract:

Biofortification in horticulture is an important strategy to improve the nutritional quality of crops, addressing micronutrient deficiencies in sustainable agriculture. Despite its promise, significant research gaps remain in biofortification, such as the limited application of methods to enhance specific micronutrients, like selenium, in high-value horticultural crops. Additionally, there is a need for integrated approaches that combine biofortification with plant growth-promoting techniques to improve crop uptake and bioavailability. This study investigated the synergistic effects of exogenous selenium (Se) application and Arbuscular Mycorrhizal Fungi (AMF) inoculation on garlic growth, nutritional quality, and Se biofortification. The results revealed that low Se concentrations (≤10 mg/L) significantly increased garlic bulb weight, allicin content, soluble sugar levels, chlorophyll content, antioxidant enzyme activities, and Se concentration in the bulbs. AMF was crucial in mitigating the negative effects of high Se concentrations, enhancing plant growth and nutrient uptake. This research offers valuable insights into using AMF in conjunction with exogenous Se to produce high-quality, Se-enriched garlic, improving plant health and human nutrition. The findings align with the growing demand for eco-friendly agricultural practices, demonstrating the potential of this integrated approach to improve crop quality, nutritional value, and sustainability in vegetable production systems. This study contributes to the development of biofortification techniques that enhance horticultural crop nutrition while promoting sustainable agricultural practices. This work contributes to sustainable agricultural practices, offering a potential eco-friendly method to increase crop quality, nutrient density, and resilience against biotic and abiotic stresses.

Biography

Ahmad Ali currently serves as a Research Associate at the College of Agriculture and Food Sciences, Florida Agricultural and Mechanical University (FAMU), where he collaborates on the Climate-Smart Carbon Sequestration Project. He holds a strong academic background with a Ph.D. in Horticulture–Vegetable Sciences. His research primarily focuses on the eco-physiological and sustainable development of vegetable production, with particular emphasis on soil microbiome structures and their roles in plant growth promotion, nutrient cycling, soil health, and the suppression of Fusarium and other soil-borne pathogens. Optimizing soil health, enhancing microbial interactions, and improving crop productivity in sustainable farming systems are also my research interest. Dr. Ali has also worked as a postdoctoral research fellow at Nanjing Normal University and the University of Florida. Dr. Ali has contributed extensively to the scientific community, publishing over 25 peer-reviewed articles and presenting at international conferences. His work bridges the gap between soil health, crop resilience, and climate-smart agricultural practices, making significant contributions to improving global food security.

Day 1

Agritech & Plant Science

Vitual Oral Presentation

DOES LATE WATER DEFICIT INDUCE ROOT GROWTH OR SENESCENCE IN WHEAT?

Kanwal Shazadi, Karine Chenu and Jack Christopher
The University of Queensland, Australia

Abstract:

Terminal drought is one of the principal stress factors limiting crop productivity in rain-fed systems. However, little is known about root development after heading, a stage when water uptake can be critical for crops like wheat. To investigate water-stress impacts on post-anthesis root development in wheat, three experiments were conducted with two cultivars, Scout and Mace. Plants were grown outside in 1.5-m long pots at a density similar to local recommended farming practice. Differences in root development were observed between genotypes, especially for water stress conditions under which Scout developed and maintained a larger root system than Mace. Shallow roots of both genotypes appeared to senesce between heading and maturity under well-watered conditions, whereas moderate water stress tended to increase post-heading shallow-root senescence in Mace but stimulated growth in Scout. For deep roots, post-heading biomass growth was observed for both genotypes in well-watered conditions, while under moderate water stress, only Scout maintained net growth as Mace deep roots senesced. Severe water stress resulted in root senescence at all depths for both genotypes. Above ground, Scout retained leaf greenness for only slightly longer than Mace under well-watered conditions. In contrast, under moderate water stress, Mace showed rapid post- anthesis leaf senescence while Scout was affected little if at all. Grain biomass per plant (yield) was similar between genotypes in well-watered conditions but more reduced for Mace under moderate stress. Post-anthesis differences in root growth and senescence can strongly influence water use and grain filling in drought-prone environments. Screening for this could assist breeding for drought tolerant varieties.

