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2nd World Congress on

ADVANCES IN PLANT SCIENCE AND PLANT BIOLOGY

2026

VIRTUAL EVENT

13-15 JULY

SCIENTIFIC PROGRAM

DAY 01
MONDAY

JULY 13, 2026

BST (British Summer Time)

07:55-08:00	**Inaugural Ceremony**

Topics: Agricultural Biotechnology | Plant Genomics | Plant Pathology | Soil Plant Interactions | Sustainable Agriculture | Plant Genetics | Plant Ecology | Plant Breeding | Plant Metabolism | Plant-Environment Interactions

Distinguished Speaker Talks

08:00-08:20	Title: Reverse pharmacology methodology and analgesic drug research **Liu Xiangming,** *China*
08:20-08:40	Title: Tissue Culture-Driven Solutions for Horticulture **Alice Hayward,** *The University of Queensland, Australia*
08:40-09:00	Title: Green FDI and Sustainable Plant-Based Industries: Bridging Science and Policy **Sukanya R,** *CHRIST (Deemed to be University), India*
09:00-09:20	Title: Jordan Seed Bank **Khaldoun Othman Al Sane,** *National Agricultural Research Center (NARC), Jordan*
09:20-09:40	Title: Rhizobium and Seaweed Extract Enhance Drought Tolerance of Soybean **Md. A. Mannan,** *Gazipur Agricultural University, Bangladesh*
09:40-10:00	Title: Revisiting Traditional Tribal Food Practices Involving Wild Fruits, Insects, and Worms for Sustainable Food Security **Sushma Kerketta,** *Sant Gahira Guru University, India*

REFRESHMENT BREAK 10:00-10:15

10:15-10:35	Title: Interactions between the Holoparasitic Angiosperm *Cynomorium coccineum* L. and Its Hosts in Arid Lands **Gamal Mohamad Fahmy,** *University of Cairo, Egypt*
10:35-10:55	Title: The Polyvariance of Subarctic Plants Development in Extreme Climate **Natalia Vladimirovna Vasilevskaya,** *Murmansk Arctic University, Russia*
10:55-11:15	Title: A Comparative Study for New-Age Attacks in a Machine-Learning-Based Intrusion Detection System using Neural Networks **Diya,** *Indira Gandhi Delhi Technical University for Women, India*
11:15-11:25 (E-POSTER)	Title: Factors Involved in the Decline of Sticky Rockrose (*Cistus ladanifer* L.) in Production Areas in Spain **José Plaza,** *Agrario y Alimentario (iMiDRA), Spain*
11:25-11:45	Title: Marine Actinobacterial sp. A New Hope in Mitigating Plant Biotic and Abiotic Stress **Janki N Thakker,** *Charotar University of Science and Technology, India*
11:45-12:05	Title: Valorization of Potato (*Solanum tuberosum* L.) By-Products in Broiler Chicken Feed Formulation **Benmoussa Amina,** *Hassiba Ben Bouali Chlef University, Algeria*
12:05-12:25	Title: Breeding Okra (*Abelmoschus esculentus* (L) Moench) for Marketable Quality Traits **Karthika Rajendran,** *VIT University, India*
12:25-12:45	Title: How to Map Soil Organic Carbon Stocks at Field Scale in South Africa **Willie Herman Cloete,** *North-West University, South Africa*
LUNCH BREAK 12:45-13:25	

13:25-13:45	Title: *Antrodiella ussurii* and *Irpex lacteus* (*Basidiomycota*;) *Steccherinaceae* two New Records from Pakistan
	Humaira Bashir, *Graduate College for Women Wahdat Colony Lahore, Pakistan*
13:45-14:05	Title: Evaluation of the Effectiveness of Feed for *Oreochromis Niloticus* Tilapia « Brazilian Strain » Based on Local Agricultural By-Products
	Youssouf Diabagate, *Nangui ABROGOUA University, Côte d'Ivoire*
14:05-14:25	Title: *In silico* Evaluation of SARS-CoV-2 Main Protease Inhibition by Peach Kernel Polyphenols : Molecular Docking and Molecular Dynamics Simulations
	Cyrine Landolsi, *University of Tunis El Manar, Tunisia*
14:25-14:45	Title: Spatial Mapping of Soil Salinity in a Semiarid Region using a Machine Learning Model Based on Spectral Indices and Ground Data
	Khalid El Bahjaouy, *University Sultan Moulay Slimane, Morocco*
14:45-15:05	Title: Evaluation the Performance of the Centre Pivot Irrigation Systems in Southwester Libya
	Ali A M Shaki, *Wadi Al- shatti University, Libya*
REFRESHMENT BREAK 15:05-15:20	
15:20-15:40	Title: Annual Plants' Plasticity in Escaping Terminal Droughts Stems from their Limited Tolerance to Transient Droughts
	Iddo Kan, *The Hebrew University of Jerusalem, Israel*
15:40-16:00	Title: A Declaration of Economic Interdependence with Three Applications
	Carmine Gorga, *The Somist Institute, USA*

16:00-16:20	Title: Starch Derived from Corn Seeds Inhibits the Activity of Extracellular Enzymes Produced by the Phytopathogenic Fungus *Sporisorium Reilianum* **Yuridia Mercado-Flores,** *Polytechnic University of Pachuca, México*
16:20-16:40	Title: Effects of Dietary Humic Acid Supplementation on Survival, Immune Response, and Gut Microbiota in Nile Tilapia (*Oreochromis niloticus*) Challenged with *Lactococcus Garvieae* **Edén Vladimir Gaitán Morado,** *Universidad Michoacana de San Nicolás de Hidalgo, México*
NETWORKING	
END OF DAY 1	

SCIENTIFIC PROGRAM

DAY 02
TUESDAY

JULY 14, 2026

07:55-08:00	**Introduction**

Topics: Agricultural Biotechnology | Plant Genomics | Plant Pathology | Soil Plant Interactions | Sustainable Agriculture | Plant Genetics | Plant Ecology | Plant Breeding | Plant Metabolism | Plant-Environment Interactions

Distinguished Speaker Talks	
08:00-08:20	Title: *Sorghum Bicolor* Subsp. *Bicolor* as a Source of Bioactive Compounds Acting on Cholesterol: First Data on its Lipid-Derived Extracts **Sarah Caronni,** *University of Milan-Bicocca, Italy*
08:20-08:40	Title: Use of Plant Based Eco-Friendly Alternatives to Combat Single use Plastic Pollution **Jayanthi Murali,** *Tamil Nadu, India*
08:40-09:00	Title: The Effects of Different Organic Fertilizers on Soil Fertility Properties, Plant Growth and Yield **Oyata E. B. Balah,** *Great Lakes University of Kisumu, Kenya.*
09:00-09:20	Title: Harnessing Heritage: Characterization of Unexplored Rice Landraces from Southern India **J. Lydia Pramitha,** *School of Agricultural Sciences Karunya Institute of Technology and Sciences, India*
09:20-09:40	Title: Circular Protection Approaches for the Control of *Xanthomonadaceae* Plant Pathogens: Antibacterial Efficacy of Pomegranate Peel Extract and Cellulose Nanocrystals **Muhammad Amir Muawiya,** *University of Tuscia, Italy*

09:40-10:00	Title: Development And Evaluation of a Herbal Nanoformulation as a Multi-Mechanistic Anti-Aging Cosmeceutical: Phytochemical Profiling, *in vitro* and *in vivo* Assessment
	Sara M. Elghandour, *Mansoura university, Egypt*
REFRESHMENT BREAK 10:00-10:15	
10:15-10:35	Title: Storage and Quality of Ozone-Fumigated 'Manik Chaman' Table Grapes: A Comparison with Sulfur Dioxide Treatment
	Suneel Subray Hegde, *ICAR - Indian Institute of Horticultural Research, India*
10:35-10:55	Title: Synergistic Effect of Green Synthesized Zinc Oxide Nanoparticles and Vitamin C for Biological Activities
	Rida Fatima Saeed, *National University of Medical Sciences, Pakistan*
10:55-11:15	Title: Integrated Assessment of Wheat End-use Quality and Grain Hardness using Multi-Environment Trials and NIR-PLS Modelling
	Sunil Kumar, *ICAR-Indian Institute of Wheat & Barley Research, India*
11:15-11:25 (E-POSTER)	Title: The Ecosystem Role of Soil Respiration,Taking into Account the Absorption of CO_2 by Plant Roots
	Amiran Khabidovich Zanilov, *Kabardino-Balkarian State University named after H.M. Berbekov, Russia*
11:25-11:45	Title: Identification and Development of Stable Male Sterility Lines for Hybrid Onion Breeding under Indian Conditions
	Santhiya S, *ICAR-Vivekanada Parvatiya Kishi Anusandhan Sansthan, India*
11:45-12:05	Title: Effect of Different Irrigation Methods and Mulching on Growth and Yield Performance of Two Brinjal (*Solanum Melongena* L.) Varieties
	N. Priyanka, *University of Jaffna, Sri Lanka*

12:05-12:25	Title: Nanoparticles Modulates Growth, ROS, Antioxidant Responses and Gene Expression During Abiotic Stress in Rice **Hrishikesh Upadhyaya,** *Cotton University, India*
12:25-12:45	Title: Preparing Crop Germplasm for Future Climates: De-Novo Domestication and Controlled-Environment Evaluation of Wild Relatives for Climate and Stress Resilience **Charu Bisht,** *Teerthanker Mahaveer University, India*
LUNCH BREAK 12:45-13:25	
13:25-13:45	Title: Sampling in Wearable Impedance Plant Sensors **Lee Bar-On,** *Reichman University, Israel*
13:45-14:05	Title: Agronomic and Qualitative Comparison of two Strawberry Varieties (Palmeritas and Victory) under Organic Treatment in Morocco **Nassima Alami,** *Abdelmalek Essaadi University, Morocco*
14:05-14:25	Title: Implementing and Managing ESG in a Family Business in the Light of Institutional Theory **Roberto Aprile,** *University of Bergamo, Italy*
14:25-14:45	Title: Sustainable Briquette Manufacturing from Sawdust and Textile Waste: A Path to the Circular Economy and Renewable Energy **Gurumurthy Bangalore Ramaiah,** *Federal Technical and Vocational Training Institute, Ethiopia*
14:45-15:05	Title: Wheat Stem Rust in Tanzania: Navigating Climate Change Challenges for Sustainable Crop Protection **Agatha A. Aloyce,** *Nelson Mandela African Institution of Science and Technology, Tanzania*
15:05-15:25	Title: Cost-Effective Cultivation of Native *Bacillus subtilis* Strains Enhances Maize Performance through Defense Activation and Rhizosphere Colonization **César E. Falconí Saá,** *Universidad de las Fuerzas Armadas ESPE, Ecuador*

REFRESHMENT BREAK 15:25-15:40	
15:40-16:00	Title: Circular Economy – Transition to Sustainable Development or a New Model of Economic Transformation **Venelin Terziev,** *Black Sea Institute, Bulgaria*
16:00-16:20	Title: Genetic Diversity and Population Structure of Fonio Landraces Millet [*Digitaria exilis* (Kippist) Stapf] using Ethnolinguistic, Agro-Morphological and SSRs Markers **Idi Saidou Sani,** *University of Diffa (UDA), Niger*
16:20-16:30 (E-POSTER)	Title: Coffee Flower Evocation Fine Tuning **Paula Cristina da Silva Angelo,** *Embrapa Café/ IDR-Paraná, Brazil*
16:30-16:50	Title: Microencapsulated Anthocyanins from Purple Sweet Potato as a Potential Natural Food Colorant: Effect of the Extraction Method and Stability through Storage **Luz Araceli Ochoa-Martínez,** *Tecnológico Nacional de México/Instituto Tecnológico de Durango, México*
16:50-17:10	Title: Biotechnological Potential of *Bursera fagaroides:* Cytotoxic Phytochemicals from *in vitro* Callus Culture **Anabel Ortiz Caltempa,** *Centro de Investigación en Biotecnología, México*
NETWORKING	
END OF DAY 2	

SCIENTIFIC PROGRAM

DAY 03
WEDNESDAY

JULY 15, 2026

06:55-07:00	**Introduction**

Topics: Agricultural Biotechnology | Plant Genomics | Plant Pathology | Soil Plant Interactions | Sustainable Agriculture | Plant Genetics | Plant Ecology | Plant Breeding | Plant Metabolism | Plant-Environment Interactions

Distinguished Speaker Talks	
07:00-07:20	Title: Oxygen Transport into Soil *via* Radial Root Oxygen Loss
	Freeman John Cook, *Freeman Cook & Associates, New Zealand*
07:20-07:40	Title: On the Concept of Well Being: The Significance of Medicinal Plants in Wisdom Texts
	Meera Chakravorty, *Jaun University, India*
07:40-08:00	Title: Nodding's Philosophy of Care in the Online Teaching Environment of Graduate Program Education in State Universities in the Philippines
	Edilberto Z. Andal, *Laguna State Polytechnic University, Philippines*
08:00-08:20	Title: Silver Nanoparticles Synthesized from Enicostemma Littorale 2 Exhibit Gut Tight Junction Restoration and Hepatoprotective 3 Activity *via* Regulation of the Inflammatory Pathway
	Hiral Aghara, *P D Patel Institute of Applied Sciences, India*

08:20-08:40	Title: Sustainable Precision Agriculture Requiring the Incorporation of Artificial Intelligence with Smart Irrigation Infrastructure **Aditya Singh,** *Independent Researcher, Amrita Vishwa Vidyapeetham, India*
08:40-09:00	Title: Fusarium Disease Identification in Pineapple using Convolutional Neural Network with False-Prediction Interpretability *via* Local Interpretable Model-Agnostic Explanations **Rosemarie V. Pellegrino,** *Mapua University, Philippines*
09:00-09:20	Title: Microplastic-Degrading Bacteria Improve Plant Growth in Soilless Cultivation Systems **Pooja Singh,** *Monash University, Malaysia*
09:20-09:40	Title: Novel tRNA-Derived Fragments Mediated Regulation in *Agrobacterium* Pathogenicity **Jebasingh Tennyson,** *Madurai Kamaraj University, India*
09:40-10:00	Title: Identification of Novel Drug Targets in *Xanthomonas citr*i pv. *citri* using Subtractive Genomics and Coevolution Analysis **Tumpa Mahato,** *The University of Burdwan, India*
REFRESHMENT BREAK 10:00-10:15	
10:15-10:35	Title: Typersig: A Novel Activation Function for Deep Learning-Based Classification of Complex Biological Data **Singanamalli Renuka,** *GITAM School of Computer Science and Engineering, India*
10:35-10:55	Title: Advancing Food Security Goals through CRISPR-Mediated Crop Improvement **Nabarun Roy,** *Galgotias University, India*
10:55-11:15	Title: Integrating Nanotechnology with Agriculture to Address Global Food Security and Environmental Challenges **Divya Mohanty,** *University of Delhi, India*

11:15-11:35	Title: The Carbon Storage Potential of an Old Growth *Quercus semecarpifolia* (Brown Oak) Dominated Forest in Rudraprayag District, Uttarakhand, India
	Ashish Tewari, *Kumaun University, India*
11:35-11:55	Title: Fungal-Specific Lectin FGB1 based LAMP Assay for Specific Detection of *Fusarium oxysporum* f. sp. *ciceris* Causing Fusarium Wilt in Chickpea
	Prassan Choudhary, *Amity University, India*
11:55-12:15	Title: Innovative ITK-Based Biopesticide Formulation from Chilli and Neem for Eco-Friendly Control of Sucking Insect Pests
	Rinny Swain, *GIET University, India*
12:15-12:35	Title: Antibiotic Resistance: A Result of Microbial Biofilm Association
	Nidhi Verma, *Mahatma Gandhi University of Medical Science and Technology, India*
12:35-12:55	Title: Spectroscopic Screening and Radical Scavenging Evaluation of Phytocompounds in *Kigelia Africana* Ethanolic Extract
	Beema Jainab S.I, *Justice Basheer Ahmed Sayeed College for Women (Autonomous), India*
12:55-13:15	Title: Valorization of Red Pepper and Tomato Canning By-Products for the Development of Bioplastic Fiberboards
	Marwa Cheikh Rouhou, *University of Manouba, Tunisia*
NETWORKING	
END OF DAY 3	

PEERS ALLEY MEDIA

DAY 01

VIRTUAL EVENT

2nd WORLD CONGRESS ON

ADVANCES IN PLANT SCIENCE AND PLANT BIOLOGY

JULY 13-15, 2026

SPEAKER TALKS

Reverse Pharmacology Methodology and Analgesic Drug Research

Liu Xiangming, Chen su and **Zhao Dongyu**
China

Traditional Chinese medicine (TCM) research has long followed the classic approach of isolating chemical components and then studying their pharmacological effects, a paradigm established by Chen Kehui in the 1920s. However, this reductionist strategy often fails to connect the holistic actions of the crude drug with those of its isolated constituents, leading to incomplete mechanistic understanding and inability to pinpoint which components are responsible for specific therapeutic effects. To address this, we adopted a reverse pharmacology methodology—a "clinical-to laboratory" pathway that prioritizes clinically proven efficacy over initial mechanistic insight. Using the pharmacological profile of the whole herbal drug as a reference, we compared its effects with those of its component combinations to identify active substances that can replicate the original drug's action.

We applied this strategy to Stauntonia chinensis (wild papaya), a TCM herb with well documented analgesic and anti inflammatory clinical uses. The total saponin fraction (TSS) showed significant antinociceptive activity in thermal and chemical induced acute pain models, effects that were not blocked by naloxone, excluding opioid involvement. Electrophysiological studies on dorsal root ganglion neurons revealed that TSS concentration dependently inhibited capsaicin induced TRPV1 currents, indicating a direct modulation of pain signal transduction in primary sensory neurons. Fractionation and screening identified a triterpenoid saponin, C9, as the key active component: its removal abolished TRPV1 inhibition, and C9 alone replicated both the in vitro current suppression and in vivo analgesic efficacy across multiple animal models.

Our findings demonstrate that C9 is the primary material basis for the analgesic effect of S. chinensis, acting via TRPV1 pathways. This work validates an operational definition of efficacy substances and provides a practical example of reverse pharmacology, offering a rational pipeline for elucidating TCM

mechanisms, discovering lead compounds with clear chemical structures, and ensuring quality control and continued clinical use of well evidenced traditional medicines.

Presenter:
Liu Xiangming
China

Tissue Culture-Driven Solutions for Horticulture

Alice.Hayward[1], Chris.O'Brien[1], Jingyin.Bao[1], Magnolia. Hu[1], Andrea.Putri-Subroto[1], Van Anh.Nguyen[1], Xueying. Li[1], Thi Thao.Ninh[1], Albert.Wong[1], Maddy.Gleeson[1], Lily.Whelehan[1], Ben.Russo-Jonsson[1], Eveline.Kong[1], Daniela.Murillo[1], Jayeni.Hiti-Bandaralage[2], Neena. Mitter[3], Ricardo.Mancera[4], Bryn Funnekotter[5] and **Karen.Sommerville[6]**

[1]Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Australia
[2]J&S Biotech, Australia
[3]Charles Sturt University, Australia
[4] Curtin University, Australia
[5]Kings Park and Botanic Gardens, Australia
[6]Botanic Gardens of Sydney, Australia

Plant tissue culture technologies underpin modern solutions for food and crop advancement worldwide by enabling: (1) true-to-type propagation of elite varieties at commercial scale, (2) long-term *ex situ* preservation of genetic diversity; (3) accelerated genetic improvement; and 4) Innovation of novel cell-based food and bio-production systems.

