8TH EDITION OF GLOBAL CONGRESS ON

PLANT BIOLOGY AND BIOTECHNOLOGY

MARCH 25-27, 2024

Singapore

Venue: Village Hotel Changi
1 Netheravon Rd, Singapore 508502

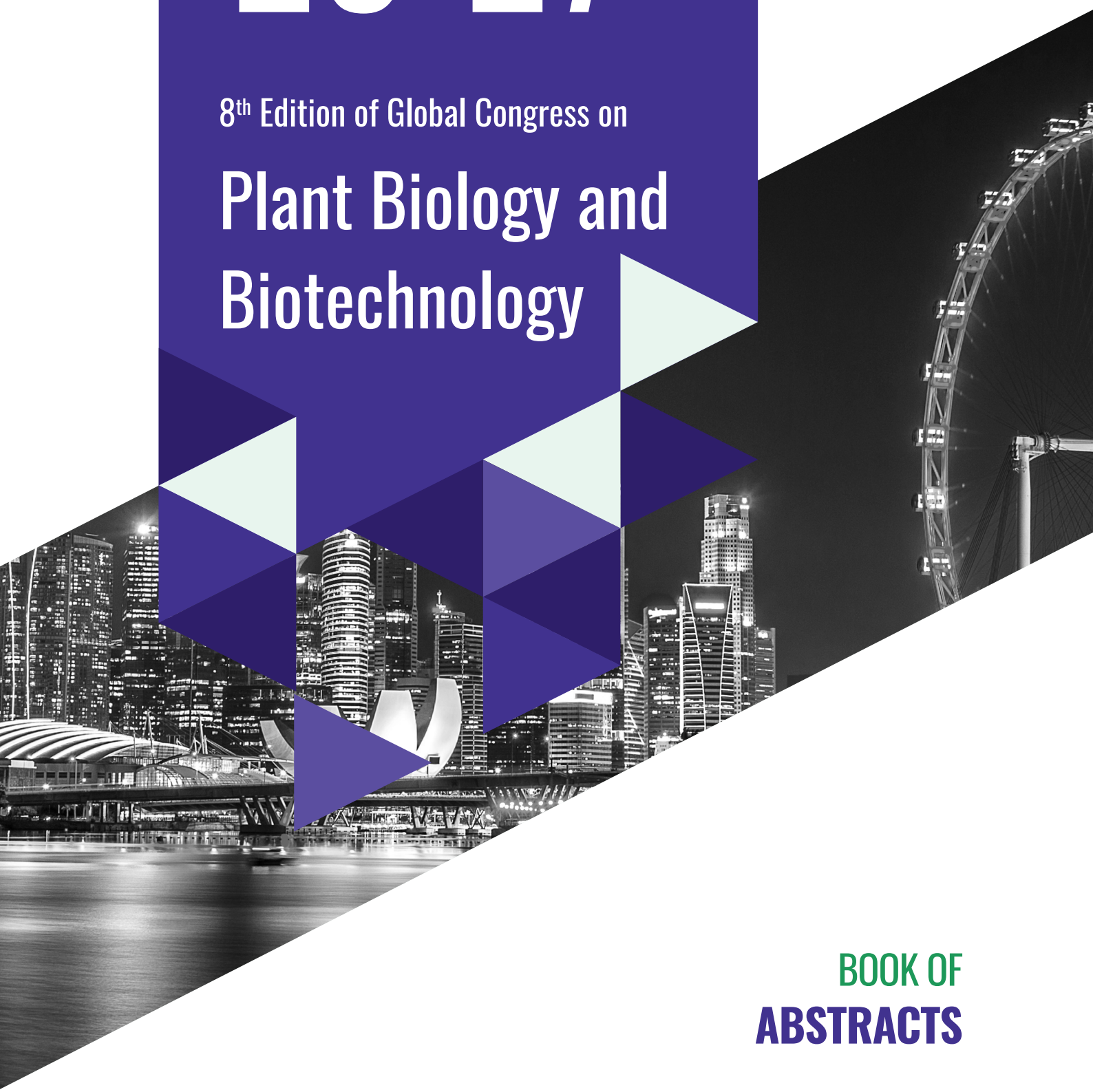
BOOK OF ABSTRACTS

MARCH

25-27

8th Edition of Global Congress on

Plant Biology and Biotechnology



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Thank You All...

Welcome Message

DR. MOHAMMAD BABADOOST

University of Illinois, United States

As a plant pathologist, witth more than 30 years of experience, I wouod like to emphasize that problem-solving in plant pathology is now different than 10, 15, and 20 years ago. Without using biotechnology, accurate identification of plant pathogen species is not possible. For example, for decades, mycologists struggled to established a reliable identification of Fusarium species. It was not possible until 2000s, when molecular analyses of Fusarium isolates helped to offer a reliable classification of Fusarium species. Similar reports have been published on many other plant pathogenic gerens, such as Colletotrichum, Phytophthora, Xanthomonas, etc. The most important step in problem-solving in plant pathology is accurate identification of the causal agents. Plant Biology and Biotechnology Conferences offer broad knowledge in using basic and applied sciences for problem-solving in plant pathology. I am looking forward to seeing you in the 8th Edition of Global Congress on Plant Biology and Biotechnology scheduled for March 25-27, 2024 at Singapore.

Welcome Message

Dr. Mary Cole

The University of Melbourne, Australia

Dear congress visitors. It is an honour and pleasure to write some welcoming words. At this moment in Australia, we are seeing the impact of climate change along our east coast, with unseasonal rainfall and tropical humidity moving down into Victoria in the south. I have spent 45 years of my career showing farmers around the world that the regenerative concept of soil health and plant health is compatible with an increasing population. I take so called 'waste streams' and turn them into 'resource streams'. This makes organics available for agriculture leading to improved nutritional values in foods produced. Also, recycling efficiently urban 'waste' into resources that capture carbon, improve food quality, and give farmers a viable future as their capacity to farm effectively becomes increasingly more problematic. The products are most useful in parks and gardens in urban areas so that material does not need to be brought in from a distance at economic and environmental cost but can be composted on-site and used as a resource. We generate too much organic 'waste' so it must be recycled and made into the wonderful resource nature designed it to be.

Welcome Message

DR. Dol Prasad Dhakal

Freelance Researcher, United States

Dear valued Participants,

It is my great pleasure and privilege with enthusiasm to write a few words to welcome you all participating in this global summit. I am delighted to extend my heartfelt warm welcome to you as an Organizing Committee Member and Keynote Speaker for the "8th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2024)" which is held from March 25-27, 2024, embraces a Hybrid format, offering both online and in-person options in the vibrant setting of Singapore.

Our shared focus on "Ensuring Sustainability and Global Transformation through Crucial Plant Science Advances" promises enlightening discussions and insights. As we navigate the challenges of our evolving world, your participation is integral to shaping the discourse on sustainable solutions through plant science.

I look forward to engaging with you virtually or in person, fostering collaboration, and collectively advancing our understanding of crucial plant science breakthroughs.

Welcome Message

Carlos Ruiz Garvia

UN Climate Change, Adaptation Division, UNFCCC
Germany

Greetings, participants of the Forest Science and Technology session at "8th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2024)".

A warm welcome to this gathering where we explore the realms of forestry, plant biology, and biotechnology. As your session chair, I am delighted to facilitate discussions on the intricate balance of managing, preserving, and utilizing forests. From plantations to natural stands, our focus spans biological, physical, social, political, and sustainable management and sciences. In this session, we will be looking into forest technology, encompassing tree production, harvesting, and preservation, with an emphasis on work science, accident analysis, and heat stress. Our discussions will extend to sustainable forest management, forest engineering, and forest conservation, all crucial components in addressing global challenges, particularly climate change. I am committed to linking our deliberations to international policies, emphasizing the need for coordinated action in the face of climate change. Your active participation will enrich our exploration, fostering collaborative solutions. Here's to a session of insightful dialogue and shared knowledge. Thank you, and let's embark on this journey together.

Welcome Message

DR. EDGAR OMAR RUEDA PUENTE

Universidad de Sonora, Mexico

Dear colleagues and general public present at this honorable 8th Edition of Global Congress on Plant Biology and Biotechnology event, it is a pleasure for me to address you on the occasion of Welcome.

I would like to inform you that global food production under adverse environments and that reduce the productivity of conventional crops, environments such as deserts, arid and semi-arid areas, biotechnology has played an important role in overcoming some adversities. There are several examples which are notable examples of the creativity of the researchers, suggesting that biotechnology is playing a significant role in changing the course of humanity in one way or another, and being one of the disciplines and industry that more have advanced in recent years, the injection of capital into it represents one of the best options for investors for the future. The development of events such as the one we will be witnessing GPB 2024, will show how biotechnology is an interdisciplinary field of enormous applications that helps the development in a very significant way in the present and in the coming years.

Welcome Message

DR. ABDUL KHALIL GARDEZI

Colegio de Posgraduados, Mexico

Dear Esteemed Conference Attendees,

Welcome to the 8th Edition of Global Congress on Plant Biology and Biotechnology. We are thrilled to gather a diverse community of experts, researchers, and enthusiasts to explore innovative solutions addressing the pressing global challenge of water scarcity in agriculture. The increasing demand for water-efficient practices has led us to examine unconventional sources like waste water, and today, we delve into the vital discussion on mitigating environmental challenges associated with its unregulated use in irrigation. Our focus is on bioremediation, a sustainable approach utilizing organisms such as plants, fungi, and bacteria. I am excited to present findings that highlight the remarkable potential of selected bacterial consortia in enhancing tomato plant development in wastewater-irrigated soil. This research underscores the promise of bioremediation as a viable strategy, offering crucial insights into seed germination, seedling vigor, and overall plant growth. Together, let's contribute to the ongoing discourse on responsible water use in agriculture and pave the way for a more sustainable future.

Welcome Message

Dr. Bijayalaxmi Mohanty

National University of Singapore,
Singapore

Dear Participants of the Global Congress on Plant Biology and Biotechnology (8th edition). A very warm welcome to the Global Congress on Plant Biology and Biotechnology (8th Edition) to be held in the Garden city of Singapore. It is an honour for me to deliver a key note speech for this conference. It is indeed a great opportunity for all of us to present and discuss our research on various aspects of plant biology and biotechnology which is crucial for solving our present and future problems related to the yield of different crops, vegetables and fruits. Rice, maize, wheat, sorghum and barley are the major food crops which constitute the world's nutrient requirements. Although the overall yield of such cereals has been increasing, the growing population and adverse climatic changes pose huge challenges for their sustained production. Hence, we need to develop new breeding targets and agronomic traits for improving crop production. I hope the extensive scientific sessions of this conference would be beneficial for all of us in understanding and solving different aspects of plant biology.

Welcome Message

Valasia Lakovoglou

UNESCO chair Con-E-Ect, International Hellenic University, Greece

Dear participants,

Welcome to the 8th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2024)", that takes place in Singapore (March 25-27, 2024). It is an honor and pleasure to be part as Organizing Committee Member and Keynote Speaker at this Outstanding International gathering among distinguished researchers, sharing my more than 25-yrs of experience in the research field of Ecophysiology/Forestry. Undoubtedly, climate change is having and will continue to have serious negative impacts on the environments, worldwide. The situation urges for solutions to alleviate problems and achieve sustainable ecosystems for long-term benefits. Nature-based Solutions (NbS) is a tool that, if used properly, can mitigate the negative climate change effects and provide benefits like reducing erosion, improving water quality, supporting agricultural production and resilience for long-term food security, reducing disaster risk, and overall enhancing healthy sustainable ecosystems."

Highly honored being part of this Great International Scientific even. Looking forward sharing my experience on NbS and interacting with you all.

Welcome Message

Manuel Tornel Martinez

Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario, Spain

Dear Conference Attendees,

It is a privilege and a pleasure to address you with a few words of welcome for the session entitled "Expanding global table grape production and consumption trends driven by new seedless varieties". Consumer preference for healthy, easy-to-prepare foods reflects a growing awareness of the importance of maintaining a balanced diet in the midst of busy lifestyles. This shift in food mentality has become a significant trend in today's society.

The convenience of seedless grapes, allowing for direct consumption as a pre-prepared snack without the need for additional processing, has facilitated their integration into the daily diets of many individuals. The variety of flavors, colors and shapes, their crunchy texture and the remarkably large size of their berries have made table grapes a popular choice, especially among those looking for healthy and tasty alternatives to snacking. On the other hand, the consumption of antioxidant-rich foods such as grapes is recognized for its role in maintaining cellular health, which establishes grapes as a highly valued and healthy fruit.

Welcome Message

DR. Rameshkumar K B

Jawaharlal Nehru Tropical Botanic Garden and Research Institute
India

Esteemed delegates of the Global Conference on Plant Biology and Biotechnology-2024; its my privilege and honor to extend a welcome note to the conference participants. As we know, plants contribute significantly to human health and well-being and the fascinating diversity of phytochemicals are ultimately responsible for the wide applications of plant resources, and also have a significant role in understanding the plant life and ecological interactions. Recent developments in plant biology and especially plant biotechnology are based on an interdisciplinary approach, where the contribution of plant chemistry is significant. Life science research is going through an 'omics' era and the unprecedented progress in phytochemical techniques as in the case of hyphenated analytical techniques and ambient analytical techniques opened new avenues for phytochemists to explore boarder areas such as chemical ecology, chemogenomics and metabolomics. The conference will definitely act as a platform to orient new directions to the contemporary research in phytochemistry field

ABOUT
MAGNUS GROUP

Magnus Group, a distinguished scientific event organizer, has been at the forefront of fostering knowledge exchange and collaboration since its inception in 2015. With a steadfast commitment to the ethos of "Share, Receive, Grow," Magnus Group has successfully organized over 200 conferences spanning diverse fields, including Healthcare, Medical, Pharmaceutics, Chemistry, Nursing, Agriculture, and Plant Sciences.

The core philosophy of Magnus Group revolves around creating dynamic platforms that facilitate the exchange of cutting-edge research, insights, and innovations within the global scientific community. By bringing together experts, scholars, and professionals from various disciplines, Magnus Group cultivates an environment conducive to intellectual discourse, networking, and interdisciplinary collaboration.

Magnus Group's unwavering dedication to organizing impactful scientific events has positioned it as a key player in the global scientific community. By adhering to the motto of "Share, Receive, Grow," Magnus Group continues to contribute significantly to the advancement of knowledge and the development of innovative solutions in various scientific domains.

ABOUT
GPB 2024

Magnus Group is thrilled to unveil the "8th Edition of the Global Congress on Plant Biology and Biotechnology (GPB 2024)", slated as a Hybrid Event blending online and in-person experiences, set to take place in Singapore from March 25-27, 2024.

Themed "Ensuring Sustainability and Global Transformation Through Crucial Plant Science Advances," this congress aims to underscore the indispensable role of plants in sustaining life on our planet. From revolutionizing agriculture to impacting food production and beyond, Plant Biology & Biotechnology continually spearhead groundbreaking research and innovations, charting the course for various industries' future.

GPB 2024 remains steadfast in its commitment to spotlighting the latest scientific breakthroughs in plant biology and biotechnology, fostering an inclusive platform that embraces both established and emerging research areas. The congress extends a warm invitation to researchers, scientists, academicians, biotechnologists, agriculturists, botanists, soil science experts, farmers, industrialists, and enthusiasts worldwide to come together, share their work, and offer insights, fostering a dynamic and influential gathering.

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DAY 01

KEYNOTE FORUM

Importance of biotechnology in developing effective management of fruit rots of apples

Three fruit rots of apples have been reported in the Midwest of the United States, which are bitter rot, black rot, and white rot caused by Colletotrichum spp., Botryosphaeria obtusa, and Botryosphaeria dothidea, respectively. In the past 10 years, outbreaks of bitter rot disease occurred in Illinois apple orchards. This study was conducted to develop effective management of fruit rots in Illinois. Orchard surveys conducted during 2019-2021 showed that 58, 67, and 64% of the orchards in 2019, 2020, and 2021, respectively, had from 0.7 to 100% of apple fruits with bitter rot symptoms. During the surveys, 270 isolates of Colletotrichum fungi were collected from the symptomatic fruits of 'Braeburn', 'Cortland', 'Empire', 'Fuji', 'Gala', 'Golden Delicious', 'Gold Rush', 'Granny Smith', 'Honeycrisp', 'Jonagold', 'Jonathan', 'McIntosh', 'Red Delicious', and an unknown cultivar of apples from 33 orchards. Pathogen species were identified based on the morphological and molecular characteristics of the isolates. GAPDH gene sequence analyses identified species of the pathogens as Colletotrichum fioriniae, C. siamense, and C. chrysophilum. Laboratory and orchards studies were conducted to evaluate effectiveness of fungicides for managing bitter rot disease. Laboratory studies showed 8.3, 8.0, and ≤0.11 mg/L EC_{50} of benzovindiflupyr, captan, and fluxapyroxad + pyraclostrobin fungicides, respectively. Orchard experiments were conducted in 2019, 2020, and 2021 on 'Honeycrisp' apple. Benzovindiflupyr (Aprovia 0.83SC), captan (Captan 80WDG), and fluxapyroxad + pyraclostrobin (Merivon 4.18S) prevented development of bitter rot and other fruit rots in the treated plots.

Mohammad Babadoost[1]*, Festus Acheampong[1], Andrew N. Miller[2]

[1]Department of Crop Sciences, University of Illinois, Urbana, IL 61801, United States

[2]Illinois Natural History Survey, University of Illinois, Champaign, IL 61820, United States

Biography

Mohammad Babadoost received his Ph.D. in plant pathology from North Carolina State University. In 1999, he joined the faculty of the University of Illinois at Urbana-Champaign, where he is now a Professor of Plant Pathology and Extension Specialist. Mohammad conducts research and extension programs on the biology and management of vegetable and fruit crops diseases, and teaches "Plant Disease Diagnosis and Management". Dr. Babadoost has published 57 peer-reviewed and more 400 extension articles. He has developed a profound commitment for improving crop production in the developing countries and establishing food security in the world.

Using the urban and farming waste streams to improve soil health in agricultural systems

Victoria, Australia, has recently introduced food organics into the green organic urban collection for recycling rather than going to land fill. Developing fit-for-purpose products from this combined waste in the form of thermal aerobic compost was carried out together with feedlot manure which also did not have a fit-for-purpose end product. A grant from Sustainability Victoria allowed field and replicated research trials on these raw materials to be combined such that the end products had good fungal:bacterial ratios, good ammonia:nitrate ratios for perennial and annual crops and useful data on the impact of these products on the soil biota, soil organic matter and plant health. As was expected, the fresh organic mater composted under thermal aerobic conditions faster than the straight aged feed lot manure. A blend of 75% Food and Green Organics (FOGO) and 25% aged Feed Lot Manure (FLM) showed the highest total carbon and highest carbon: nitrogen ratio. The 25% FOGO and 75% FLM gave the highest total nitrogen. Replicated trials were carried out on two soil types for pasture: Two soil types for vegetables and two different vegetable types with 6 treatments and 5 replications. The treatments were: untreated control, FLM, aged finished thermal aerobic compost, freshly composted FOGO, blend of 50% FLM and 50% FOGO, and compost tea made from high quality fungal dominated compost. Interestingly, compost tea alone gave results that stood up against the other products. This will be useful for farmers who cannot make sufficient compost to cover their farms but have the capacity to make good quality compost tea. Also, the data will allow waste streams from city urban collections and feedlots to be introduced into the farming systems improving soil and plant health. The urban waste streams become urban resources for the farming community.

Audience Take Away Notes

- How best to turn urban waste streams into high quality fit-for-purpose farming resources
- Add to understanding of how soil biota reacts to external inputs in farming regimes
- Help farmers minimise input costs while improving the environmental impact of the farming system
- Encourage farmers to consider organic/regenerative farming practices over synthetic chemical conventional farming practices
- Assist town planners and government agencies to plan around urban organic waste streams
- Offer alternative products that will encourage organic/regenerative farming practices to better protect the environment and produce nutrient dense food

Mary Cole

Agpath Pty Ltd, Garfield, Victoria, 3814 Australia

School of Agriculture, Food & Ecosystems Sciences, Faculty of Science, University of Melbourne, Parkville, Victoria 3010, Australia

Biography

Dr. Cole graduated with a PhD in plant pathology from Monash University, Melbourne, Victoria, in 1998, and lectured at Charles Sturt University, NSW, Monah University, Victoria and is currently an Honorary Senior Fellow at the University of Melbourne, Victoria, Australia. In 1980 she established Agpath Pty Ltd where she works with farmers and students around the world in the benefits of organic/regenerative agricultural systems for future-proofing farming again climate change and improving soil and plant health. Dr. Cole was awarded the 2021 Holt electorate Australia day award for community service. She holds a CAg, Ag Institute of Australia Accredited Charted Agriculturist.

- This data can be used in agricultural courses that promote organic/regenerative farming practices
- This is the way of the future if farming is to provide an economical outcome for farmers. The move away from fossil fuel in farming and generally will need soil and plant health from organic/regenerative systems to remain sustainable in the face of climate change
- List all other benefits
    - Improves urban recycling
    - Improves soil and plant health
    - Has the potential to remove or minimise the use of synthetic chemistry in agriculture
    - Produces healthier plants, so less need for synthetic chemical pesticides, herbicides and fertilisers

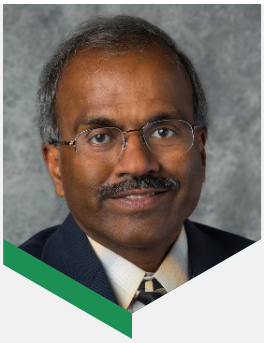
Develop smart biochar-based control release nitrogen fertilizers to improve the sustainability of corn production

Conventional Nitrogen (N) fertilizers tend to dissolve in the water quickly without allowing sufficient time for the plants to uptake the N nutrient. The consequence is low N Use Efficiency (NUE) (NUE < 50%) due to losses by volatilization of N in air, runoff, and leaching in the field that is rising severe environmental pollution. Controlled-Release Fertilizers (CRFs) uses for the controlled release of N nutrients as an innovative solution. Research conducted using different compositions and coating methods for CRFs yet underdeveloped provides inadequate release control from fertilizer particles. The complexity of the preparation methods, biodegradability, and other physical properties are questionable in the modern agriculture sustainability achievement. This study aims to develop a novel Biochar-Based Controlled-Release N Fertilizer (BCRNF) by explicitly formulating the nitrogen fertilizer particles, using polypropylene as coating material applied via the dipping method.

This research focuses on selecting cost-effective and environmentally friendly coating materials for the fabrication of Biochar-Based Controlled-Release Nitrogen Fertilizers (BCRNFs) to address the challenges, such as Nitrogen Use Efficiency (NUE), N lost through leaching, volatilization, and runoff into the water systems. To address economic challenges, biodegradable Polypropylene (PP) was selected in this study to examine its economic viability and biodegradability in the BCRNF fabrication and application. This material was used to coat the BCRNF particles using a dipping method, which enables the particles to control the release of nitrogen, synchronizing with the nitrogen uptake of crops. The new environmentally friendly fertilizer BCRNF was fabricated in a pelletizing machine and coated with PP 15(%). The results show that the release of Nitrogen was 99.65 (%) for the coated samples which corresponded to 8 (hr), and it can be compromised depending on the efficiency of the dipping method. The produced particles showed more successes on plants growth, health, and overall yield on the wheat trial in the greenhouse.

Audience Take Away Notes

- This research can be beneficial to a variety of individuals, such as researchers, professionals in the plant biotechnology, and educators, that make up the audience. The findings of this study have the potential to provide advantages to these different groups



Kasiviswanathan Muthukumarappan*, Lin Wei

Department of Agricultural and Biosystems Engineering, South Dakota State University, Brookings, SD 57007 United States

Biography

Dr. Kasiviswanathan Muthukumarappan is a distinguished professor in the agricultural and biosystems engineering department at South Dakota State University. He has led multiple research projects and advised students in academic and research activities. His work focuses on food and bioprocessing standards development, resulting in over 200 peer-reviewed publications and 350 presentations. He has revised three ASABE standards, served on various committees, and held leadership roles within the Food and Process Engineering Institute (FPEI). Dr. Muthukumarappan has received numerous awards for his contributions to research and education in food and bioprocess engineering at both national and international levels.

Enhancing tomato crop growth in wastewater-irrigated soils: Exploring the potential of bacterial consortia for bioremediation

The escalating demand for water-efficient practices in agriculture has prompted the exploration of unconventional water sources such as wastewater to alleviate water scarcity and ensure food security. However, the unregulated utilization of wastewater in irrigation poses environmental challenges, necessitating effective remediation strategies to restore affected ecosystems. Bioremediation, a biological approach employing various organisms like plants, fungi, and bacteria, offers a sustainable method to mitigate contaminants in soil and water. This study focuses on assessing the potential of three tomato varieties inoculated with bacterial consortia for the bioremediation of soils irrigated with wastewater. The investigation unfolds in three phases: firstly, exploring the viability of tomato seeds exposed to $CuSO_4$ solutions, assessing the impact of pregerminative treatments, and examining seed responses to bacterial consortium inoculation. The second phase involves determining the vigor of tomato seedlings, while the third phase evaluates the performance of tomato plants in a greenhouse environment up to 120 days post-sowing in wastewater-irrigated soil. Results reveal that the germination process is influenced by factors such as temperature, seed hydration, and storage time. In both in vitro and greenhouse evaluations, bacterial consortia 1 and 3 demonstrate a positive impact on seedling development, validating their effectiveness. Specifically, in the R.G. 22 tomato variety, the use of bacterial consortium 1 leads to increased stem length and diameter, root length and volume, and dry biomass of the aerial part compared to the control. Bacterial consortium 3, applied to the R.G. 19 variety, results in an augmented stem and root length, aerial part dry biomass, and leaf area. For the Rn 22 variety, the application of consortia 1 and 3 leads to heightened leaf count, stem and root length, root biomass, and aerial part dry biomass compared to the control. These findings underscore the potential of selected bacterial consortia to enhance tomato plant development in wastewater-irrigated soil, suggesting a viable bioremediation strategy for sustainable agricultural practices. By elucidating the positive effects of bacterial consortia on seed germination, seedling vigor, and overall plant growth, this research contributes valuable insights to the ongoing discourse on the responsible use of wastewater in agriculture.

Keywords: Water Pressure, Wastewater, Bioremediation, Bacterial Consortia, Tomato.