Biography

Kanwal Shazadi graduated from The University of Queensland, Australia, in 2024. Her research focuses on evaluating novel phenotyping methods to identify genotypic variation in both developing and mature wheat root systems. She is particularly passionate about enhancing drought tolerance in crops by investigating deep root development at later growth stages, especially in wheat. Her work provides valuable insights for improving crop models through refined root system modelling, advancing phenotyping techniques, and supporting the selection of cultivars better adapted to drought-prone environments.

LIFE CYCLE ASSESSMENT (LCA) PROCESS OF THE SEED- COTTON (OR KAPAS)

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

Abstract:

Seed-Cotton (Or Kapas) is a seed with fiber that is a commodity grown in a seed-cotton boll all around the kapas of the cotton plant. Conventional seed-cotton (Or Kapas) is ginned to separate the fiber from the seeds in eight cotton-producing states of India. It uses large amount of toxic chemicals to grow and farm its product, which seeps into air, water, land, greenhouse gases and indirectly into our bodies. Organically grown seed-cotton, genetically modified seed-cotton and naturally pigmented color seed-cotton is treated without toxic chemicals. Conventional cotton is treated with harmful chemicals and carcinogens like chrome composite leather clad rollers used in cotton roller gins and formaldehyde. The life cycle assessment (LCA) process of the seed-cotton commodity is complex that including farm cultivation and manufacturing processes, namely, ginning, lint baling, blowing, carding, drawing, roving, spinning, weaving, dyeing, cutting, sewing, and ironing and retailing for commercial textile and knitted products. Green Cotton uses sustainable methods of cultivation and is therefore made from fibers of certified ecological origin. Green cotton is the cotton which is unprocessed and unwashed without uses of bleaches, dyes, chemicals or fungicides. It is raw and natural odor that will dissipate over time. Cotton is a natural fiber and generally skin-friendly, but it has its drawbacks known as moisture retention. *Gossypium hirsutum* represents 93% of the hybrid cotton in India and Bacillus thuringiensis (Bt) seed-cotton hybrids are *G. hirsutum*. The worms present on the leaves of Bt seed- cotton become lethargic, sleepy and cause less damage to the kapa plants. When the worms consume the plant, the environmental toxic proteins produced by the crops are ingested and kill worms. Environmental impacts assessment (EIA) process is conducted concerning to air pollution, surface water and soil and ground water use, environmental toxicity, Bt Seed-cotton toxicity, eutrophication, and greenhouse gas (GHG) emission magnitude (P X A X T X E X S). Pesticides such as insecticide, herbicide, growth regulators, desiccant, defoliant and fungicide are being used considerably in seed- cotton (Or Kapas) cultivation. Green Cotton labelled clothing are made solely from cotton that is free of any pesticide residues. Organic cotton, is a fabric grown using organic methods, without the use of chemical fertilizers and pesticides. Life Cycle Assessment (LCA) process is a suggested technique in this paper that is used to assess the

environmental impacts across seed-cotton commodity's life cycle from cotton cradle to grave that is from raw material to seed- cotton acquisition through lint cotton production, baling, fiber and yarn and fabric use, cotton seed oil expulsion, oil cake production, end-of-life treatment, recycling and composting, waste to energy (WTE) and final disposal.

Biography

Vijayan Gurumurthy Iyer has his expertise in environmental health impact assessment (EHIA) process and life cycle assessment process passion in improving the environmental health and wellbeing. He has built environmental impact and climate change sustainability model after years of experience in research, evaluation, teaching and administration both in industry and research and education institutions. He has more than forty years' research experience. He was awarded Ph.D. (Environmental Science and Engineering) from Indian School of Mines, Dhanbad during the year 2003 as well post-doctoral elaborator from WSEAS, Greece in 2010. He was awarded D.Sc., LL.D. and DL honorary doctorates. He has published more than 450 research publications and 5000 research citations in journals and conference proceedings including abstract books and Hirsch index 60. He has published more than 100 eBooks and 600 citation index databases. He is serving as a faculty in Bihar Institute of Public Administration & Rural Development, Gaya, Bihar, India.

LOOP MEDIATED ISOTHERMAL AMPLIFICATION (LAMP)

Rajesh J Panchal
College of Agriculture, Madhav University, India

Abstract:

A Loop Mediated Isothermal Amplification (LAMP) is a simple, fast, explicit and cost-effective nucleic acid amplification method comparative to PCR (Polymerase Chain Reaction). It is nucleic acid sequence based, self-sustained sequence replication and strand displacement amplification. This technique uses Bst DNA polymerase and specifically sequenced (designed) four to six primer pairs which recognize total six to eight different target sequences on template strand. As a result of amplification, a large amount of DNA is synthesized, yielding a large pyrophosphate ion as by-product. It is a recognized nucleic acid amplification method offering rapid, accurate and cost-effective diagnosis of infectious diseases.