Here we highlight our progress across each of these fronts using real-world examples from a range of fruit, vegetable, and endemic plant species. It includes firsts in large-scale macadamia propagation *via* meristem culture, enabling the production of hundreds of clonal plants from a single bud of a commercial cultivar. We also showcase advances in cell-based improvement platforms for avocado, strawberry, and tomato. Furthermore, we update on cryopreservation progress for the long-term storage of avocado and macadamia and the translation of protocols to conservation of critically endangered native species.

The importance of culture health and nutritional optimisation will be emphasised, showing that 100% cryopreservation success can be achieved by using nutrient media refined through response surface methodology. We highlight how incorporation of computer vision tools for digital phenotyping and AI-predictive modelling will accelerate plant tissue culture practise globally. Broader application of these approaches across genotypes and species offers global value both for advanced crop breeding programs, production of novel cellular products, and for safeguarding biodiversity under accelerating environmental change.

Presenter:
Alice Hayward
The University of Queensland, Australia

Green FDI and Sustainable Plant-Based Industries: Bridging Science and Policy

Sukanya R

Assistant Professor, Department of Commerce, CHRIST (Deemed to be University), India

The transition toward sustainable, low-carbon economies necessitates a synergistic nexus between scientific innovation, policy formulation, and green investment flows. Among the emerging instruments of sustainable transformation, Green FDI has become a critical catalyst in driving eco-innovation, resource efficiency, and inclusive growth within plant-based industries. These sectors - encompassing bio-based materials, nutraceuticals, renewable agro-industries, and biotechnological applications - hold immense potential for decarbonizing economies and advancing global sustainability goals. The study examines how Green FDI can be leveraged as both a financial and technological conduit to foster sustainable plant-based enterprises through technology transfer, capacity building, innovation diffusion, and the creation of green value chains. Drawing on international case studies and empirical insights from emerging and developing economies, this study explores the pathways through which environmentally responsible investments, aligned with ESG principles, can accelerate plant biotechnology, circular bioeconomy models, and carbon-smart agriculture.

The study highlights the crucial role of science-led innovation, including breakthroughs in genomics, bioinformatics, green chemistry, precision farming, and digital agri-technologies, in enhancing productivity while minimizing ecological footprints. It further underscores how policy coherence, institutional readiness, and regulatory frameworks can enhance the absorptive capacity of host nations, enabling them to effectively channel Green FDI toward long-term sustainability outcomes. By bridging scientific insight with policy architecture, this presentation highlights how Green FDI can transform plant-based industries into engines of ecological restoration, rural livelihood empowerment, and global food security. Ultimately, it positions Green FDI not merely as a financial inflow but as a strategic instrument for sustainable development, linking innovation, investment, and inclusive growth in the emerging global green economy.

Presenter:
Sukanya R
CHRIST (Deemed to be University), India

Jordan Seed Bank

Khaled Abulaila, Khaldoun Othman Al Sane and Ziad Tahabsom

Plant Biodiversity and Genetic Resources Directorate, National Agricultural Research Center (NARC), Jordan

An extensive overview of Jordan's abundant plant genetic resources (PGRs) is provided in this chapter. It describes the varied flora found throughout the nation, offering historical documentation and insights into the preservation and use of this national heritage. The chapter emphasizes Jordan's significance as part of the well-known Fertile Crescent, considered the cradle of agriculture and home to an abundance of plant genetic resources, including wild edible species, crop wild relatives (CWRs), and local landraces. These resources' genes for stress tolerance are essential for improving crops. The chapter also examines the current situation of the National Seed Bank at Jordan's National Agricultural Research Center (NARC). The significance of species distribution modeling, diversity assessment, vegetation evaluation, seed germination ecology, and genetic resource characterization is highlighted. Cooperation between NARC and regional and international partners, such as ICARDA, FAO, and international gene banks, is also addressed. The chapter concludes with plans for the upcoming National Seed Bank of Jordan, including information on its goals and facilities. The new seed bank aims to provide breeding materials for pest resistance and climate change adaptation, improve seed research capabilities, and preserve Jordan's floral legacy.

Conclusion and Prospects:

In summary, Jordan's rich floral legacy is being preserved and used sustainably thanks to the creation and management of the National Seed Bank at the National Agricultural Research Center (NARC). A well-known platform to exchange genetic material with other gene banks abroad is established, and a verified seed source for habitat restoration in degraded and semi-degraded lands is founded.

The most important implications of this conclusion include (1) sustainability and preservation: by which the National Seed Bank stores and safeguards *ex situ* seeds and propagation materials, which is a vital part of maintaining Jordan's floral legacy. Long-term sustainability depends on maintaining ge-

netic diversity, which is made possible by this preservation effort. (2) Responsible usage, by which a balanced approach to conservation and utilization is ensured by the bank's emphasis on sustainable usage, which shows that it is actively using seeds for breeding, research, and habitat restoration in addition to merely storing them. (3) Modern infrastructure and technology, in which advanced equipment is used. Maintaining seed viability is demonstrated by the mention of advanced storage facilities at varying temperatures and specialized storage rooms that operate at precise humidity and temperature levels. Seeds can be preserved for a long time without losing their viability thanks to this state-of-the-art infrastructure. Research labs and glasshouses for seeds are among the essential support for precise seed banking, multiplication, and research activities; these facilities enhance the storage infrastructure. This guarantees that the seeds are not only conserved but can also be efficiently used for a range of applications, such as promoting pest resistance and climate change adaptation. Moreover, the establishment of a platform for exchanging genetic materials with other gene banks abroad indicates a commitment to global collaboration and sharing of genetic resources. This not only enriches the seed bank's collection but also fosters international cooperation in biodiversity conservation.

On the other hand, habitat restoration has a crucial practical implication. The seed bank serves as a verified seed source for habitat restoration in degraded and semi-degraded lands. This demonstrates a practical application of the stored genetic resources in addressing environmental challenges, emphasizing the bank's role beyond mere conservation. In addition, an overall impact on seed longevity and viability could be achieved as long as the bank guarantees these significant features of genetic resources, which are essential for sustainable agriculture, biodiversity conservation, and environmental restoration initiatives. It does this by safeguarding *ex situ* seed materials and utilizing advanced storage techniques. Encouraging agricultural and environmental resilience is another potential impact of the National Seed Bank since it has access to breeding materials for pest resistance and climate change adaptation which means that agricultural resilience can be directly improved, and environmental issues can be addressed with better crop varieties.

In fact, the initiatives listed above demonstrate a comprehensive strategy for seed conservation that includes cutting-edge infrastructure, research, cooperation, and real-world applications. This all-encompassing approach not only preserves Jordan's floral heritage but also advances sustainable farming methods and the preservation of biodiversity worldwide.

Presenter:
Khaldoun Othman Al Sane
National Agricultural Research Center (NARC), Jordan

Rhizobium and Seaweed Extract Enhance Drought Tolerance of Soybean

Md. A. Mannan, Masuma Akter, Most. Tanjina Akter and **Ummay Habiba**

Department of Agronomy, Gazipur Agricultural University, Bangladesh

A pot experiment was conducted to investigate the effectiveness of Rhizobium (*Bradyrhizobium japonicum*) inoculation and seaweed (*Gracilaria tenuistipitata var. liui*) extract application in enhancing drought tolerance of soybean. The study aimed to evaluate their individual and combined effects on physiological, biochemical, and yield parameters under water deficit conditions. The experiment comprised two factors: drought levels -D_1 (80–100% field capacity, well-watered) and D_2 (40–50% field capacity, drought stress); and treatments -T_0 (Control), T_1 (Rhizobium @ 50 g kg^{-1} seed), T_2 (Seaweed extract @ 10 ppm foliar spray), and T_3 (Rhizobium + Seaweed). The treatments were arranged in a factorial design with appropriate replications. Drought stress markedly reduced chlorophyll content, carotenoids, total sugar, and yield components, while significantly increasing oxidative stress indicators such as H_2O_2 and MDA. However, the combined treatment (T_3) significantly improved chlorophyll a (1.65 mg g^{-1} FW), chlorophyll b (0.603 mg g^{-1} FW), and total chlorophyll (2.24 mg g^{-1} FW) under drought compared to single applications. It also enhanced flavonoid, phenol, total sugar, and antioxidant activity, while effectively reducing H_2O_2 and MDA accumulation under water deficit conditions. Drought stress significantly decreased pods per plant, 100-seed weight, and seed yield per plant. Nevertheless, the combined application (T_3) produced the highest number of pods per plant (20), 100-seed weight (20.1 g), and seed yield (36.6 g $plant^{-1}$) under drought, which were significantly superior to control and individual treatments. The findings demonstrate that the combined application of Rhizobium and seaweed extract synergistically enhances drought tolerance in soybean by improving photosynthetic efficiency, strengthening antioxidant defense mechanisms, and sustaining yield under water-limited conditions.

Presenter:
Md. A. Mannan
Gazipur Agricultural University, Bangladesh

Revisiting Traditional Tribal Food Practices Involving Wild Fruits, Insects, and Worms for Sustainable Food Security

Sushma Kerketta[1], Amrita kumari Panda[2] and **Bajrang Dewangan[2]**

[1]Department of Farm Forestry, Sant Gahira Guru University India

[2]Department of Biotechnology, Sant Gahira Guru University India

Indian Traditional tribal food systems, shaped through long-term interactions with forest ecosystems, have historically ensured nutritional diversity, food availability during scarcity, and cultural continuity. In recent decades, however, these systems have been rapidly eroding under the pressures of modernization, changing food preferences, and declining intergenerational knowledge transfer. The study reveals the need of revisiting the traditional tribal food practices involving wild fruits, insects, and worms among indigenous communities of Surguja district, Chhattisgarh, and highlights their relevance for achieving sustainable food security.

The study highlights the findings from ethnographic field-based studies documenting traditional food and health practices related to forest-derived resources. Using semi-structured interviews, group discussions, and participatory observations, the studies recorded the use of 26 wild edible fruit species and 10 edible faunal species, including insects and worms. Quantitative ethnobiological indices like Informant Consensus Factor (ICF), Use Value (UV), and Relative Frequency of Citation (RFC) were applied to assess cultural importance and patterns of use. The results demonstrate that these foods contributed essential micronutrients, proteins, energy, and bioactive compounds, particularly during the periods of economic vulnerability.

Despite their nutritional and ecological significance, the studies reveal a marked decline in the consumption and transmission of traditional food knowledge, especially among younger generations. This shift has implications for dietary diversity, nutritional resilience, and cultural identity, while increasing dependence on market-based and nutritionally less diverse foods.

The result suggests that revisiting and revitalizing traditional tribal food practices through documentation, community engagement, and integration into nutrition and forest-sensitive development strategies can strength-

en sustainable food security, support biodiversity conservation, and reaffirm indigenous knowledge systems in the face of climate and socio-economic change.

Presenter:
Sushma Kerketta
Sant Gahira Guru University, India

Interactions between the Holoparasitic Angiosperm *Cynomorium coccineum* L. and Its Hosts in Arid Lands

Gamal M. Fahmy[1] and **Roda F. Al-Thani**[2]

[1]Department of Botany and Microbiology, Faculty of Science, University of Cairo, Egypt
[2]Department of Biological and Environmental Sciences, College of Arts and Sciences, Qatar University, Qatar

Parasitic plants depend on host plants for carbon, nutrients, and water by attaching to them with multicellular structures known as haustoria. The site of attachment to the host classifies the parasite as a root or a shoot parasite. The study of parasitic plants in arid regions is limited since they represent a small percentage of life forms, and the ambient conditions are inadequate for meticulous observations. *Cynomorium coccineum* L. is an obligate root holoparasite in the monogeneric family Cynomoriaceae. It has a wide geographical range from the west in the Mediterranean salt marshes of southern Europe, North Africa, and the Middle East to the east in Afghanistan, Mongolia/China. *C. coccineum* consists of a perennial subterranean branched fleshy rhizome from which numerous secondary haustoria emerge. During April and May, it sends several annual aboveground club-shaped inflorescences. We report relationships between *C. coccineum* and its hosts in two arid habitats: in a salt marsh in the Western Mediterranean coastal zone of Egypt in Africa, and in the inland desert in the State of Qatar in Asia. *C. coccineum* was recorded parasitizing xerophytic and halophytic hosts belonging to Chenopodiaceae, Plumbaginaceae, and Zygophyllaceae. The electron microscope studies revealed that plasmodesmatal connections were lacking between the cells of the host root and the haustorium. Conversely, xylem (parasite)-xylem (host) connections were either direct, with luminal contact, or occurred *via* contiguous walls. In comparison to its hosts, the parasite had a low transpiration rate. The water potential and the osmotic potential of the parasite were lower (more negative) than those in the host roots. The value of the parasite's osmotic potential was lower (more negative) when it infected two hosts than when it infected one host. The high ratios of K+/Ca2+ and N/Ca2+ ratios in the *C. coccineum* implied that it is possibly a phloem-feeding parasite.

Presenter:
Gamal Mohamad Fahmy
University of Cairo, Egypt

The Polyvariance of Subarctic Plants Development in Extreme Climate

Natalia Vasilevskaya
Murmansk Arctic University, Russia

In recent decades, the concept of polyvariance of ontogenesis is developed, forming the basis for studying the diversity of pathways of individual development. Active research has begun on its manifestation in plant populations and the nature of this phenomenon. It has been shown that individuals of any age can exhibit a wide range of variability in structural organization, types of reproduction, and developmental rates within the genetic program of ontogeny inherent to a given species. Plant populations in the Arctic and Subarctic are of great interest for studying the phenomenon of polyvariance of development. The research was conducted in the mountain tundra of the Kola Peninsula. The characteristics of the ontogenetic development of individuals in plant populations, including organogenesis, growth, and development, were studied. It was shown that adaptation to the short growing season at high latitudes is expressed in the extension of the complete generative cycle of plants by several seasons and the polyvariance of ontogeny. A study of the organogenesis of ericaceous shrubs revealed that the formation and differentiation of floral meristems occur a year before the next flowering. Polyvariance of reproductive development was revealed, due to variations in the duration of the primary intrabud phase (from one to several years) and the varying duration of the development of the monopodial monocarpic shoot. Under the influence of low temperatures during the growing season, floral meristems may not form on vegetative shoots for several years. It was found that under the influence of abiotic and anthropogenic environmental factors, polyvariance of ontogenesis is observed, manifested in changes in the duration or elimination of age stages, polyvariance of reproductive development, variations in sexual and vegetative reproduction, and increases or decreases in developmental rates.

Presenter:
Natalia Vladimirovna Vasilevskaya
Murmansk Arctic University, Russia

A Comparative Study for New-Age Attacks in a Machine-Learning-Based Intrusion Detection System using Neural Networks

Diya and **Vibha**
Indira Gandhi Delhi Technical University for Women, India

Data Transmission has skyrocketed with the ever-growing use of the internet. And this data has constantly been an eye candy for the malicious intruders or attackers and they are willing to obtain/alter it at any given point in time. And with the growing frequency of these attacks has become a major hurdle in detecting intrusion and also a threat to a system's security over the internet. An Intrusion Detection System is a software which monitors network traffic and sends alerts to the administrator. This paper puts forward a comparative study about how different machine-learning techniques work with a high-dimensional dataset. This paper talks about the concept of Intrusion Detection System along with the taxonomy of an IDS in the first part and then different machine-learning techniques explained used in the model. After that, methods used to evaluate an intrusion detection system are discussed, majorly discussing the results that were achieved by using various ml algorithms, emphasizing the benefits and drawbacks of each system. Throughout this research, experiments were conducted with CICIDS17 and CICIDS2018 datasets to construct the model. Lastly, it covers discussions regarding observations, future trends, and challenges along the research.

Presenter:
Diya
Indira Gandhi Delhi Technical University for Women, India

Factors Involved in the Decline of Sticky Rockrose (*Cistus Ladanifer* L.) in Production Areas in Spain

José Plaza, Lilyana Tihomirova-Hristova, Esther Morate-Gutiérrez, Marta Adalia-Mínguez, Belén Álvarez and **Pedro V. Mauri**

Área de Investigación Agroambiental, Instituto Madrileño de Investigación y Desarrollo Rural, Agrario y Alimentario (iMiDRA), 28805 Madrid, Spain

Exploitation of rockrose (*Cistus ladanifer* L.) provides not only essential oils and labdanum gum but also products for use in the pharmacological, cosmetic, agricultural, and food industries, as well as residual products involved in biomass generation. The cultivation of rockrose does not have high resource requirements, as it grows under hot climates and degraded soils, and reports on pathogens are scarce. However, in plots from Mainland Spain, a high number of plants developed yellowing symptoms and decline, eventually resulting in death. Soil and foliar analyses, and a phytopathological study were carried out. The crop was grown from cuttings in soil with a tillage sole, which could be limiting the plant's ability to adapt to the soil structure. The symptoms were observed after an unusually prolonged period of rain in late spring, with high temperatures, probably resulting in atypical high vegetative activity. Variations in soil density did not affect root development. Although infiltration rates were not indicative of water saturation, upon removal of the infiltrometer a horizontal water flow was observed that could be associated with the symptoms. Laboratory analyses revealed an excess of iron in soil and plant that could also be contributing, since all these conditions are stressful for the plant. Moreover, the phytopathogenic fungal species *Macrophomina phaseolina, Fusarium acuminatum, F. equiseti,* and *F. tricinctum* were identified by ITS sequencing from symptomatic plant material. Taken all the data together, although these fungi can cause disease in other hosts, in the *C. ladanifer* plants could probably be acting more opportunistically, since an association of several biotic and abiotic factors seem to be involved in the decline observed in the rockroses, pointing out the need for sustainable integrated management to be implemented in the production areas.

Presenter:
José Plaza
Agrario y Alimentario (iMiDRA), Spain

Marine Actinobacterial sp. A New Hope in Mitigating Plant Biotic and Abiotic Stress

Janki N Thakker[1], Poorva Suthar[1], Gandhi Parth Ahir[1] and **Pinakin Dhandhukia[2]**

[1]Department of Biological Sciences, P D Patel institute of Applied sciences, Charotar University of Science and Technology, India
[2]Department of Microbiology, School of science and technology, Vanita vishram Women's University, India

Marine Actinobacterial species are known to produce various secondary metabolites which have been used for its antibiotic production. The use of marine Actinobacteria in controlling the *Fusarium* sp. and its growth promoting effect on plants is least explored. Present study focuses on the use of Marine Actinobacterial species as biocontrol agent under salt stress. Qualitative and quantitative assays of Chitinase and glucanase production was done in presence of different salt concentration. Dual culture and broth assay were done to confirm the decrease in the fungal growth in presence of Actinoabacteria at different salt concentration. Though increase in salt concentration negatively affected biocontrol potential but as compared to control, decrease in the fungal growth was noted using Scanning electron microscopy and gravimetric assays. Further confirmation of Actinobacterial effect on inhibiting fungus was confirmed by SEM and Melandialdehyde assay. Actinoabacteria inoculated plant samples showed potential to control disease by inducing defense enzymes and increasing markers like proline and chlorophyll, under various concentration of salt stress. Study opens the way of exploring marine microbes for its disease control potential in chickpea plants under salt stress which would be an ecofriendly approach.

Presenter:
Janki N Thakker
Charotar University of Science and Technology, India

Valorization of Potato (*Solanum tuberosum* L) By-Products in Broiler Chicken Feed Formulation

Amina Benmoussa, Malika Meziane Ahmed, Khedidja Boudour and **El Hassen Lankri**

Natural Bioresources Laboratory, Hassiba Ben Bouali Chlef University, Algeria

In recent years, there has been growing interest in the use of agricultural by-products as feed ingredients in poultry diet. The poultry industry operates on the American food model, which is based primarily on cereals as a source of energy, huge quantities of which are imported. The high price and sometimes unavailability of certain imported raw materials is the main obstacle to the development of poultry farming. For this reason, several researchers are interested in finding local resources to partially and/or completely replace imported raw materials.