Abdul Khalil Gardezi[1]*, Leticia Manuela Izunza Medina[2], Guillermo Carrillo Castaneda[3], Hector Manuel Ortega Escobar[1], Sergio Roberto Marquez Berber[4], Oscar Raul Mancilla Villa[5], Gabriel Haro Aguilar[1]

[1]Posgrado en Hidrociencias, Colegio de Posgraduados/ Professor, Montecillo, Texcoco, Estado de Mexico

[2]Posgrado en Hidrociencias, Colegio de Posgraduados/ Student, Montecillo, Texcoco, Estado de México

[3]Centro de Genetica, Colegio de Posgraduados/Professor, Montecillo, Texcoco, Estado de México

[4]Departamento de Fitotecnia. Universidad Autónoma Chapingo/Professor, Chapingo, Texcoco, Estado de Mexico

[5]Centro Universitario de la Costa Sur, Universidad de Guadalajara/ Coordinador de la Maestría, Autlán, Jalisco, Mexico

Biography

Dr. Abdul Khalil Gardezi is a distinguished scientist and academic member of the Hydro science Center, Postgraduate College in Agriculture Science in Mexico, since 1981. He has received distinctions for teaching, research and service from 1988

Audience Take Away Notes

- The potential of selected bacterial consortia to enhance tomato plant development in wastewater-irrigated soil
- A viable bioremediation strategy for sustainable agricultural practices
- This research contributes valuable insights to the ongoing discourse on the responsible use of wastewater in agriculture

until 2023. He has been selected for the originality of his research, presented as the best paper and oral presentation from 2003 until 2023 in international congresses in USA, Dubai, France, Spain, England, Germany, Mexico, Nederlands, Switzerland, and Australia. He has published more than 200 papers internationally. He has been honored among 2000 outstanding intellectuals of the 21st century by the International Biographical Center Cambridge, England.

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DAY 01

SPEAKERS

Paulo Cesar Baleeiro[1]*, Richard Jobson[2], Rod Fensham[1], Lyn Cook[1]

[1]School of the Environment, The University of Queensland/PhD student, Queensland, Australia

[2]Royal Botanic Gardens Sydney, Mount Annan, New South Wales, Australia

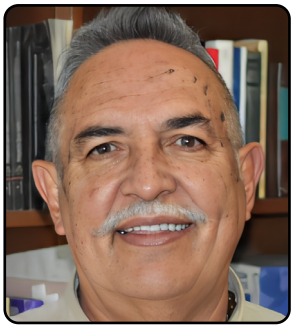
Islands in the desert - Exploring the genetic diversity and structure of eriocaulon in the springs of the Great Artesian Basin, Australia

Island biogeography and landscape genetics offer valuable insights into species evolution during extended periods of isolation. In this study, we applied these concepts to explore genetic diversity and gene flow among populations of Eriocaulon species in isolated springs associated with the Great Artesian Basin (GAB) in Australia. The GAB groundwater discharges from small springs in a vast arid and semiarid region, creating clusters of wetlands that harbor isolated populations of endemic taxa. We focused on E. carsonii subsp. orientale, and two microendemics, E. giganticum, and E. aloefolium, using dd-RADSeq data from eight populations of E. carsonii subsp. orientale, considering differences in ploidy. Our findings revealed varying levels of genetic diversity and inbreeding across the populations. Habitats consisting of sub-population clusters showed higher genetic diversity compared to single populations, with E. aloefolium exhibiting greater genetic diversity and lower inbreeding than E. giganticum. The non-GAB population used in the study displayed elevated genetic diversity and negative inbreeding levels, indicating recent admixture from distinct colonization events or significant expansion. Limited admixture between populations from different complexes and high genetic differentiation (Fst) suggested minimal gene flow between these populations. These results provide valuable insights into genetic diversity and gene flow patterns in plant populations across the GAB, indicating that the ancestor of Eriocaulon carsonii was already isolated in the springs before the aridification of Australia around 4-6 million years ago. Understanding the evolutionary history and long-term persistence of these species within the isolated springs of the Great Artesian Basin emphasizes the importance of maintaining genetic diversity and connectivity among populations for the continued survival of these unique taxa.

Keywords: Great Artesian Basin, Springs, Eriocaulon, Genetics.

Biography

Paulo Baleeiro, Msc, commenced his biological research at Brazil's State University of Mato Grosso, studying the Pantanal wetlands' aquatic plants. He further delved into the carnivorous genus Utricularia for his masters' thesis at the Federal University of Rio de Janeiro. From 2009 to 2015, he pursued his interest at the University of Sao Paulo, contributing to phylogenetic theories and new taxa descriptions. Currently, he is pursuing his PhD at the University of Queensland, examining the genus Eriocaulon in Australasia, with 20 published academic papers.



Ramón Garza-García*, Carmen Jacinto Hernández, Dagoberto Garza-García

Programa de Frijol del Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias. Campo Experimental Valle de México. Km. 13.5 carretera Los Reyes-Texcoco, Coatlinchán, Texcoco, Estado de México. C.P. 56250. México

Breeding of new common bean varieties from preferred native genotypes in Mexico

In the High Valleys of the Central Table of Mexico, the cultivation of native beans is very common, and in the Mezquital Valley, in the state of Hidalgo, beans of this origin are used, of the so-called San Franciscano type, which are generally of Indeterminate growth habit and late cycle, with problems of incidence of diseases, such as root rot and common blight (Xanthomonas campestris pv. phaseoli (Smith)), mainly. To overcome the limitation that these factors represent for production, crosses were made between native San Franciscano genotypes with improved varieties, with resistance to diseases and earlier development cycles. From these crosses, two new varieties have been released, with characteristics of native bean grain, with adaptation to the High Valleys of the Central Mesa of Mexico. These new varieties are Huitel-143 and Xicuco-10. Under rainfed conditions, Huitel-143, of type III growth habit, reaches between 1,485 and 2,900 t ha-1, high culinary quality and a protein content between 23 and 25%; while Xicuco-10, is a variety of determined growth habit, type I of bush, which reaches between 1,200 to 1,800 t ha-1, high culinary quality and with a protein content of 23%. The potential yield of Huitel-143 (>2 t ha-1) represents approximately 25-30% more than what is obtained with native varieties that are planted in the zone of good rainy season in the Central Table. Likewise, Huitel-143 and Xicuco-10 offer good commercial quality due to the characteristics of their San Franciscano type bean, which is a prized and preferred bean in the Mezquital Valley and contributes to preserving the tradition and consumption habits of native beans.

Keywords: Mexican Highlands, Grain Quality.

Audience Take Away Notes

- Through the high protein content in dry bean genotypes we obtain new varieties in Mexico
- The results of this job show that is possible to obtain dry bean genotypes with high protein content and low cooking time

Biography

Dr. Ramon Garza Garcia studied Agronomist at the Universidad autónoma de Tamaulipas, México. He joined the Entomology Program. In 1994 and 1995 He had a training on bean genetics and biotechnology at the Centro Internacional de Agricultura Tropical (CIAT). He studied to get master in Science (1985) and PhD (1998) at the Colegio de Postgraduados in México. He working about dry beans entomology and plant breeding. After He had genetic postdoctoral fellowship in 2005, supervised by Drs. Teresa Millán y Juan Gil at the Genetics Laboratory, University of Córdoba, Spain. He participates in the Bean Breeding Program of the Valle de México Experimental Station.

Carmen Jacinto-Hernández[1]*, Ramón Garza-García[2]

[1]Laboratorio de Calidad de Frijol

[2]Programa de Frijol Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias (INIFAP). Texcoco, estado de México, México

Polyphenol oxidase activity in common beans with different post-harvest time

In Mexico, part of the bean production is stored for months to satisfy the demand during the year. The environmental conditions of the warehouse and the storage time influence the quality of the grain. In light-colored bean varieties, the darkening of the seedcoat occurs, which leads to a decrease in market value, since it is associated with an aged grain. We have previously found that polyphenol oxidase activity in some varieties in accelerated storage tests is associated with seedcoat darkening. The objective of this work was to determine the activity of Polyphenol Oxidase (PPO) and its possible association with darkening of the seedcoat in light-colored bean genotypes with postharvest times from 1 to 3 years. Seven bean varieties were studied, provided by the CEVAMEX-INIFAP Bean Genetic Improvement Program. Azufradoro, a yellow colored variety was included as slow darkening reference. The PPO activity was determined for these genotypes. The color of the seed coat was measured using a Konika Minolta CM5 reflectance spectrophotometer.

At a longer postharvest time, six of the varieties showed visible darkening of the seedcoat. The values of L* tended to decrease, while those of a* and b* increased, which indicated an increase in red and yellow tones. Statistical differences in PPO activity were observed between varieties. The Azufradoro variety showed the highest color stability and the lowest PPO activity. A positive statistical correlation was identified between the PPO activity and the a* b* variables of grain color. These results indicate that the enzyme polyphenol oxidase participates in the formation of pigments that modify the color of the seedcoat.

Audience Take Away Notes

- Through the use of reflectance spectrometry it is possible to detect changes in color and associate them with the grain darkening process
- A different response is observed between common bean market classes and among varieties of the same market class

Biography

Dr. Carmen Jacinto-Hernández studied human nutrition at the Universidad Veracruzana, Mexico. She joined the Oilseed Program of the National Institute of Agricultural Research (INIA). In 1984 she completed an oilseed training at the Grain Research Laboratories, Agriculture Canada. Subsequently, she completed her master's degree (1988) and doctorate (2000) at the National Polytechnic Institute in Mexico City. She began to work on the quality of the common bean. He completed a postdoctoral stay in 2005, at the Genetics Laboratory of the University of Córdoba, Spain. She currently participates in the Bean Improvement Program of INIFAP.

Maria do Carmo Horta[1,2]*, Verónica Oliveira[3,4], Berta Riaño[5], Claudia Vitória[1], María Cruz García-Gonzalez[6]

[1]Polytechnic Institute of Castelo Branco, School of Agriculture, Quinta da Sra. de Mércules, 6001-909 Castelo Branco, Portugal
[2]CERNAS-IPCB Research Centre for Natural Resources, Environment and Society. Polytechnic Institute of Castelo Branco, 6001-909 Castelo Branco, Portugal
[3]Polytechnic Institute of Coimbra, Applied Research Institute, Rua da Misericórdia, Lagar dos Cortiços, 3045-093 Coimbra, Portugal
[4]Research Centre for Natural Resources, Environment and Society (CERNAS). Polytechnic Institute of Coimbra, Bencanta, 3045-601 Coimbra, Portugal
[5]Agricultural Technological Institute of Castilla y León, Ctra. Burgos, Valladolid, Spain
[6]Superior Technical School of Agricultural Engineering, University of Valladolid, Avda. de Madrid, 57, 34004 Palencia (Spain)

Recovery of N and P from livestock and agro-industrial effluents: Physical-chemical processes and agronomic efficiency

Mineral fertilizers must be applied to agricultural soils to overcome the natural shortcoming of soil nutrient's level needed to maintain or increase crop productivity. At the same time both livestock production and agro-industrial sectors produce effluents with high levels of N, P and other nutrients. These effluents can be applied to agricultural soils providing those nutrients to crops (N, P, Mg, Ca, K, etc.) as well as organic matter to soil contributing to close the cycle of nutrients. However, not only the amount of N, P and other nutrients in those effluents are variable but also the ratio between the organic to inorganic forms. This variability causes differences in the agronomic efficiency of the nutrients mainly for N (Norg:Ntotal) and can also impact on their losses to waterbodies and in the case of nitrogen to losses through volatilization. To decrease these disadvantages, the effluents can be treated by physical-chemical processes such as Gas-Permeable Membrane (GPM) technology and Electrodialytic (ED) process which allow the extraction of major nutrients, namely N (GPM) and N, P and other nutrients (ED), to obtain mineral biobased fertilizers. The GPM technology allows capturing of NH_3 gas present in the effluent in the trapping solution to form an ammonium salt. The ED process allows separating and concentrating of N, P, and other ions through applied electric current and ion exchange membranes. In this study we will present results on N recovery in concentrate solutions from an agro-industrial anaerobic digestate effluent by using GPM technology and on N, and P recovery from a pig effluent by using ED process. N recovery efficiencies of GPM technology and ED process achieved 70-90% for GPM and 40%, for ED. P recovery efficiency in ED process achieve 74-100%. It should be noticed that the ED process was applied to recover N for the first time in this work. The crop experiments done with the ammonium sulphate solution obtained by the GPM technology as N liquid fertilizer showed the same or even higher agronomic efficiency than the traditional N mineral fertilizers. The mineral biobased fertilizers obtained by these processes have the advantages regarding the traditional mineral fertilizers of having i) commercial value adding value to organic wastes, ii) a known mineral composition (N, P and other nutrients), iii) decrease mining of natural resources and iv) safe and easier transportation.

Audience Take Away Notes

- This project aimed at turning agri-food wastes into secondary sources of nutrients and recover also bioactive organic compounds to use as fertilizers in agriculture, or in the case of bioactive compounds to use in pharmaceutics or food industry contributing to the circular economy

- The variability of the mineral and organic composition of the agri-food effluents as well as the environmental impact of their incorporation into soils mainly in the rainy seasons lead to the need for their storage in the facilities where they are produced for long periods, with high costs for agricultural and agri-food companies. The problem arises at an environmental level (contamination of water resources and possibly soil) and financial (treatment of effluents and waste of the nutrients and organic matter they contain). The urgency of finding a solution is related also to saving finite natural resources, since synthetic mineral fertilizers require the exploitation of these resources. It is estimated, for example, that the world's reserves of phosphate rock (80% of its exploitation is directed towards the production of phosphate fertilizers) could only be economically exploited for another 200 to 300 years. The agri-food effluents produced daily can be a secondary source of crop nutrients allowing to reduce the mineral fertilizers used in agriculture
- The final output proposed with the project referred in this presentation allowed to obtain several products from agri-food effluents with fertilizer interest, namely a liquid formulation with a known concentration of nutrients, which can be used in fertigation both in the field and in the greenhouse. Currently, and due to global warming, the fertigation solution is the most advisable way to save water. The liquid fertilizer formulation obtained with the Gas Permeable Membrane technology (GPM) and the Electrodialytic process (ED) will also allow to be used in hydroponics
- The agri-food effluents studied in this project had also some bioactive organic compounds showing a biostimulant effect on the production of agricultural crops. In addition, the recovery for food industry or pharmaceutical uses of some of these organic compounds in agri-food effluents will add value to the final products obtained
- Due to the high variability in the composition of these kind of effluents the use of the technology referred in this presentation can also be tested and improved in other environments/regions, by the researchers, technics or entrepreneurs in the audience and improved and upscaling it in the nearby enterprises

Biography

Dr. Maria do Carmo Horta is Agronomist from the University of Lisbon, Portugal and graduate as Msc in 1992 by the same University. She joined the research group of Prof. José Torrent at the University of Córdoba, Spain and obtain her European PhD. in 2005. She is Professor of Soil Science at the Polytechnic Institute of Castelo Branco, Portugal. Her research areas are the sustainable use of fertilizers and organic amendments to improve soil fertility and crop productivity. She has published more than 110 research papers in international and national journals.

Pakhawat Pookhamsak*, Piyada A. Tantasawat

School of Crop Production Technology, Institute of Agricultural Technology, Suranaree University of Technology, 111 University Avenue, Muang District, Nakhon Ratchasima, 30000, Thailand

Pyramiding of powdery mildew and leaf spot resistance genes in mungbean using marker-assisted backcrossing

Mungbean or green gram (Vigna Radiata (L.) Wilczek) is one of the important economic crops in Thailand. Protein and several important nutrient sources for human consumption were found in mungbean seeds. However, the current mungbean production is not enough for its requirement due to poor harvest index, lack of genetic variability, susceptibility to abiotic stresses and particularly biotic stresses. Cercospora Leaf Spot (CLS) and Powdery Mildew (PM) are the major foliar diseases in mungbean production that can reduce the quality and quantity of mungbean yields. CN84-1 with high yield and starch percentage is widely grown in Thailand, but highly susceptible to CLS and PM diseases. In the present study, the pyramiding of 1 CLS and 2 PM resistance genes from donor parents A and B into elite variety CN84-1 was achieved through marker-assisted backcross breeding (MABB). The triple pyramided progenies in each cross from BC_1F_1 to BC_4F_1 generations were identified using 6 linked markers to these resistance genes. Using background selection, high percentage of Recurrent Parent Genome (RPG) recovery with a maximum of 97.6 and 100.0% in BC_4F_1 generation was obtained through 24 and 26 polymorphic ISSR loci of cross A and B, respectively. These results indicate that the pyramided progenies in the advanced generation contain a similar genome with CN84-1 and three resistant genes. Our findings indicate that MABB is an efficient approach to pyramid multiple resistance genes and accelerate backcrossing in mungbean.

Audience Take Away Notes

- The audience will be able to learn the gene pyramiding concept which is one of the powerful breeding programs
- The audience will be able to learn how to reduce the time-consuming of breeding programs through marker-assisted backcross breeding
- Our findings can be applied to other breeding programs with different crops and disease resistance

Biography

Pakhawat Pookhamsak (Ph.D. Candidate) in the School of Crop Production Technology, Institute of Agricultural Technology, Suranaree University Technology, Thailand. Currently, he is a Ph.D. Visiting Research Student at the University of Saskatchewan and Canadian Light Source, Canada. His research activities focused on molecular plant breeding for disease resistance and resistance mechanisms using synchrotron techniques. He has developed several new mungbean breeding lines that contain high yields and are resistant to powdery mildew and leaf spot diseases by using marker-assisted backcross breeding approach.

Shrishail

Assistant Professor, Department of Applied Botany, Kuvempu University, Shivamoga, Karnataka, India

Phytochemical and physicochemical characterization of apiary honeys from the different regions of Central Western Ghats of Karnataka, South India

Honey is a natural sweetener produced from honey bees. This study explores the diverse composition of honey, influenced by the foraging preferences of honey bees. The research focuses on analysing phytochemical and physicochemical characteristics, such as, moisture content, acidity, pH levels, total reducing sugars, HMF (Hydroxymethylfurfural), and diastase activity. The investigation of five distinct varieties of honey samples sourced from domesticated Apis cerana colonies in the Central Western Ghats of Karnataka. Samples were collected from various commercial beekeeping sites, providing valuable insights into the quality of honey based on floral sources. The results supports that composition of honey depends on nectar yielding plants and from the Economic point of view it adds commercial value to local honeys.

Keywords: Central Western Ghats, Phytochemicals, Apis Cerana.

Audience Take Away Notes

- Audience will gain comprehensive insights into honey by understanding its chemical composition, including phytochemicals and understand the influence of geographical and botanical factors on its properties
- Can utilize the knowledge gained in optimizing bee keeping practices
- Researcher can use findings as a basis for the further research on the relationship between composition of honey and its regional flora and can contribute to the scientific understanding of local honey varieties
- Honey adulteration is a serious problem by working on physicochemical properties of honey it will help to distinguish between the natural honeys and adulterated. Thus, assure the authenticity and quality of honey
- List all other benefits
    - The research contributes to biodiversity conservation efforts, promoting diverse and high-quality honey production practices

Biography

Dr. Shrishail, a botanist, graduated with a M.Sc. in 2001, specializing in plant tissue culture and genetic engineering from Gulbarga University, Kalaburgi, at Karnataka. Subsequently, under the guidance of Dr. Pratima Mathad, he pursued a Ph.D., concentrating on plant taxonomy. His doctoral research is a comprehensive biodiversity study on fort flora in Hyderabad Karnataka, South India, and earning doctoral degree in 2010. Currently serving as an Assistant Professor in the Department of Applied Botany Kuvempu University at Shivamoga. Dr. Shrishail has showcased his commitment to advancing botanical sciences through extensive research, boasting a prolific publication record comprising over 50 journals.

Geetha Balakrishnan Sreedevi

Kerala State Council for Science Technology and Environment, Sasthra Bhavan, Pattom, Thiruvananthapuram-695 004, Kerala, India

Braided botany: My thrills of scientific plant research at botanic garden

The presentation, "Braided Botany: My Thrills of Scientific Plant Research at Botanic Garden" represents the journey in scientific exploration. The multi-dimensional journey showcases the interconnectedness and continuous growth of scientific plant research at a Botanic Garden in Kerala. The presentation narrates the captivating land scape of Botanic Garden, garden's overview and commitment to research. It also describes the initial steps taken in research, illustrating challenges and growth, excitement and significance of thrilling scientific achievements and the impact of research on sustainable utilization of plants. Further the presentation covers the scientific exploration that was enriched by collaborations, mentorship and technological advancement, connection with the community, future aspirations, and reflective moments.

Biography

Geetha B S is from Kerala State Council for Science Technology and Environment, India.

Januka Pradhan[1]*, Jyotsna Kapil[2], Karma G Dolma[3]

[1]P.HD Scholar, Department of Microbiology, Sikkim Manipal Institute of Medical Sciences, Tadong Sikkim

[2]Prof. Department of Microbiology, Sikkim Manipal Institute of Medical Sciences, Tadong Sikkim

[3]Associate Professor, Department of Microbiology, Sikkim Manipal Institute of Medical Sciences, Tadong Sikkim

In-vitro antibacterial activity of the Sikkim Himalayan medicinal plant hippophae salicifolia: Promising source of new drug for (Multi Drug Resistance) MDR pseudomonas aeruginosa

Medicinal plants are the most important source of life saving drugs for the majority of the world. Hippophae Salicifolia (HS) commonly known as Sea buckthorn, is a versatile plant. The present study was carried out to determine the antimicrobial potential of Hippophae salicifolia against Multi Drug Resistant (MDR) Pseudomonas aeruginosa. It is a gram-negative, aerobic, non-spore forming rod that is capable of causing a variety of infections in both immunocompetent and immunocompromised hosts. The Pseudomonas aeruginosa was isolated from clinical specimen and were identified by Gram stain and Biochemical test. The identification of drug resistant gene like (blaCTX-M, blaTEM, blaSHV) by real-time PCR and antimicrobial susceptibility test followed by DNA extraction was done to isolate the MDR Pseudomonas aeruginosa.The extract was further studied on the MDR bacterial strain for their antibacterial properties by agar diffusion followed by MIC and MBC. The result obtained revealed inhibition against P.aeruginosa. The phytochemical test showed the presence of tannins, alkaloid, glycosides, and flavonoid. Therefore it highlights the medicinal plant is a potential source of drug to combat MDR P.aeruginosa at a time when the antibiotics are being rendered ineffective due to emergence of multi drug resistance worldwide.

Keywords: Medicinal plant, Phytochemical test, Multi Drug Resistant (MDR) Pseudomonas aeruginosa, DNA extraction, Drug resistant gene, Antimicrobial, folkloric medicine.

Audience Take Away Notes

- Antibiotic-resistant bacterial infections are already widespread on the globe
- In February 2017, World Health Organization (WHO) published its first ever list of antibiotic-resistant 'priority pathogens' that pose the greatest threat to human health
- New/novel antibiotics are desperately needed for battling these rapidly evolving pathogens
- Globally, the demand for purely plant-based medicines is increasing

Biography

Januka Pradhan, P.HD scholar (2019 batch), studied Microbiology from Bangalore University, and graduated from Bangalore University. I have joined as JRF (Junior Research Fellow) at Forest Department, Government of Sikkim, India. Presently working as a Researcher at Sikkim Manipal Institute of Medical Sciences, Sikkim India. I have publish 1 research article (International Journal of Science and Journal (IJSR), ISSN:2319-7064,SJIF(2020):7.803).

R. Daniel[1], G. Sajith Kumar[2], Theivasigamani Parthasarathi[1]*

[1]VIT School of Agricultural Innovations and Advanced Learning (VAIAL), Vellore, Tamil Nadu, India

[2]School of Bioscience and Technology (SBST), Vellore, Tamil Nadu, India

Mitigation of abiotic stresses by using phyto-microbiome

Now a days crops are exposed to various abiotic stresses like drought, salinity, high and low temperatures, metal toxicities, ultraviolet rays, flooding, and nutrient deficiencies, which significantly reduce agricultural productivity and soil health. Extreme climate change is one of the main factors to increase abiotic stresses on crops which causes heavy loss of crops worldwide and affects plant biological mechanisms. This leads to a substantial threat to global agriculture and food security. Plant-associated various types of microorganisms include bacteria, archaebacteria, fungi, and viruses, which have ecological relationships with host plants. It improves economical and eco-friendly plant growth and health. The beneficial microorganisms include Plant Growth-Promoting Rhizobacteria (PGPRs), Arbuscular Mycorrhizal Fungi (AMFs), and Endophytes promote plant growth and alleviate abiotic stresses. Plant microbes increase plant growth, and act as biological control to protect from plant pathogens. Certain microbial communities including Bacillus and Pseudomonas species improve saline and drought stress tolerance. However recent agriculture practices like chemical fertilizers and pesticide usage decrease beneficial microbial health. In this view, it is important to identify the plant microbiome's role in sustainable agriculture production and to identify how to alleviate abiotic stresses and inhabit plant pathogens mechanisms. The selected microbe's cross tolerance towards biotic and abiotic stresses provided new insights on tolerance mechanism in crops.

Biography

Dr. Parthasarathi T. completed his undergraduate, postgraduate, and doctor of philosophy at Tamil Nadu Agriculture University, India, with good academic grades. He worked a Post-Doctoral Fellow at Ben-Gurion University of the Negev, Israel in the year of 2016. At present working at Vellore Institute of Technology, Vellore, India, as Assistant Professor senior. He got 11 prestigious awards in various fields and published more than 20 articles in various journals.

Resmi A[1]*, Jithesh Krishnan R[2]

[1]Department of Botany, SN College Punalur, Kerala, India
[2]Post Graduate and Research Department of Botany, NSS College Pandalam, Kerala, India

Substitutes of Albizia lebbeck (L.) Benth in ayurveda: Comparative analysis of properties and prospective for scientific validation

Herbal medicines are the principal constituents of traditional systems of medicine. Albizia lebbeck (L.) Benth., commonly known as Indian Siris, is a plant native to Indian subcontinent and is used in alternative systems of medicine including Ayurveda, Siddha, and Yunani. The plant is used as a medicine in different countries of the world, including Africa, Australia, Bangladesh, China, India, Myanmar, Nepal, Nigeria, Philippines, Taiwan, and Tibet. The bark of the plant is made use of in the treatment of diseased conditions like bronchitis, leprosy, paralysis, gum inflammation, and helminthic infections in Ayurveda. The anti-anaphylactic, anti-asthmatic, anti-diarrheal, anti-spermatogenic, and anxiolytic activities of the plant are already scientifically proven. The bark of the plant is also well known for its anti-allergic, anti-Alzheimer's, anti-cancerous, anti-diabetic, anti-microbicidal, antioxidant, antiparasitic, antiparkinsonian, antipyretic, antivenomic, estrogenic and wound healing activities. Though the plant is included in the least concern category by the IUCN, the geographical abundance of the plant varies in different regions affecting its availability. As concerned with the present scenario, in which many medicinal plants are disappearing rapidly, it is the need of the hour to emphasise the need to find and explore plants with similar essential values and properties. The application of substitutes ('Pratinidhi Dravyas') for the original drug had been quoted earlier in different Ayurveda classics, but the fundamental basis on which they are selected had not been mentioned anywhere. Most of the drug materials are being collected from the wild with the support of local collectors. The restricted distribution of the plant, phenotypic variability, and misidentification had led to the intentional and unintentional use of adulterants apart from the substitutes mentioned in Ayurveda texts. Hence the scientific validation of the drugs used and its authenticity had become an indispensable requisite to maintain the sustainable ethics of the system of medicine. The substitutes used should be tested using newer technologies, and the properties of the substitutes should be compared with those of the original plant material. An analysis of the toxicity or side effects of the drug on targeted living organisms has to be clearly done with precision before human consumption. Different substitutes for the bark of A. lebbeck used in Ayurveda are articulated using different literature. Furthermore, the taxonomic, phytochemical, pharmacological, pharmacognostic, and toxicity aspects and the prospective for the scientific validation of the substitutes are discussed in the study. The study might throw light on the beneficial knowledge of plant-based substitute drugs in the alternative fields of medicine.