Biography

Rajesh Panchal is currently serving as an Assistant Professor in the Department of Genetics and Plant Breeding at the College of Agriculture, Madhav University, Rajasthan. With a strong academic and research background, he has made notable contributions in the field of plant genetics, particularly focusing on Rice heterosis during his M.Sc. and genetic parameters of double Bt Cotton during his Ph.D.He has been recognized for his academic excellence and research work with several prestigious awards, including multiple Gold Medals during his undergraduate studies, the Dr. C. T. Patel Gold Medal for quality research on American double Bt Cotton, and the Young Professional Award. Additionally, he was a recipient of the SHODH scholarship scheme by the Government of Gujarat.Panchal has an impressive record of academic contributions, having published 10 research papers, 1 book, 5 book chapters, 1 edited book, and 23 farmer-oriented articles. He has also actively participated in over 50 seminars, webinars, international conferences, trainings, and symposiums, reflecting his commitment to continuous learning and knowledge dissemination in the field of agricultural sciences.

INTEGRATED LOGISTIC GROWTH MODEL FOR RESOURCE EFFICIENT SMART AGRICULTURE

Nezha Kharraz
Hungarian University of Agriculture and Life Sciences, Hungary

Abstract:

The classical logistic growth model characterized by it carrying capacity and intrinsic growth rate has long served as a cornerstone for simulating population and crop dynamics under resource constraints. However, its traditional formulation assumes trait homogeneity and static environmental conditions, limiting its applicability in precision agriculture and controlled environment farming. We present a novel four-dimensional extension of the logistic framework that simultaneously models plant height (H), biomass (B), chlorophyll content (C), and leaf area (L), while dynamically adapting both carrying capacity and growth rate to environmental drivers and sustainability metrics.In this model, the state vector X(t) evolves according to dX-

where "⊙" denotes element wise multiplication, and both r and K are vector functions of light intensity (J), temperature (T), nutrient availability (N), and a sustainability factor (S) that captures energy savings, CO_2 reduction, and nitrogen use efficiency. Photosynthesis driven growth rates φ_i (J, T, C) follow a Michaelis–Menten formulation and K(t) adapts via feedback from resource depletion and environmental improvements.The model was implemented as a system of coupled differential equations solved with a 4th order Runge–Kutta method over a 90-day simulation period. We compared a baseline scenario with fixed resources against an adaptive allocation scenario where light and nutrient inputs adjust based on chlorophyll feedback and an energy efficient strategy that optimizes lighting and CO_2 levels to minimize consumption. Model performance was evaluated using the coefficient of determination (R^2) and root mean square error (RMSE) against empirical growth data. The adaptive allocation scenario delivered a 15 % increase in biomass accumulation compared to the baseline, while the energy efficient strategy achieved a 22 % reduction in energy consumption without sacrificing yield. Across all traits, the model demonstrated strong explanatory power ($R^2 > 0.93$) and precise predictive accuracy (RMSE < 0.15), confirming its robustness.This four-dimensional logistic framework offers a powerful tool for smart agriculture, enabling real time optimization of resource inputs in controlled environments such as hydroponics and vertical farms. By capturing interdependencies among key physiological traits and embedding sustainability considerations, it supports data driven decision making to maximize yield and minimize environmental impact.

Future work will extend validation to field trials and integrate real time sensor networks for closed loop crop management.

Biography

Nezha Kharraz is currently pursuing her Ph.D. at Szent István University, Gödöllő, Hungary, in the Department of Mechanics and Machine Structures. Her doctoral research focuses on the monitoring of plant growth in indoor environments using phenotyping techniques and advanced data engineering methods, including data flow optimization, Internet of Things (IoT) integration, and artificial intelligence algorithms. She develops cloud-based systems and mathematical models to enhance the analysis and prediction of growth conditions. Nezha holds a master's degree in mechanical engineering (2021) with honors and a Bachelor's degree in Mechanical Engineering obtained prior to her master's. Her research interests span mechanical properties, engineering design, and computational processes, with expertise in data-driven optimization, IoT systems, artificial intelligence applications, machine learning-based monitoring, and IoT system integration. She bridges the fields of mechanics and data engineering to enhance precision agriculture technologies. Nezha is fluent in French, Arabic, English, and has basics in German, enabling effective collaboration on diverse international projects.