The potato (*Solanum tuberosum* L) processing Agro industry generates large quantities of peelings as by-products. These are a good source of several beneficial functional ingredients, particularly in terms of their vitamin content and fatty acid composition which can therefore be included in poultry rations to reduce feed costs. This study aims to evaluate the chemical composition by analyzing the GC-MS, mineral and vitamin content of dried potato peels. Three different potato varieties, namely, SPUNTA, RUDOLPH and MANITOU were peeled. The peels were dried and converted into a fine powder and studied to gain insight into their possible use in feed formulation. The results shows that potato peels are a source of dietary energy due to their carbohydrate levels and high protein content. They contain a variety of micronutrients such as vitamins (A, E, C, B2, B3, B9, and B12) in addition to its remarkable level of minerals and biologically active compounds. Even when thawed, the fat content is low but has a variety of FAME.

Presenter:
Benmoussa Amina
Hassiba Ben Bouali Chlef University, Algeria

Breeding Okra (*Abelmoschus esculentus* (L) Moench) for Marketable Quality Traits

Karthika Rajendran[1] and **Divya Nagarajan**[1,2]

[1]VIT School of Agricultural Innovations and Advanced Learning, VIT University, India
[2]School of Biosciences and Technology, VIT University, India

Okra (*Abelmoschus esculentus*) is a nutritionally dense vegetable crop that has a divergent gene pool with desirable agronomic traits to develop improved varieties. Due to biotic and abiotic stresses, as well as the lack of improved varieties and hybrids, okra yields have decreased in many nations (West Africa, 2.5 tons per hectare). Okra's economic rewards depend on a number of quality attributes in addition to pod yield. So, it is necessary to consider the quality parameters along with yield during breeding. To develop improved varieties/hybrids with increased yield and superior quality traits (fruit length, diameter, pubescence, ridges, colour, shape, fibre and mucilage content) that can attract consumer preference and enhance the market competitiveness in both domestic and international markets. In India, okra with five ridges, dark green and less fibre is usually preferred. In Asian and African countries, the shorter and thicker pods with five ridges are widely used. The preference for okra pods with shorter and darker green pods is more prevalent in the region of Ghana in West Africa. Enhancing quality traits along with tolerance to various biotic and abiotic stress paves the way for the development of new varieties/hybrids in okra. The conventional method of hybridization combined with modern molecular breeding methods promotes the development of F1 okra with superior quality traits with stress tolerance.

Presenter:
Karthika Rajendran
VIT University, India

How to Map Soil Organic Carbon Stocks at Field Scale in South Africa

Willie Herman Cloete, Gerhard du Preez and **George van Zijl**

Unit for Environmental Sciences and Management, North-West University, South Africa

Reliable soil organic carbon stocks (SOCS) maps are important for accurately assessing carbon credits. To address this gap, the study aimed to determine whether conventional mapping using ordinary kriging (OK) or digital soil mapping (DSM) with machine learning (ML) could be used for mapping SOCS at a field scale in South Africa. At two fields, fifty samples from three depths, 0–5, 5–15 and 15–30 cm were collected and analysed for soil organic carbon (SOC) content using the total dry combustion method. For dry bulk density (ρb), a pedo-transfer function was created for predicting the ρb at unsampled locations. Maps for SOC content, ρb and SOCS were created using OK and DSM and assessed with evaluation statistics including root mean square error (RMSE) and Lin's concordance correlation coefficient (ρc). A calculate-first approach (calculate SOCS and then map it) and map-first approach (map SOC, ρb and then calculate SOCS) were compared. Findings of this study demonstrated that DSM should be used rather than OK for mapping SOCS at the field scale in South Africa. Utilising DSM will lead to more accurate and reliable SOCS maps. However, the results also indicated that the SOC content, ρb and SOCS maps need to be improved. To increase the accuracy of maps generated using DSM, additional soil samples need to be collected, and field scale covariates should be incorporated. The results were inconclusive regarding whether the calculate-first approach or the map-first approach should be used when utilising OK or DSM. Nevertheless, the study concluded that the calculate-first approach should be considered, because this approach is simpler and might lead to more reliable and accurate SOCS estimations.

Presenter:
Willie Herman Cloete
North-West University, South Africa

Antrodiella Ussurii and *Irpex lacteus* (Basidiomycota;) *Steccherinaceae* two New Records from Pakistan

H. Bashir[1,2], R. Babar[3], S. Jabeen[2,3] and **A. N. Khalid[2]**

[1]Graduate College for Women Wahdat Colony Lahore, Pakistan
[2]Fungal Biology and Systematics Research Laboratory, Institute of Botany, University of the Punjab, Quaid-e-Azam Campus, Pakistan
[3]Department of Botany, Division of Science and Technology, Township Campus, University of Education, Pakistan

Three basidiomata of polyporous fungi were collected from Ayubia National Park, Khyber Pakhtunkhwa, Pakistan during the moonsoon season of August 2017 to September 2021. These were studied by morph-anatomicall and molecular bases using the DNA sequences of internal transcribed spacer region of the nuclear ribosomal RNA gene. The one specimen was found morphologically and anatomically similar to *Antrodiella ussurii* and two to *Irpex lacteus*. Phylogenetic tree constructed by Maximum Likelihood method supported their positions with already known specimens as similar to morpho-anatomical bases of *A. ussurii* and *I. lacteus*. *Antrodiella ussurii* and *Irpex lacteus* represent two new records from Pakistan on the basis of detailed morpho-anatomical and molecular data.

Presenter:
Humaira Bashir
Graduate College for Women Wahdat
Colony Lahore, Pakistan

Evaluation of the Effectiveness of Feed for *Oreochromis Niloticus* Tilapia « Brazilian Strain » Based on Local Agricultural By-Products

Youssouf DIABAGATE, Yacouba BAMBA, N'Golo OUATTARA and **Alassane OUATTARA**
Nangui ABROGOUA University, Côte d'Ivoire

In order to contribute to the development of local fish farming, an experiment feeding Oreochromis niloticus tilapia of the 'Brazilian strain' was conducted at the fish farm of Nangui ABROGOUA University in Côte d'Ivoire. Fry with an average weight of 5.9 ± 0.05 g were fed two local feeds (ACOP and ACOT) and an imported industrial feed, "Koudijs", which served as a reference (AR). The feed composition was: ACOT (cotton seed meal, soybean meal, rice bran, wheat bran and premix) and ACOP (copra meal, soybean meal, rice bran, wheat bran and premix). The AR reference feed contained 30% protein and the local feeds contained approximately 29% protein. Six concrete tanks were used, with two tanks per feed. The fish were stocked at a density of 100 fish/m3. After 60 days of feeding, the best feed conversion ratio and daily growth were obtained with AR (1.33 and 0.49 g/day, respectively), followed by ACOT (1.78 and 0.37 g/day, respectively). The highest feed conversion ratio (2.26) and lowest daily growth (0.29 g/day) were obtained in fry fed with ACOP. In terms of financial analysis, local ACOP and ACOT feeds were favoured, as they substantially reduced feed costs per unit of weight gain by 55.13% and 65.36% respectively, compared to AR feed. This study highlights the benefits of using agricultural by-products in the feed of Oreochromis niloticus tilapia during the pre-grow phase. The results obtained suggest that local feed can replace commercial industrial feed during the pre-grow phase in cases where industrial feed is unavailable or extremely costly.

Presenter:
Youssouf Diabagate
Nangui ABROGOUA University, Côte d'Ivoire

In Silico Evaluation of SARS-CoV-2 Main Protease Inhibition by Peach Kernel Polyphenols : Molecular Docking and Molecular Dynamics Simulations

Cyrine Landolsi[1], Nidhal Tarhouni[2] and **Saoussem Harrabi[1]**

[1]Laboratory of Clinical Biochemistry, LR99ES11, Faculty of Medicine Tunis, University of Tunis El Manar, Tunisia
[2]Laboratory of Enzyme Engineering and Microbiology, Engineering National School of Sfax (ENIS), University of Sfax, Tunisia

Recently, plant-derived by-products have been recognised as a rich source of bioactive compounds. Among these, *Prunus persica* kernels are particularly rich in polyphenols, which exhibit diverse biological activities, including enzyme inhibition relevant to pharmaceutical and nutraceutical applications. Viral proteases are critical enzymes required for viral replication and protein maturation, making them attractive therapeutic targets. As small molecule inhibitors, polyphenols represent promising leads for antiviral drug discovery. Therefore, this study aims to evaluate the antiviral activity of polyphenols identified from peach seeds.

The identified compounds were evaluated *in silico* against the SARS-CoV-2 main protease (Mpro) through molecular docking and molecular dynamics (MD) simulations.

Among the twenty-one phenolic compounds previously characterised, di-methyl-ellagic acid glucoside was reported for the first time in peach kernels. Docking analysis showed that di-methyl-ellagic acid glucoside (−7.8 kcal/mol) and amygdalin (−7.3 kcal/mol) displayed the highest binding affinities, comparable to the reference drug X77 (−7.9 kcal/mol). MD simulations confirmed the strong stability of X77 (RMSD 1.5 ± 0.3 Å), while di-methyl-ellagic acid glucoside and amygdalin maintained moderate but stable conformations within the binding site, with RMSD values of 4.4 Å and 3.4 Å, respectively.

Overall, the phenolic constituents of peach kernels demonstrate notable inhibitory potential against SARS-CoV-2 Mpro, supporting the value of plant-derived by-products as a source of antiviral candidates.

Presenter:
Cyrine Landolsi
University of Tunis El Manar, Tunisia

Spatial Mapping of Soil Salinity In a Semiarid Region using a Machine Learning Model Based on Spectral Indices and Ground Data

Khalid El Bahjaouy, Ahmed Barakat, Abdessamad Hilali, Hassan Mosaid and **Amine Oussilkane**
University Sultan Moulay Slimane, Morocco

The expansion of intensive agriculture has led to increasing soil salinity worldwide. Highlighting the critical need for accu rate soil salinity measurements is essential to address this situation. In this context, digital soil salinity mapping becomes necessary to properly manage soil resources in limited data regions. Therefore, this study aimed to map soil salinity using a Random Forest (RF) model that incorporated several spectral indices and physicochemical properties in the Tadla Plain. 149 samples were used to investigate the physical and chemical characteristics of soils in the study area. The dataset was divided into 70% of the ground data for model training and 30% for validation. The results show that 81.1% of the studied soil is non-saline, 15,5% is slightly saline, and 3,4% is moderately saline. However, statistical metrics showed that the RF model performed well with a salinity index (SI6), achieving a correlation coefficient (R2) of 0.80 and Root Mean Square Error (RMSE) of 0.084. Salinity indices SI1, SI2, SI3, SI4, SI5, and SI7 yielded results with low precision, with R2 values below − 0.2. These findings provide valuable insights for developing strategies to mitigate soil salinity in semi-arid areas.

Presenter:
Khalid El Bahjaouy
University Sultan Moulay Slimane, Morocco

Evaluation the Performance of the Centre Pivot Irrigation Systems in Southwester Libya

Ali Shaki[1] and **M. Ajarmawey**[2]

[1]College of Environment and Natural Resources, Wadi Al- shatti University
[2]Faculty of Agriculture, Sabha University, Libya

The pivot irrigation system is considered one of the most suitable irrigation systems for dry and semi-dry areas that require a large amount of irrigation water. The use of the pivot irrigation system has been widespread in recent years, mainly in south west of Libya; limited to public agricultural projects managed by specialized companies and trained technical staff, Recently, the pivot irrigation systems have expanded to the private sector, especially in the southwestern region.

This study was conducted to determine the current use of pivot irrigation systems in different areas of southwest Libya with the aim of conducting standardized experiments to assess the uniformity of irrigation water distribution and these efficiency of distribution for eight Lindsey-type center pivot irrigation systems.

The results showed that most of the center pivot irrigation systems were low values according to the Herman and Hein index for uniformity of irrigation water distribution efficiency. The values of the distribution coefficient ranged from 13% to 78%, while the values of distribution efficiency ranged from 13% to 81%.

Presenter:
Ali A M Shaki
Wadi Al- shatti University, Libya

Annual Plants' Plasticity in Escaping Terminal Droughts Stems from their Limited Tolerance to Transient Droughts

Iddo Kan[1], Yacov Tsur[1] and **Menachem Moshelion[2]**

[1]Department of Environmental Economics and Management, Center for Agricultural Economics Research, The Hebrew University of Jerusalem, Israel
[2]Institute of Plant Sciences and Genetics in Agriculture, The Hebrew University of Jerusalem, Israel

Annual plants tolerate within-season transient droughts and escape the end-of-season terminal drought. To study the relationship between these specializations, we develop an integrated theoretical–empirical methodology to characterize the principles underlying the evolution of annual plants' water-governing traits. We consider the transpiration trajectories employed by annual plants during transient droughts as their optimal transpiration strategy in stochastic rainfall environments. This strategy maximizes the plants' expected end-of- season reproduction by balancing two contrasting goals: maximizing biomass accumulation and minimizing desiccation risk. Four traits (water-use efficiency, maximal transpiration rate, minimal transpiration rate, and maturity time) dictate the optimal strategy thus: during dry- down events, plants first maximize biomass accumulation by employing maximal transpiration rate and then switch to minimal transpiration rate at the exact time that ensures their survival until maturity. Accordingly, natural selection pressures favor plants with higher water-use efficiency and maximal transpiration rate combined with lower minimal transpiration rate, the latter increasing expected reproduction by enabling prolonged growing seasons. Using an estimation–simulation procedure, we quantify the four traits in wild barley plants (Hordeum vulgare ssp. spontaneum) evolved in different environments. Trait analyses suggest the presence of two biological constraints that impose trade-offs between the traits' selection pressures: higher maximal transpiration rate entails lower water-use efficiency (photosynthesis constraint) and greater minimal transpiration rate (constrained intra-plant water flow). Maturity time is the only biologically unconstrained trait, explaining the high plasticity of annual plants' escape strategy in adapting to dry conditions. We discuss applications of the methodology for research and breeding drought-tolerant rain-fed cultivars.

Presenter:
Iddo Kan
The Hebrew University of Jerusalem, Israel

A Declaration of Economic Interdependence with Three Applications

Carmine Gorga
President, The Somist Institute, USA

Fully appreciative of the many blessings of the Declaration of Independence it might now be an appropriate time to draft A DECLARATION OF ECONOMIC INTERDEPENDENCE.

Whereas the Declaration of (Political) Independence has, without open discussion, been transformed into a Declaration of Personal Independence;

Whereas this ideology has given rise to the Age of Entitlements, an age dominated by the conception that there can ever be rights without responsibilities;

Whereas the lack of personal and civic responsibility has generated the conception of Life as One-Against-All

Whereas this emphasis on our own welfare — independent, if not at the expense, of the welfare of our fellow citizens has created economic insecurity for everyone, rich and poor alike,

We affirm that our greatest political need is to build a society in which the reality of

Economic Interdependence is fully acknowledged.

In this society, we declare, the fundamental conception of Life is One-With-All - and we trust that the effect will be economic jubilation for all.

In order to build such a society we are called upon to realize the political ideals of Liberty, Justice, and Goodwill toward one and all. In order to build such a society our challenge is to deny all structures of individual and societal selfishness and to affirm

THE PRINCIPLES OF ECONOMIC JUSTICE

The best explanation of economic interdependence that this writer has found is an article by Leonard E. Read entitled

“I, Pencil: My family Tree”. It is available from The Foundation for Economic Education, Inc. at www.fee.org.

NOTE: A longer explanation of economic interdependence is contained in Carmine Gorga, The Economic Process: An Instantaneous Non-Newtonian Picture. Lanham, MD, and Oxford: University Press of America, 2002, 2010,and 2016. It was reproduced in Concordian economics, Vol. 2, Some Applications published by Springer Studies in Alternative Economics (2024).With some modifications, the Declaration of Economic Interdependence was presented at the United Nations Conference Rio + 20.

Three Applications

The integration of the physical (real natural wealth), monetary wealth, and legal wealth is contained in the following diagram:

Even in the purchase of a chocolate bar there are these three factors: 1. Real Wealth; 2. Money; and 3. The exchange of Ownership between money and real health.

This is the Theory of Concordian economics. Through the converse, one obtains the Policy of Concordian economics. This construct is is best organized through this diagram:

The doctrine of economic justice was formulated by Aristotle, adopted by Tnomas Aquinas, and perfected by the Doctors of Salamanca. It contained only the planks of Distributive Justice and Commutative justice (for the economic exchanges to be fair).

It ruled the Western world for two thousand years.

Without explanation, the doctrine of economic justice was transformed by John Locke into a completely different construct, the justice of property rights. This construct was transformed by Socialist and Karl Marx into the injustice of property rights.

Concordian economics eschews this vice by adding the plank of Participative Justice to the two traditional planks of distributive justice and commu-

tative justice.

Neither Aristotle nor Thomas Aquinas could, because of their tolerance of slavery, conceive of participative justice–justice extended to one and all human beings.

The development of Concordian economics is dependent on, and in turn the cause of, a paradigm change from Rationalism to Relationalim. This change is outlined in this diagram:

This construction leads to two fundamental propositions:

Women are not Rational; they are Relational. God is not Rational; HE/SHE/IT is Relational.

Presenter:
Carmine Gorga
President, The Somist Institute, USA

Starch Derived from Corn Seeds Inhibits the Activity of Extracellular Enzymes Produced by the Phytopathogenic Fungus *Sporisorium Reilianum*

Yuridia Mercado-Flores, Yusiri Velázquez-Juárez and **Martha Patricia Falcón-León**

Polytechnic University of Pachuca, Zempoala, Mexico

Head smut, caused by the fungus *Sporisorium reilianum*, poses a significant threat to maize production, prompting the search for alternative control strategies that reduce reliance on chemical fungicides. The objective of this study was to evaluate the inhibitory effects of compounds extracted from corn seed flours on two key fungal enzymes, the aspartyl protease EAP1 and the xylanase SRXL1, which are associated with fungal pathogenicity. The study compared inhibitors from two maize hybrids: a white variety (DK-2061) and a purple variety (BOGUI). Enzyme inhibitors were extracted from the seed flours of both hybrids and subsequently purified. The isolated compounds were characterized using Fourier transform infrared spectroscopy (FTIR) to identify functional groups, scanning electron microscopy (SEM) to examine surface morphology, and energy-dispersive X-ray spectroscopy (EDS) to determine elemental composition. During the purification process, the starches underwent acetylation; however, their inhibitory properties were preserved. Enzyme inhibition assays were conducted to assess the effects of the purified compounds on EAP1 and SRXL1 activities, and kinetic parameters were determined to elucidate the inhibition mechanism. The results showed that the isolated compounds were starches from both corn hybrids and exhibited significant inhibitory activity against both enzymes. Kinetic analysis revealed uncompetitive inhibition, with simultaneous decreases in Km and Vmax for EAP1 and SRXL1. These findings indicate that the inhibitors interact preferentially with the enzyme-substrate complex. This study is the first report of corn starches inhibiting the aspartyl protease and xylanase produced by S. reilianum. In conclusion, starches extracted from corn seeds show promising potential as natural enzyme inhibitors targeting key fungal enzymes involved in head smut development. These results suggest that such compounds could be incorporated into integrated disease management strategies, supporting sustainable agriculture and reducing reliance on synthetic fungicides.