Audience Take Away Notes

- Relevance of herbal drugs in curing diseases
- Significance of scientific validation of drugs used in alternative systems of medicine
- Need for sustainable utilization of plant-based drugs by identification of plants with similar properties and chemical composition
- Will learn how to explore the possible therapeutic interventions of herbal drugs in the treatment of diseases

Biography

Resmi A holds a Bachelor Degree in Botany being graduated in the year 2008 from Sree Narayana College for Women, affiliated to the University of Kerala and had completed her Post Graduation in Botany in 2010 from Government College for Women Thiruvananthapuram, affiliated to the University of Kerala. After that she had qualified the National Eligibility Test conducted by Council of Scientific and Industrial Research, India. Before joining as Assistant Professor in Botany at Sree Narayana College for Women, Kollam in 2016 she had her expertise in working as Assistant Professor on Contract at Sree Narayana College Kollam, Kerala (2014) and St Johns College Anchal, Kerala (2015). Currently she is working as Assistant Professor in Sree Narayana College, Punalur. She has been currently actively engaged and extensively exploring in pursuing research degree focussing on phytochemistry, pharmacognosy and toxicity of herbal drugs under the guidance of Dr. Jithesh Krishnan R., Associate Professor, Post Graduate and Research Department of Botany, NSS College Pandalam, Kerala, India. She has two publications to her credit. She is a lifetime member of Centre for Innovation in Science and Social Action (CISSA) and Kerala Academy of Sciences (KAS).

BOOK OF ABSTRACTS

MARCH

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8th Edition of Global Congress on

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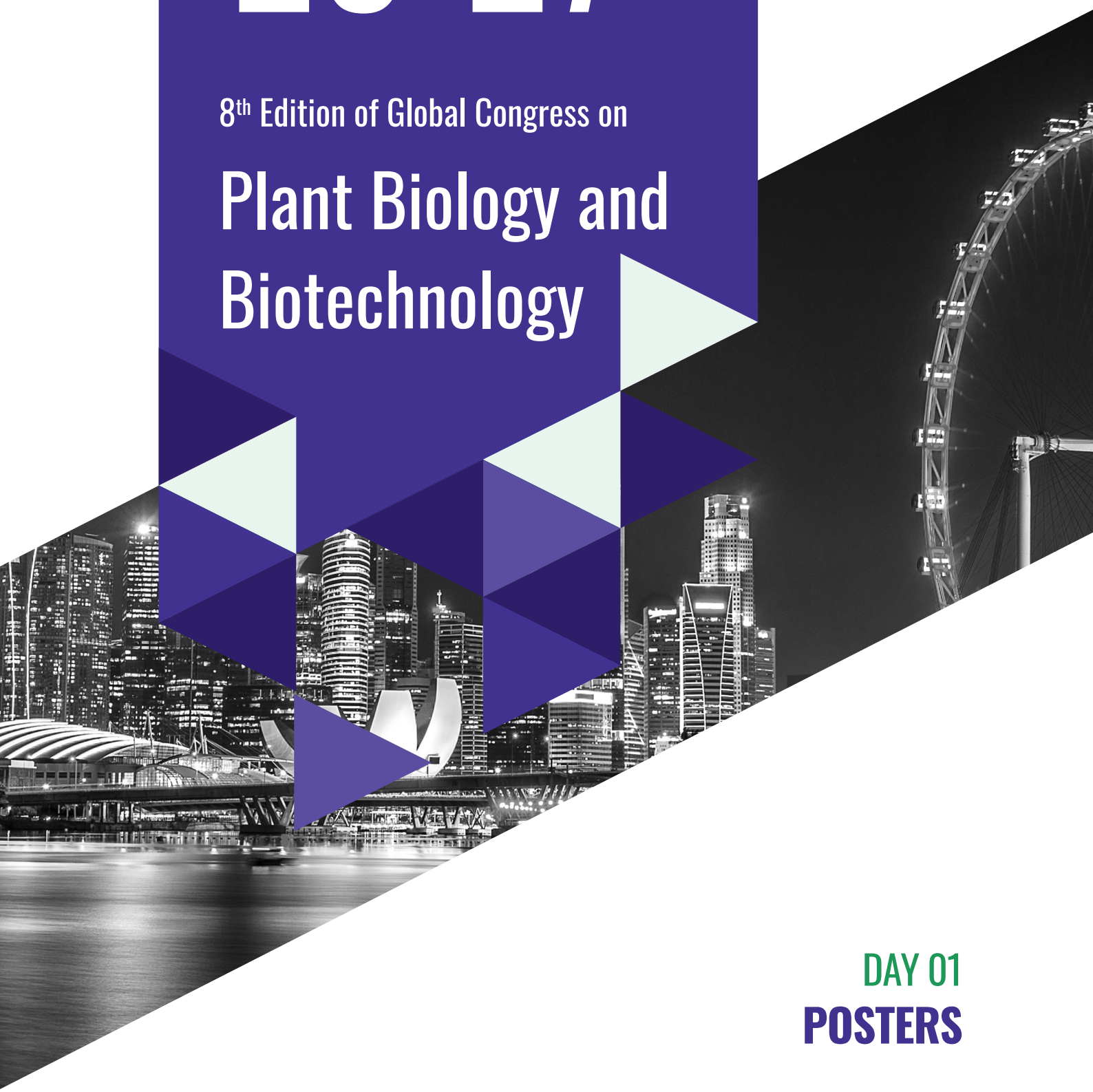

DAY 01

POSTERS

Alice Dulaj*, Aidan Andrew Murrey, Bruno Trevenzoli Favero, Henrik Lütken

University of Copenhagen, Department of Plant and Environmental Sciences, Section for Crop Sciences,
Højbakkegård Allé 9, 2630 Tåstrup, Denmark

The presence of rol genes in nature and the applications of the rol-technology via non-GMO breeding to improve horticultural plant traits

Rhizobium rhizogenes is a gram-negative, soil-borne bacteria capable of infecting plants through horizontal gene transfer of a DNA fragment called T-DNA present on its Root inducing (Ri) plasmid. Among other traits, the bacteria infection induces the formation of hairy roots. This is a result of the insertion of different genes in the pathogen's T-DNA into the plant's genome. The mostly known genes are the root oncogenic loci (rol-genes), namely rol A, B, C and D, and other open reading frames with less characterized functions. As a consequence, the Ri-phenotype can develop in host plants. Interestingly, sequences matching the T-DNA of R. rhizogenes have been found in different plant genera such as Nicotiana, Linaria and Ipomoea. This is a result of natural transformation involving R. rhizogenes over several million years.

The aim of this study was to find new plant species within different genera that have been naturally transformed. In particular, this method was utilized to investigate the presence of rolB in various plant species belonging to different genera of ornamental value. Plant material from these species, grown both in vivo and in vitro was examined by PCRs targeting rolB. Positive bands were cloned in E. Coli plasmid and later sequences were compared with R. rhizogenes rolB. In a secondary part of this study, Linaria repens was used in transformation with R. rhizogenes to generate Ri lines.

This was obtained through the inoculation and infection of the plant material (i.e. leaves and stems) with the bacterium in order to obtain hairy roots as the main phenotypic response of the successful inoculation. Consequently, the hairy root tissue was put through a regeneration process of the plant through the use of different combination of auxin and cytokinin hormones.

Useful breeding traits through the use of this bacterium have been successfully obtained in other ornamental plant species with a high market value, such as Kalanchoë. The use of the rol-technology to obtain relevant traits such as compact phenotype is breakthrough in order to avoid the use of chemical growth retardants with malicious effects for health, production costs and environmental reasons. More recently drought tolerance could be a new relevant trait derived of the Ri phenotype based on the improved root growth also observed in Ri Kalanchoe lines. Moreover, the use of this technology is defined as non-GMO in e.g. the European Union as it uses unmodified bacterial strains, thus making it more accessible for breeders in the near future.

Audience Take Away Notes

- Understand the broader presence of natural occurrences of natural transformation events through Rhizobium rhizogenes during the evolution of plant species
- rol genes as a source for potential new traits for horticulture species e.g. compactness and enhanced rooting as well as boosted production of secondary metabolites in medicinal plants
- Expand the perception of GMOs vs non-GMOs to a larger public

Biography

Alice Dulaj studied at the University of Pavia, Italy earning her bachelor's degree in Biology. She then decided to pursue a MS in Agriculture (Plant Science) at the University of Copenhagen, Denmark in 2019. She is currently working on her master's thesis supervised by Assoc. Professors Henrik Lütken and Assist. Prof. Bruno T. Favero focusing on the presence of rol genes in nature and its applications as a non-GMO technology in the horticultural field.

Khin Mar Cho*, Tan Kay Yee, Chan Kit Lun, Ganapathy Rajaseger, Kadamb Patel

Centre for Research Opportunities in Plant Science, School of Applied Science, Temasek Polytechnic, Singapore

Developing innovative soil-less microgreens cultivation

Food security is a global concern that refers to the availability, accessibility, and stability of safe and nutritious food. To address the need for a reliable, fresh, nutrient-rich and healthy diet, it offers growing microgreens. Microgreens (young seedlings) are edible seedlings of vegetables and herbs consumed as salad, soups, and sandwiches. Eating microgreens has high nutritional values with health benefits these tiny, nutrient-packed greens are getting popularly used as food dishes to enhance the flavour, texture and colour of our food. Addition to their texture, color, taste, aroma, and visual appeal of several food dishes in restaurant industry and have been promoted as healthy food diet.

Growing microgreens is simple, quick, and easy to grow. Microgreen has a shorter time to harvest and high market values. It can be harvested for eating in 10-14 days depending on the selected seed variety. Microgreens are cultured in substrate media. Microgreens can be grown as part of soilless urban farming to produce reliable and nutritious organic food whilst utilizing unused urban spaces. Microgreens can be grown at different types of seed germination, with choices of growing media in soil-less method.

Microgreens has higher concentration of macro- and micro- nutrients and phytochemical content. The production cost for growing microgreens is minimal, no requirement of specific technical skills and can harvest in a shorter time. Being rich in nutrients and having a short growth cycle, sprouts and microgreens are regarded as microscale vegetables that become ideal for urban indoor farming. It could be an alternative solution of food security to lead sustainability.

Audience Take Away Notes

- Understand how to grow microgreens with the basic requirement
- Complete step by step growing practices
- Develop self- innovative/creative idea to scale-up growing microgreens
- Design set up for location specific microgreens growing technic at indoor/outdoor spaces

Biography

Dr. Khin Mar Cho is a scientist under CROPS (Centre for Research & Opportunities in Plant Science), School of Applied Science, Temasek Polytechnic. Mar Cho has over 15 years of experience in agricultural and industrial research. Her research areas are growing microgreens and their nutritional profile, optimisation of hydroponics and aquaponics growing systems, urban farming technology, composting methods, sustainable agriculture, soil fertility and soil quality management, plant nutrition, plant tissue culture techniques for orchids, ornamental, and aquatic plants, etc.

Kowit Hengphasatporn[1]*, Pattarasuda Chayapakdee[2], Yasuteru Shigeta[1]

[1]Center for Computational Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8577, Japan

[2]Department of Biology, Chiangmai University, Chiangmai, Thailand

Insights into molecular metabolism of herbicide-resistant CYP81As through molecular docking and MM/GBSA analysis

The structural protein of heme-containing monooxygenases, the CYP81As family, was modeled and evaluated in terms of herbicide-resistant study. A molecular docking study revealed the possible binding conformation of QC/CYP81As. The molecular mechanism of QC in complex with CYP81As suggests that CYP81A12 could be the preferential protein target for the QC metabolite, which is congruent with the experimental study. Additionally, the essential binding amino acid and the influence of HEME for QC/CYP81As have been proposed through per-residue decomposition free energy calculation using the MM/GBSA method. The possible metabolism of QC is elucidated through the combination of experimental and computational studies.

Audience Take Away Notes

- **CYP81A Overexpression and Multiple-Herbicide Resistance:** Discover the association between overexpression of CYP81As and the development of multiple-herbicide resistance, including resistance to quinclorac
- **CYP81A-Mediated Quinclorac Resistance Mechanisms:** Understand the role of reduced ethylene production and the transformation of Arabidopsis thaliana in supporting CYP81A-mediated resistance to the herbicide quinclorac
- **Synergy between Experimental and Computational Methods:** Recognize the significance of combining LC-MS/MS experiments in E. coli with computational simulations to suggest CYP81A-mediated quinclorac metabolism
- **Insights into QC/CYP81As Interaction:** Gain insights into the structural modeling of CYP81As, focusing on the molecular docking study that reveals the binding conformation of quinclorac (QC) with CYP81As
- **Integrated Experimental and Computational Approach:** Appreciate the collaborative synergy between experimental and computational studies in unraveling the roles of CYP81As in herbicide resistance

Biography

Dr. Kowit Hengphasatporn studied Molecular evolution at Srinakharinwirot University, Bangkok, Thailand and graduated as M.Sc. in 2015. I earned a Ph.D. in Bioinformatics from Chulalongkorn University in Bangkok, Thailand, under the supervision of Prof. Thanyada Rungrotmongkol in 2019. Currently, I hold the position of Assistant Professor at the Center for Computational Sciences, University of Tsukuba, under the Prof. Yasuteru Shigeta laboratory. My expertise lies in employing cutting-edge computational technique with a focus on Molecular Dynamics (MD) simulations and ab initio Quantum Chemistry (QM) methods that have become a powerful technique to explain and visualize biological events, including in plants at an atomistic level.

Karine Sarikyan

Scientific Centre of Vegetable and Industrial Crops, CJSC of the Ministry of Economy of the Republic of Armenia, Head of Department of Breeding and Cultivation Technology, P.ind. 0808 v. Darakert, Ararat Marz, Armenia D. Ladoyan str.38

Breeding and latest cultivation technologies of a solanaceae vegetable crops in Armenia

Eggplant, pepper (sweet and chili), tomato is a global crops but is especially popular in World. The plant is rich in bioactive compounds. For almost 90 years, in the Armenia, the local landrace forms, the breeding material of Vavilov Research Institute, INRA, AVRDC, imported from different countries have been studied in the republic: wild forms, varieties of different ecological and geographical origins, hybrids, mutants. The best donors were selected and used in the list of crossbreeding. Classic and modern selection methods were used in breeding. Pedigree, mutagenesis, individual selection, backcross, polycross, improvement methods were used.

In our scientific research, a lot of work has been done on morphological and phenotypic studies of quite a large number of genetic resources, during which the information and characteristics obtained are still relevant for use in selection work with the latest methods, such as the awareness of germplasm holders about the phenotypic characteristics that are most needed by "omics" research and description of phenotypes [Solanaceae Phenotype ontology (SP)], [Gene Ontology (GO)], Plant Ontology (PO), Phenotype and Trait Ontology (PATO).

In diversification of the National Several Genetic Resources Solanaceae of Armenia, the varieties of eggplant; Yerevani 3, Avand, Yerevani Manushakaguyn, Armavir, Karine, Tavush, Sev Margarit, Haykakan Vaghahas, Mini Miss, Varderes, Apaga, Spung, the varieties of sweet pepper; Natali, Emili, Mili, Lusapayl, the varieties of hot pepper and chili; Haykakan Teghakan, Haykakan Geghecik, Hpart, Gita, Zita, Buket, Norabac, in the varieties of fresh tomato; Yerevani 14, Haykakan shtambovi 152, Masisi 202, Zvartnots, Noy, Ranni Nush, Titan, Aspram, the varieties of processing tomato; Renesans, Marine, the varieties of cherry and datterini tomato; Zhanna, Zeitun, Rubina, Emmy created by us, are perspective in the dietary food for consumption with curative purposes.

For the varieties and hybrids created by us, we applied the new Taiwanese technologies developed by AVRDC and perfected in different ecological conditions of our republic (hot, short vegetation, lowland, mountain conditions) for growing eggplant, pepper, tomato.

Thanks to breeding works, more than 100 cultivated varieties of eggplant, pepper and tomato were bred, which were widely distributed in our republic and beyond its borders. At present, the processes of new eggplant, pepper, tomato varieties and hybrids are ongoing.

Audience Take Away Notes

- Audience learn from my presentation will learn the history of more than 90 years of selection work of these crops, thanks to which over the years earlier, high-yielding, adaptive, high-quality varieties and hybrids have been bred. The best options for using new technologies during their cultivation
- The audience can use the information about donor varieties, different species presented by us in their works, providing the best indicators of biological and agronomic properties of different varieties and

hybrids in case of cultivation in different ecological conditions

- The results of this research can be used to expand and teach
- We can cooperate with all interested researchers, students, farmers, various specialists, thanks to our long-term work experience, we will provide the best advice, joint research, publishing articles, public awareness activities

Biography

Dr. Karine Sarikyan studied Scientist Agronomost Faculty of Horticultural at the Armenian National Agrarian University and graduated as MS in 1985. She then joined the research at the Scientific Center Vegetables & Industrial Crops MoE RA. She received her PhD degree (Agronomy, Plant Industry) in 2011 at the same Scientific Center. In the 1987-2023 she worked position of Plant Breeder, Principial Investigator and Head of the Department. She has published more than 115 research articles, national reports and created 35 new sorts and hybrids of solanaceae vegetable crops. Participated in international and Union conferences and with Presentations. She is Corresponding member of WG Solanaceae and Corresponding member of WG On-farm Conservation and Management ECP/GR_Bioveraity International. She is President <<Golden Reed>> Charitable NGO.

Melyan Gayane[1,2]*, Sahakyan Narek[1], Martirosyan Yuri[2]

[1]Department of Plant Propagation by Biotechnological Methods/ Scientific Center of Agrobiotechnology, branch of Armenian National Agrarian University, Etchmiadzin, Republic of Armenia

[2]All-Russia Research Institute of Agricultural Biotechnology of RAS, Moscow, 127550, Russia

In vitro propagation of grapevine (Vitis vinifera L.) cultivar ´Sveni´ by direct organogenesis

The research was conducted at the Scientific Center of Agrobiotechnology of the National Agrarian University of Armenia. The objective of this research was to elaborate the protocol for the mass multiplication of the grapevine (Vitis vinifera L.) rare cultivar ´Sveni´. It is distributed on single vines inside the old vineyards of the Goris region of RA and is used both fresh and for making wine. The plant materials for this research were collected from the Armenian National Filed Collection of Grapevines. Although propagation by stem cuttings is a common method, it does not guarantee the production of high-quality planting material. Tissue culture is the only method for quickly and reliably obtaining healthy (virus-free) planting material. The introduction of grapevine cultivars into in vitro was undertaken during the period of active shoot growth in the first decade of May. The most effective option for sterilizing explants was 70% (v/v) ethanol for 30 sec + 3.0% (v/v) H_2O_2 for 1.0 minutes + 2.0% (w/v) Ca $(OCl)_2$ for 10 minutes. The use of this combination of sterilizants resulted in an 86.0% survival rate for explants. MS medium with the addition of 0.5 mg/L BAP, 0.5 mg/L Kin, and 0.8 mg/L GA_3 was chosen as the best for direct shoot organogenesis. MS/2 medium supplemented with 0.8 mg/l IBA and 0.2 mg/l IAA was more effective for the rooting of micro-shoots in vitro (90.6%). The best soil medium for hardening in vitro plantlets consisted of perlite (2 parts), soil (1 part), and biohumus (1 part), which resulted in the survival of 83.3% of plantlets, but in the mini-aeroponic system, plant adaptation was more efficient and plant survival reached 100%. The described protocol can be used not only for the large propagation of this rare cultivar but also to conserve healthy plant material in vitro.

Audience Take Away Notes

- The presentation can be useful for a wide range of people, including professors, students, and teachers who are interested in the latest research and techniques in the field of grapevine propagation. It can also be valuable for researchers who wish to study grapevine growth and development in vitro. The results of this experiment can be conveyed to grape growing farmers, who face challenges related to virus and viroid's diseases in plants. The presentation can provide valuable insights into the principles of in vitro plant propagation and its advantages over other propagation methods. Overall, it can provide valuable insights into in vitro propagation of grapes and its potential applications, and the benefits of in vitro propagation not only for grapes, but in other cultures as well

Biography

Dr. Melyan Gayane graduated from the Armenian Agricultural Institute in 1988. She received her PhD degree (Biological Sciences) in 1992 at the Scientific Research Institute of Agriculture of Armenia, and from 1992–2004 she was a scientific worker at the same institute. From 2005 to 2019, she was Deputy Director and GeneBank Manager at the Scientific Center of Agrobiotechnology (SCA) of Armenia. From 2019 until now, she has been a Deputy Director and Head of the Department at the SCA brunch at Armenian National Agrarian University. She has published more than 80 scientific articles in national and international scientific journals.

Alimzhanova Mereke*, Meirbekov Nurkanat, Ibraimov Aibat, Syrgabek Yerkanat, Yegemova Saltanat

Al-Farabi Kazakh National University, Kazakhstan, Almaty, Kazakhstan

Co_2 extract of tobacco (Nicotiána) as antifungal materials of grape diseases

This research investigates the antifungal properties of a carbon dioxide (CO_2) extract obtained from tobacco plants cultivated in Kazakhstan. While the primary focus lies on CO_2extraction, the study also evaluates its efficacy compared to other extraction techniques in influencing antifungal activity. Given the rising resistance of fungal infections to conventional treatments, there is a growing concern. Furthermore, the study seeks to elucidate the factors impacting the antifungal properties of different tobacco extracts.

Tobacco leaves cultivated in Kazakhstan undergo five distinct extraction processes: heat-assisted extraction, Soxhlet extraction, maceration, supercritical CO_2, and subcritical CO_2 extraction methods. Subsequently, the extracted materials are subjected to testing against various fungal strains, including mildew, powdery mildew, and anthracnose, using standard methods such as micro-dilution and disk diffusion assays. CO_2 extraction is emphasized as a safe and efficient approach for isolating bioactive compounds from plants.

The study assesses the antifungal activity of the CO_2 extract against these fungal strains. The minimum inhibitory concentration of each extract is determined to assess its effectiveness in inhibiting fungal growth. Gas Chromatography-Mass Spectrometry (GC-MS) is employed to analyze the chemical composition of the extracts, focusing on key compounds such as Pyridine, 3-(1-methyl-2-pyrrolidinyl); Phytol; 9,12-Octadecadienoic acid, ethyl ester; Vitamin E; Hexadecanoic acid; Cotinine; 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl; Methylamine; N-cyclopentylidene; Pyridine, 3-(3,4-dihydro-2H-pyrrol-5-yl).

The anticipated outcomes of this study include the identification of the most effective method for isolating antifungal compounds from Kazakhstani tobacco. Additionally, the study aims to recognize potential antifungal compounds within the CO_2 extract and compare their efficacy with alternative extraction methods. The investigation will also explore the impact of terpenes, identified through GC-MS analysis, on the overall antifungal effectiveness of the extract.

Unveiling the most efficient extraction method and understanding the significance of terpenes will provide crucial insights for optimizing the production of innovative, natural antifungal substances derived from Kazakhstani tobacco. This research holds the promise of uncovering alternative strategies for combating fungal infections, particularly those resistant to traditional treatments. Moreover, utilizing locally grown tobacco as a potential source for antifungal compounds could yield notable economic and environmental benefits for Kazakhstan.

Biography

Alimzhanova Mereke, In 2010 defended Candidate of Chemical Sciences (02.00.02 - “Analytical Chemistry”), in 2012 defended Doctor of Philosophy PhD (6D073200 - “Standardization and Certification”) and academic title is Associate Professor (02.00.00 – “Chemistry”). Total work experience in scientific field, 19 years old. The main direction of scientific research is fundamental and applied research in the field of biochemistry and microbiology, in particular, elucidation of the mechanism of action, study of the component composition of microorganisms. Author of more than 150 scientific papers, including 40 articles in international scientific journals (h-index in Scopus – 7).

Alimzhanova Mereke*, Sadanov Amankeldy, Ismailova Elvira, Molzhigitova Assel, Ibraimov Aibat, Akmeiir Yelubayeva

Scientific Production Center of Microbiology and Virology, Almaty, Kazakhstan

Biopesticides against apple disease Erwinia amylovora

This study was conducted to evaluate the antagonistic activity of two new strains Lacticaseibacillus paracasei M12 and Lactobacillus plantarum 17M against the pathogen Erwinia amylovora, which causes fire blight on apple flowers. The Lacticaseibacillus paracasei M12 strain was collected from the phyllosphere of the garden cenosis of the Almaty region of Kazakhstan, and the Lactobacillus plantarum 17M strain was collected from the collection of "Scientific Production Center of Microbiology and Virology" LLP. Erwinia amylovora was isolated based on the floral colonization dynamics of the apple cultivar Golden Delicious. Identification of strains was based on morphological and biochemical tests, as well as PCR analysis. Lacticaseibacillus paracasei M12 and Lactobacillus plantarum 17M strains were superior in limiting the growth of the pathogen Erwinia amylovora in all liquid media tested.

The maximum inhibitory activity of Lacticaseibacillus paracasei M12 was observed on the 7th day of fermentation. Lactic acid constituted the largest percentage (43.55%) in the component composition of the Lacticaseibacillus paracasei M12 culture broth and exhibited an inhibitory effect against Erwinia amylovora. The results showed that the zone of growth inhibition of the pathogen due to the action of the Lacticaseibacillus paracasei M12 strain was 41.5 ± 1.5 mm. In addition, the inclusion of TWEEN® 80 as an adhesive agent enhanced the antagonistic activity of Lacticaseibacillus paracasei M12 strain in vitro.

Analysis of secondary metabolites produced by the Lactobacillus plantarum 17M strain in a liquid medium showed that they consist predominantly of acetic acid (53.2 ± 4.3%), lactic acid (16.3 ± 2.3%) and 2,3-butanedione (14.84 ± 4.1%). A study on the effect of these compounds on the growth of Erwinia amylovora revealed that lactic acid at a concentration of 5% exhibits inhibitory activity but is not toxic to apple flowers. The efficiency of the culture liquid of the Lactobacillus plantarum 17M strain, diluted with sterile water and added to the Erwinia amylovora inoculum at a concentration of 10 and 20%, was 76.7 ± 5.8% and 88.3 ± 12.6%, respectively.

Therefore, the present study confirms the potential of using Lacticaseibacillus paracasei M12 and Lactobacillus plantarum 17M strains as active microbial agents to combat bacterial fire blight in fruit crops in Kazakhstan. This study was funded by the Ministry of Science and Higher Education of the Republic of Kazakhstan, research grants BR18574022 "Microbial preparations for bacterial fire blight control of fruit crops".