INNOVATIONS IN DAIRY EXTENSION FOR LOW- AND MIDDLE-INCOME COUNTRIES: ENHANCING PRODUCTIVITY AND ADOPTION BY SYNCHRONIZING SMART DAIRY FARMING PRACTICES WITH LACTATION STAGES

Terefe Taye[2], Adolfo Alvarez Aranguiz[1], Jan van der Lee[1], Abule Ebro[1,3], Mirjam Spoelstra[1] and Yenenew Bezabih[2]

[1]*Wageningen Livestock Research, Wageningen University and Research, Netherlands*
[2]*SNV Ethiopia, Ethiopia*
[3]*Independent researcher, Ethiopia*

Abstract:

Providing effective extension services to smallholder farmers remains a key challenge in low- and middle-income countries, with direct implications for food security and income. This study evaluates the impact of the 2022 Lactation Cycle Approach (LCA) on the adoption of smart dairy farming practices and milk production in smallholder dairy systems in three regions of Ethiopia. The LCA, which aligns practices with specific lactation stages, was implemented among 1,857 dairy farmers.Results indicate that early lactation practices, such as improved drinking water access, barn renovations to improve cow comfort, and targeted feeding, led to rapid and significant increases in peak milk yield. By late 2022, full implementation of the LCA revealed higher adoption rates for concentrate distribution and forage supply, while quality forage distribution and barn renovation improvements lagged. Ordinal logistic regression confirmed that cumulative adoption of practices was strongly associated with increased peak milk yield, especially beyond six litres per cow per day. Barn renovation emerged as the most impactful practice, with progressive upgrades significantly enhancing productivity. Feeding strategies tailored to lactation stage and frequent water access also showed positive effects. Random effects analysis highlighted considerable regional variability, emphasizing the importance of local context in practice design. Field observations and interviews revealed high adaptability and acceptance of the LCA, though challenges such as limited access to inputs and inadequate record-keeping persist. These findings support the LCA as an effective approach for synchronizing tailored smart dairy farming practices with biological needs, accelerating technology uptake, and improving dairy productivity in resource-constrained settings.

Biography

Terefe Taye have over 13 years of experience in the livestock and agricultural sector. He has worked in development, research, and academia across various institutions, including the Ministry of Agriculture (MoA), research institutes, TVET colleges, and international NGOs.
He holds a Master of Science (MSc) degree in Dairy Production Systems from Wageningen University and Research Centre, which has provided me with advanced knowledge in sustainable dairy farming and animal production systems. Throughout my career, he has taken on diverse roles that bridge research, teaching, and practical development, helping to improve livestock productivity and extension services. Currently, he is working for SNV, the Netherlands Development Organization, as the Lead Advisor for Extension Services on the Building Rural Income through Inclusive Dairy Business Growth in Ethiopia Plus (BRIDGE +) project. In this role, he provides strategic guidance to enhance livestock extension programs. Additionally, he manages the digital platform, which connects Ethiopian livestock professionals to facilitate collaboration and knowledge sharing across the sector. He is committed to advancing sustainable livestock development and empowering farmers through capacity building and innovative extension approaches.

BIOTECHNOLOGICAL APPROACHES IN MICROBIOME-ASSISTED PLANT PROTECTION

Paola Leonetti and Sergio Molinari
Inst. of Sustainable Plant Protection-National Council of Research (IPSP-CNR), Italy

Abstract:

In this study, biotechnological approaches have been applied to plant protection against the soil-borne parasites, known as root-knot nematodes (*Meloidogyne* spp., RKNs) and particularly the infections of *M. incognita* which has since time been considered as a major threat in agro-ecosystems and has worsened its damages due to climate change-induced changes in cultivation practices. *Solanum Lycopersicon* L. (tomato) has been chosen as the target crop because it represents an important source for world agriculture and a privileged model to study since Meloidogyne-tomato interactions involve complex and modular molecular processes due to the presence of susceptible, resistant and tolerant varieties. The attempted biotechnological approaches, such as cross kingdom transfer approaches, have been applied to the study of oxidative metabolism, gene regulation, epigenetics of nematode-infected plants also treated with SAR (Systemic Acquired Resistance) inducers or promoters (for example hormones and/or municipal green waste composts). The objective is to find for these Phyto parasites control methods that do not harm the health of plants and plant food consumers. We explore the opportunities that genomics, post-genomics and novel editing biotechnologies offer in order to understand the importance of plant microbiome in resistance to diseases and the occurrence of pathogen resistance/tolerance to design innovative control strategies.