Presenter:
Yuridia Mercado-Flores
Polytechnic University of Pachuca, México

Effects of Dietary Humic Acid Supplementation on Survival, Immune Response, and Gut Microbiota in Nile Tilapia (*Oreochromis niloticus*) Challenged with *Lactococcus garvieae*

Edén Vladimir Gaitán-Morado[1], Ruth Escamilla-Montes[2], Antonio Luna-González[3], Ruth Escamilla-Montes[3], Genaro Diarte-Plata[3] and **Rodolfo Pérez-Rodríguez[4]**

[1]Programa Institucional de Doctorado en Ciencias Biológicas, Universidad Michoacana de San Nicolás de Hidalgo, México
[2]Centro de Investigaciones Biológicas del Noroeste, S.C.-Unidad Guaymas, México
[3]Instituto Politécnico Nacional, Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional-Unidad Sinaloa, México
[4]Laboratorio de Biología Acuática, Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo, México

Aquaculture of Nile tilapia (*Oreochromis niloticus*) has faced challenges from pathogens such as the emerging bacterium *Lactococcus garvieae*. Humic acid (HA) was used as a prophylactic measure to evaluate its effect on the intestinal microbiota, immune system, and survival in tilapia challenged with *L. garvieae* under laboratory conditions. Four concentrations of HA were tested in feed over 83 days. The intestinal microbiota was analyzed in treatment IV (1.0 g/ kg of feed) and control through 16S rRNA gene sequencing (V3). Liver and gill tissue were collected for immune system gene expression analysis (COX-2, TGF, IL-1B, and TNF-α) through real-time qPCR methods. On day 71, the fish were inoculated by immersion with *L. garvieae* (CL50 = 8.5 × 105 CFU/mL). Gene expression in the liver (COX-2 and TNFα) and gills (COX-2, TGF-β, and IL-1β) increased significantly in treatment IV. *Cetobacterium* was among the most abundant genera in the tilapia gut. Fusobacteriota (phylum) and the genera *Aeromonas, Rhodobacter, Gemobacter,* and *Ideonella* were enriched in HA, whereas the phylum Patescibacteria and genera *Pelomonas, Nitrobacter,* and *Clostridioides* decreased significantly. Dietary HA supplementation significantly altered gut microbiota diversity and the interaction network core. In channel catfish (*Ictalurus punctatus*), dietary HA supplementation significantly altered gut microbiota alpha diversity (Oladipupo et al. 2024). Our results in tilapia showed that, while Shannon and Simpson indices (reflecting both richness and evenness) showed no significant differences between HA and control group, the Chao1 and ACE

indices (estimating species richness) were significantly higher in HA- treated fish. Humic acid supplementation significantly improved tilapia survival against *L. garvieae* by enhancing immune gene expression and modulating gut microbiota—enriching Fusobacteriota and beneficial genera (*Rhodobacter, Ideonella*) while reducing pathogens (*Pelomonas, Clostridioides*). These findings support HA as a prophylactic alternative against lactococcosis in Nile tilapia (*O. niloticus*) farming.

Presenter:
Edén Vladimir Gaitán Morado
Universidad Michoacana de San Nicolás de Hidalgo, México

PEERS ALLEY MEDIA

DAY 02

VIRTUAL EVENT

2nd WORLD CONGRESS ON

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SPEAKER TALKS

Sorghum Bicolor Subsp. Bicolor as a Source of Bioactive Compounds Acting on Cholesterol: First Data on its Lipid-Derived Extracts

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The use of phytochemicals in medicine and nutraceutical sciences has become increasingly popular. Specifically, policosanols and phytosterols are currently considered for their lipid-lowering efficacy. These compounds, abundant in several cereals, seem to act on the reduction of dietary cholesterol absorption in the intestine. However, the information on the specific policosanol and phytosterol matrix of several cereals, among which *Sorghum bicolor* (L.) Moench subsp. *bicolor* (here-after S. bicolor), is still scarce. Furthermore, their mechanisms of interaction with the protein responsible for cholesterol transport from the intestinal lumen into the enterocytes (NPC1L1) are still not clear. The objectives of this study are: 1. to obtain a detailed characterization of the phytosterols and policosanols matrix for *S. bicolor* 2. to evaluate the effects of such compounds on the modulation of NPC1L1 expression.

Policosanol and phytosterol extracts were obtained from *S. bicolor* grains; a crude lipid extraction followed by saponification and purification by column chromatography were conducted, obtaining fractions of the extracts enriched in each of these groups of compounds. The fractioned extracts were then characterized by gas chromatography coupled with mass spectrometry (GC-MS). Furthermore, their biocompatibility was evaluated with a MTT-based in vitro cell viability assay, considering an intestinal barrier model consisting of Caco-2 and HT-29 cells. Finally, such cells were treated with increasing doses of the extracts, assaying both NPC1L1 protein levels and those of the transcription factor STAT-3 by Western Blot techniques.

The findings confirmed a high content of both policosanols and phytosterols in *S. bicolor* grains, with the presence of several cholesterol-lowering compounds. Furthermore, no adverse effects of the tested extracts fractions were observed on cell viability and integrity. Lastly, the phytosterol fraction appeared to significantly reduce NPC1L1 protein levels by about 40% compared to controls while a similar effect was not observed when using the policosanol one.

Acknowledgement

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Presenter:
Sarah Caronni
University of Milan-Bicocca, Italy

Use of Plant Based Eco-Friendly Alternatives to Combat Single use Plastic Pollution

Jayanthi Murali and **Chandrasekaran Sekaran**
Tamil Nadu, India

Global plastic waste generation more than doubled from 2000 to 2019 to 353 million tons. Nearly two-thirds of plastic waste is composed of plastic items with a life of less than five years. Under the total plastic waste, 40% is from packaging, 12% from consumer goods and 11% from clothing and textiles. Considering the impact of the growing plastic menace, Tamil Nadu has taken exhaustive measures to combat plastic pollution by rolling out in 2019 a statewide single-use plastic ban on the manufacture, sales, and use of 14 types of single-use plastics across the State. Further to the ban, the State had taken a multifocal approach by emphasizing and working towards promoting alternatives to the banned plastics, alongside creating awareness among the people.

While the ban has resulted in the closure of around 250 banned SUP manufacturing industries till to date since 2019, it has also resulted in the rise of around 350 eco-alternative manufacturers across different eco-alternative materials/ products to the banned SUPs. Multiple initiatives have increased the number of manufacturers of eco-alternative products. Cloth bags made from pure cotton (Gossypium herbaceum) have been a traditional usage in the past decades was revived in place of increased usage of banned plastic carry bags. So far, 0.5 million cotton cloth bags had been dispensed which had prevented the usage of 6 million plastic carry bags. Similarly, various eco-friendly alternatives such as jute bags (Corchorus), arecanut plates (Areca catechu), arecanut cups, palm leaf plates, natural plantain leaves (Musa Musa sp.) and sal leaves (Shorea robusta) are replaced in place of banned plastic carry bags, plastic plates, plastic coated plates /cups and compostable plastic made from corn starch in place of every banned Single Use Plastics.

Presenter:
Jayanthi Murali
Tamil Nadu, India

The Effects of Different Organic Fertilizers on Soil Fertility Properties, Plant Growth and Yield

Oyata E. B. Balah
Great Lakes University of Kisumu, Kenya

Organic manures improve soil properties through supply of organic matter to the soil, which results from several complex, interactive edaphic factors, with a non – exhaustive list of benefits, grouped as physical, chemical and biological. Such benefits tend to improve these physical, chemical and biological properties to improve soil fertility. Although organic fertilizers consistently alter key soil chemical and physical parameters, a clear potential to improve soil fertility and quality are highly manure and site specific, and the comparative effects of different manure sources on soil health, crop growth and yield are not well understood in many local contexts, which necessitated this characterization and field evaluation of the emerging / local products in this work. The objective of the present work was to compare the effect of different manure sources and the conventional chemical fertilizer application on soil chemical properties, plant growth and yield. The various organic manure sources were categorized as composts (Ecoplanting, Evergrow and Filter Mud), vermicompost (Boomax) and slurries (Market waste slurry and Dung slurry). In a randomized complete block design, replicated thrice, the field evaluation was carried out on a black cotton soil of the Kano Plains of Kenya. The results displayed that the Total Nitrogen and plant available Phosphorus remained inadequate in all treatments, soil Ph, Total Carbon, excheangable Potassium, Calcium, and Magnessium, and the Cation Exchange Capacity were raised to adequate levels for plant growth by the various organic manures. Composts significantly increased germination percentage and the number of branches per plant compared to the digestates with adequate soil moisture. All growth parameters and yield of fresh leaves compared favourably between the composts and the inorganic NPK with adequate soil moisture content. Organic manures can restore soil fertility and support responsible growth and crop yield as effectively as is the inorganic NPK.

Presenter:
Oyata E. B. Balah
Great Lakes University of Kisumu, Kenya

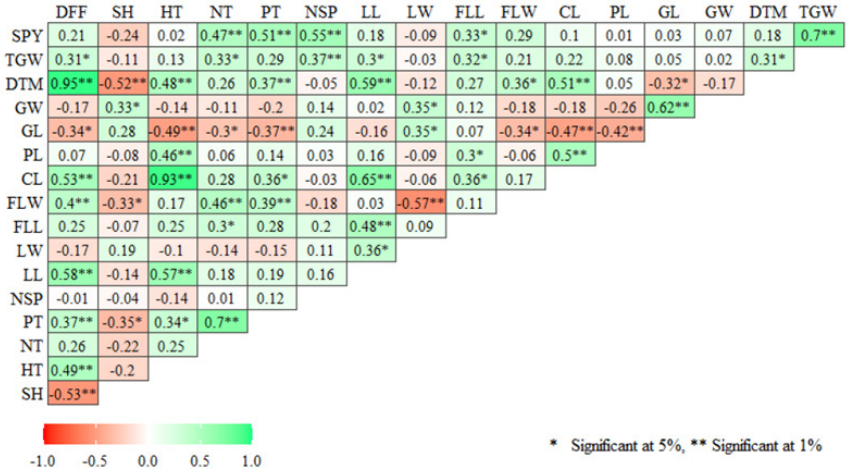
Harnessing Heritage: Characterization of Unexplored Rice Landraces from Southern India

Lydia Pramitha J, Sherina Jebakani and **Aishwarya.D**

School of Agricultural Sciences Karunya Institute of Technology and Sciences, India

Rice is one of the world's most vital food crops and continues to be a focus of genetic improvement to meet the demands of a growing population. In this study, forty-three traditional rice landraces and varieties from Tamil Nadu were evaluated for genetic diversity using D^2 statistics, DUS characterization, and principal component analysis (PCA) based on fifteen quantitative and eleven qualitative traits. The genotypes were grouped into eight clusters, with Cluster VIII containing the largest number of genotypes, while Clusters IV and VII contained one each. The greatest inter-cluster distance occurred between Clusters I and II, suggesting their suitability as parents in hybridization programs. Variability parameters revealed high PCV, GCV, heritability, and genetic advance for all traits, indicating additive gene action and scope for effective selection. PCA identified five principal components with eigenvalues greater than one, cumulatively explaining 68.30% of the total variability. Traits such as days to 50% flowering, plant height, flag leaf length and width, panicle length, number of productive tillers, and grain width contributed most to the observed diversity. Cluster II exhibited superior mean values for key yield-related traits, while Cluster VII recorded high grain and seedling dimensions. Notably, landraces such as Aanai Komban, Kichili Samba, Karuppu Kavuni, Sornamasuri, and JGL were identified as promising genotypes for yield improvement. Considering the nutritional significance of the identified rice landraces: karuppu kavuni, CR 1009 SUB 1 and kothamalli samba and seeraga samba were found to exhibit a comparatively higher iron, zinc, GABA, anthocyanin and crude protein content. Moreover, the correlation and path analyses further revealed that the number of productive tillers, flag leaf width, number of seeds per panicle, and grain length had strong positive direct effects on yield, marking them as key selection indices in future rice breeding programs.

Cluster	No of genotype	Name of genotype
I	4	Kullakar, seeraga samba, kichadi samba, sivapu kavuni
II	1	Aanai Komban
III	7	Norungan, Kulliyadichan,Sithiraikar, Milagu samba, CO 52, Kuttakar, Rathashalli
IV	13	Karum kuruvai, Chinnar, Sorna masuri, CR1009 SUB 1, TPS 3, CO 54, CO 53, CO 51, CO 55, ADT 45, Karudan samba, Kullaiyadi samba, Kattuyanam.
V	1	Karuppu kavuni
VI	9	Arumpatham kuruvai, Kothamalli samba, ASD 16, Keerai samba, Kollan samba, Kerala samba, Raja kuruvai, Kottaram samba, JGL.
VII	1	Mappillai samba
VII	1	TPS 5
IX	6	Kalaser, Thanga samba, Poongar, Amman ponni, Vellakar, Thuyamalli.



Presenter:
J. Lydia Pramitha
School of Agricultural Sciences Karunya Institute of Technology and Sciences, India

Circular Protection Approaches for the Control of *Xanthomonadaceae* Plant Pathogens: Antibacterial Efficacy of Pomegranate Peel Extract and Cellulose Nanocrystals

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Circular plant protection strategies that valorize agricultural waste into high-value bioproducts represent a key direction for sustainable crop health management. In this context, pomegranate peel extract (PGPE) and cellulose nanocrystals (CNC), both derived from agro-industrial residues, have shown promising antibacterial potential against members of the *Xanthomonadaceae* family. Rich in polyphenolic compounds such as ellagic acid, gallic acid, and punicalagins, PGPE demonstrated strong inhibitory effects on the growth, motility, and biofilm formation of *Xanthomonas campestris* pv. *campestris* (Xcc), the causal agent of black rot in cruciferous crops, resulting in a significant reduction in disease severity when applied preventively. Under *in vitro* conditions, PGPE at 0.5% completely suppressed *Xylella fastidiosa* subsp. *pauca* (Xf) and markedly reduced its biofilm production, a critical factor in pathogen virulence and persistence.

Phenotypic and molecular analyses in olive cuttings and two-year-old olive plants revealed that PGPE, particularly when combined with CNC and applied at the root level, elicited biostimulant effects by enhancing chlorophyll metabolism and activating defense-related genes. CNC, a biodegradable nanomaterial, also exhibited antibacterial properties by modulating biofilm production and limiting bacterial growth *in vitro*. Ongoing work focuses on optimizing PGPE–CNC formulations and delivery systems, alongside the synthesis of thermo-reversible polymers and soil amendments to enhance field efficacy for both disease control and plant stimulation. Overall, this study highlights the potential of PGPE and CNC as circular, sustainable solutions for bacterial disease management in crops, currently being evaluated in model systems (e.g., tobacco) and naturally infected plants in the Apulia region.

Presenter:
Muhammad Amir Muawiya
University of Tuscia, Italy

Development and Evaluation of a Herbal Nanoformulation as a Multi-Mechanistic Anti-Aging Cosmeceutical: Phytochemical Profiling, *in vitro* and *in vivo* Assessment

Sara M. Elghandour

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This study aims to design a naturally based skin anti-aging cosmeceutical. Different plant extracts were screened for their anti-tyrosinase, anti-hyaluronidase and antioxidant activities in order to develop a multi-mechanistic herbal formula (HF) that targets various skin aging mechanisms. Based on the results, Arctium Lappa L., Camellia sinensis (L.) Kuntze, Hibiscus sabdariffa L., Glycyrrhiza glabra L., Moringa oleifera Lam., Salix alba L. and Stevia rebaudiana Bertoni were selected. Tentatively, 131 metabolites were identified in HF using ultra performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS). HF was incorporated into a nanoemulsion-based gel (HFN gel) to enhance its permeability and *in vivo* activity. The optimized nanoemulsion showed an excellent particle size (PS) with high zeta potential (ZP) and a sustained release profile at pH 5.2, besides, transmission electron microscopy (TEM) exhibited a spherical shape. A three-month stability study demonstrated the high physical and chemical stability of HFN gel with enhanced permeability performance through the skin as compared to a conventional dosage form. The *in vivo* anti-aging activity was evaluated in C57BL/6 mice subjected to daily subcutaneous injections of D-galactose followed by topical application of HF and HFN gels at concentrations of 1% and 2% w/w. Our findings indicated that HFN gels can mitigate the skin aging changes induced by D-galactose in a dose-dependent manner. It augmented the overall antioxidant capacity of the skin. HFN gel significantly inhibited nuclear factor kappa B (NF-κB) and interleukin-1-beta (IL-1β) expression *via* modulating the Nrf2/HO-1 pathway, thereby preserving the integrity of skin oxidative capacity. Western blot analysis showed that HF and HFN gels significantly reduced the expression of matrix metalloproteinase-1 (MMP-1).

Presenter:
Sara M. Elghandour
Mansoura university, Egypt

Storage and Quality of Ozone-Fumigated 'Manik Chaman' Table Grapes: A Comparison with Sulfur Dioxide Treatment

Suneel Subray Hegde[1,2], M.D. Jameel Jhalegar[2] and **Viresh Mallayya Hiremath[3]**

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Table grapes are among the most widely consumed fruits globally, valued for their sensory qualities and nutritional value. However, postharvest deterioration remains a significant challenge during cold storage. This study evaluated the effectiveness of a single pre-storage ozone fumigation (3, 5, and 7mL/L), sulfur dioxide fumigation (2500ppm), grape guards, and sodium metabisulphite powder (1g/kg grapes) on disease incidence and physicochemical quality parameters of 'Manik Chaman' grapes stored at 5±2°C and 85–95% relative humidity for 70 days. All treatments, except sodium metabisulphite powder and the untreated control (Fig. 1), effectively suppressed postharvest decay caused by *Rhizopus stolonifer*, *Fusarium* spp., and *Penicillium* spp., with no symptoms observed throughout the 70-day storage period. Among them, 7mL/L ozone fumigation proved to be the most effective, achieving the maximum shelf life (70 days), while retaining the highest berry firmness (4.20N) and titratable acidity (0.70%) and exhibiting the lowest physiological weight loss (13.05%). Furthermore, it received the highest scores in sensory evaluations. These findings indicate that 7mL/L ozone fumigation offers an effective and environmentally friendly alternative for postharvest disease control and quality maintenance in table grapes, making it a promising technology for commercial cold storage applications.

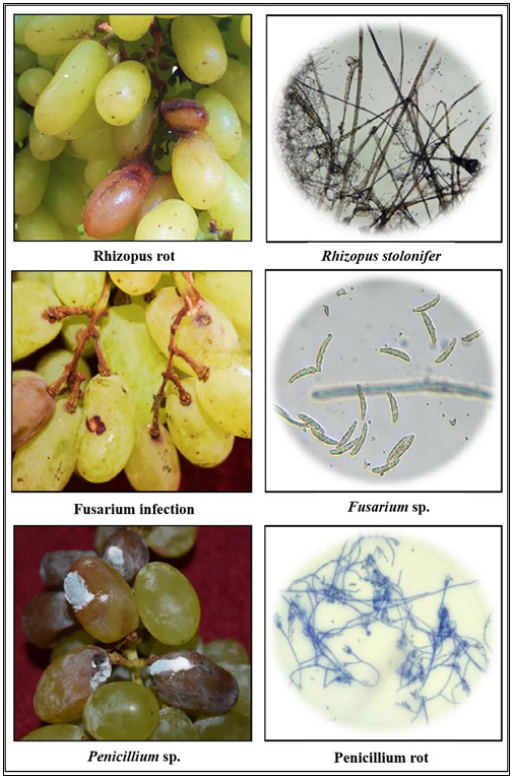

Fig 1. External disease symptoms (left) and microscopic images of spores at 40 X magnification (right) observed in untreated table grapes cv. Manik Chaman during storage

Presenter:
Suneel Subray Hegde
ICAR - Indian Institute of Horticultural Research, India

Synergistic Effect of Green Synthesized Zinc Oxide Nanoparticles and Vitamin C for Biological Activities

Rida Fatima Saeed, Joham Sarfraz Ali, Adeen Rehman, Aleeshbah Amir, Lalarukh and **Muhammad Zeeshan Bhatti**

National University of Medical Sciences, Pakistan

Nanoparticles (NPs) are perfect for biological applications because of their unique physicochemical properties and a high surface area-to-volume ratio. In this study, ZnO-NPs were synthesized *via* a green, non-toxic method using Monotheca buxifolia leaf extract. Successful synthesis was indicated by a color change and confirmed through UV–Vis spectroscopy (peak at 360 nm), zeta-size analysis (average size: 195.2 nm), SEM, XRD, and FTIR, which revealed key functional groups involved in nanoparticle stabilization. To enhance biological activity, ZnO-NPs were conjugated with Vitamin C in varying ratios (1:0.5, 0.5:1, 1:1, 1:2, 2:1). The 1:1 formulation exhibited the highest antioxidant activity, with 90.2% DPPH inhibition, 307 µg AAE/mg total antioxidant capacity, and 301.1 µg AAE/mg reducing power. It also showed elevated phenolic (155.75 µg GAE/mg) and flavonoid (82.5 µg QE/mg) content. Enzyme inhibition assays demonstrated concentration-dependent activity against AChE, BChE, α-amylase, glucosidase, lipase, and urease, with specific ratios optimizing different targets. Brine shrimp lethality assays revealed dose-dependent cytotoxicity. These findings suggest that ZnO-NPs conjugated with Vitamin C offer promising potential for targeted drug delivery, metabolic disorder management, and environmental applications such as antimicrobial coatings and pollutant degradation.