Biography

Alimzhanova Mereke, In 2010 defended Candidate of Chemical Sciences (02.00.02 - “Analytical Chemistry”), in 2012 defended Doctor of Philosophy PhD (6D073200 - “Standardization and Certification”) and academic title is Associate Professor (02.00.00 – “Chemistry”). Total work experience in scientific field, 19 years old. The main direction of scientific research is fundamental and applied research in the field of biochemistry andmicrobiology, in particular, elucidation of the mechanism of action, study of the componentcomposition of microorganisms. Author of more than 150 scientific papers, including 40 articles ininternational scientific journals (h-index in Scopus – 7).

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KEYNOTE FORUM

Study of the diseases of large cardamom (Amomum subulatum roxb.) in the Eastern Hills of Nepal

Large Cardamom, (Amomum subulatum Roxb.) belongs to the family Zingiberaceae of natural order Scitaminae. The freshly harvested fruit capsules are deep red in colour and are c. 2.3 cm in length and 1.5 cm in diameter. It has a pleasant aromatic odour resulting from a low content (maximum c. 4.5 – 5 %) of the volatile oil 1,8-cineole and is mainly used as a flavouring and spice. It is a cross- pollinated monocotyledonous, perennial herbaceous plant. It prefers shade and may be grown on a range of altitudes from 600 2300 masl. Cultivation of large cardamom, Amomum subulatum is confined to the sub Himalayan range of Nepal, northern India (Sikkim and West Bengal) and Bhutan. Approximately 12.5 thousand metric tons of large cardamom is produced annually in India, Nepal and Bhutan. The large cardamom covers 23500 ha, 11562 ha and 200 ha with the production of 5562 mt., 6188 mt. and 1000 mt. in India, Nepal and Bhutan respectively. Nepal is the world's largest producer of large cardamom supplying about 50 % of the world's market followed by India and Bhutan. The contribution of large cardamom in Nepal is 0.76 % of the total export and 0.07 % of GDP. In the recent year, plantation has been declining with resulting production losses. Rhizome rot, Foorkey and Chhirkey (viral diseases), leaf eating caterpillar (Eupterote molifera), stem borer (Glyphipterix sp.) and aphid (Pentalonia nigronervosa) are reported as the main yield limiting factors for the cultivation of large cardamom in Nepal. Kala (Palm civets), a vertebrate animal pest was reported as a threat to mature cardamom capsules in the cardamom growing area. Similarly, other animal pests such as monkeys and rats were reported as a nuisance to cardamom plantations. In addition, natural occurrences such as frost and drought were also reported to yield limiting factors in large cardamom plantations in Nepal.

Dol Prasad Dhakal

Freelance Researcher, United States

Biography

Dr. Dol Prasad Dhakal currently working as a freelancer Researcher after quitting job from Texas A&M AgriLife Research and Extension Center, Lubbock, Texas. I have been working as a senior research scientist in the entomology research program in this institute up to last February 2024. I have worked on developing biologically and ecologically intensive arthropod management strategies for the Texas High Plains recently. It emphasizes factors that enable the integration of different pest management approaches, with a broad objective of reducing unilateral reliance on chemical control and advancing the use of ecological methods. I focused on ecologically based IPM research, particularly on corn, cotton, and sorghum pests in the region. I have a long and wide range of research and developmental experiences working on more than 20 years in the field of crop protection. I am now working on maize weevil research to assess ecological parameters in stored corn to develop maize weevil management options.

Plant systems biology: Application to rice for understanding metabolic and regulatory characteristics under different abiotic and biotic stress conditions

Rice is one of the major food crops and staple food in South-East Asia. Although the overall yield of rice has been increasing, the growing population and adverse climatic changes pose huge challenges for their sustained production in the future. Therefore, systematic approaches are highly required to explore their effects on cereal crops' phenotypic and cellular responses. It could be achieved by combining the available multiple high throughput data such as genomics, metabolomics, proteomics and transcriptomics, thereby analyzing the possible biochemical adaptations to several abiotic stresses, and subsequently improving the crop yield. Concurrently, the advent of constraint-based metabolic reconstruction and analysis paves way to characterize cellular physiology under various stresses via the mathematical network models. The first plant metabolic modeling studies have started in Arabidopsis followed by cereals such as, rice, maize and barley. We have employed similar systems biology approach, and initially developed a core mathematical model of rice to characterize cellular behaviour and metabolic states under various abiotic stress conditions. The core model was then further expanded to reconstruct a fully compartmentalized genome scale metabolic model. Subsequently, transcriptomics and metabolomics data were systematically integrated with the model to identify the potential transcription factors. For the first time, we have developed this integrative system for identification of potential candidate regulatory genes as new breeding targets for improving rice production. In addition, we have reconstructed a genome-scale metabolic model of Xanthomonas oryzae pathovar oryzae (Xoo), a vascular pathogen that causes leaf blight in rice leading to severe yield losses. In future, the current in silico model-guided framework can be further extended by including comprehensive genome-scale model of rice and its leaf microbiome for characterizing their interactions with Xoo and host. As such, this will allow us to systematically devise new strategies to effectively control leaf blight in rice.

Bijayalaxmi Mohanty

Environmental Research Institute, National University of Singapore, Singapore

Biography

Bijayalaxmi Mohanty received her MSc and MPhil degree from Utkal University, Bhubaneswar, India in 1983 and 1985 respectively and PhD degree from the University of Cambridge, UK in 1991. She is currently a Visiting Research Scientist at the Environmental Research Institute, National University of Singapore, Singapore. Her main research interests focus on the abiotic stress tolerance in rice and other plants, plant genomics, metabolic and transcriptional regulation, integrative omics approaches to different abiotic stress conditions and plant modeling. She is the Associate Editor for Current Plant Biology, Plant Biophysics and Modeling, Frontiers in Plant Science, and review Editor for 30 internationally referred journals.

Plant volatile organic compounds - An avenue of possibilities

The plant kingdom represents an extraordinary reservoir of molecules, synthesized from the fascinating laboratory of plants, and Phytochemistry deals with the diversity of such compounds. Out of the diverse phytochemicals, plant aroma chemicals, also known as Plant Volatile Organic Compounds (PVOCs), are typically small molecules with low boiling points and high vapour pressure at ambient temperature. Plant volatiles are generally made up of terpenoids, phenylpropanoids, benzenoid compounds, amino acid derivatives and fatty acid derivatives. PVOCs are produced in plants mainly to cope with various biotic and abiotic factors. The PVOCs are generally investigated through essential oils and recently Head Space (HS) analysis has received much attention as a rapid tool for PVOCs analysis. Essential oils are steam volatile components of plants responsible for the aroma of the plant and mainly constitute terpenes, some phenolics, and aliphatic derivatives. Essential oils, as the name implies, bears the essence of the plant, and are generally obtained through hydrodistillation process. Headspace refers to the gas phase above a solid or liquid sample. Headspace analysis is a simple, non-destructive and solvent-free technique used to analyse the highly volatile compounds emitted from plants. Gas Liquid Chromatography (GLC) coupled with Mass Spectrometry (MS) can be regarded as the best single tool for PVOCs analysis. PVOCs are widely utilized in various sectors such as perfumery, cosmetics, medicines, preservatives, nutraceuticals, flavours and food additives. The array of PVOCs, released into the atmosphere by plants, are responsible for attracting pollinators and other beneficial insects, providing a means of inter-plant communication, and directly repelling or intoxicating attacking herbivores. PVOCs were investigated intensively with respect to chemical ecology, atmospheric chemistry, integrated pest management, defence against herbivores, below-ground emissions, detection of disease infestation, food quality, chemotaxonomy, biological control mechanisms and metabolomics. A better understanding of the biosynthesis of PVOCs and its applications have created new avenues in various research sectors. The presentation is on the diversity of aromatic plants, the diversity of PVOCs, their chemical profiling, the applications of PVOCs and the novel avenues in PVOCs.

Audience Take Away Notes

- Diversity of aromatic plants
- Diversity of Plant Volatile Organic Compounds (PVOCs)
- Techniques and recent developments in PVOCs extraction and analyses
- Application of PVOCs
- New avenues for PVOCs R&D

Rameshkumar K B

Phytochemistry and Phytopharmacology Division Jawaharlal Nehru Tropical Botanic Garden and Research Institute (KSCSTE-JNTBGRI) Palode, Thiruvananthapuram-695562, Kerala, India

Biography

Dr. Rameshkumar K. B, PhD from the University of Kerala, Thiruvananthapuram, has 25 years of research experience in the field of Phytochemistry at KSCSTE-JNTBGRI, Kerala, India. He had several new molecules, new plant species, more than 70 research papers, produced 5 Ph.Ds, received several awards including the prestigious 'Young Scientist' award by Govt. of Kerala and FAS by KAS. He has organised International Seminars on Phytochemistry, and is the General Secretary of Kerala Academy of Sciences. He is currently working as Principal Scientist in the Phytochemistry and Phytopharmacology Division of KSCSTE-JNTBGRI, and also the Sci/c of CIF-JNTBGRI.

Expanding global table grape production and consumption trends driven by new seedless varieties

Table grape consumption worldwide has experienced a remarkable growth in the first two decades of the 21st century, becoming the third most consumed fresh fruit in some countries, after bananas and apples. This increase has been attributed to several reasons, including the availability of seedless grapes, which has been a key factor in the increase in consumption. These grapes are appreciated for their convenience, as they can be consumed directly as a pre-prepared convenience product, without the need for factory processing, facilitating their inclusion in the daily diet of many people.

The new table grapes are known for their crunchy texture and the relatively large size of their berries, characteristics that have contributed to their appeal, offering a pleasant sensory experience when consumed.

The diversity of flavors of table grapes, such as muscat, foxé, or the combination of both, has been an additional factor that has attracted consumers. The sweet taste, sometimes similar to candy, has made table grapes a popular choice, especially among those looking for healthy and tasty snack alternatives.

The high content of phenolic compounds and the antioxidant capacity of grapes are characteristics highly valued by consumers and may also have beneficial effects on cardiovascular health and may contribute to the prevention of chronic diseases, in addition to combating oxidative stress in the body associated with aging and the development of various diseases, so consuming foods rich in antioxidants, such as grapes, can help maintain cellular health, being recognized as a very healthy fruit.

Audience Take Away Notes

- Global table grape production and consumption situation
- Table grape market trends
- Seedless, crunchy texture, extraordinary flavor and color, easy handling and very productive, are the basic characteristics of the grapes demanded by the market, the growers and mainly the consumer
- Phenolic compound content and antioxidant capacity of grapes and their beneficial effects on health

Manuel Tornel[1]*, María José Candel[2], Marisa Serrano[2], Pablo Crespo[1]

[1]Departamento de Mejora vegetal, Table Grape Team, Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA), Murcia, España

[2]Investigación y Tecnología de Uva de Mesa (ITUM), Blanca, Murcia, España

Biography

Dr. Manuel Tornel is a Agronomist engineer with a PhD in agricultural research that leads the table grape team at IMIDA, the public institute for agricultural research. Together with ITUM, we have developed a genetic breeding program to obtain new varieties of seedless table grapes, using biotechnological techniques such as in vitro culture and molecular markers to obtain seedlings. Breeder of 20 new varieties already being grown in Spain; the first commercial farms are being stablished in Chile, Peru, Brazil, Mexico, Namibia and Australia, with South Africa, India and USA to follow in the next few years. Two of the varieties have genes for resistance to powdery mildew, focusing on organic farming.

BOOK OF ABSTRACTS

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SPEAKERS

Siti Nor Akmar Abdullah[1,2]*, Mohammad Hafizuddin Halwi[2], Mohammad Nazri Abdul Bahari[2] Nurshafika Mohd Sakeh[2]

[1]Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

[2]Institute of Plantation Studies, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Unravelling molecular mechanism at early stage of ganoderma boninense infection of oil palm for an effective disease mitigation strategies

Ganoderma boninense is a hemibiotrophic fungal pathogen that causes major loss of revenue to oil palm industry. Physical symptoms in the field can only be observed at the advanced stage of infection when severe and often irreversible physiological damage has occurred. Understanding of the molecular mechanism during early infection stage would enable employment of a more effective intervention strategies to prolong the economic lifespan of field palms. Our studies revealed potential biomarkers through transcriptomics and metabolomics analysis at the early phase of Ganoderma boninense infection before the appearance of physical symptoms. Involvement of key transcription factors in coordinating cellular responses during the biotrophic phase and subsequent transition to necrotrophic showed the activation of different defence response pathways that can be exploited in developing effective mitigation strategies. The development of an aptamer-based onside biosensor as an early diagnostic tool based on the results of the studies will be elaborated. Electron microscopic analysis revealed the positive effects of an anti-Ganoderma chemical fertiliser and endophytic bacteria as a biocontrol agent in reducing cellular damage. The illustration of potential link with the defence pathway genes at the early stage of infection that have been discovered will provide strong evidence supporting their applications and initial efforts on this will be presented.

Audience Take Away Notes

- Oil palm, Ganoderma boninense, Hemibiotroph, Transcription factors, Plant defense response
- Design strategies to study plant early defense response to hemibiotroph
- Ideas to utilise advanced research methodologies
- For early detection of fungal pathogen infection to improve plant survival and retain economic output
- New information to give more precision control of fungal pathogen infection
- List all other benefits
    - Understanding at the molecular level enable early detection of fungal pathogen infection
    - Identification of molecular markers for early detection to prevent disease spread
    - Innovation in developing simple, fast and accurate on-site diagnostic tool
    - Molecular explanation of intervention strategies such as anti-fungal fertilizer and biocontrol agent

Biography

Dr. Siti Nor Akmar is a Professor in Plant Molecular Biology at the Faculty of Agriculture, Universiti Putra Malaysia (UPM). She is also a Research Associate of the Institute of Plantation Studies (IKP), UPM where she was a previous Institute Director (2016 – 2019). She is a Fellow of the Academy of Sciences, Malaysia. She is an Editorial Board Member of BMC Plant Biology, Springer Nature. Her research is on oil palm molecular biology and genomics to study defence response to Ganoderma boninense, phosphate uptake mechanism and improvement of Vit. E. She has published more than 100 journal papers and books.

Ananda Virginia de Aguiar[1]*, Wanderley dos Santos[2], Valderês Aparecida de Sousa[1], Juliana Denghardt[1], Regina Quisen[1], Jorge Luis Monteiro Matos[3], Ivan Venson[3], José Guillherme Prata[3], Edilson Oliveira Batista[1], Karina Martins[4], José Cambuim[5], Mario Luiz Teixeira de Moraes[5], Osmar Vila boas[6], Elenice Fritszons[1], Marcos Silveira Wrege[1], Bruno Marchetti Souza[5], Miguel Luiz Menezes Freitas[6], Vinicius Contigo[7], Priscila Bueno[8], Jarbas Y. Shimizu[9]

[1]Embrapa Florestas, Brazil
[2]Autonomous – Projeto Cooperative de melhoramento de pínus; Brazil
[3]Universidade Federal do Paraná, Brazil
[4]Universidade Federal de São Carlos (UFSCar), Brazil
[5]Universidade Estadual Paulista, Brazil
[6]Instituto de Pesquisas Ambientais, Brazil
[7]Resinas, Brazil
[8]Recena, Brazil
[9]Autonomous, Brazil

Biotechnologies applied to the improvement of pine for resin production

Brazil is the second largest resin producer in the world. Although the activity began in the 60s, little has been done in terms of genetic improvement. The genetic improvement scenario for this purpose is the consolidation of some untested clonal seed orchards (phenotypic) in private companies and public institutions for resin production. However, this is not very representative of the pine accessions that can be explored for this purpose. Furthermore, the genetic improvement program did not show any progress. Thus, in 2017 a cooperative pine project was proposed to wood and resin production. For resin production, production evaluations have been used via the creation of striations, as well as resin flow. The quality of the resin has also been considered based on gas and liquid chromatography and others. Genetic tests are being established, as well as new untested clonal orchards of other pine species and hybrids. The technologies applied to multiply the most productive individuals have been somatic embryogenesis, micro and macropropagation. To induce early flowering, top grafting is performed on young trees or seedlings on adult trees, top grafting. The development of interspecific hybrids or hybrids between different origins is also being carried out. Genome-wide selection is also being considered in this program with the aim of reducing the cycle of genetic improvement. These tools will be important to obtain accurate results in a shorter period. The collaboration between research institutions, universities, and affiliated companies has been the primary strength of this program.

Biography

Ananda Virginia de Aguiar is from Embrapa Florestas, Brazil.

Pannaga Krishnamurthy[1]*, Bhushan Vishal[2], Prakash P. Kumar[1]

[1]Department of Biological Sciences, National University of Singapore, 14 Science Drive 4, Singapore 117543

[2]Department of Biochemistry, Yong Loo Lin School of Medicine, National University of Singapore, Science Drive 2, Singapore 117456

Salt tolerance in plants; lessons learnt from mangroves

Salinity is one of the most deleterious abiotic stress factors that affects crop yield and reduces crop productivity. Increasing soil salinity poses a threat to food security globally. Excessive accumulation of toxic ions such as Na^+ and Cl^- in plant cells leads to osmotic imbalance as well as ion toxicity. Mangroves such as Avicennia officinalis have evolved adaptations such as ultrafiltration at the roots aided by apoplastic cell-wall barriers to thrive in saline conditions. We characterized Cytochrome P450 genes, AoCYPs from A. officinalis and their Arabidopsis orthologs AtCYPs. We show that they are involved in apoplastic barrier formation and are induced within 30 minutes of salt treatment in the roots. Heterologous expression of AoCYPs in Arabidopsis T-DNA insertional mutants and wild-type rice conferred increased NaCl tolerance to seedlings by enhancing root suberin deposition leading to reduced Na+ accumulation in the shoots. Histochemical staining and GC-MS/MS quantification of suberin precursors confirmed the role of CYPs in suberin biosynthesis. Using chromatin immunoprecipitation, yeast one-hybrid and luciferase assays, we identified AtWRKYs as the upstream regulator of AtCYPs in Arabidopsis. In addition, the atwrky mutants exhibited reduced suberin and salt sensitive phenotypes, which were rescued by expressing 35S::AtCYPs in atwrky mutants. This further confirms that the regulation of AtCYPs by AtWRKYs is part of the salt tolerance mechanism, and our findings can help in generating salt tolerant crop plants.

Audience Take Away Notes

- Audience can understand and appreciate how biotechnology can be useful and applied to improve crops
- This research that other faculty could use to expand their research or teaching
- This will be beneficial to researchers trying to understand salinity stress tolerance

Biography

Dr. Pannaga Krishnamurthy studied Biotechnology at Mysore University, India, and graduated masters in 2001. She then joined the research group of Prof. MK Mathew at the National Centre for Biological Sciences (NCBS-TIFR), Bangalore, India. After completing her PhD and a postdoctoral fellowship in the same institution she joined as a Research Fellow supervised by Prof. Prakash Kumar at the National University of Singapore in 2011. Currently she is a Senior Research Fellow at the Centre for Sustainable Urban Farming at NUS.

Arti Jamwal Sharma

Department of Bio Sciences, Career Point University, Hamirpur, Himachal Pradesh, India

Phytochemical profiling and radical scavenging activity of Fagopyrum esculentum moench under drought stress: A potential medicinal herb of Himalayas

Adaptation of plants to the changing environment is one of the most interesting research areas in plant biology. Environmental conditions such as drought, high salinity, high irradiance and freezing temperature influence the development of plant and synthesis of phytochemicals. Phytochemicals are natural compounds and play a major role to cope up the negative effects of the stress conditions in plants. Phytochemicals have great antioxidant potential and are of immense interest in providing essential health benefits to consumers. Among all the abiotic stresses drought is the major stress that significantly influence the growth and secondary metabolites of medicinal plants. Secondary metabolites of plants are distinctive sources for flavors, food additives, pharmaceuticals, and industrially essential biochemicals. Fagopyrum esculentum Moench is a medicinal herb which is extensively used to cure different ailments such as celiac, diabetes, obesity, cardiovascular, cancer, digestive disorder etc. After 15 days of transplantation F. esculentum was subjected to drought stress with various water potentials (-0.01, -0.02, -0.03, -0.04, -0.05, -0.06 and -0.07 MPa. Watering and weighing method were used to impose and maintain the drought stress. Leaves and roots of F. esculentum were analyzed after 30, 45, 60 and 75 days of growth to evaluate the response of plant under drought stress. F. esculentum increased antioxidants (ascorbic acid and tocopherol) and secondary metabolites (phenol, flavonoid and rutin) production under drought stress to limit oxidative damage. Drought stress increased the capacity of plant to scavenge DPPH and ABTS free radicals. It was interesting to note that the therapeutically active compound rutin was high in stressed plants compared to control plants.

Audience Take Away Notes

- Audience will learn the health benefit of F. esculentum Moench and they can add plant/plant products in their routine diet to prevent development of chronic diseases
- They can use the experimental set up of present research work to analyze the phytochemicals of other medicinal plants
- They can evaluate the molecular mechanism of the plant under drought stress
- List all other benefits
    - Expanding cultivation and utilization of F. esculentum can contribute essentially to upgrade wellbeing and nourishment, wage generation and biological sustainability

Biography

Dr. Arti Jamwal Sharma studied Botany at the Central University, Uttarakhand, India and post-graduated as MSc in 2008. She then joined the MPhil at the Shoolini University of Biotechnology and Management Sciences, Himachal Pradesh, India. She received her PhD degree in 2017 at the same university. She obtained the position of an Assistant Professor at the Career Point University, Hamirpur, India. She has published many research articles in SCI(E) journals. Under her supervision PhD Scholars are doing research in the area of Plant Stress Biology, Ethnomedicinal Botany, Consequences of Phytohormones and Phytochemical Screening in Medicinal Herbs.

Rajeev Kumar[1]*, Seweta Srivastava[2]

[1]Department of Botany School of Bioengineering and Bioscience Lovely Professional University Phagwara, Punjab

[2]Department of Plant Pathology, School of Agriculture, Lovely Professional University Phagwara, Punjab

Biocontrol activity of weed leaf extract against phytopathogenic, phytopthora and fusarium fungi

The leaf extracts of different weed plant such as (Cannabis sativa, Lantana camara, Ageratum conzoides, Parthenium hysterophorus) in different organic solvents (methanol, acetone, ethanol and aqueous) were assessed in-vitro for fungitoxic activity against phyto-pathogenic, Phytopthora, Fusarium isolated from different soil samples where the Potato, Tomato, Capsicum grown in field. The assessment of fungitoxicity was carried out by food poison technique using four different extracts at 200 mg/ml and their activity was recorded as radial growth and percentage inhibition. Among the four extracts, ethanol and acetone extracts showed complete inhibition of growth of fungus; while methanol extract showed 50% inhibition and aqueous extract did not produce any inhibition of fungus. Findings from present study confirmed that ethanol and acetone extract of Ageratum conzoides, Cannabis sativa, Parthenium hysterophorus, can be used as biofungicide to control this phytopathogenic fungus.

Keywords: Biofungicides, Fungi, Solanaceae, Poison, Extract, Weed Plant.

Biography

Rajeev Kumar currently I am pursuing PhD Botany from Lovely Professional University, Punjab. I have done my Graduation from Chatarpati Sahu Ji Maharaj University, Kanpur and Masters from Maharishi Markandeshwar Deemed to be University Mullana, Ambala, i have an Publication in Reputed Journals. Currently I am doing My PhD Research in Preparation of Biofungicides using Micro-organisms and Weed Plants leaves extracts.

Navneeti Chamoli*, Deepti Prabha, JS Chauhan

Dept. of Seed Science & Technology, School of Agriculture and Allied Sciences, HNB Garhwal University, Srinagar, Uttarakhand, India

Assessment of genetic diversity and population structure of French bean accessions of Garhwal Himalayas by SSR markers and morpho-agronomic traits

The Himalayan region of India boasts a vast french bean diversity that remains unexplored. The use of molecular and agromorphological markers to obtain information on landrace could facilitate future breeding improvements. To assess genetic polymorphism and differentiation among 176 french bean accessions, ten qualitative, fifteen quantitative traits, and twenty SSR were utilized. The genotypic (43.87%) and phenotypic (46.06%) variance in the various parameters examined displayed less variation, indicating that the observed trait variation and expression are primarily due to genetic factors. The Principal Component Analysis was used to eliminate redundancy in the data set, revealing that all fifteen quantitative traits were loaded on five components. However, the first two components explained the majority of the variance (45.38%) in French bean germplasm. Molecular diversity among accessions was assessed using twenty microsatellite markers spread over eleven linkage groups, and two hundred ninety alleles were scored for the accessions studied. The Bayesian clustering model implemented in STRUCTURE software on the primary level (K=2) clearly indicated the presence of both Mesoamerican and Andean gene pool, with the Mesoamerican gene pool being predominant. The average allele/loci were 4.25 and 32.38 for Andean and Mesoamerican gene pools, respectively. The neighbor joining tree revealed duplicacy in germplasm. When the PCoA results were compared with geographical distribution, it indicated that the Andean gene pool belongs to higher altitudes. Moderate genetic diversity was recorded among the French bean accessions, and approximately twenty-one accessions showed agronomic superiority. The information generated in this study will play a significant role in future French bean breeding programs.

Keywords: French bean, Genetic diversity, SSR, Germplasm, Gene pool, Principle component analysis.

Audience Take Away Notes

- In this presentation the whole collection of French bean of Himalayan region, Uttarakhand will be discussed. By this the audience will know the diversity of French bean, its origin, the importance of conserving the local landraces and about some disease (Anthracnose and Angular Leaf Spot) resistant accessions which we have identified from the local landraces
- This presentation will emphasize the significance of biodiversity in maintaining the health and stability of ecosystems. It can help the audience understand the interconnectedness of different species specially (French bean) and the role each one plays in maintaining ecological balance. By understanding these challenges, the audience can gain a deeper appreciation for the urgency of conservation efforts
- This presentation can educate the audience about different conservation strategies and initiatives aimed at protecting biodiversity. As the French bean is a most important source of protein in human diet and also an economically important crop. The crop is a major product in international commerce, produced and consumed by large numbers of the rural and urban poor in all over the world. In India the Himalayan region represents the richest repository of French bean germplasm where a huge diversity

is present among the germplasm. The study of genetic diversity will help to analyse the variation among germplasm. For genetic improvement, the usefulness of molecular markers will increase as their capacity to predict the behaviour of crosses in field experiments also increases. Such prediction is possible when there is an association between the loci controlling molecular traits and those controlling morpho-agronomical traits

Biography

Dr. Navneeti Chamoli did Bachelors in Science in the year 2014, Masters in Agriculture Science in the year 2016. After that she joined as Junior Research Fellow (JRF) and received her Ph.D. degree in Seed Science & Technology at H.N.B. Garhwal University, Srinagar Garhwal, Uttarakhand, India in the year 2022. She then joined as Guest faculty in the same department. During Ph.D. she qualified National Eligibility Test (ICAR-NET) and received young scientist award by Uttarakhand State Council for Science and Technology, Uttarakhand, India. She has published a book in Seed Science & Technology, published 6 research papers and attended many national and international conferences.