Biography

Paola Leonetti is a Senior Researcher at the Italian National Research Council (CNR), Department of Biology, Agricultural and Food Science (DisBA), Institute for Sustainable Plant Protection (IPSP) in Bari, Italy. She has been part of the CNR since 2001, holding a tenured research position until 2023, and was promoted to Senior Researcher in 2024.Leonetti holds a Master's Degree in Biology (cum laude, 1994) and a Specialization Degree in Biochemistry and Clinical Chemistry (cum laude, 2000), both from the University of Bari "Aldo Moro." Her academic journey also includes an international research internship at the German Cancer Research Center (DKFZ) in Heidelberg, Germany, during 1995–1996, where she further developed her expertise in molecular biology and biochemistry.Her research focuses on plant-pathogen interactions, biological control, and epigenetics, with a special interest in the molecular, biochemical, and epigenetic mechanisms underpinning plant disease development. She investigates the dynamic relationships between host organisms and their environment, employing a range of techniques from stereomicroscopy to next-generation sequencing (NGS). Dr. Leonetti has a particular focus on the study of plant-parasitic nematodes, exploring both the pathology they cause and sustainable strategies for their management Her work contributes to the development of environmentally friendly pest control approaches, emphasizing the use of plant-derived biocidal compounds such as glucosinolates, saponins, and essential oils, as well as organic amendments derived from plant and agro-industrial waste biomasses.

HOW TO DEVELOP INTEREST IN THE PLANT SCIENCES; LESSONS FROM AN INTERNATIONAL SCHOOL. THE AGRICULTURAL PLANT SCIENCE ELECTIVE AND BOLIVAR GARDEN AT COLEGIO BOLIVAR, CALI, COLOMBIA

Wojciech Simon Waliszewski
Colegio Bolivar, Colombia

Abstract:

Plant sciences at the secondary school level is usually focused on learning about photosynthesis, cell differentiation, investigating stomata, something regarding genetics in the abstract, perhaps a root squash to look at chromosomes and some work in the field looking at ecosystems and biodiversity. At Colegio Bolivar the Bolivar Garden and the Agricultural Science Elective, for 11th and 12th graders, has put plant science front and center in the education of the students with practical, hands-on experiences in the garden and dedicated scientific writing in preparation for university studies. This has led to engaging students in real-world activities, through experiential learning; given them the opportunity to work, communicate and learn from agricultural / plant scientists, visit field experiments and research centers, engage with producers in the local area, and present at international scientific conferences.The project focusses on the vocational and experiential model of learning about plants and agriculture, through exposure to working with plants in a real-world environment, where student questions developed through working, in-situ, lead to exploration of topics putting students in charge of their learning. This leads to a real engagement and interest. The Bolivar Garden began ten years ago at Colegio Bolivar, Cali, Colombia. A K-12 bilingual American School. In that time a functioning terrace producing food for the workers cafeteria and a multi-strata coffee agroforestry project that produces high-quality coffee, Don Simón, has been established. Students run the Don Simón Coffee project and use funds to develop new projects, such as a now functioning green house, a new cacao agroforestry project and the transformation of the terrace to an enclosed outdoor pumpkin patch.This model could be expanded and modified to other international schools and public schools. These initiatives should be supported at all levels to increase interest in plants and agriculture.

Biography

Wojciech Simon Waliszewski is currently the 10th grade chemistry and 11th/12th grade agricultural plant sciences teacher at Colegio Bolivar, where he developed the Bolivar Garden. He is a passionate educator who believes in the importance of experiential and vocational learning, applying his knowledge of agroforestry to the teaching of his elective class.Together with his students he has developed a high-quality coffee brand

– Don Simón – which is produced on site at Colegio Bolivar and sold to the local community, profits of which fund the garden. In 2022 the garden was awarded the Tri-Association International Community Award.