Presenter:
Rida Fatima Saeed
National University of Medical Sciences, Pakistan

Integrated Assessment of Wheat End-Use Quality and Grain Hardness Using Multi-Environment Trials and NIR-PLS Modelling

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Assessment of wheat quality is essential for determining the suitability of genotypes for specific end-use products. In the Indian plains, wheat is cultivated during the winter (rabi) season from October–November to March–April. In addition to genetic factors, both grain yield and quality are substantially influenced by agro-climatic conditions and geographical location. To account for these effects, six years of multi-location trial data were analyzed using Pearson's correlation coefficients to quantify linear associations among quality traits. A "mean-of-means" approach was adopted to minimize year-to-year environmental noise and to better capture genetically stable trait relationships.

The analysis was based on 239 mean observations derived from coordinated trials conducted across four major wheat-growing zones of India—North Western Plains Zone (NWPZ), North Eastern Plains Zone (NEPZ), Central Zone (CZ), and Peninsular Zone (PZ). Trials were evaluated under three agronomic conditions: Irrigated Timely Sown (ITS), Irrigated Late Sown (ILS), and Restricted Irrigated Timely Sown (RITS). The study focused on three major end-use quality traits—biscuit, chapati, and bread—and their relationships with key physicochemical parameters, including grain hardness index (GHI), wet gluten (WG), dry gluten (DG), gluten index (GI), grain appearance (GA), and protein content.

Correlation analysis of biscuit quality (biscuit spread factor ≥9) showed a strong and significant negative association with GHI ($r = -0.614^{**}$), indicating that harder grains are unfavorable for biscuit spread. Biscuit spread factor also exhibited negative correlations with WG ($r = -0.315^{**}$), DG ($r = -0.407^{**}$), and protein content ($r = -0.425$, non-significant). These results reinforce the well-established distinction between biscuit and bread wheat, confirming that high-protein and high-gluten flours—desirable for bread making—are

generally unsuitable for biscuit production. In contrast, chapati score showed weak or non-significant correlations with most measured physicochemical traits, suggesting that chapati quality is less sensitive to variation in individual grain quality parameters.

Given the pivotal role of GHI in influencing milling performance, flour functionality, and end-use suitability, a rapid and non-destructive prediction model for GHI was developed using near-infrared reflectance spectroscopy (NIRS). A total of 806 wheat grain samples, comprising 645 calibration and 161 independent validation samples, were analyzed using reflectance spectra in the 850.0–1091.5 nm range. Reference GHI values were obtained using the Single Kernel Characterization System (SKCS). Spectral data were pre-processed using standard normal variate (SNV) correction and first-derivative Savitzky–Golay transformation (1,16,16,1) to correct for scattering effects, baseline drift, and kernel-size variability inherent to intact grain measurements.

Partial least squares (PLS) regression with 16 optimized latent variables yielded a robust calibration model (R^2 = 0.786, SEP = 6.36, bias = 0.000). Venetian-blinds cross-validation confirmed model stability (R^2 = 0.761, SEP = 6.73). Independent validation further improved predictive performance (R^2 = 0.810, SEP = 5.69) with negligible bias, demonstrating strong generalizability. The wide GHI range represented in the dataset (10.1–99.0), spanning soft, medium-hard, and hard wheat classes, ensured the robustness and practical applicability of the model.

Presenter:
Sunil Kumar
ICAR-Indian Institute of Wheat & Barley Research, India

The Ecosystem Role of Soil Respiration,Taking into Account the Absorption of CO_2 by Plant Roots

Amiran Zanilov and **Zalim Dudarov**

Kabardino-Balkarian State University named after H.M. Berbekov, Russia

The purpose is to assess the ecosystem role of soil respiration as a biospheric mechanism that ensures increased CO_2 sequestration, in contrast to the view that soil respiration is associated with increased CO_2 levels in the atmosphere.

The study used a review of the literature, CO_2 sensors in corn crops and an author's device to measure root absorption of CO_2.

Soil respiration is associated with climate damage, and soil microorganisms are “blamed” for 70% of all CO_2 emissions. However, there is evidence of a close relationship between soil bioactivity and carbon content. We observed an increase in Corg in bioactivated soil by 0.09-0.54%. This contradiction ultimately leads to a scientific conflict.

Given that 73-90% of the emitted CO_2 occurs during the growing season, it is incorrect to evaluate the role of soil respiration isolated from photosynthesis. Measurements conducted in corn crops revealed that the main source of carbon for plants is CO_2 of the soil. Thus, with an average CO_2 value of 596 ppm at an altitude of 0.1 m and a background value of 411 ppm at an altitude of 2.4 m, the concentration at the level of the main vegetative mass (1.4 m) was lower - 384 ppm.

The mechanism of the effect of soil respiration on the carbon cycle was revealed by recording CO_2 in root zone of plants. It was found that when the CO_2 concentration in the leaf zone reaches 367-417 ppm, the mechanism of root absorption of CO_2 is activated, and about 25% of plant biomass is formed through root absorption of CO_2.

In this context, soil respiration is revealed as a carbon-protective mechanism, as at low concentrations of CO_2 at the level of the main vegetative mass, soil CO_2 is used, which could be converted into more stable organic compounds in the soil.

Presenter:
Amiran Khabidovich Zanilov
Kabardino-Balkarian State University named after H.M. Berbekov, Russia

Identification and Development of Stable Male Sterility Lines for Hybrid Onion Breeding under Indian Conditions

Santhiya S, Nirmal Kumar Hedau and **Lakshmi Kant**

Crop Improvement Division, ICAR-Vivekanada Parvatiya Kishi Anusandhan Sansthan, India

Onion (*Allium cepa* L.) is one of the most economically important vegetable crops worldwide; however its productivity in India remains comparatively low, largely due to the limited adoption of hybrids in the country. Cytoplasmic-genic male sterility (CGMS) is important for hybrid onion breeding, yet the availability of stable male-sterile and maintainer lines adapted to Indian agro-climatic conditions in different background is inadequate. The present study outlines the approaches for identification and development of stable male sterility systems in Indian onion germplasm through integrated phenotypic and molecular strategies. Various CMS systems reported in onion, particularly S and T cytoplasms, were reviewed with emphasis on their genetic control and utility in hybrid seed production. Morphological and cytological traits distinguishing male-sterile and fertile plants were documented and validated through visual and pollen viability analysis. Molecular characterization using cytoplasm-specific markers (e.g., cob based markers) and nuclear Ms locus-linked markers (OPT, AcPMS1, PsaO) enabled precise discrimination of sterile, maintainer, and restorer genotypes. Screening of Indian germplasm revealed a high frequency of S cytoplas, while marker-assisted genotyping facilitated early identification of homozygous recessive (msms) plants. Through systematic selfing and test crossing, stable CMS lines in different background can be developed. The study demonstrates that combining phenotypic screening with marker-assisted selection significantly accelerates the development of stable male-sterile systems. These findings provide a practical framework for strengthening hybrid onion breeding programs and enhancing onion productivity under Indian conditions.

Presenter:
Santhiya S
ICAR-Vivekanada Parvatiya Kishi Anusandhan Sansthan, India

Effect of Different Irrigation Methods and Mulching on Growth and Yield Performance of Two Brinjal (*Solanum melongena* L.) Varieties

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Department of Agronomy, Faculty of Agriculture, University of Jaffna, Sri Lanka

Brinjal (*Solanum melongena* L.) is an important vegetable and ranks among the most widely cultivated crops in Sri Lanka. It also holds substantial global importance due to its strong market demand, nutritional value, and adaptability across diverse growing environments. Rising brinjal demand in Sri Lanka highlights the need for sustainable production, as local supply remains insufficient. Improved crop management practices can significantly improve crop yield. Therefore, a field study was conducted in Kilinochchi district of Sri Lanka during 2025 to evaluate the performance of two brinjal varieties (Thinnaweli Purple and Jaffna Special), under different irrigation systems and mulching practices.The experiment was arranged in a split-plot design with three replicates, where irrigation systems (drip, sprinkler, and basin) were assigned to main plots, and mulch types (control,Gliricidia leaves, and silver polyethylene mulch) were arranged to subplots. Two brinjal varieties, Thinnaweli Purple and Jaffna Special, were evaluated under these treatment combinations. Data were collected on growth parameters, fruit characteristics, yield, weed density, and economic returns, and analyzed using SAS software. Mean separation was performed using Duncan's multiple range test at p= 0.05. Results showed that plant height, number of branches and leaf number were highest under sprinkler irrigation combined with Gliricidia mulch. Gliricidia mulch enhanced fruit size in both varieties. Total yield exhibited significant interaction between irrigation and mulch, Thinnaweli Purple produced 23.54 t/ha under drip with Gliricidia, and Jaffna Special produced 26.16 t/ha under sprinkler with Gliricidia. Weed density was lowest under polyethylene mulch, while Gliricidia mulch provided moderate weed suppression and improved soil fertility. Economic analysis revealed that the combination of drip irrigation with Gliricidia mulch produced the highest profit for Thinnaweli Purple (8400 USD/ha), while sprinkler irrigation with Gliricidia generated the greatest profit for Jaffna Special(8800 USD/ha). These findings highlighted that the choice of irrigation method and mulch type had a strong impact on plant growth, fruit yield, and overall profitability in brinjal cultivation.

Presenter:
N. Priyanka
University of Jaffna, Sri Lanka

Nanoparticles Modulates Growth, ROS, Antioxidant Responses and Gene Expression During Abiotic Stress in Rice

Hrishikesh Upadhyaya
Department of Botany, Cotton University, India

Rice (*Oryza sativa*. L.), a staple food crop consumed globally which is highly affected by abiotic stress, like water stress, salinity stress, arsenic and aluminium stress etc. therefore the present study investigated the potential of nanoparticles (NPs) in mitigating abiotic stress. In this study, rice plants were subjected to water stress, aluminium and arsenic stress in presence and absence of various forms of nano zinc (Zn, ZnO NPs) and Se NP and plants were sampled for growth, ROS and antioxidant responses by using standard methods. Relative expression of ZIP genes (*Os ZIP1, Os ZIP3, Os ZIP4, Os ZIP5, Os ZIP6, Os ZIP7* and *Os ZIP8*) in rice during water stress in presence and absence of Zn NP was also done using real time PCR. The present study revealed that NPs at low concentration promotes antioxidant responses and reduce content of superoxide (O_2-), hydrogen peroxide (H_2O_2) and melonyldialdehyde (MDA). Moreover, Zn and ZnO NPs modulate the expression of OsZIP, FRDL4, OsNRAT 1, ART1, ALMT1 genes and enhance zinc uptake, thereby improving water stress tolerance and modulating Al and As stress tolerance in rice. Thus, zinc nutrition through Zn and ZnO NPs has the potential to ameliorate the adverse effects associated with abiotic stress in rice plants by regulating OsZIP genes, thereby increasing zinc uptake and transport, as well as by improving the antioxidant capacity of the plant. Selenium NP also promotes antioxidant responses and reduce content of superoxide (O_2-), hydrogen peroxide (H_2O_2) and lowers lipid peroxidation during As stress in rice. Furthermore, it would be interesting to evaluate the impact of engineered (functionalized and non-functionalized) Zn, ZnO and Se NPs in rice for their prospective application in managing abiotic stresses in rice.

Presenter:
Hrishikesh Upadhyaya
Cotton University, India

Preparing Crop Germplasm for Future Climates: De-Novo Domestication and Controlled Environment Evaluation of Wild Relatives for Climate and Stress Resilience

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Crop wild relatives (CWRs) provide a vital source of genetic diversity crucial for improving stress tolerance, adaptability, and productivity in cultivated crops. As climate variability intensifies, harnessing the genomic potential of wild taxa through marker-assisted selection, genomic prediction, and de-novo domestication has emerged as a transformative strategy for breeding programs. Recent advances in germplasm exploration, molecular characterization, and genomic mapping across crops such as rice, wheat, Brassica, and tomato have revealed extensive reservoirs of adaptive traits. High-throughput sequencing technologies—including genotyping-by-sequencing (GBS), SNP arrays, and pan-genomic analyses—facilitate the discovery of stress-responsive alleles and loci associated with domestication. Genome-wide association studies (GWAS) and QTL mapping further enable the identification of genes conferring drought, heat, and pathogen resistance. Marker-based introgression and genomic-assisted pre-breeding effectively transfer these alleles into elite cultivars while minimizing linkage drag. De-novo domestication, accelerated by CRISPR/Cas-mediated editing of domestication genes, expedites the conversion of wild species into climate-resilient crops. Integrating multi-omics data (genomic, transcriptomic, metabolomic) with precise phenotyping enhances the predictive accuracy of selection models. The establishment of genomic databases and marker repositories for CWRs will be indispensable for guiding breeding under environmental uncertainty. Ultimately, conserving wild germplasm and expanding genomic resourc-

es underpin sustainable crop improvement. By integrating genomics-driven domestication with natural genetic diversity, breeders can unlock the latent potential of wild relatives, ensuring resilient and productive agricultural systems for a changing global climate.

Presenter:
Charu Bisht
Teerthanker Mahaveer University, India

Sampling in Wearable Impedance Plant Sensors

Lee Bar-On[1,2], Adi Avni[2] and **Yosi Shacham-Diamand[3]**

[1]Scojen Synthetic Biology, Reichman University, Israel
[2]School of Electrical Engineering, Tel Aviv University, Israel
[3]School of Plant Science, Tel Aviv University, Israel

Plant sensing using direct coupling to the living plant and reading signals that occur within the anatomical and physical plant tissue offer new insights for plant monitoring and improved treatment. Our method incorporated an electrical impedance derivation of the plant behavior that is collected across long time periods alongside standard measurement methods. Once vast data has been collected questions regarding improved sampling methods and time for overall sensor system planning are offered. Measurements are collected in a continuous manner, and changes examined in relation to induced external stress factors. The approach suggests examining the plant`s basic anatomy and physiology and applying physics and engineering modelling methods and measurement techniques that are adapted to the plant structure. This application is expected to allow a more rigorous assessment of plant physiological status in a quantitative manner that can be adapted for a complete electronic system of sensors in the future. The advances that this offers for improving plant and crop monitoring are expected to be extremely significant, thus providing a new approach to field monitoring and data collection. Once the method has been established and data is continuously collected, the question of optimized sampling and data study is required to improve crop monitoring in an effective manner is raised. Here various system approaches are inspected and examined in light of existing new portable field devices that can be mounted outside and allow data transmission for ongoing and timely adaption of plant care.

Presenter:
Lee Bar-On
Reichman University, Israel

Agronomic and Qualitative Comparison of Two Strawberry Varieties (Palmeritas and Victory) under Organic Treatment in Morocco

Alami Nassima[1], Khalid El ayoubi[2], Merwan Aatany[3], Rachid Jbilou[1], Kacem Rharrabe[4], Douae Lamrahli[2] and **Ahmed Bakrim[1]**

[1]Research team of Agriculture and Aquaculture Engineering. FPL. Abdelmalek Essaadi University, Morocco
[2]MESSEM Company, Morocco
[3]FSJES, Cadi AYAD University, Morrocco
[4]Research Laboratory: Biology, Environment, and Sustainable Development, ENS, Abdelmalek Essaadi University, Morocco

Organic strawberry cultivation in Morocco faces major challenges related to pest and fungal disease control. Imported strawberry plants are the primary source of supply in Morocco, due to a lack of local data on the performance and production potential of the varieties grown in the country. This study evaluated the agronomic and quality performance of two short-day strawberry varieties, Palmeritas and Victory, in organic crops grown in the Loukkos region during the 2023–2024 growing season. A total of 384 plants (192 per variety) were selected using a stratified random sampling method. Treatments included biostimulants and GC-Mite, a biopesticide composed of clove, garlic, and cottonseed oils. Palmeritas recorded a higher yield (1.72 t/ha compared to 1.58 t/ha for Victory) and a higher sugar content (8.30 °Brix compared to 7.89 °Brix), while both varieties showed a significant reduction in the incidence of aphids and fungal diseases. Sensory analysis revealed differences in fruit texture and taste. These results highlight the potential of tailored biological strategies to improve strawberry production by increasing yield and fruit quality while reducing pest and disease pressure. Multi-season and multi-site trials are needed to confirm these observations and support the large-scale adoption of sustainable practices.

Presenter:
Nassima alami
Abdelmalek Essaadi University, Morocco

Implementing and Managing ESG in a Family Business in the light of Institutional Theory

Roberto Aprile[1] and **Sergio Bovo**[2]

[1]University of Bergamo, Italy
[2]Alma Petroli S.p.A. and Eurobitume, Italy

The research analyses how the governance of a leading company in the production of high-quality bitumen and operating in a sensitive industry such as the oil & gas, has been acting with reference to the implementation and management of environmental, social, and governance (ESG) elements within its organization. The company is also one of the first, achieving the Gender Equality certification (UNI/PdR 125:2022).

The case study addresses a family business— which represents a widely diffused ownership structure in the Italian context and at a global level.

This study is based on the institutional theory to better analyze how the isomorphic process and the relevance of the different typologies of pressure can affect company decisions and strategy with reference to the ESG perspectives. The analysis has been based on semi-structured interviews with the CEO, articulated in different moments in a way to understand the company, and other managerial roles within the company.

This research has shown that the path towards the implementation of a comprehensive and integrated ESG approach meets a first hurdle in cost constraints. Business expansion, stability and organization growth, represent in substance, sort of pre-requisites. In this context ESG parameters should be applied mainly for two reasons: regulatory requirements and mimetic isomorphic pressure made by the supply chain and strongly able to affect financial performance, since they can increase the reputation of the company (Othman et al., 2011). Such starting point is clearly relevant, and leads to the introduction of a comprehensive culture of sustainability, articulated in the three ESG dimensions, but mainly rooted to environmental aspects and aspects related to the creation of a safe place for the employees of the company. That is due to the institutional pressure exerted by two important stakeholders, namely customers and workforce.