Birendra Kumar Bhattachan[1]*, Carlos C. Abon Jr[2], Stephan M. Haefele[3]

[1]Agriculture and Forestry University, Chitwan, Nepal (Pensioner)
[2]Central Luzon State University, Science city of Munoz, Philippines
[3]International Rice Research Institution (IRRI), Laguna, Philippines

Toposequencial terraces environment and use of fertilizer influenced grain yield of rainfed lowland rice in the mid-hills of Nepal

Cultivation of rainfed lowland rice in manmade terraces of different toposequencial environment is common farming practices of the farmers in the mid-hills of Nepal. Therefore, surveys and experiments were conducted to study the influences of four different toposequencial terraces environment and four different fertilizer doses on the grain yield of rainfed lowland rice for two years with farmer's participation in the mid-hills of Nepal using questionnaire and split-plot design. Survey results of two years showed that farmers of four villages in mid-hills produced significantly highest mean grain yield of 3.28 t ha^{-1} at the terraces near to house while the least mean grain yield of 2.46 t ha-1 was produced at upper terraces environment. Experiments in the farmers' field showed that among the toposequencial terraces environment, terraces near to house produced significantly highest mean grain yield of 4.38 t ha^{-1} while upper terraces produced the least mean grain yield of 2.46 t ha^{-1}. Similarly, among the four fertilizer doses, use of 60;30;20 kg NPK ha^{-1} produced significantly highest mean grain yield of 4.11 t ha^{-1} while control or zero fertilizer produced the least mean grain yield of 3.12 t ha^{-1}. Higher mean grain yield production at terraces near to house and use of nutrients at 60;30;20 kg NPK ha^{-1} were attributed by the higher yield attributing characters such as numbers of grains per panicle, number of tillers per square meter and panicle length per plants. Similarly, fertility status of the soil at toposequencial terraces environment near to house was comparatively highest soil nutrient content of the other toposequencial terraces environment. Therefore, based on these studies, it is concluded that manmade toposequencial terraces environment near to house and the use of nutrients at 60:30:20 kg NPK ha^{-1} can produce the highest grain yield of rainfed lowland rice and thereby the net income in the mid-hills of Nepal.

Keywords: Manmade Toposequencial Terrace Environment, Farmer's Participation, Rainfed Lowland Rice, Fertilizers; Grain Yield.

Audience Take Away Notes

- Specifically about the rainfed lowland rice grain yield production influenced by different terraces environment and use of nutrients in mid-hills of Nepal
- Income they can make from the farming practices
- Geographical location available in mid-hills of Nepal and their use in rice farming practices
- Useful in teaching learning program and further planning for research

Biography

Birendra Kumar Bhattachan graduated as B.Sc. Agriculture from Tribhuvan University Nepal in 1984 and joined IAAS, Tribhuvan University as an Assistant Lecturer to teach Agronomy to the B.Sc. Agriculture students in 1986. He graduated MAgri (Agronomy-Seed Technology) and Ph.D. in Crop Science (Agronomy, Soil Science) from UPLB and CLSU Philippines in 2003 and 2011 respectively under the scholarship of World Bank project AREP, Nepal and IRRI Philippines. He shifted to AFU as a professor at the department of Agronomy in 2012 and became pensioner in 2019. He published research articles and books in Nepali and English languages for the students.

Chaichi Wissem
University Blida 1, Algeria

Effect of vegetable oils and aqueous extracts on antifungal activities and strategic crop development mechanisms

Integrated production in sustainable agriculture focuses on improving the efficiency of biological inputs through biofertilizers and bioproducts based on plant extracts.

Our project is about evaluating the effectiveness of vegetable oils and aqueous extracts of Moringa oleifera, along with a biofertilizer containing a blend of trace elements in the form of orthosilicic acid "in vivo," on the antifungal activity and developmental mechanisms of strawberry cultivation (Fragaria annanasa) under controlled seedling conditions in the polycarbonate greenhouse of the Department of Biotechnology and Agroecology at the University of Blida 1. The trial involved four bioproducts (silicium-based bioproduct, Moringa Oleifera seed oil-based bioproduct, aqueous leaf extract-based bioproduct, and ethanol leaf extract-based bioproduct), using a 5 ml dose applied foliarly compared to a control. The experimental period lasted from 02/13/2023 to 07/10/2023, during which growth and morpho-physiological parameters were monitored, as well as the effect of bioproducts on fungal diseases after identification.

The results indicated a highly significant difference in growth rate, final height, above-ground and below-ground parts, leaf surface area, dry biomass, and significant effectiveness in antifungal activity among these bioproducts.

Keywords: Biofertilizer, Antifungal Activity, Moringa Oleifera, Fragaria Annanasa, Growth Parameters, Morpho-Physiological Parameter, Silicium.

Biography

Chaichi Wissem is from University Blida 1, Algeria

Chandana Paul[1], Tina Roy[2], Madhumita Maitra[1], Nirmalendu Das[3]*

[1]Department of Microbiology, St. Xavier's College, Park Street, Kolkata 700016, West Bengal, India

[2]Plant-Microbe Interaction and Molecular Biology Laboratory, Division of Biotechnology, CSIR-Institute of Himalayan Bioresource Technology, Palampur, Himachal Pradesh, India

[3]Department of Botany, Barasat Government College, Barasat, Kolkata 700124, West Bengal, India

Application of endobacterial isolates for sustainable production of Oyster mushroom

Oyster mushrooms (Pleurotus spp,) are very much popular throughout the globe due to their easy cultivation methods and rich nutraceutical contents. They positioned second just after the button mushroom Agaricus bisporus and commercially cultivated in a wide range of temperature and agro-climatic conditions. Though in Agaricus and some other mushroom, association of microbes are reported in various stages of growth and development, however, there are only a few studies on the microbiome of oyster mushrooms. In the present study some endobacteria were isolated from the different parts of sporophore of Pleurotus pulmonarius and their involvement in different stages of growth and development like vegetative phase, spawning, fruiting body development, and nutraceutical composition was assessed. In vitro production of indole acetic acid, laccase, ammonia, and siderophores are assessed in different endobacterial isolates and the suitable bacterial strains are selected for further study. The selected bacteria were supplemented with spawn, substrate, or both for sporophore production. The bacterial isolates were identified through Gram staining, biochemical characterization and 16S rRNA sequencing and identified as species of Priestia and Rossellomorea. The bacterial supplementation with all combinations not only increased the Biological Efficiency (BE) but also the nutraceutical contents of the mushroom including their antioxidant activities. The bacterial supplementation with substrate/spawn enhanced the BE of the mushroom. The supplementation of endobacterial isolates to enhance oyster mushroom cultivation unwrap a new horizon for sustainable agricultural practices in the mushroom industry. These bacterial isolates may be utilized in production of probiotics and other secondary metabolites in near future.

Audience Take Away Notes

- The audience may learn the process of oyster mushroom cultivation and application of bacterial formulations for efficient mushroom production
- Mushroom production is a profitable business even production of suitable spawn is very much promising agro-business
- Mushroom microbiome is more or less a virgin area of research. It also add lot of information in our understanding of mushroom growth and development which can be applied in industrial scale also
- It has immense practical application to enhance the production of mushroom with more nutrient content in a sustainable way
- It also improve our present knowledge of mushroom cultivation
- List all other benefits
    - In addition to efficient mushroom production, the isolated endobacterial isolates may be utilized in preparation of Probiotics. They may produce a number of enzymes, secondary metabolites of pharmaceutical importance etc

Biography

Nirmalendu Das has done his research work from IICB, Kolkata and obtained his Ph.D. in 1998 from Jadavpur University, West Bengal, India. He has about 27 years teaching experience and 31 years research experience. Presently he is working as the Associate Professor of Post graduate department of Botany, Barasat Government College, West Bengal, India. He is the member of several national and international scientific organizations, reviewer of many international journals and member of research council. He has published more than 45 papers in reputed international journals in addition to several book chapters of international repute and guiding Ph. D. students.

Nisha Singh
Gujarat Biotechnology University, Gandhinagar, Gujarat, India – 382355

Identification of genes to improve seed and nutrition quality traits in Pigeonpea using genome wide association study

Pigeonpea is an important legume crop with high protein content and nutritional attributes for more than a billion-people living in South Asia. Ever-increasing pigeonpea consumption as a major source of protein necessitates the improvement of varieties for more efficient production. The nutritional value enrichment of pigeopea is very much essential to reduce malnutrition of developing countries in the post green revolution era. To utilize its potential, a coordinated and comprehensive evaluation of germplasm is required. Identification of potential genes/alleles governing complex traits of seed quality and nutritional content such as seed weight, seed colour, Total Protein Content (TPC), amino acid and resistance starch are essential in marker-assisted breeding for quality trait improvement of pigeonpea. The current gain in knowledge on the seed quality and nutritional value related genes and QTLs will help into develop desired genotypes for the humankind. The availability of gene-based markers and advanced tool will assist breeders to accumulate specific alleles of genes known to play a role in nutritional grain quality traits in pigeonpea. Therefore, the present study on the profiling for the first-time to understand these complex genetic architectures of qualitative and quantitative traits in pigeonpea. For GWAS (Genome-Wide Association Study), high-throughput genotyping information of 62K SNP "CcSNPnks" genic chip genome-based SNPs discovered from 45 diverse varieties of pigeonpea utilized. The chip comprises total 62,053 SNPs from 9629 genes belonging to five different categories, including 4314 single-copy genes unique to pigeonpea, 4328 single-copy genes conserved between soybean and pigeonpea, 156Mhomologs of agronomically important cloned genes, 746 disease resistance and defense response genes and 85 multi-copy genes of pigeonpea. Our analysis revealed that the average protein content carrying genotypes are DG (RG) 45, AKPR -324, MC-99, UP-73 and BRG-2 (16.8, 19.3, 21.5, 24.7, 30.3 gm). This led to identification of most effective genomic loci (genes) associated with seed quality and nutritional content in pigeonpea from diverse sets of wild and cultivated genetic backgrounds. The informative functionally relevant molecular tags scaled down essentially have potential to accelerate marker assisted genetic improvement by developing seed quality and nutritionally rich pigeonpea cultivars.

Keywords: Genes, Genotyping, GWAS, Pigeonpea, Nutritional Quality, Seed, SNP.

Biography

Dr. Nisha Singh is working as Assistant Professor (Bioinformatics), Department of Bioinformatics, Gujarat Biotechnology University, Gandhinagar, India, and DST-INSPIRE Faculty. Dr. Singh has completed her PhD in plant genomics from ICAR-NIPB, New Delhi, India and postdoctoral studies from Cornell University, Ithaca, New York, USA. She has rich expertise in crop genomics, proteomics and bioinformatics and well recognised national and international level. She has published more than 65 papers in reputed international journals and has been serving as an editorial board member and reviewer of reputed journals. For her scientific contribution she gained several prestigious awards and honours (>25) such as INSA-Medal for Young Scientist Award-2020 from Indian National Science Academy, New Delhi, India, National Environmental Science Academy-2022, Scientist of the Year Award, and NASI-Young Scientist Platinum Jubilee Award 2022, India.

Francis Machumi[1]*, Ramadhani S.O. Nondo[1], Michael Clovis[1], Boniphace C. Mwita[1], Mariana J. Shayo[1], Young Eun Du[2], Yern-Hyerk Shin[2], Dong-Chan Oh[2]

[1]Institute of Traditional Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
[2]College of Pharmacy, Seoul National University, Seoul 008826, South Korea

Antimicrobial properties of Tanzanian Combretum species

Combretum species are well known and documented in treatment of broad-range of ailments, including microbial infections. Previous studies have shown that extracts of few investigated Tanzanian Combretum species have significant antifungal activity. The studies however did not cover all Combretum species found in Tanzania, or go further in identifying the active compounds.This study aimed to collect and extract Combretumspecies found in Tanzania for the purpose of evaluating their antimicrobial activity and isolate active secondary metabolites from the most active species. Combretumspecies were collected from different regions of Tanzania and extracted by cold maceration at room temperature using 95% ethanol. Antimicrobial activity of extracts and secondary metabolites were carried out using disc-diffusion and broth microdilution methods. Isolation of secondary metabolites was done on the most active extracts using chromatographic methods and identification was done by spectroscopic methods.

A total of 83 samples from twenty-four Combretum species were collected and extracted. Antimicrobial tests showed that 41 extracts had activity to at least one microbe, with best activity displayed by C. apiculatum and C. mole, with inhibition zone of 12.5 mm and 11.0 mm respectively against S. aureus, at 1 mg/disc. Eleven secondary metabolites were isolated and identified as quercitrin, afzelin, apigenin, mollic acid, musambin C, 24-epiquadrangularic acid M, musambin B, flavogallonic acid dilactone, combreglutinin, terflavin A, and terchebulin. Terchebulin had the best antifungal activity of 64 μg/ml against C. albicans. Antimicrobial activity displayed by the extracts and the isolated secondary metabolites from the Combretum species support traditional use of Combretum species in treatment of microbial infections.

Keywords: Combretum, antimicrobial, secondary metabolites

Audience Take Away Notes

- How best to turn urban waste streams into high quality fit-for-purpose farming resources
- The audience will learn that Combretum species and their secondary metabolites have potential for development of medications for microbial infections, hence build curiosity for more investigation into the species
- Researchers intending to evaluate further the medicinal properties of combretum spies will have baseline information on the antimicrobial activities and secondary metabolites found in some of the species
- Using findings of this research, combretum extracts can be formulated into medicinal products which can provide a practical solution to microbial infections after some efficacy and safety tests.

Biography

Dr. Francis Machumi is a Senior Research Fellow at the Institute of Traditional Medicine of the Muhimbili University of Health and Allied Sciences in Tanzania. He holds an MSc and PhD in Natural Products Chemistry from University of Botswana and University of Nairobi respectively. He specializes in chemistry and bioactivity of natural products from medicinal plants, an area where he has published about 40 papers and supervised a number MSc and PhD students.

MARCH

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8th Edition of Global Congress on

Plant Biology and Biotechnology

DAY 03

KEYNOTE FORUM

Shifting paradigms with bamboo: Prominent solutions for climate change and sustainability

The global housing crisis, particularly acute in developing and least developed countries, calls for innovative and sustainable solutions. The construction sector, a significant contributor to greenhouse gas emissions, is ripe for transformation. Bamboo, traditionally employed as a construction material in bamboo-growing regions, is emerging as a modern, eco-friendly, and sustainable alternative. Recent technological advancements have broadened bamboo's applications, offering the potential to alleviate housing shortages, attain carbon neutrality, and enhance community resilience against climate change.

Innovative financial instruments can play a pivotal role in catalyzing bamboo production in tropical regions, providing essential capital for plantation establishment, infrastructure development, and value chain expansion. These financial mechanisms can simultaneously contribute to land restoration, offer building materials to underserved communities, and create sustainable income sources for farmers and local communities.

Bamboo, known for its versatility and rapid growth, has emerged as a promising sustainable resource in various countries across diverse regions. Its substantial carbon sequestration potential, estimated at 10-30 tons of carbon dioxide per hectare per year, depending on factors such as species, climate, and management practices, makes it a valuable ally in climate action. Insights gleaned from various forums promise to benefit both bamboo-producing and consuming nations.

The global construction sector, vital for fulfilling the core human need for shelter, accounts for nearly one-third of greenhouse gas emissions and extensive resource consumption. Bamboo forests function as carbon sinks, effectively sequestering ecosystem carbon due to their extensive coverage and rapid growth. Furthermore, bamboo's capacity to replace emission-intensive materials like aluminum, concrete, plastic, PVC, steel, and unsustainable timber can lock carbon in durable products, significantly reducing the environmental footprint of the construction industry.

With over a billion people dwelling in bamboo homes worldwide, bamboo's historical role as a construction material is well-established. Recent research and innovation have further diversified its utility, positioning it as an ideal green, affordable, and resilient construction material to address housing shortages amidst rapid urbanization. This study draws insights from four case studies spanning different continents, pinpointing priority areas for innovation, research, and development. It underscores existing gaps and pressing needs while proffering recommendations

Carlos Ruiz-Garvia

UN Climate Change, Adaptation Division, UNFCCC, Bonn, Germany

Biography

Carlos Ruiz-Garvia joined the UNFCCC secretariat (UN Climate Change) more than 12 years ago, where he is currently appointed as a Team Lead in the Adaptation Division. Mr. Ruiz-Garvia is a graduate of Forestry Engineering (Universidad de Concepción, Chile), has a PhD in Agricultural Engineering (University of Göttingen, Germany), a M.Sc. in Forestry from the same university, a Project Management Diploma (University of Stetson, USA) and Economics at Harvard. His master thesis on Climate was granted an international award for excellence in forestry sciences. Throughout his career, Carlos provided leadership to multi-stakeholder organizations committed to innovations on sustainability standards.

for countries and the multilateral system to spearhead impactful, swift advancements in the adoption of bamboo as a solution for climate change adaptation and mitigation.

Audience Take Away Notes

- Learn related aspects of the latest multilateral discussions on the climate crisis and some of the agricultural and forestry technologies that countries in the tropics can use to address this crisis while meeting core human needs such as nutrition and shelter
- It can help participants look at their activities through a climate change and sustainability lens with a focus on innovative systems transformation for value chain substitution aligned with the Paris Agreement and the SDGs
- All researchers and participants can access our digital collaboration platform a tool for collating government entities' demand for climate and sustainability solutions. The platform is designed to be a platform of global ambitions to tackle climate change

Plant endobiome and climate change

Plants host many mutualistic bacteria and fungi inside their living tissues. Termed the endophytes (endo=inside; phyte=plant), these microbes have coevolved with the plant and constitute a plant's endobiome. The fungal endophyte-plant association evolved about 400 million years ago. The fungal endophyte-plant host interaction encompasses a balanced antagonism with the endophyte showing controlled virulence and the plant restricts the induction of disease by the endophyte. Considering their evolutionarily long and constant association with plants, it is not surprising that fungal endophytes modulate phenotypic plasticity of plant traits and enhance their host plant's tolerance to heat, drought and salinity, metals and insect pests and pathogens. Although the exact mechanism of the fungal endophyte-induced abiotic stress tolerance is not clear, in a few cases they increase their plant host's antioxidant enzymes including ascorbate peroxidase and catalase which are associated with salt tolerance of plants. Epigenetic modification and alterations in the levels of abscisic acid, jasmonic acid and salicylic acid induced by endophytes aids plants tolerate heat and drought. Similarly, endophytes upregulate many defence genes of their plant hosts thereby enhancing the plant's tolerance to peat and pathogen attacks stress. The density of colonization of fungal endophytes in a leaf is high enough to cogitate on their contribution to the carbon dioxide pool within a leaf through their respiration. This condition would tilt the RuBP carboxylase enzyme to function more as a carboxylase than as an oxygenase such that the net photosynthesis is increased and photo respiration in is decreased in C3 plants.

With such an overarching influence, it is logical that fungal endophytes would aid in plants' resilience to the stresses induced by a rapidly changing climate. With their relatively small genomes, short generation times, recombination and sexual reproduction processes, fungi are expected to support higher rates of evolution than plants and therefore adapt more rapidly to climate change. Apart from this, most species of fungal endophytes are generalists and infect plants widely separated in their taxonomy and geographic location. Hence, fungal endophyte isolates exhibiting a favourable trait could be introduced in a crop experiencing stress due to climate change. Similarly, an endophyte isolate exhibiting higher rate of respiration could be inoculated in crops to increase its photosynthetic efficiency thus increasing crop production and reducing carbon dioxide release in to the atmosphere.

Many of the dominant and commonly occurring endophytes could be latent pathogens behaving as non-disease causing commensal but could become pathogenic due to change in the environmental conditions. It is necessary to study if alteration in the climate could be a signal for such a shift in the life style of endophytes. This is critical since their wide

T. S. Suryanarayanan

Vivekananda Institute of Tropical Mycology (VINSTROM), RKM Vidyapith, Chennai, Tamilnadu, India

Biography

T. S. Suryanarayanan ranked in the list of top 2% of researchers in mycology in an analysis "Updated science-wide author databases of standardized citation indicators. Published 145 research papers in National and International Journals. 6983 citations, h-index - 43 (GOOGLE Scholar). Fulbright Nehru Senior Fellow, TWAS Visiting Expert, Visiting Professor, University of Amazonas, Amazonia; Honorary Research Associate, Fredericton and St. John Campuses, University of New Brunswick, Saint John, Canada; Research Supervisor, University of Muenster, Germany; Visiting Scientist, Department of Molecular Pathology, Georg August University, Gottingen. Germany.

host range could result in epidemics. Thus, the fungal endobiome of plants require immediate attention to manage climate change effects on plants.

Audience Take Away Notes

- This topic has been least addressed so far and hence the audience will be able to use what they learn
- Endophytes are relatively easy to isolate and study; they produce novel pharmaceutically important secondary metabolites as well as novel biomass degrading enzymes. Hence, a deep study on them involving microbiologist, biochemists and industries could be beneficial

Nature-based solutions for sustainable management of ecosystems

Nowadays, adverse climatic conditions pose many obstacles to achieve sustainably management of ecosystems. Extreme weather events, specifically intense rainfalls events may result to catastrophic floods. Further, factors such as increased agricultural activities, deforestation and wildfires also result to excessive erosion rates. At this study, preliminary results are presented on research that was conducted for the Aggitis Basin, located at the prefecture of Eastern Macedonia in Northern Greece. In order to identify the pollution sources, the study areas were selected based on land use characteristics, such as dominant vegetation and soil type. The categorized land uses were, natural areas of sclerophyllous vegetation, rangeland, agricultural and riparian vegetation. Based on erosion "pin-measurements", the land use that contributed the least sedimentation and reflected a "nature-based solution" scenario, were the areas with the riparian vegetation. On contrary, the rangeland, the agricultural and the areas with sclerophyllous type of vegetation contributed the most pollutants. Consequently, specific land uses were more prone to increased levels of erosion (e.g., agricultural). So, those areas require further action, such as introduction of nature-based solutions in order to mitigate non-point source pollutants reaching the sea bodies.

Audience Take Away Notes

- Nature based solutions help mitigate problems like soil lose through erosion
- Sustainable ecosystems through practices such as the introduction of Nature-based solutions
- Understand the importance and impact of the effect of land use alterations

Valasia Lakovoglou*, G.N. Zaimes, P. Koutalakis, G. Gkiatas, G. Pagonis

UNESCO chair Con-E-Ect, Drama, Greece

Laboratory of Geomorphology, Edaphology and Riparian Areas (GERi Lab), Department of Forestry and Natural Environment Sciences, International Hellenic University, University Campus (Drama), 1st km Drama-Mikrohoriou, Drama, GREECE, 66100

Biography

Dr. Valasia Lakovoglou is a distinct graduate of Iowa State University, USA. She has more than 25-yrs of national/international research and teaching experience as an Ecophysiologist/Silviculture expert in seedling production and Restoration/Conservation of Ecosystems with emphasis on Biodiversity under the challenges of Climate Change. She has received numerous scholarships, awards and recognitions. She is an editor of more than ten international journals and a reviewer in more than fifteen, as well as a reviewer at the Intergovernmental Panel on Climate Change (IPCC). She has more than 100 publications (books/book chapters, peer-reviewed scientific articles) and more than 20 international projects. She is active in many scientific societies such as the Mediterranean Experts of Climate and environmental Change (MedECC) and the International Network of Bioresource Management (INBM). She holds leading positions such as: Director of Ecotourism Sector of the UNESCO chair Con-E-Ect; Executive Board of Directors of Climate Smart Agriculture Youth Network Global (GCSAYN) in Africa; "General Secretary" of associations such as the "Association of Inter-Balkan Woman's Cooperation Societies (AIWCS)" of UNESCO Center for the peace in the Balkan area; International Council of World Tourism Forum Institute; Country Chair of Greece of the G100 Women of the World serving as for Farming and AgriTourism.

The potential of beneficial microorganisms with the interaction with halophytes in desert and/or arid saline areas

Abiotic factors such as salinity, drought, high and low temperatures and heavy metal toxicity reduce crop productivity. Climate change increases the frequency and severity of these abiotic factors. Mainly, high temperatures and low precipitation cause droughts of increasing severity. Recent estimates report that abiotic stress accounts for the loss of 50% of crop production. The salinity has led to a 1–2% annual decline in arable land. Arid and semi-arid zones are the areas most affected by drought and salinity, two types of abiotic stress closely related to each other. Salinization is the increase in the concentration of soluble ions such as Na+, Ca2+, Mg2+ and K+ as a result of low precipitation and high temperatures. Agricultural activities promote the salinization of soils through irrigation with poor-quality water, inadequate farming systems and excess use of conventional mineral fertilizers and pesticides, all of which ultimately reduce soil fertility and quality. Drought influences crop yields as low water availability adversely affects the photosynthetic rate, nutrient uptake and metabolic processes in plants. Facing these issues, several studies have been carried out through different approaches, including the search for new techniques in traditional agriculture, new plant varieties, genetic engineering and the use of biostimulants, with the aim of reducing crop yield losses caused by abiotic factors. Efforts made as part of traditional agriculture and genetic engineering to develop plants resistant to salinity and desiccation are complex because these stressors affect several physiological aspects of the plant and require many years of study. By contrast, biostimulants have shown positive effects on plants to improve tolerance to abiotic stress. This presentation will be focusing on the potential of Halobacteria can increase the yield of crops grown under these types of stress. These bacteria thrive across a wide salinity range (1–25% NaCl) and also in the absence of NaCl and have direct and indirect mechanisms that promote plant growth with halophytes for food, fodder and biofuels production, as well as their impacts on the environment and societies.

Keywords: PGPB, Salinity, Pgpb.

Edgar Omar Rueda Puente

Departamento de Agricultura y Ganadería, Universidad de Sonora. Sonora, México. CP 83000

Biography

Edgar Omar Rueda Puente was Awarded with the Doctor Honoris Causa degree by the International Organization for Inclusion and Educational Quality. Level two in the National System of Researchers of CONACyT. Six occasions as distinguished 2004-2006-2008-2010-; 2012-; 2014-2015; QUALIFIED TO AUDIT AND IMPLEMENT INSTITUTIONS MANAGEMENT SYSTEMS by Mexican Accreditation Entity (EMA: ISO 9001: 2015 Quality Management Systems; ISO 14001: 2015 Environmental Management System; ISO 21001: 2018Management System for educational organizations; ISO 50001 Energy management systems; Certification in labor competence in the EC0217-CONOCER Competency Standard (teaching of training courses in a group face-to-face manner; Member of the Inter-secretarial Commission for Biosafety of Genetically Organisms Modified in Mexico.