He has spent over 20 years in secondary education in Zimbabwe, the UK and Colombia. He has a masters degree in International Education & Supervision from Western Carolina University, a masters degree in tropical environmental forestry from the University of Wales, where he investigated the local agroecological knowledge of the understorey forest herb Thaumatococcus daniellii (Benn.) Benth and a PhD from Bangor University, where variation in T. daniellii and its suitability as an intercrop with Hevea brasiliensis were determined. Wojciech enjoys spending time at his farm in the Andes Mountains close to Cali where he conserves three hectares of cloud forest and produces excellent coffee.

CLIMATE RESILIENCE IN OLIVE CULTIVARS: EFFECTS OF ELEVATED TEMPERATURES ON PRODUCTIVITY AND OIL QUALITY

Yana Mizrahi, Iris Biton, Hanita Zemach, Mazal Ish Shalom, Yair Many, Yariv Koch, Rina Kamenetsky Goldstein and Giora Ben-Ari
The Volcani Center, Isreal

Abstract:

The olive industry is increasingly challenged by rising temperatures, which threaten productivity and oil quality. This study examines the hypothesis that high temperatures compromise pollen viability and alter oil composition, impacting reproductive success and oil quality among diverse olive cultivars. To assess the resilience of different cultivars to heat stress, pollen viability was analyzed across 48 cultivars. Results showed that certain cultivars, such as 'Ginati,' displayed heat tolerance, while commercially significant varieties like 'Koromiko' and 'Arbequina' experienced substantial pollen viability loss under elevated temperatures.Oil quality parameters were assessed for 94 cultivars grown in contrasting climatic zones. Samples from the warmer region (Sde Eliyahu) exhibited significant reductions in oil yield, fruit size, and oleic acid content. By contrast, olives cultivated in the cooler zone (Gshur) consistently produced oil of higher quality. Notably, cultivars such as 'Arbequina' from warmer climates failed to meet the oleic acid thresholds necessary for extra virgin olive oil, underscoring the influence of temperature on oil quality standards.This study underscores the genotype-dependent nature of heat tolerance in olives, with implications for breeding climate-resilient cultivars. By shedding light on the relationship between temperature stress, reproductive success, and oil quality, these findings offer practical insights for mitigating the adverse effects of climate change on olive oil production.

Biography

Yana Mizrahi is a PhD student at the Robert H. Smith Faculty of Agriculture, Food and Environment at the Hebrew University of Jerusalem, conducting her research in the Laboratory of Olives at the Volcani Institute. Her work focuses on the effects of high temperatures and growth conditions on pollen germination and development in olives. She is also exploring the impact of elevated temperatures on the olive productive cycle and oil quality, particularly in the context of climate change's effects on agricultural productivity. The aim of her research is to identify climate-resilient olive varieties and to develop sustainable strategies for maintaining high-quality olive oil production.Yana completed her master's and bachelor's degree at RUDN University, where she concentrated on the introduction of nontraditional plants. Her research includes studies on model plants and fruit trees from warm regions, with contributions to several scientific publications in agricultural sciences. She remains dedicated to advancing knowledge in plant development and resilience to environmental stress.

THE ESSENTIAL ROLE OF PHOTOSYNTHESIS IN DEFINING NET ZERO CARBON DIOXIDE EMISSIONS FOR EQUILIBRIUM CALCULATIONS

Dave White[1], Henry Ealy[2] and Kathrine Martin[3]
[1]*Climate Change Truth Inc. USA*
[2]*Health Institute and Operation Phoenix Rising, USA*
[3]*Research department for Climate Change Truth, USA*

Abstract:

In this research manuscript, the authors seek to answer four essential questions relative to the current climate change conversation now underway globally: (Q1) what is the numerically defined goal for annual Net Zero Carbon Dioxide Emissions in gigatonnes essential for global atmospheric homeostasis? (Q2) Why is atmospheric CO_2 rising even though recent data support that CO_2 emissions have the rate of rise lowered by 50% since 2014 globally? (Q3) Are CO_2 cap and trade policies the best immediate intervention, or does globally increasing photosynthesis offer a more rapid and better long-term solution to climate change? (Q4) What strategies can be employed to have the greatest positive impact over the upcoming crucial twelve-year period? Nothing absorbs carbon dioxide out of our atmosphere like photosynthesis, and therein lies the most under-discussed solution to the greatest problem of our time. A single hectare of healthy Amazon Rainforest can sequester up to 100 tons of CO_2yr_{-1} due to photosynthesis. And the fast-growing Empress Tree (*Paulownia tomentosa*) not only grows ten to twenty feet tall in its first year, but a single hectare of these trees can sequester up to 103 tons of CO_2yr_{-1} due to photosynthesis.Prior to the Industrial Revolution and long before global deforestation devastated Earth's delicate atmospheric ecosystem, forests around the world are estimated to have consumed up to 400 billion tons of CO_2yr_{-1}. As of 2019, that has been reduced dramatically as global forests consume less than 10 billion tons of CO_2yr_{-1} with photosynthesis.