Presenter:
Roberto Aprile
University of Bergamo, Italy

Sustainable Briquette Manufacturing from Sawdust and Textile Waste: A Path to the Circular Economy and Renewable Energy

Gurumurthy Ramaiah, Tolera A. Negawo, Senay Yacob Baraki, Robel Legese, Daniel Asfaw, Anbesaw Muket, Alembante Tiruye, Dawit Samuel, Abenezer Lemma, Sleabat Gebeyehu and **Ibsa Amenu Gondore**

Department of Textile Technology, Federal Technical and Vocational Training Institute, Ethiopia

This study investigates the influence of varying binder percentages on key performance parameters of biomass briquettes, including calorific value (CV), compressive strength (CS), durability, moisture content (MC), and water resistance. Controlled laboratory experiments were conducted to evaluate how binder content affects briquette fuel quality and structural integrity. The results show that a binder concentration of 30% produced the best overall performance. Sample 2, formulated with 30% binder, achieved the highest calorific value of 5233 cal/g, indicating optimal densification and enhanced energy content suitable for efficient heating and combustion applications. Increasing the binder content beyond this level led to reduced densification, resulting in a decline in CV. Similarly, the briquette with 30% binder demonstrated the maximum compressive strength of 2188.56 kN/m^2, reflecting excellent mechanical stability and durability. Further increases in binder proportion caused a reduction in CS, supporting the conclusion that excessive binder weakens briquette compactness. Durability assessments carried out over 24 hours of simulated handling and transportation confirmed the structural integrity of all briquettes, with Sample 2 again performing best. Moisture content analysis showed a consistently low MC of 5%, contributing to improved combustion efficiency, ease of ignition, and enhanced storage stability. Water resistance tests under high humidity exposure for 48 hours revealed only minor surface changes, and the briquettes retained their shape and combustion capacity, indicating strong resistance to moisture-induced degradation. Overall, the findings highlight the critical role of binder optimization in determining the fuel and structural characteristics of biomass briquettes. A 30% binder content provides the best balance of calorific value, mechanical strength, durability, moisture stability, and water resistance. This study offers valuable insights for the development of high-quality, sustainable biomass briquettes as an efficient renewable energy source.

Presenter:
Gurumurthy Bangalore Ramaiah
Federal Technical and Vocational Training Institute, Ethiopia

Wheat Stem Rust in Tanzania: Navigating Climate Change Challenges for Sustainable Crop Protection

Agatha A. Aloyce

Nelson Mandela African Institution of Science and Technology, Tanzania

Wheat stem rust (*Puccinia graminis f. sp. tritici*) is a major constraint to wheat production in Tanzania. This study examined how climate variability influences the incidence and severity of stem rust in the country's principal wheat-growing regions: Arusha, Kilimanjaro, Manyara, Iringa, and Mbeya. During the 2023 wheat-growing season, 17 fields were surveyed across these regions at the booting and ripening stages, which are critical for stem rust development. Disease incidence and severity were recorded and analyzed alongside local temperature, relative humidity, and rainfall data. The findings revealed that northern regions, with warmer temperatures (23–25 °C) and moderate humidity (55–65%), experienced the highest disease levels, while cooler southern regions (12–13 °C) with more variable humidity (55–75%) had lower levels. Traditional varieties such as Mamba and Juhudi were highly susceptible, whereas modern varieties like Sifa showed strong resistance. Disease severity was significantly correlated with temperature ($r = 0.72$) and relative humidity ($r = 0.67$), both $p < 0.01$. Projections under future climate scenarios indicate that, without intervention, stem rust incidence could increase by over 20% and severity by over 30% by mid-century. These results highlight the need for locally adapted, climate-smart management strategies, including the use of resistant wheat varieties, improved disease forecasting, and responsive agronomic practices. This research provides actionable guidance for farmers, researchers, and policymakers to strengthen wheat production resilience, secure food supply, and address the challenges posed by climate change on crop health in Tanzania.

Presenter:

Agatha A. Aloyce

Nelson Mandela African Institution of Science and Technology, Tanzania

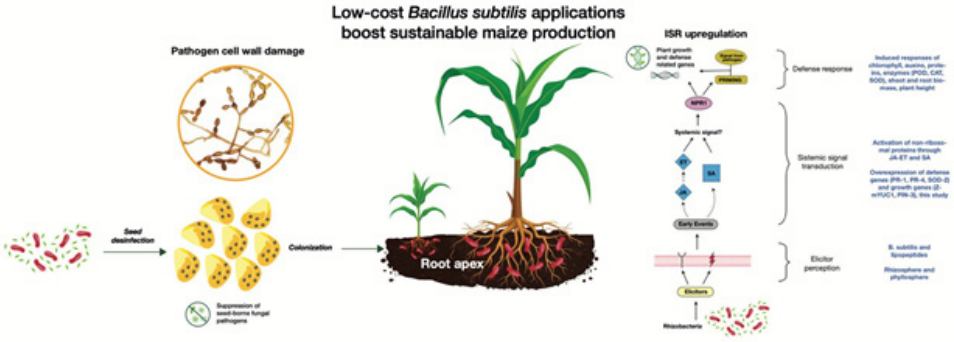
Cost-Effective Cultivation of Native *Bacillus subtilis* Strains Enhances Maize Performance through Defense Activation and Rhizosphere Colonization

César. E Falconí[1], Viviana Yánez-Mendizábal[2], Stephen B. Goodwin[3,4] and **C. D. Cruz[3]**

[1]Laboratorio de Fitopatología y Control Biológico – Carrera Agropecuaria IASA I, Departamento de Ciencias de la Vida y la Agricultura, Grupo de Investigación Diversidad y Restauración Agroecológica (DYRA), Universidad de las Fuerzas Armadas ESPE, Ecuador
[2]OneHealth Research Group, Ingeniería Agroindustrial, Facultad de Ingeniería y Ciencias Agropecuarias (FICA), Universidad de Las Américas, Ecuador
[3]Department of Botany and Plant Pathology, Purdue University, USA
[4]Crop Production and Pest Control Research Unit, USDA-Agricultural Research Service, USA

Native *Bacillus subtilis* strains represent promising bioinoculants for sustainable maize production. In this study, two strains (CtpxS2-1 and CtpxS3-5) cultivated in the low-cost DSF40–MOL5 medium were evaluated as seed treatments under greenhouse conditions. Both strains significantly enhanced seed germination, achieving rates above 91%, compared to <75% in untreated controls. Seed-borne fungal pathogens including *Fusarium, Alternaria,* and *Aspergillus* spp. were markedly suppressed, with disease incidence reduced to ≤0.3% versus 3.4% in controls. Vegetative growth was consistently improved, with CtpxS2-1 producing the highest shoot and root biomass, while CtpxS3-5 also promoted growth with slightly greater variability. Molecular analyses revealed strong activation of defense and growth pathways. RT-qPCR showed upregulation of *ZmPR-1* and *ZmPR-4* (~2-fold), and strain-dependent induction of *SOD-2* (CtpxS2-1: 4.9-fold; CtpxS3-5: 3.4-fold), consistent with systemic acquired resistance. Growth-related genes *ZmYUC-1* and *PIN-3* were also upregulated (~2-fold), supporting enhanced auxin biosynthesis and transport. Physiological assays confirmed elevated auxin levels (2× control) and increased chlorophyll content, particularly in CtpxS2-1 treatments. Biochemical responses included higher protein accumulation and significant increases in antioxidant enzyme activities (catalase, POD, SOD), reaching ~15–16 $U \cdot g^{-1}$ FW compared to ~7–10 $U \cdot g^{-1}$ FW in controls. Longitudinal monitoring demonstrated sustained improvements in plant height and chlorophyll index over 90 days, with treated plants exceeding 153

cm versus <102 cm in controls. Rhizosphere colonization dynamics revealed stable bacterial populations (7–8 log CFU·g^{-1}) at the root apex throughout the experiment, confirming persistent root association, while bulk soil populations declined after day 45. Overall, DSF40–MOL5 medium enabled scalable production of native *B. subtilis* strains that enhanced maize growth, suppressed seed-borne pathogens, activated systemic defenses, and maintained long-term rhizosphere colonization, underscoring their potential as cost-effective bioinoculants for sustainable agriculture.



Presenter:
César E. Falconí Saá
Universidad de las Fuerzas Armadas ESPE, Ecuador

Circular Economy – Transition to Sustainable Development or a New Model of Economic Transformation

Venelin Terziev
Professor, D.Sc. (National Security), D.Sc. (Economics), D.Sc. (Social Activities), Ph.D.
Black Sea Institute, Bulgaria
Full Member of the Russian Academy of Natural History, Russia

In essence, the circular economy seeks to replace the linear “take–make–dispose” model with a regenerative system in which resources remain in use for as long as possible, products are designed for durability and recyclability, and biological materials safely return to natural cycles.

Plant science provides foundational knowledge that supports circular systems by improving nutrient cycling, enhancing soil fertility, and enabling the development of renewable, plant-based raw materials. These materials can be reused, repurposed, or biodegraded, aligning perfectly with circular principles.

Advanced plant research also contributes to climate resilience, helping crops withstand drought, pests, and environmental stress. This reduces dependency on external inputs and supports long-term regenerative agriculture - a core element of the circular economy.

In this transformative vision, plant-based innovations become central drivers of sustainable growth, enabling societies to shift toward low-impact production systems that integrate economic, ecological, and technological progress.

Presenter:
Venelin Terziev
Black Sea Institute, Bulgaria

Genetic Diversity and Population Structure of Fonio Landraces Millet [*Digitaria Exilis* (Kippist) Stapf] using Ethnolinguistic, Agro-Morphological and Ssrs Markers

IDI SAIDOU Sani[1,7], ILLO SOULEY Mahamane Hamissou[2], 1RABO Younoussou[1], MOUSSA MAMOUDOU Boubacar[1,7], ABDOU Laouali[1,3], HABOU Rabiou[1,7], ZEKRAOUI Leila[4], RONAN Rivalen[5], BARNAUD Adeline[4], BILLOT Claire5, ALI Mahamane[6,7], SAADOU Mahamane[6,7] and BAKASSO Yacoubou[6,7]

[1]Department of Biodiversity and Plants Productions, Faculty of Agronomic and Ecological Sciences, University of Diffa (UDA), Niger
[2]Department of Livestock and Pastoralism, Faculty of Agronomic and Ecological Sciences, University of Diffa (UDA) BP, Niger
[3]Mixte Unit of Research (UMR): Aridoculture and Oasis Crops, University of Diffa (UDA) BP: Niger
[4]Research Institut of Development, UMR DIADE, France
[5]International Center of Agronomic Research for Development, UMR-AGAP, France
[6]Department of Biologie, Faculty of Technical Sciences, Abdou Moumouni University of Niamey (UAM) BP: Niger
[7]Laboratory for the Management and Valorization of Biodiversity in the Sahel (GeVaBioS), Abdou Moumouni University, Niger

Identification and assessment of the diversity of cultivated and wild plant species based on ethnolinguistic nomenclature, agro-morphological, and molecular characteristics are essential for sustainable management of agro-biodiversity. This study focuses on the ethnolinguistic nomenclature, agro-morphological, and molecular characterization of fonio cultivated by Niger farmers with aim to assessing the genetic diversity of these fonio local accessions in order to provide an additional basis for the selection of germplasm for improved breeding. After the collection of samples and the ethnolinguistic interview, agromorphological assessment of core samples and genetic analyses using fifteen nuclear microsatellite SSR markers were carried out on 357 accessions belonging to thirty and eight (38) fonio-producing villages in Niger. ANOVA using a linear mixed model was used to evaluated performance of the different accessions and the survey parameters using Fisher's test. For diversity structuring, hierarchical clustering analysis (HCA),

discriminant factor analysis (DFA), principal component analysis (PCA), discriminant principal component analysis (DPCA) and Bayesian analysis were performed with the software (RV.4.3.1.), Darwin (V.5.158) and STRUCTURE (v3.4.1). Four terminologies are commonly used to designate fonio grown by 469 farmers surveyed and 357 accessions where collected. Hierarchical clustering and discriminant analyses showed that diversity was structured around three highly heritable traits: dry biomass weight, seed weight and internode length. DFA analysis revealed morphological variability between these first three axes, related to yield. Using highly polymorphic SSR markers, genetic diversity parameters (He= 0.529; Ho = 0.055) observed and four subgroups were distinguished through PCA and DFA analysis based on the identification of morphological groups for phenotypic evaluation. The data highlight the main sources of diversity among local accessions in Niger. They can be used for mapping genes with molecular markers for the identification of trait-specific genes and the use innovative tools of genome editing technology “CRISPR-CAS9” or “Gene Drive” for variety improvement.

Presenter:
IDI SAIDOU Sani
University of Diffa (UDA), Niger

Coffee Flower Evocation Fine Tuning

Paula C. S. Angelo[1], Fernanda P. Blegniski[2], Letícia M. Parteka[3], Luciana H. Shigueoka[4], Heverly Morais[5], Alexandre Urbano[6] and Gustavo H. Sera[7]

[1]Embrapa Café/IDR-Paraná, Brazil
[2]Universidade Estadual de Londrina, LMEM, Brazil
[3]Embrapa Café/IDR-Paraná, Brazil
[4]Embrapa Café/IDR-Paraná, Brazil
[5]IDR-Paraná, Brazil
[6]Universidade Estadual de Londrina, Brazil
[7]IDR-Paraná, Brazil

Scope: Coffee flower evocation is an absolutely neglected process despite being the first step of the annual reproductive cycle. In south-southeastern Brazil, evocation is separated from flower growth/concluding development by weeks of dormancy. For most species, flowering occurs by reaction to environmental signals. For coffee, decreases in temperatures and day-lengths were proposed as flowering triggers on the basis of field observations, and those are indeed essential signals for cultivar adaptability and yields. We aim to contribute indicating really primeval evocation-specific morphological markers, which are imperceptible for the naked eye in the fields, for late (18), intermediary (20) and early (19) genotypes regarding fruit development and maturation.

Objectives: Identify morphological/anatomical markers to compare late, intermediary and early genotypes regarding coffee flower evocation.

Methods: Sampled plants are cultivated in a same experimental plot, at Londrina/PR (23°18'S-51°09'W). Phenological data/sample collects were accomplished weekly/monthly, for three plants in three parcels/genotype, from Jan- Jun/2025. Samples were fixated with glutaraldehyde+paraformaldehyde in cacodylate buffer, chemically dehydrated, and coated in gold for scanning electron microscopy. Meristem protection bracts were measured for a minimum of four buds/plant/month to compare genotypes. Anatomy of closed (with) and open (without bracts) buds were also evaluated. All data were correlated to temperatures and day-lengths.

Results: Meristem protection bracts differed ($P \leq 0.05$) for all genotypes in May, earliest bud bract areas being six folds larger than latest ones. On April, buds in the earliest genotype had already acquired reproductive morphology. In opposition, undifferentiated meristems were still observed inside the latest genotype buds on April. Conclusion. Genotypes are distinguishable,

specially the earliest one (19), due, probably, to interactions among distinct structural and/or regulatory variants of the same flower evocation related genes, such as FLC and VRN, which we are already analyzing. These findings may contribute for plantation management strategies founded in cultivar adaptability.

Presenter:
Paula Cristina da Silva Angelo
Embrapa Café/IDR-Paraná, Brazil

Microencapsulated Anthocyanins from Purple Sweet Potato as a Potential Natural Food Colorant: Effect of the Extraction Method and Stability through Storage

Luz Araceli Ochoa-Martínez, Sandra Vega-Maturino, Silvia Marina Gonzáles-Herrera, Olga Miriam Rutiaga-Quiñones and **Ariana Vázquez-Quiñones**

Tecnológico Nacional de México/Instituto Tecnológico de Durango, Laboratorio Nacional Conahcyt-LaNAEPBi, Durango, Dgo., Mexico

Introduction: Due to regulatory bodies prohibiting several synthetic food colors, the industry must adopt natural alternatives, as color is the first attribute that influences the quality and acceptance of foods by consumers. Natural pigments have shown to reduce the risk of diseases like diabetes, obesity, and coronary. The purple sweet potato is an adaptable and fast-growing crop, making it a promising source of anthocyanins. However, their instability limits their application.

Aim: This study aims to apply various extraction methods for anthocyanins from purple sweet potato and to evaluate their stability in microencapsulated form.

Materials and Methods: The extraction was performed using hydroalcoholic solutions, and microwave-assisted extraction (MAE). An aqueous extraction included (CE). The analysis was total anthocyanin content, antioxidant activity, and color. The best extracts were microencapsulated by spray drying. The stability of the microencapsulated anthocyanins was evaluated through 60 days of storage and degradation kinetics was established.

Results: The higher concentration of anthocyanins in the extracts was in HAE (670.69 ± 2.30 mg/100 g), under the conditions of 30 % de ethanol, 60 min y 80 °C. The conditions used in the extraction processes were sufficient to inactivate the enzymes. It was observed that the MAE presented the highest difference in color in respect to CE. Infrared spectroscopy analysis of the microencapsulated extract confirmed its protection, while calorimetric analysis demonstrated its thermal stability. About the rehydration properties of the microencapsulated, wettability increased with time for HAE and CE, but not for MAE. The remaining measured parameters remained unchanged during storage, and the color. Based on the kinetic degradation of anthocyanins,

the $t_{1/2}$ ranged from 68 to 106 days.

Conclusion: The results suggest that hydroalcoholic extraction and micro-encapsulation with maltodextrin 10 DE, the stability of purple sweet potato anthocyanin extract was significantly improved, offering a natural colorant with potential use in the food industry.

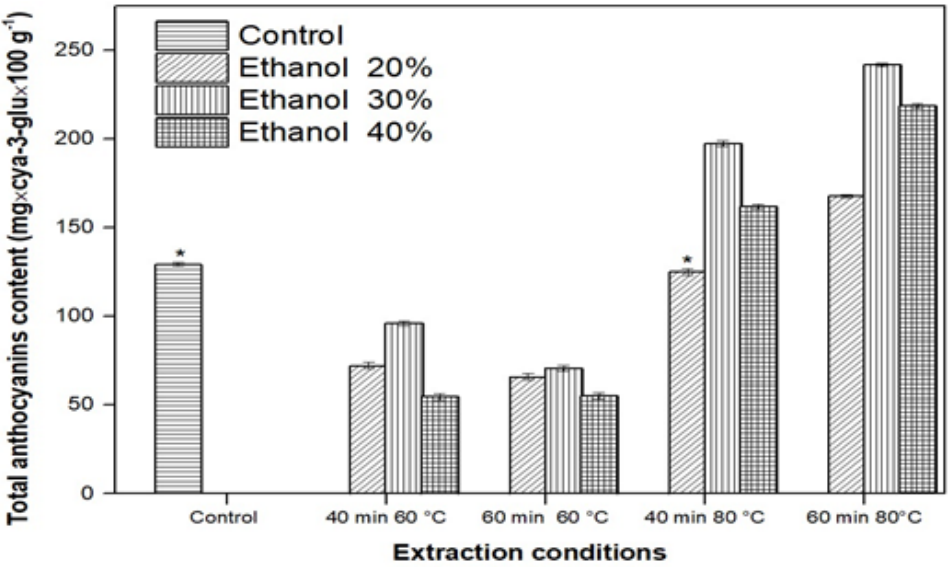


Figure 1. Total anthocyanin content in purple sweet potato extracts obtained with different hydroalcoholic solutions. The results are expressed as the mean ± SD from triplicate determination. Bars not labeled with * are significantly different from control ($p < 0.05$)

Presenter:
Luz Araceli Ochoa-Martínez
Tecnológico Nacional de México/Instituto Tecnológico de Durango, Mexico

Biotechnological Potential of *Bursera fagaroides*: Cytotoxic Phytochemicals from *in Vitro* Callus Culture

Anabel Ortiz-Caltempa[1], María Luisa Villarreal Ortega[1], Nancy Pérez-Mejia[1] and **Laura Álvarez Berber[2]**

[1]Centro de Investigación en Biotecnología, Mexico
[2]Centro de Investigaciones Químicas, Universidad Autónoma del Estado de Morelos, Avenida Universidad 1001, Mexico

Bursera fagaroides is an emblematic species in Mexican traditional medicine, known for producing lignans with notable cytotoxic activity. However, its use is limited by the low yield of these metabolites in natural tissues and the ecological impact associated with bark harvesting. This study explores biotechnological strategies for the sustainable production of bioactive compounds by comparing wild plant leaves with *In vitro* callus cultures. A callogenesis system was induced from leaf explants using 2,4-D, NAA, and zeatin. Cultures were maintained for 28 days, during which growth parameters and metabolite production were evaluated. For wild plants, dichloromethane extracts were obtained and analyzed by open-column chromatography, followed by HPLC and GC-MS. Cytotoxic activity was assessed in human tumor cell lines. Callus cultures showed optimal growth at 28 days, with a specific growth rate of 0.059 $days^{-1}$. The *In vitro* system favored accumulation of scopoletin as the dominant metabolite, suggesting a stress-related metabolic response. Bioactive sterols such as γ-sitosterol and stigmasterol were also detected. In contrast, wild plants exhibited a lignan-rich profile, including yatein and podophyllotoxin derivatives. Biological assays revealed differential selectivity: wild plant extracts showed higher activity against PC-3 cells, while callus extracts were more effective against HeLa cells. In conclusion, *In vitro* callus cultures of B. *fagaroides* provide a promising biotechnological platform for the sustainable production of cytotoxic metabolites. The distinct phytochemical profiles observed between wild and *In vitro* systems highlight their complementary potential in the discovery of anticancer compounds.