BOOK OF ABSTRACTS

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DAY 03

SPEAKERS

Akio Tateya
Technical adviser of Japan Fumigation Technology Association Tokyo, Japan

Alternatives used in plant quarantine treatment and appropriate use of methyl bromide in Japan

When plants are imported from abroad, they are subject to plant inspection at the entry because of the protection from pest invasion, spread and establishment in the country. When plant inspector intercepts pest, he orders to disinfest pest. In the disinfestation methods there are various ways available to the pests. Currently methyl bromide fumigation treatment is popular because of the secure disinfestation effectiveness, simple treatment operation and economic feasibility.

However, methyl bromide is one of the substances of the Montreal Protocol on the substances that deplete the ozone layer. Methyl Bromide (MB) for soil treatment and pest disinfestation of non Quarantine and Pre-Shipment (non QPS) commodity uses of harvested products and of the living pests in the structure is already phased out.

However, methyl bromide for the use of QPS treatment is exempted from the control. Currently annual global consumption is about 10,000 tonnes. There is no sign to decrease its volume. Therefore, it is concerned with the impacts to the ozone layer and expected to reduce by the use of alternatives to methyl bromide. According to Decision XX/6 of the Montreal Protocol, the use and emission of MB in the quarantine and pre-shipment is suggested to reduce as much as possible to adopt alternative.

In this presentation, I would like to stress on the alternatives currently available in the quarantine treatment in Japan and to explain methyl bromide fumigation treatment for the minimum use with secure disinfestation effectiveness to the pests and the less emission to the atmosphere at the end of treatment.

Alternatives to methyl bromide applied in the quarantine treatment in Japan are mainly aluminum phosphide and carbon dioxide fumigation to treat grain, methyl iodide fumigation for timber and wood, system approach for the import of cherry fresh fruit from US and heat treatment of Kiln dry to wood packing materials for export etc. They are all authorized as a disinfestation treatment.

Methyl bromide is exclusively registered for quarantine treatment and not allowed for other uses. Dosage rates for grain are specified in fumigation standards to ensure the disinfestation effectiveness and minimum emissions to the atmosphere. It is included various factors for treatment such as for bagged grain in a chamber or bulk grain in a silo, plant product absorption, fumigation duration time, kinds of quarantine insect pest, gas retention capability of fumigation chamber, gas circulation system, grain temperature and grain loading rate. The majority of fumigation chambers in Japan are considered to be of high gas retention ability and have good airtightness which is expected to give the minimal emissions of MB to the atmosphere. Lists of quarantine and non-quarantine pests are established in accordance with the pest risk analysis mentioned in the International Standards for Phytosanitary Measure (ISPM)-15 issued by International Plant Protection Convention (IPPC).

Items for the people concerned to the plant quarantine treatment to learn from the presentation. It may give opportunity to realize what issues are existing for acceleration of adoption of alternatives to

MB for QPS and how methyl bromide use could be reduced. For more adoption of alternatives, it needs more specific quarantine level efficacy data, pesticide registration, economic feasibility, residue survey for mitigating anxiety of the consumers, training on safe handling and management in the pest control operation. For more reduction of methyl bromide use, it needs improvement of gas retention ability of the chamber for good efficacy for the pest control and for methods to reduce leakage from the chamber to minimize emissions to the atmosphere. Improving methods can lead to the establishment of lower dose rates in the fumigation standard to guarantee pest control with less emission of MB to the atmosphere. For agreement of those issues, it is highly important that the National Plant Protection Organization (NPPO) takes leadership to assist evaluation of issues with the cooperation of the consignee, owner of fumigation chamber and pest control operator. It could be expected to prioritize with NPPO officers in those countries of high level of methyl bromide consumption in quarantine treatment.

Biography

Akio Tateya graduated from Agriculture Master course of Kyoto University and employed by the Ministry of Agriculture, Forestry and Fisheries (MAFF). I have been stationed at the office of Chemistry section of Research Division of Yokohama Plant Protection Station in 1966. Since then, I have been engaged in the research on fumigation treatment. From 1992 to 2013, I have participated to the Meeting of the Parties on the Montreal Protocol on the substances that deplete ozone layer as a member of the Japan government delegation. MAFF also agreed with me to be nominated as the member of Methyl Bromide Technical Options Committee (MBTOC) in 1993. I have participated the activity as a member of MBTOC since then. I retired from MAFF in 1998 and have worked for Japan Fumigation Technology Association as the technical adviser. From 2005 to 2014, I have worked for Syngenta Japan of agricultural pesticide manufacturing company as the technical adviser. In 2014 I have come back to work for Japan Fumigation Technology Association up to now.

Youcai Qin, Fenglian Jia, Xiaobing Zheng, Xiaohui Li, Jiaqi Duan, Beibei Li, Hongfei Shen, Xiufen Yang, Jie Ren, Guangyue Li*

State Key Laboratory for Biology of Plant Diseases and Insect Pests, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing 100081, People's Republic of China

Enhancing the production of Xenocoumacin 1 in Xenorhabdus nematophila CB6 by a combinatorial engineering strategy

Xenocoumacin 1 (Xcn1) is an excellent antimicrobial natural product against Phytophthora capsici. However, the commercial development of Xcn1 is hindered by the low yield, which results in high application cost. In this study, multiple metabolic strategies, including blocking the degradation pathway, promoter engineering and deletion of competing Biosynthetic Gene Clusters (BGCs), were employed to improve the production of Xcn1, which was increased from 0.07 g/L to 0.91 g/L. The formation of Xcn1 reached 1.94 g/L in the TB medium with the final strain T3 in shake flask, and further reached 3.52 g/L in a 5-L bioreactor, which is the highest yield ever reported. The engineered strain provides a valuable platform for production of Xcn1, and the possible commercial development of the bio-fungicide. We anticipate that the metabolic engineering strategies utilized in this study and the constructed constitutive promoter library can be widely applied to other bacteria of the genera Xenorhabdus and Photorhabdus.

Keywords: Xenorhabdus Nematophila, Xenocoumacin 1, Constitutive Promoters, Metabolic Engineering.

Biography

Guangyue Li is a professor at the Institute of Plant Protection, Chinese Academy of Agricultural Sciences. His research primarily focuses on the discovery of antimicrobial nature products in symbiotic bacteria of entomopathetic nematodes. He also works on optimizing metabolic pathways and engineering key enzymes within these pathways. From 2010 to 2014, he pursued his PhD degree at the Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences. After that, from 2014 to 2017, he worked as a postdoctoral researcher in Professor Manfred. T. Reetz's laboratory at the Max Planck Institute for Coal Research in Germany. In November 2017, he returned to China and joined the Institute of Plant Protection, Chinese Academy of Agricultural Sciences.

Yifeng Wang*, Yazhou Shu, Jian Zhang

State key laboratory of rice biology and breeding, China National Rice Research Institute, Hangzhou, Zhejiang, China

ABF1 positively regulates rice chilling tolerance via inducing trehalose biosynthesis

Chilling stress seriously limits grain yield and quality worldwide. However, the genes and the underlying mechanisms that respond to chilling stress remain elusive. This study identified ABF1, a cold-induced transcription factor of the bZIP family. Disruption of ABF1 impaired chilling tolerance with increased ion leakage and reduced proline contents, while ABF1 over-expression lines exhibited the opposite tendency, suggesting that ABF1 positively regulated chilling tolerance in rice. Moreover, SnRK2 protein kinase SAPK10 could phosphorylate ABF1, and strengthen the DNA-binding ability of ABF1 to the G-box cis-element of the promoter of TPS2, a positive regulator of trehalose biosynthesis, consequently elevating the TPS2 transcription and the endogenous trehalose contents. Meanwhile, applying exogenous trehalose enhanced the chilling tolerance of abf1 mutant lines. In summary, this study provides a novel pathway 'SAPK10-ABF1-TPS2' involved in rice chilling tolerance through regulating trehalose homeostasis.

Audience Take Away Notes

- We report the identification of a 'SAPK10-ABF1-TPS2' pathway in rice chilling tolerance
- Using biochemical interaction and phosphorylation assays, we show that SAPK10 phosphorylate ABF1. The SAPK10-dependent phosphorylation enhances the DNA-binding ability of ABF1 to the G-box cis-element of TPS2 promoter, thereby elevating the TPS2 transcription and the endogenous concentration of trehalose
- Applying exogenous trehalose enhanced the chilling tolerance of abf1 mutant, suggesting ABF1-mediated rice chilling tolerance partially relied on the elevated trehalose concentration.

Biography

Dr. Wang Yifeng is an associate researcher and master tutor at China Rice Research Institute. He graduated from Shangdong University, China, with a bachelor's in biotechnology in 2009. In 2014, he graduated from Zhejiang University, China, with a Ph.D. in botany. He worked at the China Rice Research Institute in 2015. He is mainly engaged in Crop Functional Genomics and Biological Breeding. He presided over projects such as the National Natural Science Foundation of China, and the Natural Science Foundation of Zhejiang Province. As the first/corresponding author, he has published 17 articles in New Phytologist, Journal of Advanced Research, Plant Cell and Environment, etc, with a cumulative impact factor of>40.

Debjyoti Das, Komal Bisht, Sneh Gautam, Pushpa Lohani*

Department of Molecular Biology & Genetic Engineering, College of Basic Science and Humanities, G. B. Pant University of Agriculture & Technology, Pantnagar, India

Zinc-chitosan-salicilic acid nanoparticles enhance tolerance and augment yield in wheat (Triticum Aestivum L.) during drought

Wheat (Triticum aestivum L.) is an important cereal crop worldwide and drought has become a limiting factor for its growth as well as yield. A field experiment was conducted during Rabi season of 2020-21 using randomized block design at Pantnagar Centre for Plant Genetic Resources, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand to study if there is any effect of Zinc-Chitosan-Salicylic acid (ZCS) nanoparticles for providing drought tolerance in wheat without compromising the yield. The morpho-physiological and biochemical responses of wheat plants to different concentrations of ZCS nanoparticles (100, 200 and 400 ppm) under water stress condition were studied. The plants treated with 100 ppm ZCS nanoparticles showed significant increase in plant height, root length, number of leaves, chlorophyll and carotenoid content, free proline and ascorbate content under water stress condition. There was a decrease in the malondialdehyde content with the application of ZCS nanoparticles at 100 ppm concentration. Specific activity of antioxidant enzymes like ascorbate peroxidase, guaiacol peroxidase, glutathione reductase and superoxide dismutase was found to increase gradually with the increase in ZCS nanoparticles concentrations. Grain yield/ plant significantly increased (≈ 50%) with foliar application of ZCS nanoparticles at 100 ppm concentration under water stress condition. Application of nanoparticles at 200 and 400 ppm concentrations did not show any promising result possibly be due to toxicity effect. From this study, it was concluded that zinc-chitosan-salicylic acid nanoparticles played an important role in mitigating drought stress of wheat and it also boosted grain yield of wheat under water stress condition by altering metabolism and activating ROS scavenging pathway.

Biography

Dr. Pushpa Lohani received MSc. in Biotechnology from Banasthali Vidyapith, India in 1997. She joined research group at Central Drug Research Institute, India and obtained her PhD degree from the same institute in 2003. She joined as Assistant Professor at Department of Molecular Biology & Genetic Engineering, College of Basic Science and Humanities, G. B. Pant University of Agriculture & Technology, Pantnagar, India in the year 2006. Her research focuses on nanoparticle mediated drought recovery and transcriptional regulation during drought tolerance in plants. She has published many papers in international journal of repute and is recipient of many awards.

Shumaila Shahid
Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi-110012, India

Fusarium wilt disease of cucurbits - Its importance and management

Fusarium wilt is a devastating disease of cucurbits which are an important group of vegetable crops. Fusarium wilt is primarily a soil-borne disease and is responsible for causing great yield losses and quality decline in cucurbits. It is currently a major limitation to cucurbit cultivation around the globe. Cucurbits provide several edible and useful products to humans as well as animals. The crop is rich in nutrition and the infection due to the pathogen hampers its nutritional value. Fusarium wilt is caused by the fungus, Fusarium oxysporum which is highly host-specific. The host specificity of the fungus is classified by its formae speciales also known as f. sp. and the different hosts which they infect includes muskmelon, watermelon, cucumber, bitter gourd, etc. There are races also within the same f. sp. Three kinds of spores are produced by the fungus namely, chlamydospores, macroconidia and microconidia. The fungus causes wilting symptoms as it colonizes the xylem vessels of the plant and forms tylosses inside it which prevent the movement of water. The pathogen eventually causes retardation of growth, yellowing as well as necrosis of leaves. When the disease is highly severe, it may cause death of the plant. Since the fungus causes huge losses in the quantity as well as quality of cucurbits due to which its market value decreases, hence it is very much essential to manage the disease. Management of Fusarium wilt is very challenging due to persistent nature of the chlamydospores for several years and the development of new physiological races. Use of resistant varieties help in protection of plants against Fusarium wilt disease to a greater extent. The management of Fusarium wilt could also be achieved through several approaches including chemical control using the fungicides, solarization, crop rotation, bio-fumigation, nanoparticles etc. In addition, biological control strategy also offers an attractive and efficient method for the management of Fusarium wilt disease of cucurbits.

Keywords: Fusarium Wilt, Cucurbits, Fusarium Oxysporum, Management.

Audience Take Away Notes

- Audience will be able to know the importance of the plant disease and the losses caused by them. This knowledge will help them to prevent the losses caused due to fungal diseases if they will grow the cucurbits
- If the audience are in the jobs related to agriculture, horticulture or plant sciences, this presentation will enable them to tell the growers about the importance of the disease and the management practices which they can follow
- Other faculty can also use this knowledge to expand their research or teaching.
- In order to provide a solution to every problem, one should understand the root-cause and the presentation will help understand the root-cause of the problem
- It will definitely provide new information and future prospects which will help the researchers to have a research oriented perspective

- List all other benefits
    - The listeners including those who are working on this aspect will get all the benefit from the presentation because the presentation will cover all the points related to its importance, its constraints as well as solutions of the problems

Biography

Dr. Shumaila Shahid received her M.Sc. and Ph.D. in Plant Pathology from Aligarh Muslim University, Aligarh in 2008 and 2018, respectively. She is currently working as Scientist (ARS- Agricultural Research Service) in the Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi, India. She is Co-Principal Investigator of 7 on-going major research projects at IARI and has also successfully completed 3 major research projects. She has 12 years of experience in research and teaching (Ph.D. and M.Sc.). She has published many research papers in peer-reviewed International and National Journals, edited books and also published several book chapters. She has been honoured with various prestigious awards such as Scientist of the Year Award, Young Scientist Award in Plant Pathology, Dr. Rajendra Prasad Excellence Scientist Award, Young Women Scientist Award, Research Excellence Award, etc. She is a life member of many renowned societies.

Neeraj Bainsal[1]*, Jitender Singh[2]

[1]University Institute of Pharma Sciences, Chandigarh University, Mohali, Punjab-140413, India

[2]Institute of Pharma Sciences, IET Bhaddal, Technical Campus Rupnagar, Punjab 140001, India

Antianxiety activity of thalictrum foliolosum (roots) and shorea robusta (resin): Research outcomes from animal experimentation studies

Introduction: Anxiety is a fearful state expressed as common mental issue that witness by population as a part of everyday life. The reason for fear and worries may be imagined or real. These feelings affect mentally or physically both and considered as anxiety disorder, if persists for longer period of time, especially in case of absence of any stressor or cause. As per surveys based on large population, more than 33.7 percent of total population affected by anxiety ailment.

Objective: The aim of current study was to perform a comparative estimation of antianxiety activity of two traditionally utilized herbal plants – Shorea robusta (resin) and Thalictrum foliolosum (roots).

Methods: The activity of various successive extracts viz. petroleum ether, chloroform, ethanol and water of both the plants were evaluated using EPM (elevated plus maze) animal model at doses 100, 200 and 400 mg/kg. The studies were performed using laca mice and test materials were given per oral route.

Results: The ethanol extract of Thalictrum foliolosum roots possessed maximum and significant effects at 400 mg/kg on EPM. The results were compared to diazepam (2mg/kg) standard antianxiety drug.

Conclusion: The results suggest the therapeutic potential of Thalictrum foliolosum roots as an alternative in the management of anxiety disorder.

Audience Take Away Notes

- Audience will learn about the antianxiety activity of Thalictruum foliolosum
- Scientist can expand this information to make an herbal formulation
- Practically anxiety can be cure by adopting such herbal treatments

Biography

Dr. Neeraj Bainsal completed her Bachelor of Pharmacy from Himachal Pradesh University Shimla in 2011 with 76 percent and studied Masters of Pharmacy from Baddi University in 2013. She completed her PhD degree in 2023 from Chandigarh University. She has 27 review and research papers and 2 book chapters in her credit. She has 1 published and 1 filed patent. She has a total of 10 years of teaching experience. She guided more than 10 projects of Pharmacy final year students. Her specialization is in herbal plants and their antianxiety activity. Currently she is working as Assistant professor in Chandigarh University Gharuan Mohali since 2016.

Pratibha Pandey*, Fahad Khan

Department of Biotechnology, Noida Institute of Engineering & Technology, Greater Noida, Uttar Pradesh, India

Plant based compounds targeting dysregulated cell signaling pathways in several human carcinomas

Over the recent few years natural compounds has gained wider attention in exhibiting inhibitory potential against selected oncotargets for inducing apoptotic and antiproliferative activity in several human cancer cells. Several deregulated signaling pathways are implicated in cancer pathogenesis. Therefore we have inclined our research towards exploring the anticancerous efficacy of a very potent phytocompound for modulating the incontinent expression of selected crucial oncogenes. Further, inhibitory efficacy of natural compounds against oncoproteins in cervical and gall bladder cancer has not been elucidated yet. This research addresses the growth inhibitory efficacy of several phytocompounds against selected oncoproteins in cancer cells, which is known to inactivate several tumor suppressor proteins such as p53 and p27. Natural compounds treatment exhibited reduced cell viability with increased cell accumulation in G0/G1 phase of cell cycle in cancer cell lines. This has further resulted in enhanced Bax expression and decreased Bcl-2 expression releasing cytochrome c into cytosol followed by caspase cascade activation with cleavage of caspase-3, caspase-8 and caspase-9. Further, in silico studies have also supported our in vitro findings by exhibiting significant binding energy against selected target oncoproteins. Therefore, our research findings might recommend the usage of natural compouns as one of the potent drug candidate in human cancer management via targeting selected crucial oncoproteins associated with cancer progression.

Audience Take Away Notes

- Students as well as Researchers would gain insightful details about identifying natural compounds as potent alternate to chemotherapeutic drugs for cancer management
- This lecture will help them to understand research writing alongwith research project preparation that will definitely help them to become experts in the field of research and development in both industries and academia
- Faculties could gain wider details about exploitation of plant product in cancer management which would further help them to design research projects for their students and writing projects for getting Government grants

Biography

Pratibha Pandey, PhD, is an Assistant Professor working in the Department of Biotechnology, Noida Institute of Engineering and Technology, Greater Noida, India. She has received her PhD degree in Biotechnology (cancer biology) from Integral University in collaboration with Sanjay Gandhi post graduate Institute of Medical Sciences Lucknow (Workplace) in the year 2019. Her research profile includes more than 75+ publications with more than 900 citations and h index of 18 and has a cumulative impact factor 170+. She has supervising PhD and Post graduate students. She has been awarded grants from various funding agencies such as the Young Women Scientists (WOS-A) from the Department of Science and Technology, Government of India, and the CRIP Programme of TEQIP III from AKTU, Lucknow. She is an editorial board member and reviewer for several journals, including Scientific Reports (Springer Nature), Cell Cycle (Taylor and Francis), BMC, and Frontiers in Pharmacology. She has written two books with Taylor& Francis & 3 book chapters.

Rolika Gupta

Assistant Professor, Division of Microbiology, Career Point University, Hamirpur, H.P. India, 176041

Technologies for the production of tissue raised quality rich swertia chirayita using LED lamps

The major bioactive compounds in S. chirayita are amarogentin (most bitter compound) and mangiferin, which contribute to its medicinal value due to its anti-diabetic, anticancer, antimicrobial and anti-malarial properties. In this study, we developed a Light Emitting Diode (LED)–based culture setup as an alternative to the existing White Fluorescent Lamps (WFL) used as a light source in the tissue culture conditions of the plants. The tissue raised plants of S. chirayita cultivated under LED lights showed a higher accumulation of shoot biomass and secondary metabolites as compared with plants growing under WFL. In the LED lights experiment, red LED accounted for the maximum biomass accumulation (3.56 ± 0.04 g L^{-1}), and blue LED accounted for the accumulated maximum content of amarogentin (8.025 ± 0.04 µg mg-1 DW), total phenolics (22.33±1.05 mg GA g^{-1} DW), total flavonoids (29± 1.03 mg QE g^{-1} DW) and DPPH radical scavenging activity (50.40 ± 0.16%) in comparison with other light conditions. From the findings, we propose LED lightning as a more sustainable, eco- friendly and reliable source for the enormous production of quality rich secondary metabolites in shoot cultures of S. chirayita than the traditionally used fluorescent lights. Such studies open up new avenues for the conservation of natural population of the herb too.

Biography

Rolika Gupta is a highly motivated and accomplished biotechnology professional with a strong academic background in plant tissue culture and microbiology, holding a Ph.D. degree from Jaypee University of Information Technology. I am currently working as Assistant Professor in Career Point University, Hamirpur. With a passion for research, she has conducted extensive study in the field of medicinal herbs of Himalayan Region, leading to several publications and a book chapter. Her expertise lies in in-vitro technologies for the production of bioactive compounds and cryopreservation of plants. She has also demonstrated a keen interest in optimizing nutrient media conditions for the continuous production of shoot biomass enriched in major medicinal constituents. She is seeking a challenging position to utilize her knowledge and skills in a competitive environment and is known for her resourcefulness, innovation, and flexible approach to problem-solving.

Vijayan Gurumurthy Iyer
Faculty (Climate Change), Bihar Institute of Public Administration & Rural Development (BIPARD), Gaya, Bihar, PINCODE: 82300, Bihar, India

Total Quality and Environmental Management (TQEM) from product quality to environmental performance excellence for the sustainable seed-cotton (or kapas) development

Organic seed-cotton (or kapas) is the seed-cotton (or kapas) grown without using synthetic chemicals either as pesticides or as growth promotors, there by supporting bio-diversity and bio-geo-chemical cycles.

Genetically modified seed-cotton is not sustainable seed-cotton. This kind of seed-cotton is cultivated using lower levels of pesticides and fertilizers; however, it is not completely free from them. Organic cotton does not use genetic modification, chemical pesticides or fertilizers.

Helicoverpa armigera, commonly known as American cotton bollworm, is a pest that causes boll worm diseases which is a serious damage to seed-cotton (or kapas) crops. Extensive use of chemical insecticides, such as pyrethroid and organophosphates, has led to the development of resistance against these chemicals in H. armigera.

Pectinophoro gossypiella, is commonly known as Pink Bollworms and bud worm. India has adopted Bt seed-cotton (Bt Kapas) in the year 2001, which is grown in almost 90% of its total cotton area. Bt Cotton is the seed-cotton (or Kapas) that is seed-cotton crop which a kind of plant duly modified genetical seed-cotton. The toxicity produced by the bacterium Bacillus thuringiensis (Bt) that is the gene production pesticide added in to the genome of the cotton. Bt Toxin which acts as a pesticide or insecticide for the insects destroying the seed-cotton crops. The insect resistant genetically modified seed-cotton was designed and developed from the soil bacterium Bacillus thuringiensis in such away enables to produces Bt Protein and kills Heliothis (cotton bollworm) responsible for eating the seed-cotton leaves. Bt Gene protects the cotton plants from bollworm and bud worms which are major pest of seed-cotton as the bollworms present on the leaves become lethargic and sleepy and thus cause less damage to the seed-cotton plants. Bacterium Bacillus thuringiensis (Bt) is a bacterium that is not toxic to humans or other mammals but is toxic to certain insects when ingested. Bt works as an insecticide by producing crystal shaped toxic protein that specifically kills certain insects and protects transgenic seed-cotton crops. As the Bt Toxin gene is cloned from bacteria as it provides insects' resistance, the need for decreasing traditional insecticides which results in less soil pollution from these non-biodegradable chemicals. This causes swelling and lysis for the bud and bollworm insects's death. The Bt. cotton growth rate and sustainability of pesticide reductions have been considered in this research paper. The genetically modified seed-cotton in India, have considerably reduced chemical insecticides usage by 38% while increasing seed-cotton productivity by 22% and increasing farmer profitability by 70%. The usage of pesticide has considerably reduced by using Bt Technology for sustainable cotton development.

The regular seed-cotton is in the textile manufacturing process. Regular seed-cotton come from the genetically modified seed-cotton. The genetically modified seed-cotton provides resistant to three kinds boll worms such as American seed-cotton bollworms and pink boll worms, UK bollworms.

Helicoverpa armigera, commonly known as American cotton bollworm, is a pest that causes serious damage to cotton crops. Extensive use of chemical insecticides, such as pyrethroid and organophosphates, has led to the development of resistance against these chemicals in H. armigera.

The emerging pest of seed-cotton (or kapas) is called Helopeltis bradyi (water house) as major pest in interspecific Bt seed-cotton which has the history of causing cent percent damage and yield loss to seed-cotton due to boll worm diseases. The Helicoverpa gelotopoeon as also major pest that causes reducing productivity. Regular seed-cotton comes from Genetically Modified Seed-Cotton (GMS). GMS that modifies in order to resist bugs and more pesticides are required when bugs become stronger and more resilient.

The seed-cotton bollworm can cause quality, productivity and yield sustainability losses of 67% due to boll worm diseases caused by American boll worms, UK bollworms, pink boll worms resulting damages to crops and lint cotton. Therefore, effective and efficient product and process management must be required for sustainable seed-cotton development.

It is further concluded that natural seeds are to be designed and developed to produce organic seed-cotton and organic colour seed-cotton.

Pesticides, insecticides, genetically modified seed-cotton and other harmful chemicals are not to be used in cultivating seed-cotton (or kapas).

Organic seed-cotton is generally less environmentally destructive than conventional seed-cotton as organic seed-cotton does not use any pesticides, insecticides, bollworm and bud worm resistant seed-cotton, transgenic seed-cotton. Conventional seed-cotton are manufactured for meeting industrial requirements and conventional seed-cotton growing methods, and environmentally unsustainable methods.

Sustainable seed-cotton is inclusive of organically produced seed-cotton due to the beneficial requirements in organic cultivation practices. It is concluded that the sustainable seed-cotton production using sustainable organic practices including organic seed-cotton and naturally pigmented colour seed-cotton must be on the rise.

Keywords: Artificial, Kapas, Lint-Cotton, Natural, Productivity, Quality, Seed-Cotton, Sustainability.