Biography

Dave White currently works at the Research, Climate Change Truth Inc. Their current project is 'Bring down atmospheric CO2 quickly'. I have proved and presented at the 2018 Climate Change Conference in NYC finding show we need to plant 100 billion trees and shrubs worldwide and stop all non-sustainable deforestation we can bring down Atmospheric CO2 to 330 ppm by 2031. 29 more Climate Change Conferences have invited me to present the correct solution. I am a chemical engineer with graduate studies in statistics. To put up a graph like it is cause and effect without doing correct statistical analysis is pure deception.

APPLICATION OF DIGITAL TWING AND VIRTUAL REALITY TO ENHANCE SAFETY IN AGRICULTURAL EQUIPMENT

Shirin Ghatrehsamani, Priyanka Mali and Judd Michael
The Pennsylvania State University, USA

Abstract:

Agriculture is one of the most hazardous industries in the United States, with machinery being the leading cause of fatalities and injuries, as confirmed by multiple studies. Among various types of machinery, all-terrain vehicles (ATVs) are particularly linked to a high number of severe and fatal incidents in both agricultural and recreational settings. Common ATV-related accidents include rollovers, operator entrapment, and fatalities due to asphyxiation, with research consistently identifying rollovers as the primary cause of operator deaths. In agricultural operations, rollovers account for approximately 85% of operator fatalities, while in recreational settings, they make up about 55%.To address these risks, we are developing an advanced Rollover Detection and Emergency Alert System designed to prevent ATV rollovers and improve post-incident response. This system integrates state-of-the-art technologies, including machine learning (ML), digital twin (DT) simulations, and virtual reality (VR). The ML component analyzes and predicts rollover risks in real time, allowing for preventive measures, while DT and VR technologies enable comprehensive system testing in controlled environments. When a rollover risk is detected, the system provides immediate alerts to the operator. In the event of an actual rollover, it automatically sends an SOS emergency alert to designated responders, ensuring a swift response. This integrated approach aims to significantly reduce ATV-related fatalities and injuries in agricultural settings by focusing on both proactive prevention and rapid post-incident assistance.

Biography

Shirin Ghatrehsamani is an Assistant Professor in the Department of Agricultural and Biological Engineering at Penn State University (PSU) since January 2023. She specializes in Machinery Design, Mechatronics, Robotics, and Precision Agriculture, with a focus on UAV applications, Remote Sensing, Wireless Sensor Networks, and Artificial Intelligence in agricultural systems. he holds a Ph.D. in Agricultural Engineering from the University of Florida (2019) and M.Sc. degrees in Mechanical Engineering (2018) and Agricultural Engineering (2010). Her B.Sc. in Mechanical Engineering of Agricultural Machinery is from Shahrekord University, Iran (2007).Shirin Ghatrehsamani has extensive professional experience, having worked as an Assistant Research Professor at Montana State University, Assistant Extension Professional at the University of Missouri, and Research Assistant at various institutions, including the University of Florida and University of Malaya.In addition to her academic roles, she has taught courses like Combustion Engineering for Mobile Equipment, Precision Agriculture Technology, and Mechatronics Design Principles. She is also an active member of the American Society of Agricultural and Biological Engineers (ASABE), the International Society of Precision Agriculture (ISPA), and the American Society of Mechanical Engineering (ASME).

International Conference on

AGRICULTURE ENGINEERING & PLANT SCIENCE

SCI SYNOPSIS

June 23-24, 2025 | Berlin, Germany

of our SCI SYNOPSIS

Vibrant Conference

Contact us:

Email: info@scisynopsis.com

WhatsApp: **+1-404-759-9729**

Phone: **+1-770-832-7291**