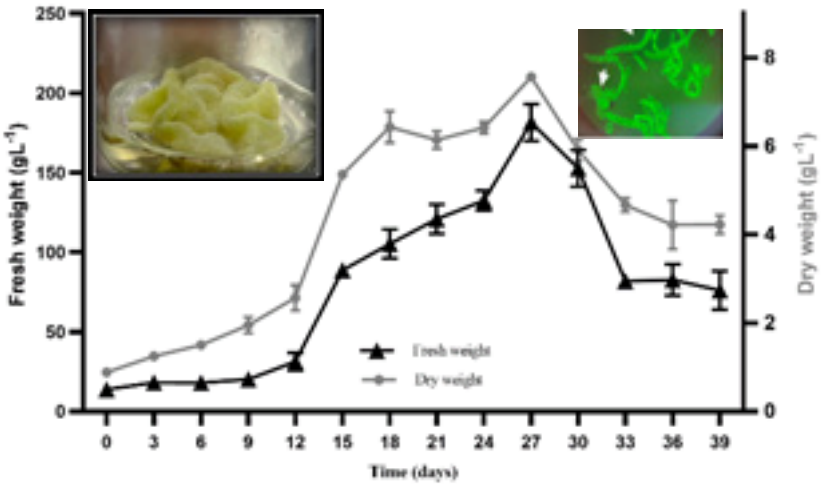


Figure 1. Growth curve of the callus culture with the weights of the fresh and dry biomass, from *Bursera fagaroides*.

Presenter:
Anabel Ortiz Caltempa
Centro de Investigación en Biotecnología, Mexico

PEERS ALLEY MEDIA

DAY 03

VIRTUAL EVENT

2nd WORLD CONGRESS ON

ADVANCES IN PLANT SCIENCE AND PLANT BIOLOGY

JULY 13-15, 2026

SPEAKER TALKS

Oxygen Transport into Soil *via* Radial Root Oxygen Loss

Freeman J Cook[1, 2,3]

[1]Freeman Cook & Associates, New Zealand
[2]Griffith University Australian Rivers Institute, Australia
[3]The University of Queensland, Australia

Some plants can detoxify saturated soils by the transport of oxygen from the atmosphere *via* their roots to soil. Part of the reason is to detoxify the soil around the roots so they can extract water and nutrients. Recently I published a paper on transport of oxygen into soil *via* diffusion with two sinks microbes (a distributed sink) and roots (a line sink). Changing the root to a source allows the solution to be used to explore the effect of radial oxygen loss (ROL), root length density, soil properties, temperature and the distributed sink strength on the volume of soil detoxified with depth. The first step is to assume that the microbial/chemical sink is equal to the root source and derive the radius (R2) at which the oxygen concentration is equal to zero. This can be compared with the average root spacing (b) from the length density and if R2 > b then b can be used to derive the concentration at this distance. The value of b will increase with depth and so at some depth the soil will be partially anoxic. Using literature values root length density for rice we will calculate the volume of soil that is not anoxic.

Presenter:
Freeman John Cook
Freeman Cook & Associates, New Zealand

On the Concept of Well Being: The Significance of Medicinal Plants in Wisdom Texts

Meera Chakravorty
Jaun University, India

In light of the profound health upheaval that occurred in the recent past and continues to be prevalent, it is imperative to revisit the concept of well-being as articulated in the wisdom texts of India, which can inform a new praxis of well-being. A unique perspective is reflected in the ancient wisdom texts, which elaborate on the real causes of affliction to demonstrate the critical trajectory of more profound development that would be consequential for later studies in this area. It especially provides cures and points to the dimension of transcending to a disease-free life, central to our thinking, not only of a healthy existence but also of healthy survival. And, for this to sustain, the philosophy behind the concept of well-being challenges any shortcut that restrains the mere emergence of an unwellness for some time, only to manifest in a precarious way at a later point in time. A tacit medication that assumes a cure will ultimately be achieved often misses the real reason, since the trends and causes are not explored at the source. Besides, it is important to note that, alongside the essential medicinal plants referred to in various sources, spirituality also plays a significant role in this process. The unholy alliance of global interests in faking medicines for their financial profit is too happy to overlook this significant aspect, and consequently, this has led to the collapse of a healthy world. Hence, a revisit to those sources will allow us to advance questions that can emerge from a worthwhile comprehension of the ideas and practices with natural or botanical wealth, along with the concern for human collectiveness, to step towards a radical praxis of being humane.

Presenter:
Meera Chakravorty
Jaun University, India

Nodding's Philosophy of Care in the Online Teaching Environment of Graduate Program Education in State Universities in the Philippines

Edilberto Z. Andal and **Jherwin P. Hermosa**
Laguna State Polytechnic University, Philippines

Grounded in the Philosophy of Care of Nel Noddings, this study explored how care is experienced and enacted by instructors in the online teaching environment of graduate education programs in Philippine state universities. Specifically, it sought to examine the lived experiences of Graduate Studies and Applied Research (GSAR) instructors in caring for their students while maintaining their own well-being in virtual learning contexts. Using a qualitative phenomenological research design, in-depth interviews were conducted with four GSAR instructors who had extensive experience in online graduate instruction. Data were analyzed through thematic analysis to identify recurring meanings and patterns related to caring practices and self-care experiences. Findings revealed that care in online teaching extends beyond academic support and encompasses emotional responsiveness, accessibility, flexibility, empathy, and sustained engagement with learners. Participants described a persistent responsibility to address students' academic and personal needs, often resulting in increased emotional labor and blurred boundaries between professional and personal life. The narratives further highlighted the tension between caring for students and preserving instructors' own well-being, necessitating deliberate self-care strategies to prevent exhaustion and maintain teaching effectiveness. The study concludes that caring relationships remain central to effective online graduate education and that institutional support mechanisms are essential to sustain both student-centered care and instructor well-being. The findings contribute to the growing body of literature on ethics of care in online learning and provide insights for developing policies and practices that foster supportive and sustainable virtual teaching environments.

Presenter:
Edilberto Z. Andal
Laguna State Polytechnic University, Philippines

Silver Nanoparticles Synthesized from Enicostemma Littorale 2 Exhibit Gut Tight Junction Restoration and Hepatoprotective 3 Activity *via* Regulation of the Inflammatory Pathway

Hiral Aghara and **Palash Mandal**

P D Patel Institute of Applied Sciences, India

Gut barrier dysfunction and inflammation-mediated hepatic injury are central features in the pathogenesis of several metabolic and toxin-induced liver diseases. Therapeutic strategies that can simultaneously restore intestinal integrity and attenuate hepatic inflammation are of growing interest. In this study, we synthesized silver nanoparticles (AgNPs) using a phytochemical-rich extract of *Enicostemma littorale*, a medicinal plant traditionally known for its anti-inflammatory and antioxidant properties. The biosynthesized AgNPs were extensively characterized using UV–Vis spectroscopy, FTIR, TEM, and DLS analyses, confirming their stability, nanoscale size distribution, and the presence of bioactive functional groups responsible for reducing and capping the nanoparticles.

The biological efficacy of these *E. littorale*–derived AgNPs was evaluated through *in vitro* assays and an *in vivo* model of gut and liver injury. Administration of the AgNPs effectively restored the expression of key tight junction proteins, including occludin and claudins, indicating significant improvement in gut epithelial barrier function. Furthermore, treated animals exhibited marked hepatoprotection, reflected by improved serum biochemical markers, reduced oxidative stress, and ameliorated histopathological alterations in hepatic tissue. Mechanistic evaluations revealed that the nanoparticles exerted their protective effects partly by modulating inflammatory pathways, with notable downregulation of pro-inflammatory cytokines and related signalling mediators.

Overall, the study demonstrates that green-synthesized AgNPs from *Enicostemma littorale* offer a dual therapeutic advantage by reinforcing gut tight junction integrity and mitigating inflammation-associated liver damage. These findings highlight the potential of plant-mediated nanomaterials as a promising approach for managing gut–liver axis dysfunction and associated hepatic disorders

Presenter:
HIRAL AGHARA
P D Patel Institute of Applied Sciences, India

Sustainable Precision Agriculture Requiring the Incorporation of Artificial Intelligence with Smart Irrigation Infrastructure

Aditya Singh
Independent Researcher; Amrita Vishwa Vidyapeetham, India

In agriculture, the implementation of digital technologies has increased due to the raising stress on worldwide scarcity of water, production of food, degradation of resources and climate variability. The traditional systems of irrigation frequently experience limited adaptation to the dynamic conditions of the environs, in addition to delayed decision-making process, as well as allocation of water being inefficient, all consequently towards obstacles on the path of sustainability and also in decreased resource efficiency. In recent years, AI has come up as a technology which is transformative in nature and allows the improvement of irrigation infrastructure *via* data driven optimization, prediction in addition to monitoring. This study will explore the function of smart irrigation infrastructure incorporated with Artificial Intelligence in progressing the sustainable precision agriculture through the consideration of latest developments in IoT sensing, ML, GIS, predictive analytics, as well as remote sensing. This study will find out the way systems which are enabled by AI, will use data in real time from weather stations, UAV, satellite observations, as well as soil moisture sensors, in order to enhance the efficiency of water usage, the scheduling of irrigation to be optimized, and assist in the decision making for particular crops. Moreover, the incorporation of Civil Engineering infrastructure with AI particularly in the cases of systems of smart water management, distribution networks, irrigation canals, and reservoirs, will be taken into account to strengthen resilient systems of agriculture. This study will further recognize main obstacles which comprise of interoperability, cybersecurity, costs of infrastructure, scalability, and data quality, when discussing potential opportunities in the future which includes climate resilient infrastructure for agriculture, edge computing, as well as digital twins. This will help in supporting that irrigation systems incorporated with Artificial Intelligence has the potential to enhance productivity of crops, conservation of water, environmental sustainability, as well as operational efficiency, to assist the shift in the direction of not only climate adaptive precision but also resource efficient agriculture.

Presenter:
Aditya Singh
Independent Researcher; Amrita Vishwa Vidyapeetham, India

Fusarium Disease Identification in Pineapple using Convolutional Neural Network with False-Prediction Interpretability *via* Local Interpretable Model-Agnostic Explanations

Rosemarie Pellegrino, King Arjei Briol and **Robbie Rick Gutierrez**

Mapua University, Philippines

We developed an automated system for detecting Fusarium infection in pineapple leaves and fruits using a two-input convolutional neural network. Implemented on a Raspberry Pi 5 with a high-quality camera, the system analyses image pairs, fruit, and leaves of healthy and infected samples. To build the dataset, pineapple images were inoculated with Fusarium, photographed daily for 15 days, then augmented through geometric and colour transformations, producing 1500 image pairs. Model transparency was enhanced by using local interpretable model-agnostic explanations (LIME). Evaluated with a confusion matrix, the model achieved an 89.61% accuracy using 77 infected and 77 non-infected image pairs for testing.

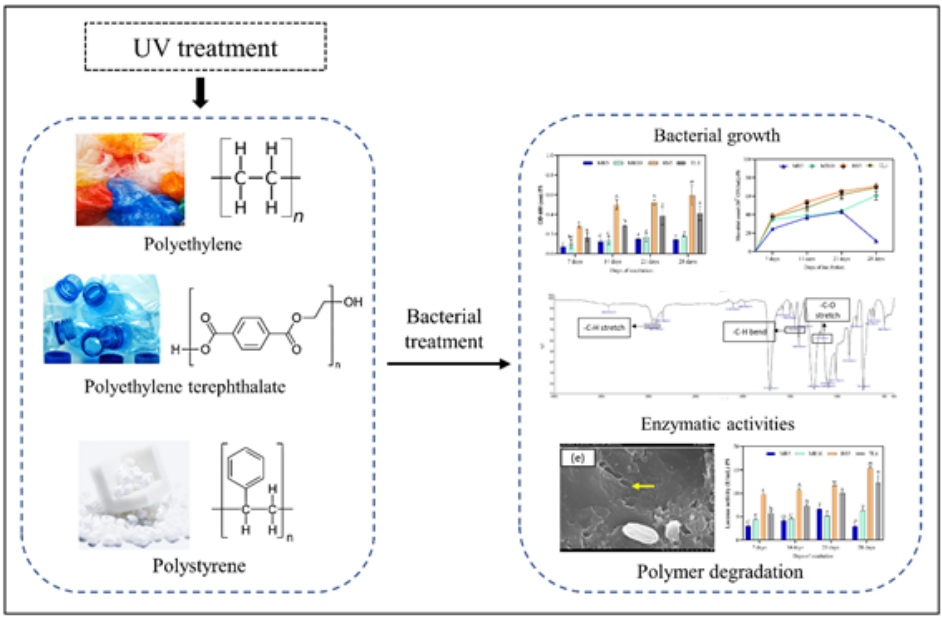
Presenter:
Rosemarie V. Pellegrino
Mapua University, Philippines

Microplastic-Degrading Bacteria Improve Plant Growth in Soilless Cultivation Systems

Pooja Singh

School of Science, Monash University, Malaysia

Plastic pollution in terrestrial ecosystems has raised urgent concerns, particularly with the accumulation of persistent polymers such as low-density polyethylene (LDPE), polyethylene terephthalate (PET), and polystyrene (PS). Biodegradation offers an eco-friendly and sustainable approach to mitigating this challenge. In one of our previous studies, four novel bacterial isolates capable of degrading multiple recalcitrant polymers were identified from plastic-polluted environments. *Dermacoccus* sp. MR5 (accession no. OP592184) and Corynebacterium sp. MR10 (accession no. OP536169) were isolated from Malaysian mangroves, while *Bacillus* sp. BS5 (accession no. OP536168) and *Priestia* sp. TL1 (accession no. OP536170) originated from a sanitary landfill. All isolates exhibited progressive growth and increased production of polymer-degrading enzymes, including laccases and esterases, after four weeks of incubation with the polymers. Among them, *Bacillus* sp. BS5 demonstrated the highest laccase activity (15.35 ± 0.19 U/mL) and the greatest PS weight loss (4.84 ± 0.6%). Structural changes in the polymers were confirmed by Fourier Transform Infrared (FTIR) spectroscopy, showing the formation of carbonyl and hydroxyl groups indicative of oxidative degradation. Liquid Chromatography–Mass Spectrometry (LC–MS) analysis further revealed the presence of oxidized intermediates such as alcohols, ethers, and organic acids, confirming metabolic assimilation. Field Emission Scanning Electron Microscopy (FESEM) validated microbial colonization, biofilm formation, and surface erosion on polymer fragments. To evaluate the functional potential of these isolates in a biological system, mung bean (*Vigna radiata*) and wheatgrass (*Triticum aestivum*) were inoculated with the selected strains under plastic-contaminated conditions. The inoculated plants exhibited improved growth parameters compared to controls, demonstrating the dual capability of these microbes to degrade plastics while supporting plant health. Overall, this study highlights the promising application of dual-function microbes in remediating plastic-polluted soils while enhancing plant performance.



Presenter:
Pooja Singh
Monash University, Malaysia

Novel tRNA-Derived Fragments Mediated Regulation in *Agrobacterium* Pathogenicity

Jebasingh Tennyson, Ganesa Moorthy Murugan, Siddharth Vikram and **Ilamathi Raja**

Department of Plant Sciences, School of Biological Sciences, Madurai Kamaraj University, India

Transfer RNA–derived fragments (tRFs) have recently emerged as a new class of regulatory small RNAs; however, their contribution to bacterial virulence remains largely unexplored. Here, we examine the role of tRFs in modulating virulence-associated gene expression in *Agrobacterium fabrum* under vir gene–inducing and non-inducing conditions. Genome-wide *in silico* analysis combined with comparative screening against *Rhodobacter sphaeroides datasets* identified four novel tRFs derived from mature tRNAs, including two tRF-3s (tRF3- fMet and tRF3-Val) and two tRF-5s (tRF5a-Leu and tRF5b-Gln). Target prediction analyses indicated specific interactions with key Ti plasmid virulence genes (virE1, virD3, virD1, and virE2). The presence of all four tRFs was experimentally validated by stem-loop RT-PCR followed by cloning and sequencing. Comparative sequence and structural analyses revealed high conservation of chromosome-derived tRFs, while linear chromosome–derived tRFs showed partial conservation. Functional annotation of predicted target mRNAs using gene ontology and COG analyses indicated enrichment of processes related to transcription, translation, metabolism, cell wall biogenesis, stress response, and pathogenesis. Differential expression analysis indicated that tRFs respond dynamically to virulence-inducing conditions and are associated with reduced expression of their corresponding virulence-related target mRNAs. These results support a coordinated post-transcriptional role of tRFs in fine-tuning virulence gene expression in *A. fabrum*.

Presenter:
Jebasingh Tennyson
Madurai Kamaraj University, India

Identification of Novel Drug Targets in *Xanthomonas citri* pv. *citri* using Subtractive Genomics and Coevolution Analysis

Tumpa Mahato[1], Jayanta Mandal[2], Eilita Chatterjee[1], Satyabrata Bhattacharya[2] and **Sangram Sinha[2]**

[1]Department of Microbiology, The University of Burdwan, India
[2]Department of Botany, Vivekananda Mahavidyalaya, India

Citrus canker, caused by *Xanthomonas citri* pv. *citri* (Xcc), is a major bacterial disease responsible for severe yield losses in citrus cultivation worldwide. The rapid emergence of antibiotic-resistant Xcc strains has limited the effectiveness of conventional control strategies, underscoring the need for novel, target-specific antimicrobial interventions. In this study, a multi-layered computational pipeline integrating subtractive genomics, protein–protein interaction analysis, and residue-level coevolution was employed to systematically prioritize high-confidence drug targets in Xcc. The complete Xcc proteome was retrieved from UniProt and filtered to remove paralogous sequences using sequence identity clustering. Host non-homologous proteins were identified *via* BLASTp against *Citrus* spp. proteomes (E-value < 0.005). Essential proteins were screened using the Database of Essential Genes (DEG) with a stringent threshold (E-value < 1e-5), yielding 750 essential, non-host homologous proteins. Functional annotation and pathway mapping were performed using KEGG, followed by subcellular localization prediction and druggability assessment to refine the candidate set. Protein–protein interaction networks were constructed using the STRING database, and network topology parameters were evaluated to identify functionally central proteins. To further assess evolutionary and functional constraints, coevolution analysis was conducted using the CoeViz server, enabling the identification of coevolving residue clusters and conserved interaction hotspots. Active-site and pocket prediction were subsequently performed to evaluate suitability for structure-based drug design. Based on integrated scores from essentiality, network centrality, coevolutionary conservation, and structural accessibility, eight proteins- GlmU, CheA, RmlD, GspE, FleQ, RpoN, Shk, and SecB- were prioritized as potential drug targets. Notably, RpoN, FleQ, and SecB have not been previously reported as therapeutic targets in Xcc and displayed strong coevolutionary signatures indicative of critical regulatory and chaperone functions. This study demonstrates that incorporating coevolution analysis into subtractive genomics significantly enhances target prioritization and provides a robust computational framework for antimicrobial target discovery in plant pathogenic bacteria.