Audience Take Away Notes

- The conceptual approach of the product and process and combined growth management of seed-cotton (or kapas) sustainable technology
- Sustainable seed-cotton technological development
- The research work provides practical solution to the present seed-cotton technological problem.
- The paper will improve the reliability, timeliness and accuracy of seed-cotton design, or provide new information to assist in a seed-cotton design and development problem

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering at the Indian School of Mines, (Presently: Indian Institute of Technology), Dhanbad, India and post graduated and doctorate as M.Tech. and Ph.D in 1998 and 2003 respectively. He then joined Post Doctoral Fellow (PDF) in World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece of Prof. Nikos Mastorakis. https://www.wseas.org/mastorakis/. He has elaborated PDF in 2010 in the same institution. He received his D.Sc. (Engg.) and LLD degrees in 2010 and 2011 at the Yorker International University respectively. He received his DL degree 2011 at the International Biographical Centre (IBC), Cambridge, Great Britain. He has published more than 460 research articles in peer-reviewed journals and conference proceedings. He has more than 5000 citations and 500 citation index databases. His h.index is 60. He has more than 130 multilingual eBooks published in his credit.

Mukul Sharad Verma, Om Prakash Shukla*, Sudhir Kumar Singh Chauhan

JK Paper Limited, Unit: CPM, Fort Songadh, Gujarat, India

Tree breeding for development of triploid hybrid in leucaena leucocephala to resolve wood sustainability in India

Subabul (Leucaena leucocephala) is native to Central America and Mexico, but now grows naturally in most tropical areas globally. It is one of the pulpable species globally which plays a prominent role in paper and pulp industry in India. As of today, Leucaena leucocephala plays important role such as fodder, green manure along with also being nitrogen fixing from atmosphere and has reduced the use of chemical fertilizers and have enhanced soil fertility. Leucaena leucocephala today is one of the major pulp sources for production of writing printing papers, newspaper and packaging board which is used in daily human lifestyles. This two-way transaction has been proven beneficiary for both farmers and Company.

Leucaena leucocephala is grown in Prakasam and Krishna District of Andhra Pradesh along with Gujarat, Maharashtra and Orissa. It is well distributed in all the geographical locations in India and tropical countries of the world. Approximately 3 million MT Leucaena leucocephala wood is being procured by the paper industries from North & South Andhra Pradesh, Gujarat, Maharashtra and Telangana with turnover of 146 million dollar per annum.

The total Leucaena leucocephala plantation is spread over 50000 Hectare generates 3 million mandays for 18 Million dollar for harvesting and 150 thousand trucks amounting 72 million dollar for transportation of wood from plantation areas to major paper industries in India. The business turnover by Leucaena leucocephala wood is 235 million dollar. If the similar wood quantity is replaced by other species imported pulpwood, then total additional amount of 353 million dollar is required.

Leucaena leucocephala is most suitable species for pulpwood and mass scale propagation can be done through seeds and clonal plants by vitro and vivo technologies. The Leucaena leucocephala plant has profound characters of higher seed production which spreads nearby fields for natural germination in others agriculture field which is a main restrictive cause for Leucaena leucocephala plantation, and more energy is moved to seed production which can be diverted to wood production by producing sterilized plant, which has been addressed by breeding and hybridization by development of triploid species. A hybridization program was initiated to enhance wood production plus disease and pest resistance clones/ hybrids.

- Leucaena leucocephala (2n)-104 Chromosomes. L. leucocephala is a highly self-compatible tetraploid (2n = 4x = 104) and has a relatively narrow genetic base.
- Leuceana collinsii diploid (2n)-52 Chromosomes, L. collinsii is high resistance to psyllids, tolerance to cold temperatures and good wood qualities.

After breeding between two parents hybrid has been developed which was further confirmed for hybridity by the DNA fingerprinting test and the hybrid seeds were released for progeny trial in that the volume increment has shown vigorous growth of seedless Leuceana leucocephala and the seedless variety was released for commercial production by vitro and vivo technologies for mass multiplication and pulpwood plantation in India.

Biography

Mr. Om Prakash Shukla is Post Graduate in M.Sc (Genetics) and SFRC. He started his service in 1983 at Nepa Ltd and during his 39 years of service he has served Sirpur Paper Mill, JK Paper Ltd, Unit Rayagada, BILT APR Unit in India for Plantation, Bamboo and Hardwood procurement. Currently he is working with JK Paper Ltd, Unit CPM as Chief General Manager (RM). He has visited Vietnam, Indonesia, Myanmar, Gabon, South Africa, Mozambique, France and Brazil for Forestry works. He has published 11 full length, 6 Abstract papers on tree improvement for pulpwood & pulp yield productivity and attended 12 Conference and seminars at National and International level.

S. Jahandari[1], G.A. Asadi[2], S. Khorramdel[2]*, D. Roodi[3]

[1]MSc student in Agroecology, Department of Agrotechnology, College of Agriculture, Ferdowsi University of Mashhad, Iran

[2]Associate Professor, Department of Agrotechnology, College of Agriculture, Ferdowsi University of Mashhad, Iran

[3]Khorasan Razavi Agricultural Research, Education and Natural Resource Center

Evaluation of sunn pest resistance in bread wheat genotypes/cultivars using agronomic characteristics

The Sunn pest (Eurygaster integriceps Put.), known for causing severe decreases in wheat growth, yield and flour quality, is one of the most destructive insects in Iran. So, efforts had been made to identify wheat genotypes that are resistant to this pest. To investigate the response of wheat genotypes to the Sunn pest, we evaluated 18 bread genotypes and 2 cultivars. These genotypes/cultivars were selected based on flour quality, high yield and tolerant to drought stress. This experiment was conducted based on a randomized complete block design with three replications in Neishabur Agricultural Research Station, Khorasan-e Razavi, Iran during 2022-2023 growing season. The numbers of adult and nymph Sunn pests were counted in mid-January and one month later by randomly selecting sampling quadrat with dimensions of 0.5×0.5 m^2. The studied traits were plant height, number of days to spike emergence, number of days to physiological maturity, and numbers of adult and nymph per m^2. The results revealed that genotype/cultivar had significant impact on density of adult and density of nymph per m^2. The highest density of adult and nymph were recorded for L_9 with 4.0 and L_7 with 3.83 No. per m^2, respectively.

Keywords: Numbers of Adult, Numbers of Nymph, Sunn Pests, Wheat.

Audience Take Away Notes

- The results introduce practical strategies for the sustainable management of the Sunn pest in cereals, such as wheat and barley
- This result provides new ideas for the agronomic management of the Sunn pest in cereals, especially in wheat and barley
- The results of this project are useful for the sustainable management of the Sunn pest to improve yield and maintain the quality of wheat flour

Biography

Dr. Soroor Khorramdel studied Agroecology as a Faculty member at the College of Agriculture, Ferdowsi University of Mashhad, Iran since 2012. She received her PhD degree in 2012 at the same University. Her research interests are biodiversity, and low external input and sustainable management of agroecosystems. She has published seven books/chapters (4 in Persian and 3 in English), 16 papers in English, and some in Persian in International and national journals, respectively. She has also cooperated in the implementation of an international project with The Centre for Sustainable Development and Environment (Cenesta) and Bioversity International. She completed the R software training course with two university professors (Dr. Alemu Tolemariam and Dr. Yohannes Gedamu).

Sangeeta Singh
International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi-110067, India

Genomic advancements: Unveiling a 62k genic-SNP chip array for precision genetic studies and breeding applications in pigeonpea (Cajanus Cajan L. Millsp.)

Pigeonpea stands as the second most vital leguminous crop in South Asia, playing a crucial role in ensuring food and nutritional security. To expedite breeding efforts, we have harnessed advanced genomic tools, specifically a high-throughput 62 K SNP chip array named 'CcSNPnks' designed for the Affymetrix GeneTitan® platform. This array is a product of meticulous filtration of 645,662 genic-SNPs identified through the re-sequencing of 45 diverse genotypes.

Comprising 62,053 SNPs from 9629 genes across five distinct categories, 'CcSNPnks' includes single-copy genes unique to pigeonpea, those conserved between soybean and pigeonpea, homologs of crucial agronomic genes, disease resistance and defense response genes, and multi-copy genes of pigeonpea. This comprehensive genic chip boasts a distribution of 28.94% exonic, 33.04% intronic, 27.56% 5′UTR, and 10.46% 3′UTR SNPs, featuring multiple SNPs per gene for effective gene haplotype network analysis.

The utility of 'CcSNPnks' extends to various applications, as evidenced by its successful deployment in analyzing the genetic diversity and population structure of 95 pigeonpea varieties. Furthermore, it facilitated high-resolution mapping of 11 QTLs related to yield traits in a biparental RIL population, specifically targeting the number of branches, pod-bearing length, and number of seeds per pod.

Functioning as a precise and high-density genotyping tool, the 'CcSNPnks' chip array emerges as a valuable resource for activities such as high-resolution fingerprinting, QTL mapping, and conducting genome-wide, as well as gene-based association studies in the context of pigeonpea research.

Biography

Dr. Sangeeta Singh currently holds the position of Principal Project Scientist at the International Centre for Genetic Engineering and Biotechnology, New Delhi, India. Previously, she served as a Senior Scientist at NGGF, National Institute of Plant Genome Research, New Delhi. Dr. Singh earned her PhD in Plant Biotechnology from DAVV, Indore, India, and pursued postdoctoral studies at ICAR-NIPB, New Delhi, India. She has expertise on plant genomics, molecular breeding, and bioinformatics. With a wealth of expertise in her field, Dr. Singh has made significant contributions, including the development of two impactful products: a 62K SNP array tailored for pigeonpea and an 80K SNP array designed for mango. Additionally, she has created two databases—an extensive GM crop database and an SSR database dedicated to millets. Dr. Singh's research endeavors are well-documented, with over 35 publications in esteemed international journals. Beyond her research, she actively participates in the scientific community, serving as an editorial board member and reviewer for reputable journals. Recognizing her scientific excellence, Dr. Singh has received numerous prestigious awards and honors, surpassing twelve in total. Notable accolades include the Junior Scientist of the Year Award in 2017 from the National Environmental Science Academy and the Fellow Award in 2023 from the Society of Plant Research in India.

Phumzile Sibisi
Department of Agriculture and Animal Health, University of South Africa, Private Bag X6, 1710 Florida, South Africa

Identification and characterization of micrornas as role players in the wheat (Triticum Aestivum) defence response against the Russian wheat aphid

Wheat (Triticum aestivum L.) is one of the most dominant crops for human and livestock feed. Yields of wheat have declined worldwide due to pathogens and pests. Diuraphis noxia (Russian wheat aphid, RWA) is the most devastating aphid pest affecting wheat cultivation in South Africa and other regions. Feeding by this insect causes the appearance of severe symptoms, including necrosis, streaking and trapping of the heads of the wheat plant. This reduces crop yield and can lead to the death of susceptible cultivars. The use of resistant cultivars against the RWA is being negated by the emergence of resistance-breaking biotypes. Feeding by the RWA on wheat induces differential expression of microRNA genes. Thus, this study aimed to use next-generation sequencing to identify a larger pool of microRNAs and to further characterize them and their putative targets. In this study, 12 microRNA libraries (3 bioreps) from Tugela uninfested, Tugela Dn uninfested, Tugela infested and Tugela Dn infested were constructed respectively. The expression of candidate miRNAs and their targets was determined by quantitative real-time PCR. The predicted target genes were analysed for their gene ontology placement to determine their biological roles in plants. A total of 503 miRNA candidates were obtained, and only 87 of these matched the known Triticum aestivum miRNA. The identified miRNAs seem to target known resistance gene family members and previously identified resistance responses from wheat after infestation by the RWA. The gene ontology results indicated that most of the identified targets in this study play a role to regulate some biological pathways that are known to be regulated during wheat-RWA interaction. The use of the next-generation sequencing method has boosted small RNA discoveries at an unprecedented scale. However, only a few out of several thousand discovered small RNAs have been functionally characterised. The field of small RNA functional genomics research is still in its early phase and in the case of complex crops like Triticum aestivum the progress is even slower. More work needs to be done to characterize more miRNAs. The identification and characterisation of more small RNA and their target genes will contribute to our understanding of wheat and RWA interaction. Once a better understand of this interaction is achieved then this knowledge can be utilised in the future production of crops with better resistance against RWA.

Audience Take Away Notes

- The audience will learn about wheat-Russian wheat interaction. How to identify Russian wheat aphids infestation in the field. How to analyse Next generation sequencing and which miRNAs are involved in wheat-Russin wheat aphid interaction
- This study will help those who are interested in plant-pest interaction and want to know which genes are involved in the defense during the interaction. This study will also benefit those who are in plant breeding. This study will help them to understand which genes are regulated during wheat-Russian wheat aphid interaction. This will help them to understand the interaction better and develop cultivars which are more resistant to insects

- This research can be used by other faculties to expand their research especially those who are working on plant biochemistry. They can use this study to understand the mechanisms that take place during plant- insect interaction
- This study will assist researchers to understand wheat-Russian wheat aphid better and develop cultivars which are more resistant to insects. This will help to limit the use of insecticides which are more harmful to the environment
- This study will assist researchers to understand wheat-Russian wheat aphid better and develop cultivars which are more resistant to insects

Biography

Dr. Phumzile Pretty Sibisi is currently a Senior Lecturer in the Department of Agriculture and Animal Health, University of South Africa. She obtained her BSc in life and environmental science from the University of Johannesburg in 2010 and completed her BSc in Biochemistry (Hons) in 2011. In 2014, she achieved her master's degree in Botany from the University of Johannesburg. In 2015, she enrolled for a doctoral degree at the University of Johannesburg and graduated in 2020. During her academic training, she has been working on plant pest interaction-related topics. She has gained valuable experience in molecular biology techniques. She started working as an academic at the Department of Agriculture and Animal Health at the University of South Africa in 2020.

Odewade Joseph Oluwaseun[1]*, Musbau Sikiru[2], Odewade Lydia Oluwatosin[3]

[1]Department of Microbiology, Faculty of Life Science, Federal University Dutsin-Ma, Katsina, Katsina State, Nigeria
[2]Department of Microbiology, Faculty of Science, Yobe State University, Damaturu, Yobe State, Nigeria
[3]Department of Environmental Management, Faculty of Earth and Environmental Sciences, Bayero University, Kano, Kano State, Nigeria

In vitro assessment of antidiarrheic properties of root fractions of chrysophyllum albidum root extract

Diarrheal disease is the third leading cause of infant and child mortality in developing countries. The prevalence rate of childhood diarrhea in Nigeria is 18.8% and is a menace in Sub-Saharan Africa. Hence, this study assessed antidiarrheic potentials of root fractions (n-butanol, aqueous and ethyl acetate) of Chrysophyllum albidum and their ability to compromise the integrity of microbial cytoplasmic membrane. The antidiarrheic potentials were evaluated via sensitivity test, Minimum Inhibitory Concentrations (MICs), Minimum Bactericidal Concentrations (MBCs) and time kill kinetics of potent fractions. Microbial cytoplasmic membrane disruption was evaluated by the amount of potassium ions and nucleotides released from Escherichia coli as representative isolates after 120 minutes of treatment with the fractions using atomic absorption spectrophotometer and Ultraviolet spectrophotometer (Perkin Elmer Lambda 35) at 260nm wavelength. The zones of inhibition expressed by the potent fractions at 10 mg/mL ranged between 10±0.94 and 24±0.00. The standard antibiotics showed inhibition zones that ranged between 9±0.47 and 27±0.00 at 1 mg/mL. The range of MICs by the potent fractions was 0.31 mg/mL and 5 mg/mL while the MBCs of potent fractions was 0.63 mg/mL and 10 mg/L. This finding showed a relationship between the amount of cellular constituents leaked out of Escherichia coli as representative organism and the percentage of cells killed with an increase in contact time and concentrations of the fractions. At 3 x MIC after 120 min contact time, 100% mortality was achieved by the n-butanol fraction against test cells while 2.83 and 0.93 µg/mL of potassium ions and nucleotides were leaked from the test cells at the same concentration respectively. This finding validated the use of the plant by the people of Sub-Saharan Africa as antidiarrheal agent.

Audience Take Away Notes

- This study provided information on the development of potent antimicrobial agent from natural origin that may combat the effect of infectious diseases caused by these pathogens
- It provides information on the production of drugs from C. albidum extracts as alternative therapy in combating increasing resistance of pathogens to the existing antibiotics
- It provides information on pharmacodynamics drug interactions of C. albidum extracts and the test bacterial isolates.
- The outstanding bioactivity expressed by the extracts against prominent enteric bacterial isolates equally validated the use of the plant by the people of Sub-Saharan Africa as antidiarrheal agent
- The growth of Escherichia coli, Salmonella typhi and Shigella dysenteriae, the common causative agents of diarrhoea, dysentery, and other infections were also significantly inhibited by the extracts as observed in this study. This validated the traditional use of the roots of the plants in treating such infections

Biography

Odewade Joseph studied Microbiology at The Federal University of Technology, Akure, Nigeria and graduated in 2007. He received his MSc. degree in 2015 at Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria with distinction and is currently rounding up his PhD degree in Pharmaceutical Microbiology at Bayero University, Kano, Kano State, Nigeria. He has published more than 10 research articles in pharmaceutical microbiology most especially natural products from medicinal plants. He specializes on Pharmaceutical Microbiology of natural products and drug research with more than eight years experience in teaching, research and mentorship in Federal University Dutsin-Ma, Katsina State Nigeria.

Zsolt Pónya[1]*, Attila Sragli[2]

[1]Institute of Agronomy Hungarian University of Agriculture and Life Sciences, Kaposvár, Hungary
[2]Tatam Ltd., Budapest, Hungary

The potential use of the analysis of biophoton emission profiles in monitoring plant health state

It has been known that all living organisms emit a spontaneous ultra-low electromagnetic radiation, the source of which is under constant dispute. Whether this very weak electromagnetic radiation stems from excited molecules generated during stress responses that entail redox potential changes during stress adaptation and/or a consequence of an entity depicting a subatomic feature of living matter hence representing a deeper layer of manifestation of life processes remains obscure.

Notwithstanding the uncertainty pertaining to which scenario may prove correct, an elevated level of this spontaneous emission sets in concomitantly upon stress conditions, therefore it reveals the “stress state” of living organisms which allows for monitoring the physiological conditions of crops in a noninvasive manner. This approach opens up a new vista in exploring novel ways for real-time, on-the-spot analyses of crop physiological states. However, the increase in the emission appears to be atypical and does not reflect the nature (biotic/abiotic) or the type of the stress impinging on the plant.

A deeper study of the dynamics of the emission signals and an elaborate analysis of intensity changes in sets of pixels which ensue on leaf surfaces reveals a more profound significance these changes may have viewed from the angle of possibly reflecting specific physiological responses elicited by underlying stress conditions.

This approach may prove a promising tool in the continuous and precise control of crop health state and in addressing the challenges imposed by ever-increasing environmental stress exacerbated by global climate change-driven extremes that more and more frequently occur in abiotic and biotic conditions encumbering agro-ecosystems.

During the presentation an experimental set-up and analysis method conjectured to gain relevance in efforts exerted in fulfilling the need for continuous plant health state monitoring and their potential exploitation in preemptive and modern plant protection practices emphasizing the need for ensuring biostimulants-based approach in precision agriculture will be presented.

Biography

Zsolt Pónya after conducting a research project implemented at the University of Nottingham, UK, has completed his PhD at the age of 32 years at the Eötvös Lóránd University of Arts and Sciences, Budapest, Hungary, and following obtaining his degree, he has launched his postdoctoral studies at the University of Siena, Italy, followed by a postdoc research fellowship at the Ben-Gurion University of the Negev, Israel. He is currently a senior scientist at the Hungarian University of Agriculture and Life Sciences, Hungary. He has published a number of papers in reputed international journals and is a member of the editorial board of several prestigious scientific journals.

Sirangelo Tiziana Maria

ENEA-Italian National Agency for New Technologies, Energy and Sustainable Economic Development-Division Biotechnologies and Agroindustry, 00123 Rome, Italy

Innovative approaches to investigate pathogen resistant cannabis crops

Cannabis (Cannabis sativa L.) belongs to the Cannabaceae family and is one of the earliest cultivated crops, being of particular interest due to its multiple uses. In fact, it is characterized by an extensive set of compounds used in medicinal products and being a source of food and hemp fibre. Despite this, due to the legislation regulating Cannabis cultivation, it is a poorly characterized crop at molecular and genetic level. However, the recent easing of regulations, as well as the availability of Cannabis genome sequences, has allowed further research on this crop. The resulting increase in Cannabis production has led to an increase in the incidence, range and severity of diseases caused by crop pathogens, including the identification of previously unreported diseases. Few studies look into the molecular mechanisms involved in pathogen defense, thus the underlying biological pathways are poorly explored.

Here, we provide an overview on Cannabis defense responses against common pathogens, such as Golovinomyces spp., Fusarium spp., Botrytis cinerea and Pythium spp. For each of these pathogens, we illustrate the major symptoms in Cannabis and explore studies aiming to identify the genes involved in the resistance mechanisms of this crop. Omics studies allowing the identification of candidate defense genes are also underlined. Many of them focus on the potential involvement of disease resistance genes, while others draw comparisons with other species. Finally, genome editing approaches to generate disease resistant Cannabis species are discussed.

To the best of our knowledge, this is the first study about molecular mechanisms underlying pathogen resistance in Cannabis.

Audience Take Away Notes

- The work provides some key points for future cannabis research activities aimed to investigate molecular mechanisms underlying pathogen resistance of this crop
- The results of this review could be a great input for other research approaches, based on new emerging technologies, like genetic engineering approaches aiming to generate more resistant cannabis plants. In fact, these could contribute to elucidate the role of many candidate genes individuated in literature and highlighted in this work
- A better knowledge of cannabis molecular mechanisms underlying resistant cannabis pathways could contribute to design innovative breeding programs

Biography

Sirangelo TM is a researcher collaborator at ENEA -Division Biotechnologies and Agroindustry - focusing on genetic improvement of plants. Previously, she worked at CREA - Dep. of Genomics and Bioinformatics. Her main research aim is the application of recent NGS technologies and bioinformatics approaches to investigate plant molecular mechanisms. She graduated from University of Calabria in Biology and obtained her PhD in Agri-food Sciences, Technologies e Biotechnologies at University of Modena and Reggio Emilia. She was involved in a project focused on the analysis of gene expression in eggplant cultivars aimed to investigate the Fusarium resistance of cultivars belonging to different resistance lines.

Benoit Constant Likeng Li Ngue[1,3]*, Ndzana Ndzana Emile Lionel Landy[1,3], Molo Thierry[1,3], Molo Nathalie[1], Mbo Nkoulou Luther Fort[2,3], Hermine Ngalle Bille[1], Joseph Martin Bell[1]

[1]Unity of Genetic and Plant Breeding, Department of Plant Biology, Faculty of Science, University of Yaoundé 1, P.O. Box 812, Cameroon
[2]Plant production Unit, Mbalmayo Agricultural Research Centre (CRAM), Institute of Agricultural Research for Development, Mbalmayo, PO. 2123, Yaounde Cameroon

[3]Research and Support Center for Agropastoral Producers in Cameroon (CRAPAC)

Genetic diversity of hibiscus sabdariffa collected in some countries of the Central African sub-region

Roselle (Hibiscus sabdariffa) is a Malvaceae with multiple economic and pharmacological potential, little or poorly known and under-exploited in Cameroon. The aim of this study was to assess the genetic diversity of 36 collections from several countries in the Central African sub-region, in a two-repeat Alpha lattice (6x6) set-up at the University of Yaoundé I. Results obtained from the analysis of 20 traits, including 13 qualitative and 7 quantitative, showed significant differences (P<0.0001) between collections at 60 days after sowing. Mean heights to the first branch ranged from 2.62 to 14.70 cm, with plant heights ranging from 10.5 to 86 cm. Mean collar diameter values ranged from 0.40 to 1.36 cm. Hierarchical ascending classification was used to classify the different collections into groups of 10, 12 and 14 collections each. However, no differences were observed between origins for any of the parameters studied. Diameter at collar was strongly and positively correlated with number of branches (r= 0.8). The same is true of the 50% flowering date and the date of flower bud initiation (r= 0.6) and flowering (r= 0.8). On the other hand, thanks to their high heritability, growth parameters such as collar diameter (0.6143), number of branches (0.6363), plant height (0.7240) and height of first branch (0.7653) revealed great potential for selection and genetic improvement.

Keywords: Agromorphological Characterization, Genetic Variability, Collections, Hibiscus Sabdariffa, Central Africa.

Biography

Benoit-Constant Likeng-Li-Ngue (Date of birth: July 16, 1984) holds a PhD in Plant Biotechnology with a major in genetics and plant improvement. He is Lecturer at the Department of Plant Biology, Faculty of Sciences, Director of Research and Cooperation at the Higher Institute of Agriculture and Management of Obala (ISAGO), National Coordinator of the organization of the Cameroonian Contest of Local Products (CCPT), Coordinator of the Genetics and Plant Improvement Unit of the University of Yaoundé I, Promoter of the Research and Support Center for Agropastoral Producers of Cameroon (CRAPAC).

Graham Matthews
Imperial College, United Kingdom

A future for ultra-low volume application of biological and selected chemical pesticides

Tradition of applying pesticides has relied generally on using a formulation that mixes with water and is sprayed on crops using manually operated, knapsack sprayers, tractor equipment or aircraft to spray crops to control insect pests, diseases or weeds. The volume of water applied to crops varies but has been over 100 litres per hectare. When rain occurs, the spray deposits on the foliage of crops can be washed off especially from the upper surface of the leaves. The pesticide is therefor moved into the soil and can ultimately it can reach small streams and subsequently rivers downstream. The crop may require another application of spray to maintain control of pests.

The replace of aqueous sprays is to formulate the pesticide using an oil-based liquid so that when rain occurs, the oil formulation remains effectively where spray deposit is attached to the surfaces of the crop.

The oil-based spray is normally applied at an Ultra-Low Volume (ULV). This can be as low as one litre per hectare Trials have been carried out using a sprayer fitted with a rotary atomiser to provide droplets, the size of which is within a relatively narrow spectrum to avoid spray drift with very small droplets or wastage to the soil with large droplets. Such trials have enabled yields similar to those achieved when very large volumes of water-based spray were applied.

ULV spraying is particularly important when drones are used to apply pesticides as the spray tank can carry sufficient spray to lengthen the period available for spraying a larger area of crop, without frequent landing to refill the spray tank.

Biography

Graham Matthews graduated at Imperial College, London as an entomologist in 1957. In 1958 I went to Southern Rhodesia (now Zimbabwe) and Nyasaland (now Malawi) to do research on control of insect pests of cotton crops. In 1967, I returned to Imperial College, but was seconded to Malawi in 1968 to follow up previous research there, which involved a study on ultra-low volume spraying of cotton, as farmers had difficulty obtaining enough water to spray with a knapsack sprayer. In 1972, I returned to Imperial College and remained at Silwood Park campus until I retired in 2001. In 1974 I obtained my PhD and later received a DSC. Over this period I did teaching, including special courses for overseas visitors and research on Pesticide Application and supervised students doing their Doctorate. The research unit was known as the International Pesticide Research Centre (IPARC). I also did tests of different sprayers for WHO in relation to controlling mosquitoes, and since retirement did some training courses for WHO. I visited numerous countries, including Brazil, China, Colombia, Egypt, Kenya, South Africa, Sudan, Tanzania, Turkmenistan and Uzbekistan, to advise on crop protection. Visits to certain countries, including Australia, Cameroon, Ethiopia, India, Malaysia, Nigeria, Pakistan and Zimbabwe were to participate in training courses on pesticide application. I have published several books between 1979 and 2022, notably Pesticide Application Methods, Pesticides, Health, Safety and the Environment, Pest Management, Cotton Pests and their Management, Integrated Vector Management, A History of Pesticides, and Pest Management in Cotton: A Global Perspective.