Presenter:
Tumpa Mahato
The University of Burdwan, India

Typersig: A Novel Activation Function for Deep Learning-Based Classification of Complex Biological Data

Singanamalli Renuka[1,2] and **N. Suresh Kumar**[2]

[1]GITAM School of Computer Science and Engineering, Visakhapatnam, India

[2]Mahatma Gandhi Institute of Technology, Hyderabad, India

The increasing availability of high-dimensional biological and agricultural datasets has created a demand for advanced deep learning models capable of accurate pattern recognition and classification. However, widely used activation functions such as ReLU often suffer from neuron inactivity, unstable gradient propagation, and reduced learning efficiency when processing complex and nonlinear data. To address these limitations, this study proposes **TyperSig**, a novel custom activation function integrated within a **PiNet-BiLSTM** architecture to enhance feature learning and classification performance.

The proposed activation function replaces negative activations with the mathematical constant π, thereby maintaining gradient flow and preventing neuron dormancy during training. The PiNet-BiLSTM architecture combines one-dimensional convolutional layers for spatial feature extraction with Bidirectional Long Short-Term Memory (BiLSTM) layers for capturing sequential dependencies. Experimental evaluation was conducted on multiple datasets to assess classification accuracy, training stability, and computational efficiency. The proposed model achieved classification accuracies exceeding **98%,** outperforming conventional activation functions including ReLU, Leaky ReLU, and PReLU while demonstrating improved convergence and reduced error rates.

Although originally developed for behavioral biometric authentication, the proposed activation function is domain-independent and can be extended to various biological and agricultural applications. Potential applications include plant disease classification, crop health monitoring, genomic sequence analysis, phenotypic trait prediction, and precision agriculture. The experimental results indicate that TyperSig provides a robust and computationally efficient alternative to existing activation functions, making it a promising approach for enhancing deep learning-based classification systems in plant science, bioinformatics, and related interdisciplinary research.

Presenter:
Singanamalli Renuka
GITAM School of Computer Science and Engineering, India

Advancing Food Security Goals Through CRISPR-Mediated Crop Improvement

Nabarun Roy and **Hari Shankar Gaur**
School of Agriculture, Galgotias University, India

Global food security is increasingly challenged by climate change, population growth, and the stagnation of agricultural productivity. This review highlights the transformative role of Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) technology as a next-generation tool for sustainable crop improvement. CRISPR-based genome editing enables precise, rapid, and cost-effective modification of plant genomes, facilitating the development of high-yielding, climate-resilient, and stress-tolerant crop varieties. These advances offer significant potential to overcome limitations of conventional breeding approaches and address biotic and abiotic stresses that constrain crop productivity. The application of CRISPR technology supports the transition toward sustainable and resilient agricultural systems while reducing reliance on intensive chemical inputs. Furthermore, CRISPR-driven crop improvement aligns with the United Nations Sustainable Development Goals, particularly those focused on zero hunger, food security, and sustainable agriculture. Thus, this review emphasizes the importance of genome-editing technologies in strengthening global food systems and ensuring long-term agricultural sustainability.

Presenter:
Nabarun Roy
Galgotias University, India

Integrating Nanotechnology with Agriculture to Address Global Food Security and Environmental Challenges

Divya Mohanty

Department of Botany, Hindu College, University of Delhi, India

Agriculture is the backbone of developing economies but it carries heavy environmental costs, including soil erosion, water pollution, and greenhouse gas emissions. Exponentially growing population, climate change, and resource limitations are intensifying pressure on agricultural systems, threatening both global food security and environmental sustainability. Meeting the United Nations Sustainable Development Goals (SDGs) and effectively addressing climate change demand transformative technological innovations to tackle biotic and abiotic stresses and promote sustainable intensification. Nanobiotechnology offers a versatile and promising approach for transforming agricultural systems. Its applications in agriculture include smart agrochemical delivery systems, nanosensors, seed priming, and other innovative technologies. Nanomaterials have distinct characteristics of high surface-to-volume ratio, increased reactivity, controlled-release capabilties, allowing specific interactions of the biological system at cellular and subcellular levels and leading to targeted delivery of nutrients and bioactive compounds with minimal waste and environmental pollution. It is interesting to study the interaction between nanoparticles and plants and their actual implementation in practice to get positive affects including higher crop yield, reduced impact on the environment, and high resource efficiency. There is economic forecasting that the nano-enabled agricultural technologies have great market prospects in the area of sustainable intensification. Nevertheless, there are still profound issues in the long-term environmental viability of engineered nanoparticles, evaluation of the possible ecological perturbations and health outcomes, and the creation of comprehensive regulatory models of safe commercialization. The present work provides an overview of nanobiotechnology in agriculture, benefits, constraints and the variety of nanoparticles that have been tested for impacting plant growth. Future perspectives of research include exploring biodegradable nanomaterials, digital agriculture integration, standardized regulatory guidelines, and maximizing the studies to different nanoparticles and plant types. Overall, nanobiotechnology has great potential to revolutionize agriculture by enhancing crop productivity, sustainability, and resilience to climate and environmental challenges, thereby strengthening global food security.

Presenter:
Divya Mohanty
University of Delhi, India

The Carbon Storage Potential of an Old Growth *Quercus Semecarpifolia* (Brown Oak) Dominated Forest in Rudraprayag District, Uttarakhand, India

Ashish Tewari and **Ikramjeet Maan**

Department of Forestry, D.S.B Campus, Kumaun University, Nainital, India

Old-growth forests represent a critical growth stage globally, providing key ecological roles such as biodiversity conservation, water production, and carbon storage. These forests accumulate carbonfor several centuries and store large stocks of carbon. The sequestered CO_2 is stored not only in living trees and understory vegetation but also in the soil. Additional indicative features include the presence of massive trees, trees with hollows, and substantial amounts of standing and downed dead wood in various stages of decay. There is a paucity of information on Carbon stock and sequestration potential of old growth forest in the Indian Himalayan region. The tree vegetational parameters and carbon stock of an old *Quercus semecarpifolia* forest was studied which is located between N30°35"59.1 latitude E79°11"44.3 longitudes in Rudraprayag district of Uttarakhand. A three (03) ha. area was marked for the study located at an elevation of 2696 above mean sea level between 2024- 2026. Previously developed allometric equations were used for estimating the carbon stock and sequestration rates. The average number of dead standingtrees/ha was 06 and dead fallen trees 13/ha. In the small and medium sized gaps created due to fallen trees young trees of *Litsea umbrosa* and *Machilus duthiei* were visible varying in height 2.4 m to 3.7 m. The total tree density of the forest was 141 trees / ha with *Q. semecarpifolia* being the most dominant with a density 99 trees / ha. The trees were large with average circumference of 260 cm at 1.37 m height. The regeneration of *Q. semecarpifolia* was completely absent at the site. This old growth forest had a tree biomass 1605.28 t/ha and carbon stock 754.4t/ha. The contribution of *Q. semecarpifolia* old growth trees was close to 96 percent in biomass and carbon stock. The soil carbon in the top soil layer was also high. Research demonstrates that forests between 15 and 800 years of age generally maintain positive net ecosystem productivity. The *Q. semecarpifolia* old growth forests store huge stocks of carbon and need to be protected and conserved. Given their immense long-term carbon storage capabilities and multifaceted ecological value, the continued protection of old-growth forests is critical.

Presenter:
Ashish Tewari
Kumaun University, India

Fungal-Specific Lectin FGB1 based LAMP Assay for Specific Detection of Fusarium Oxysporum F. Sp. Ciceris Causing Fusarium Wilt in Chickpea

Prassan Choudhary[1,3], Hillol Chakdar[1], Shaloo Verma[1], Sanjay Kumar Goswami[2] and **Alok Kumar Srivastava[1]**

[1]ICAR- National Bureau of Agriculturally Important Microorganisms, India
[2]ICAR- Indian Institute of Sugarcane Research, India
[3]Amity Institute of Biotechnology, Amity University Chhattisgarh, India

F. oxysporum f. sp. *ciceris* is a soil borne species complex having both virulent as well as non-pathogenic strains. In order to accurately diagnose virulent strains, appropriate genic regions must be targeted. In this study, an *FGB1* (fungal-specific β-glucan-binding lectin) gene-based PCR, qPCR and LAMP assays were developed and validated among closely related species of *F. oxysporum*. Conventional PCR showed amplification of a *F. oxysporum* f. sp. *ciceris* specificband. qPCR assay could detect 0.6 fg/ µL of pathogenic DNA with no amplification in no template control. The LAMP assay was highly specific and could detect *F. oxysporum* f. sp. *ciceris* among eleven other similar fungal outgroups. The assay could detect 3.21 fg/µL of pathogenic DNA within 15 minutes having higher sensitivity as compared to conventional PCR assay. The LAMP assay was further validated on plant and soil samples collected from chickpea fields at two different locations and time intervals. The results obtained clearly indicated that with the help of LAMP diagnostic assay, early onset of the disease could be predicted which might help in the timely management of Fusarium wilt.

Presenter:
Prassan Choudhary
Amity University, India

Innovative ITK-Based Biopesticide Formulation from Chilli and Neem for Eco-Friendly Control of Sucking Insect Pests

Rinny Swain[1], Mamata Behera[2], Mita Meher[3] and **Surabhika Panda[4]**

[1,2]Crop Improvement Division, School of Agriculture, GIET University, India
[3]Agricultural Extension Division, School of Agriculture, GIET University, India)
[4]Crop Protection Division, School of Agriculture, GIET University, India

Objectives: The present study aimed to develop and evaluate a novel eco-friendly organic biopesticide formulation based on Indigenous Technical Knowledge (ITKs) integrated with modern agri-biotechnological approaches. The objective was to assess its insecticidal efficacy, bio-stimulatory potential, and suitability for sustainable crop protection.

Scope: The research focuses on formulating a plant-based biopesticide using locally available resources and evaluating its applicability in organic farming systems. The study covers both laboratory and field-level validation against major vegetable pests, along with its potential role in improving plant health and soil fertility.

Methods: The formulation was prepared using standardized aqueous extracts of *Capsicum annuum* (chili), cow urine, *Azadirachta indica* (neem), vermiwash, molasses, and *Allium sativum* (garlic). Extraction and blending were conducted under controlled, light-protected conditions to preserve phytochemical stability. Laboratory assays, including brine shrimp lethality tests and bio-efficacy studies, were performed to determine toxicity and pest control efficiency. Field trials were conducted on brinjal, tomato, and cabbage crops using 7–10% concentrations of the formulation.

Results: The formulation exhibited a strong concentration-dependent insecticidal response against aphids, mealy bugs, hadda beetles, and stink bugs. Field applications at 7–10% concentration effectively suppressed both sucking and chewing pests. Additionally, the presence of cow urine, vermiwash, and plant extracts contributed to enhanced plant vigor, improved resilience, and stimulation of soil microbial activity, indicating bio-fertilizer properties.

Conclusion: The developed biopesticide is biodegradable, non-toxic, cost-effective, and less prone to resistance development compared to synthetic pesticides. It demonstrates significant potential as a sustainable, climate-resilient agri-biotechnological input. Further large-scale validation is recommended to confirm its long-term efficacy and economic feasibility for widespread agricultural adoption.

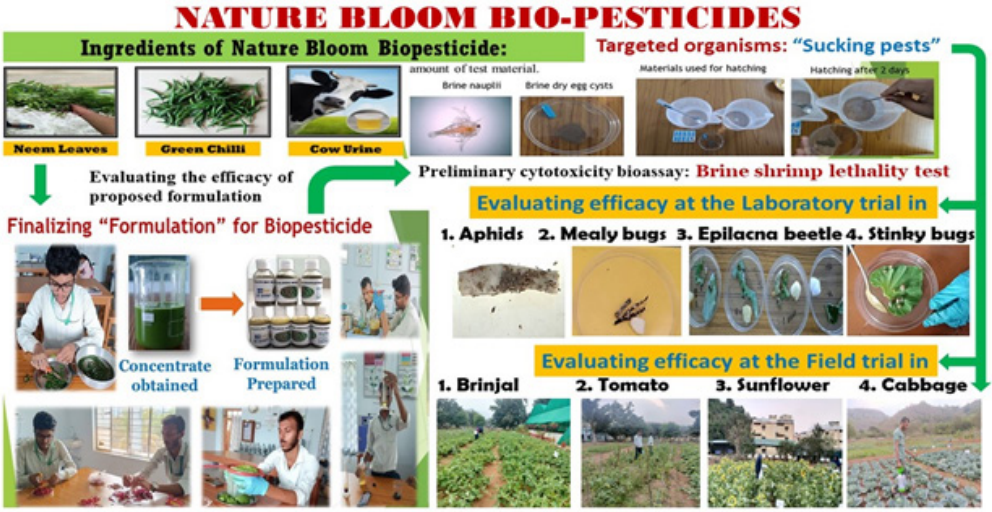


Figure-1. Graphical abstract for the project on "Innovative ITK-Based Biopesticide Formulation" for Sucking Insect Pests.

Presenter:
Rinny Swain
GIET University, India

Antibiotic Resistance: A Result of Microbial Biofilm Association

Nidhi Verma, Surbi Bhardwaj and **Ekta Menghani**
Mahatma Gandhi University of Medical Science and Technology, India

The World Health Organization (WHO) and Centre for Disease Control (CDC) have identified antimicrobial-resistant (AMR) as one of the most challenging health hazards faced by human beings. It accounts for ~ 0.7 million deaths annually worldwide and is projected to account for ~ 10 million deaths globally by 2050. At this rate, it will become the most dominant cause of human deaths surpassing cancer, cardiovascular diseases, and lifestyle diseases. Microbial biofilms have a pivotal role in antimicrobial resistance and chronic infection. Among the microbial species, ESKAPE pathogens are the group of drug-resistant bacteria responsible for nosocomial and hospital-acquired infections.

Antibiotic resistance is a complex and multifaceted issue that can arise from various factors, and biofilm-associated infections are indeed one of the contributors to this problem. Biofilms are communities of microorganisms, such as bacteria, that adhere to surfaces and produce a protective extracellular matrix. These biofilms can form on medical devices, tissues, or various surfaces within the body.

Biofilm-associated infections present challenges for treatment because the biofilm matrix can act as a physical barrier, preventing antibiotics from reaching the bacteria within. Additionally, the microorganisms within biofilms often exhibit altered metabolic states and gene expression patterns, making them less susceptible to the effects of antibiotics.

Presenter:
Nidhi Verma
Mahatma Gandhi University of Medical Science and Technology, India

Spectroscopic Screening and Radical Scavenging Evaluation of Phytocompounds in *Kigelia Africana* Ethanolic Extract

Beema Jainab S.I[1], S. Sathiya Narayana Murthy[2], G. Bhuvaneswari[3], S. Subhashini[4], Saikiruba Radhakrishnan[5] and **S. Saravanan[6]**

[1]Department of Botany, Justice Basheer Ahmed Sayeed College for Women (Autonomous), India
[2]Department of Anatomy, Shri Sathya Sai Medical College Research Institute, Shri Balaji Vidyapeeth University, India
[3]Department of Biochemistry, Annai Veilankanni's College for Women (Affiliated to University of Madras) Saidapet, India
[4]Department of Microbiology, Bharath Institute of Higher Education and Research, India
[5]Department of Biochemistry, Annai Velankanni College for Women, India
[6]Department of Pharmacology, Century International Institute of Dental Science and Research Centre, Thekkil (P.O.), Via. Chengala (KUHS, Thrissur Dt, Kerala), India

This study investigates the phytochemical profile, antioxidant capacity, and structural characteristics of the ethanolic leaf extract of *Kigelia africana*. Qualitative screening confirmed a rich diversity of secondary metabolites, including carbohydrates, proteins, amino acids, fatty acids, alkaloids, cardiac glycosides, phenolic compounds, polyphenols, tannins, flavonoids, xantho-proteins, terpenoids, leuco-anthocyanins, and coumarins. Quantitative assessments revealed high concentrations of total phenolics and flavonoids, which correlated with robust free radical scavenging activity evaluated *via* DPPH assay. Gas Chromatography-Mass Spectrometry (GC-MS) analysis identified 21 bioactive compounds, validated through their peak areas, retention times, and structural properties.

Notable identified constituents include neophytadiene, 2-nonenal, heptadecanoic acid, phytol, hexadecanoic acid, and 9-octadecenoic acid, alongside various alkaloids, flavonoids, terpenoids, and polyphenols. Furthermore, Fourier-Transform Infrared (FT-IR) spectroscopy identified key functional groups—such as alkenes, alkynes, alkyl halides, aromatics, nitro compounds, amides, carboxylic acids, and alcohols—associated with these therapeutic phytocompounds. Taken together, these findings highlight the potent antioxidant and pharmacological promise of *Kigelia africana*, supported by its complex chemical and functional profile.

Presenter:
Beema Jainab S.I
Justice Basheer Ahmed Sayeed College for Women (Autonomous), India

Valorization of Red Pepper and Tomato Canning By-Products for the Development of Bioplastic Fiberboards

Marwa Cheikh Rouhou[1,2], Souhir Abdelmoumen[1,3], William Tapia[4], Guadalupe Vaca-Medina[4], Christine Raynaud[4], Hamadi Attia[5] and **Dorra Ghorbel[1,5]**

[1]Laboratoire de Physiopathologie, Alimentation et Biomolécules, LR17ES03, Institut Supérieur de Biotechnologie de Sidi Thabet, University of Manouba, Tunisia
[2]Laboratoire des Substances Naturelles, Institut National de Recherche et d'Analyse Physico-chimique (INRAP), BiotechPole Sidi Thabet, Ariana, Tunisia
[3]Eco-Chimie (LR21ES02), University of Carthage, Tunisia
[4]LCA, ENSIACET-INP, University of Toulouse, France
[5]LAVASA (LR11ES45), ENIS, University of Sfax, Tunisia Centre Urbain Nord, INSAT, Tunisia

Cellulosic fibers were recovered from red pepper and tomato canning residues through an ultrasound-assisted extraction process and subsequently used as reinforcement for the production of biodegradable bioplastic boards. The approach aimed at valorizing agro-industrial waste from the processing sector by converting it into high-value materials without the use of synthetic binders. Fibers extracted with water and with 80% ethanol presented adequate morphological organization and thermal resistance, allowing their consolidation by thermo-pressing into cohesive structures. The resulting bioplastic boards exhibited satisfactory mechanical behavior, with flexural strength values ranging from 1.58 ± 0.33 MPa to 5.78 ± 0.92 MPa. Materials prepared from untreated raw residues showed the highest resistance, while boards reinforced with red pepper fibers demonstrated greater mechanical performance than those based on tomato fibers. These results highlight the feasibility of transforming by-products from the canning industry into functional bioplastic materials. This strategy contributes to waste reduction, resource recovery, and the development of sustainable bio-based composites for applications in agro-plastic and environmentally compatible material sectors.

Presenter:
Marwa Cheikh Rouhou
University of Manouba, Tunisia

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