Ayadi Radia*, Nakkab Selma, Riah Abdelaziz, Chanane Hidayet, Cherif Djouher, Ferdjioui Meroua, Chelali Rayane

Department of Biotechnology and Agro-Ecology, NLS Faculty, Blida 1 University, Blida, Algeria

Chemical analysis and evaluation of anti-microbial activities of extracts from aerial and underground parts of algerian echinops spinosus

Infections caused by pathogenic microorganisms such as bacteria, fungi, and viruses continue to pose a significant public health challenge. The increasing resistance to conventional antibiotics and antifungal agents underscores the urgent need for the discovery of new sources of antimicrobial substances.

Algeria, owing to its extensive land area and biogeographical position, is home to an extraordinary floral and ecological diversity, featuring over 3,000 plant species belonging to numerous botanical families. Among these, approximately 15% are endemic and remain largely unexplored from a phytochemical and pharmacological standpoint.

In the context of valorizing Algerian flora, a chemical analysis of the aerial parts (stems, leaves, flowers) and subterranean parts (roots, rhizomes) of Echinops spinosus was undertaken in the El-Hadjeb region of Biskra. The aim of this research was to characterize the chemical compounds present in this plant and to determine their potential as antimicrobial agents.

The analysis of the aerial and underground parts of the plant revealed the presence of various chemical groups, such as alkaloids, quinones, coumarins, saponosides, tannins, polyphenols, flavonoids, and reducing sugars. The results indicate the chemical richness of this plant and its potential for the discovery of bioactive compounds with therapeutic interest.

To assess the antimicrobial activity of the extracts, we employed the agar diffusion method, testing various reference bacterial strains such as Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, Escherichia coli, and Salmonella abony, as well as the fungal strains Candida albicans and Aspergillus niger. The results demonstrated resistance in some microbial strains and sensitivity in others. The chloroform extract obtained by maceration of the aerial part showed good microbial activity (sensitivity of the tested microbial strains), in contrast to the chloroform extract from the underground part, which exhibited low activity.

These results confirm the therapeutic potential of Echinops spinosus as an antimicrobial agent, thereby opening new possibilities for its use in medicine and pharmacology.

Keywords: EchinopsSpinosus, Secondary Metabolites, Phytochemical Analysis, Antimicrobial Activity.

Audience Take Away Notes

- **Antimicrobial Resistance:** The increasing resistance to conventional antibiotics and antifungal agents underscores the need to identify new sources of antimicrobial substances
- **Algerian floral diversity:** Algeria exhibits substantial biodiversity, encompassing in excess of 3,000 plant species, approximately 15% of which are endemic and extensively under-researched in terms of their phytochemical and pharmacological attributes, exemplified by species such as Echinops spinosus
- **Therapeutic Potential:** The findings of the study suggest a therapeutic potential of Echinops spinosus as an antimicrobial agent, paving the way for future applications in medicine and pharmacology

Biography

Dr. Radia Ayadi completed her undergraduate studies at the University of Blida 1 in Algeria, where she earned her State Engineering degree in Agronomy, specializing in Plant Productions, in 1997. Subsequently, she proceeded to the University of Rennes 1 in France to pursue her Advanced Studies Diploma (Diplôme d'Études Approfondies - DEA) in Genetics, Adaptations, and Plant Productions, which she obtained in 1998.From 1998 to 2003, Dr. Ayadi joined the Faculty of Pharmacy at the University of Tours in France to work towards a PhD in Biology, under the guidance of Dr. Jocelyne Trémouillaux-Guiller.Following her doctoral studies, she undertook a post-doctoral internship at the INRA of Lusignan, France, from 2004 to 2005, supervised by Dr. Bernadette Julier. Since then, Dr. Ayadi has been employed as a teaching researcher at the University of Blida 1 in Algeria.

Marouane Ben Massoud[1,2]*, Oussama Kharbech[1], Abdelilah Chaoui[1], Astrid Wingler[2]

[1]University of Carthage, Faculty of Sciences of Bizerte, LR18ES38 Plant Toxicology and Environmental Microbiology, 7021, Bizerte, Tunisia
[2]School of Biological, Earth & Environmental Sciences, University College Cork, Distillery Fields, North Mall, Cork, T23 N73K, Ireland

Effect of exogenous treatment with Nitric Oxide (NO) on redox homeostasis in barley seedlings (Hordeum Vulgare L.) under copper stress

The present research investigates the protective mechanism of Nitric Oxide (NO) in regulating tolerance to Cu-induced toxicity in shoots of barley (Hordeum vulgare L.). After 10 days, treatment with 200 µM CuCl2 caused a significant reduction in growth and photosynthetic efficiency concomitant with a strong increase in the contents of Reactive Oxygen Species (ROS), antioxidant enzymes activities such as Catalase (CAT), Superoxide Dismutase (SOD), Guaiacol Peroxidase (GPOX) and Glutathione Peroxidase (GPX). An increase in the lipid peroxidation markers malondialdehyde (MDA) and Lipoxygenase Activity (LOX) indicated oxidative stress. Furthermore, inhibition of growth in 200 µM Cu-treated plants was associated with a reduction in carotenoids, chlorophyll and maximum photosystem II efficiency. However, copper treatment provoked a strong increase in activity of the glutathione-ascorbate cycle enzymes ascorbate peroxidase (APX), Dehydroascorbate Reductase (DHAR), Monodehydroascorbate Reductase (MDAR) and Glutathione Reductase (GR), but a decrease in levels of the non-enzymatic antioxidant compounds glutathione (GSH), Ascorbate (AsA). The addition of 500 µM of the Nitric Oxide (NO) donor, Sodium Nitroprusside (SNP), to the growth medium alleviated Cu toxicity by reducing Cu uptake and enhancing antioxidant capacity, as indicated by increased contents of GSH and AsA. The current results show that NO addition can alleviate Cu toxicity by affecting the antioxidant defense system, photosynthetic system and maintaining the glutathione-ascorbate cycle status, suggesting that NO treatment protects proteins against oxidation by regulating the cellular redox homeostasis.

Audience Take Away Notes

- The present investigation was performed in order to better understand the NO-induced modulation of Cu toxicity, with special focus on the involvement of the AsA-GSH cycle
- Test the role of Nitric Oxide (NO) in plant–heavy metal interactions
- In summary, we show that NO restores the cellular redox homeostasis, photosynthesis, and antioxidant defense systems by reducing Cu-induced toxicity in the shoots of barley seedlings

Biography

Dr. Marouane Ben Massoud studied Biology at the University of Carthage, Tunisia and the University College Cork, Ireland. He currently works at the School of Biological, Earth and Environmental Sciences, University College Cork. Marouane does research in Cell Biology, Plant Physiology, Molecular Biology and Proteomics. Their current project is 'ALLEVIATION OF HEAVY METALS TOXICITY IN GERMINATING SEEDS BY EXOGENOUS CHEMICAL EFFECTORS'.

Anabela Silveira de Oliveira
Centro Universitário da Região da Campanha, Bagé, Rio Grande do Sul, Brasil

Pampas cacti: Ecology, diversity and conservation

I present a paper dealing with the family Cactaceae in the Pampas, which were studied by field surveys (2001–2023) and analysis of relevant literature. For each genus, species richness in the study area, general distribution, detailed maps concerning the study area, and original pictures are provided. The species were assessed according to the IUCN categories and criteria. A key for the identification of the genera in study area was proposed. A description of the main found phytophysiognomies (field, saxicola, forest, and wetland), in which the cacti grow, were also given using the Walking Method. Around sixty-three Cactaceae taxa were registered covered, belonging to the following genera: Parodia taxa, including a nomenclatural change, i.e. P. ritteriana comb. nov. (≡ Notocactus ritterianus), two new species (Frailea erythracantha and Parodia hofackeriana), and Frailea, Gymnocalycium, Wigginsia, Echinopsis, Cereus, and Opuntia. The floristic diversity found in the study area is related to the edaphic and climatic conditions provided by the stony springs, which constitute a favorable microclimate of intense luminosity, heat and humidity for xerophytic species to develop in open areas.

Audience Take Away Notes

- The review of species on the Pampa biome can help in studies of insect-plant interactions, as well as helping to define priority areas for conservation in Brazil, due to the high rate of degradation in mining areas, given that terrestrial Cactaceae species are mostly found in rocky outcrops
- The dissemination of this work is important for the appreciation of native species of Neotropical Cactaceae, since these plants are the target of collectors all over the world
- There are countless species to be studied in terms of their ecosystem and ornamental potential
- Identifying the species that occur in the Pampa biome is extremely important for conservation projects
- Information on the Pampas cacti is necessary for other interdisciplinary projects to be built
- List all other benefits
    - Knowledge about the ecology and diversity of the species that occur in the Pampa Biome; Recognition of species that may still be unknown to science
    - Ecological studies and studies on the biology of the species should be carried out to complement this work

Biography

Anabela Silveira de Oliveira was graduated in Biological Sciences (Full Degree) from the University of the Campanha Region (2001), Master's (2004) and Doctorate (2008) from the Department of Forestry Sciences at the Federal University of Santa Maria and Post-Doctorate (2016) from the Postgraduate Program in Geography at the Federal University of Santa Maria. Pioneers of Ecology Award, 2017. Adjunct professor, researcher at Urcamp. She belongs to the Baldu-

ino Rambo Interinstitutional Botany Studies Center at the Federal University of Santa Maria/RS. She was one of the founders of the scientific journal Balduínia and has focused her research on taxonomic botany in grassland ecosystems, mainly in the Pampean biogeographical province. She has published 60 full scientific papers with research group in national and international journals, 5 books, 8 book chapters, 44 abstracts in event proceedings.

Borja Barbero Barcenilla*, Emma Canaday, Alexander Meyers, Sarah Wyatt, Dorothy E. Shippen

Texas A&M University, United States

Growing beyond earth: Telomere tales of arabidopsis thaliana in lunar regolith simulant and on international space station

NASA envisions sustainable colonies on the moon and on Mars by 2050, and plants will play pivotal roles in these endeavors. Here we investigate how the telomeres and telomerase of Arabidopsis thaliana are impacted by space flight and growth on extraterrestrial soil simulants. We report that telomere length is steady in plants grown on the International Space Station (ISS), although telomerase enzyme activity is strongly induced, increasing by up to 150-fold in roots. Ground-based studies affirmed telomerase activity is elevated in Arabidopsis by diverse environmental stressors, and this induction is independent of telomere length changes. There was a strong inverse correlation between genome oxidation and telomerase activity levels, suggesting plant telomerase may harbor a redox protective role that can help to facilitate survival in harsh environments. Recent studies show that A. thaliana can be successfully cultivated in lunar regolith, but arrests at a terminal vegetative state and activates multiple stress responses. We found that pre- washing the simulant with an antioxidant cocktail facilitated seed setting and viable second-generation plants, but plants grown in lunar regolith simulant displayed increased genome oxidation and reduced biomass compared to earth soil cultivation. Moreover, growth in lunar regolith simulant resulted in progressive telomere shortening and reduced telomerase enzyme activity for a variety of different A. thaliana accessions and in a variety of different regolith simulants. These findings highlight both the promise and the challenges of ensuring genome integrity for successful plant growth in extraterrestrial environments.

Biography

Dr. Borja Barbero Barcenilla is Postdoctoral researcher on Texas A&M University working on E9 Rosses 2022 grant funded by NASA regarding effects of space radiation on plant genome and telomeres NASA 2022 SHINE program fellow.

Yapo Yomeh Cynthia Viviane[1]*, BOLOU Gbouhoury Eric-Kévin[2], ZIRIHI Guédé Noël[3]

[1]Department of Science and Technology, University Alassane Ouattara/ BP V 18 Bouaké 01, Côte d'Ivoire

2National Centre for Floristics, University Felix Houphouët-Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire

[3]Botanical laboratory, University Felix Houphouët- Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire

Antimicrobial medicinal plants used in the Grands Ponts region (Côte d'Ivoire): Ethnobotanical study and evaluation of the antibacterial, antifungal and toxic activities of the most frequently used taxa

The aim of this study was to identify antimicrobial medicinal plants in the Grands Ponts region of Côte d'Ivoire and to assess the antimicrobial and pharmacological activities of some of these plants. The ethnobotanical survey identified 105 species belonging to 95 genera and 48 families. The Euphorbiaceae family was the most represented in terms of species. Trees and microphanerophytes were the most represented morphological and biological types. Most of the species recorded belong to the GC-SZ phytogeographical zone. Leaves were the most commonly used parts. Decoction and kneading, and the cutaneous route, were the main methods of preparation and administration of medicinal remedies, in combination with the other routes (oral, anal, nasal, auricular and ocular). 22% of the recipes were monospecific. Among the most frequently cited species, Mallotus oppositifolius, Mareya micrantha and Macaranga hurifolia were selected. Aqueous, 70% ethanolic and aqueous residual extracts were used to assess antibacterial, antifungal, cytotoxic and acute toxicity activities, followed by phytochemical sorting. The Müller-Hinton solid diffusion and liquid microdilution methods produced zones of inhibition of the extracts ranging from 6.67 ± 0.58 to 28.17 ± 0.29 mm for all strains, with MICs ranging from 1.56 to 100 mg/mL. The agar diffusion method was used to assess antifungal activity. It yielded MICs ranging from 0.097 to 3.125 mg/mL; MFCs between 0.097 and > 1.56 mg/mL and IC50s ranging from 0.048 to 0.145 mg/mL for all extracts. Phytochemical sorting of the 9 extracts studied revealed the presence of polyphenols, flavonoids, terpenes, saponoids, sterols, coumarins and quinones. Cytotoxicity tests of 70% ethanolic extracts of M. oppositifolius, Mareya micrantha and Macaranga hurifolia using the MTT test on human HFF (Human Foreskin Fibroblast) cells in in vitro culture showed that extracts of Mallotus oppositifolius and Macaranga hurifolia were not cytotoxic. Mareya micrantha, on the other hand, is toxic to humans. All these results justify the traditional use of extracts from these species.

Keywords: Ethnobotany, Antimicrobial, Cytotoxic, Ivory Coast, Mallotus oppositifolius, Mareya micrantha and Macaranga hurifolia

Biography

YAPO Cynthia began her academic training at the University of Abobo Adjamé in Côte d'Ivoire. She obtained a master's degree in 2014, where she studied Plant Biology - ethnobotany option and specialised in Ethnopharmacology for her doctorate obtained in 2018 at the Université Félix Houphouët-Boigny. Part of her research work was carried out at the Institut Pasteur de Côte d'Ivoire. Having taught Life and Earth Sciences at the Lycée since 2018, she was recruited as an Assistant in the Science and Technology Department at the Université Alassane Ouattara on 14 October 2021. She has published 11 articles.

Ana P.G.C. Marques

CBQF – Centro de Biotecnologia e Química Fina, Escola Superior de Biotecnologia, Centro Regional do Porto da Universidade Católica Portuguesa, Rua de Diogo Botelho, 1327, 4169-005 Porto, Portugal

Can phytoremediation be a solution for the food vs fuel problem?

There are currently more than 3 million contaminated sites all over EU, according to the EEA (report 25186 EN). Contamination by Heavy Metals (HM) is particularly concerning, as they are not biodegradable and can accumulate in the food chains. With remediation being therefore an urgency, phytoremediation, when comparing to the other soil clean up methods, has proven to be an appealing low cost alternative. The technique encompasses the establishment of a vegetation cover that will ultimately stabilize the recipient sites.

Nevertheless the end destination of cultivated biomass is a common barrier for its application, it can indeed represent a prospect for generating products with added value. In fact, such kind of strategy can help responding to several environmental and economic problems at once. First by using degraded soils for valuable applications, gradually decontaminating them while simultaneously producing biomass with added value. Second by responding to the growing demand of biomass for energy generation – representing an obvious contribution to the solution of the food vs. fuel dilemma.

Although the possibility of using this novel remediation technique with the objective of biomass production for energetic purposes is of significant importance, there are very few developed studies in the area, and only some techniques have been addressed. Therefore this presentation will assess possible strategies for the utilization of phytoremediation derived biomass for the generation of energetic products.

Audience Take Away Notes

- This presentation will assist the audience to realise that the use of biomass cultivated in polluted and discarded soils, not implicating agricultural soils for energy crop production, can intensify the sustainability of using biomass for energy generation, whilst it can allow the increase of accessible agricultural soil through the resulting ongoing clean-up of those contaminated soils.

Biography

Ana Marques has completed her PhD in Biotechnology and her postdoctoral studies from the Portuguese Catholic University. She has been involved in research activities since 2000, when she was a researcher at Technical University of Denmark working on the production of bioparticles for biofilm applications. Since 2002 she has been developing work at CBQF/ESB-UCP concerning the remediation of disturbed soils using plant-based technologies, with the application of biological tools. She has published 2 book chapters and 25 papers in international peer reviewed journals, participated in numerous conferences and has been serving as a reviewer in several reputed scientific journals, having more than 1750 citations and a h-index of 21.

BOOK OF ABSTRACTS

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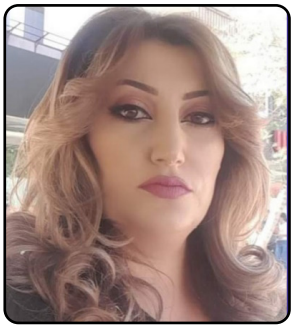

Kirakosyan Gohar

Scientific Centre of Vegetable and Industrial Crops CJSC of the Ministry of Economy of the Republic of Armenia, Ph.D, Head of Department of Breeding and Cultivation Technologies of Covered Ground Crops (Greenhous), V. Darakert, Ararat Marz, 0808, Armenia

Study of the several genetic resources beans in Armenia

Beans are rich in biologically active substances. It is a great source of vegetable proteins. Our national population consumes a large amount of beans in their diet, both in the form of green beans and beans. Cultivation of beans is carried out both in the open field and in greenhouses. More than 20 bean genetic resources/local ancient forms, cultivated varieties, imported varieties and hybrids from the world collection, original lines/research works have been developed by us. Bushy and wrapping forms belonging to the Phaseolus vulgaris species were studied. The wrapping forms were studied under greenhouse conditions. Their vegetation lasted 57-90 days, and the yield in the green under stage was 12-18 kg/m2. The Gohar variety stood out for its early maturity, its vegetation lasted 57-60 days. Armenian Chalpturik, Zepyur, Zara varieties, Ghapan variety population stood out in greenhouse conditions. In open field Masisi vegetable, Varyonka, Konditer, Dragon tang Green group varieties and Goris local variety population. An evaluation of the biological, morphological, agronomic properties of bean genetic resources in open field and greenhouse conditions was carried out. The studied genetic resources are the best starting material for the breeding of new varieties and hybrids that are adaptive in the conditions of climate variability.

Audience Take Away Notes

- Audience will learn the study genetic resourses of beans
- The audience can use the information about donor varieties, different species presented by us in their works, providing the best indicators of biological and agronomic properties of different varieties and hybrids in case of cultivation in different ecological conditions
- The results of this research can be used to expand and teach
- We can cooperate with all interested researchers, students, farmers, various specialists, thanks to our long-term work experience, we will provide the best advice, joint research, publishing articles, public awareness activities

Biography

Dr. Gohar Kirakosyan studied Breeding and Genetics of the Agricultural Crops Faculty of Agronomy at the Armenian National Agrarian University and graduated as MS in 2008. She then joined the research at the Scientific Center Vegetables & Industrial Crops MoE RA. She is PhD (Agronomy, Plant Industry) in 2016. She worked position of Head of Department of Breeding and Cultivation Technologies of Covered Ground Crops (Greenhous). She has published more than 18 research articles and created 3 new sorts beans. Participated in international and Union conferences and with Presentations.

Gayane Shaboyan[1,2]*, Karine Sarikyan[3]

[1]Scientific Centre of Vegetable and Industrial Crops CJSC of the Ministry of Economy of the Republic of Armenia Ph.D. student, Reserchер of Department of Breeding and Cultivation Technology, 0808, D. Ladoyan str.38, v. Darakert, Ararat Marz, Armenia

[2]G.S. Davtyan Institute of Hydroponics Problems, Reserchер of Department of Plant Nutrition and Productivity, National Academy of Sciences, Yerevan, Armenia, 0002, Amerikyan str.107/5

[3]Scientific Centre of Vegetable and Industrial Crops CJSC of the Ministry of Economy of the Republic of Armenia, Head of Department of Breeding and Cultivation Technology, 0808 D. Ladoyan str.38v. Darakert, Ararat Marz, Armenia D. Ladoyan str.38

Study of the several genetic resources lentils from ICARDA in Armenia

In recent years, the use of legumes, including lentils, has been increasingly recognized as ingredients for various food products. This trend goes well with increased concern about the environmental impact of meat production and consumption. Lentil is a legume crop that is one of the staples in many countries. Its global production since 2000 has increased from 3.39 to 6.54 million metric tons. Different lentil varieties have different composition and nutritional value. Lentil is very nutritious food source rich in proteins, fiber, iron and vitamin B. Combined with rice, wheat, or other cereal grains high in sulfur-containing amino acids, lentil proteins can copmlete the daily essential amino acid requirements of people in developing countries and solve their problem of need for consuming animal proteins.

The aim of the work was to study the varieties of samples obtained from ICARDA to study them in different climatic conditions of Armenia in order to select from them resistant, high-yielding varieties with high-quality chemical indicators. 16 cultivars of the global lentil collection received from ICARDA were studied, as well as the new varieties Nare and Hripsime bred by us on their basis, which were tested with 2 Armenian local varieties, Talini-6 and Haykakan 88 varieties. The seeds germinated one week after sowing. Their biological features, morphological features and economically valuable features were studied during the vegetation period. The variety Sell from 1767L stood out for overripeness, its vegetation lasted 70 days, which exceeded the controls by 20 and 24 days. The yield per square meter was: 675 g for Flip2007-12L, 660 g for 2007-4L, 570 g for super-ripe Sell from 1767L, 600 g for small grain Flip2007-3L, 300g near the inspectors, Talini 6. and near Haykakan 88: 330g. The results of the study showed that the yield of the new varieties of large-grained and small-grained Nare and Hripsime lentil exceeded the yield of local varieties by 45-50%. The protein content of lentil fruits was studied, which varied between 22-25.5% according to varieties.

Audience Take Away Notes

- Audience learn from my presentation will learn the study genetic resourses of lentils from ICARDA
- The audience can use the information about donor varieties, different species presented by us in their works, providing the best indicators of biological and agronomic properties of different varieties and hybrids in case of cultivation in different ecological conditions
- The results of this research can be used to expand and teach
- We can cooperate with all interested researchers, students, farmers, various specialists, thanks to our long-term work experience, we will provide the best advice, joint research, publishing articles, public awareness activities

Biography

Ms. Gayane Shaboyan studied Breeding and Genetics of the Agricultural Crops Faculty of Agronomy at the Armenian National Agrarian University and graduated as MS in 2010. She then joined the research at the Scientific Center Vegetables & Industrial Crops MoE RA. She is PhD student (Agronomy, Plant Industry) in 2019 at the same Scientific Center and G.S. Davtyan Institute of Hydroponics Problems. She worked position of Resercher. She has published more than 15 research articles and created 2 new sorts lentils. Participated in international and Union conferences and with Presentations.

Gayane Martirosyan
Department of Seed Production and 'Scientific Centre of Vegetable and Industrial Crops' CJSC of the Ministry of Economy of the Republic of Armenia

Impact of grafting on bio morphological and economically valuable particularities of watermelon

Watermelon (Citrullus lanatus) cv. in Armenia is an economically valuable crop with high customer demand. Its planted area was 4,525 hectares in 2022. In Armavir Marz, where watermelon cultivation is concentrated, farmers often suffer from the instability of plants to various biotic and abiotic factors, which leads to wilting of plants or a decrease in yield.

Grafting is one of the effective and environmentally friendly methods for increasing plant yield and resistance to biotic and abiotic stresses. The purpose of our study was to identify the characteristics of the growth, development, and yield of grafted watermelon plants.

Watermelon hybrids F1 (ES75077, ES75095, ES75111, ES75126, ES75127, ES75169, ES75171) used as scion were grafted onto pumpkin rootstock ES101 from the Ergon seed company collection. Grafting was done in Scientific Centre of Vegetable and Technical Crops, in greenhouse conditions by method of tongue approach. Scion seeds were sown on 8 of April and 5 days later were sown the seeds of rootstock. They were placed in germination room and kept in under the following condition: 24^{O}C day and night, humidity 90%. On the third day, we took it out of the germination room and let then to grow in the greenhouse for 10 days, after which we grafted. After grafting again 4 days they were put in germination room and kept under the same conditions: Plants were planted in v. Gribaedov in farmers plot, 1000 sq.m. Common technology for watermelon cultivation was used.

The highest vegetative growth and fruit yield were obtained by of rootstock. Compared to non- grafted plants productivity of all grafted variants increased from 70%-97%. Most of all was increased in variant ES75127-96% and ES75171 -98%. Increased yield was caused mainly by higher average fruit weight. The higher yield of fruit from grafted watermelon plants was most likely an effect of the vigorous root system of the rootstock. It is also believed to be due to enhanced water and mineral uptake. Fruit mid mass of grafted plants fruits varies from 8 kg up to 14 kg. With big fruits from 10kg to 14kg separated variants ES75095, ES750171, ES74077, other samples mass varied from 7kg up to 9kg. Grafting significantly increased dry matter content in fruits of all grafted plants from 5%-8%, sugar content 10-12% over the non-grafted plants. Compared to non-grafted variants vegetation period was prolonged from 15 to 25 days.

Audience Take Away Notes

- Audience will learn from my presentation about particularities of innovative method of grafting, thanks to which it is possible to increase watermelon productivity and resistance to biotic and abiotic stresses
- The audience can use the information about the used hybrids and rootstock, how the grafted and non-grafted hybrids performed in different ecological conditions
- The results of this research can be used to expand and teach
- We can cooperate with all interested researchers, students, farmers, various specialists, and thanks to our work experience, we will provide the best advice, joint research, publishing articles, and public awareness activities

Biography

Dr. Gayane Martirosyan graduated from Yerevan state University, Faculty of Biology. She received her PhD degree (Biological Sciences) in 1993 at the same Scientific Center. From 1978 to 2023, she worked as a Plant Breeder, Principal Investigator and Head of the Department in Scientific centre of Vegetable and Industrial Crops. She is one of the first in Armenians, who wildly studies and spreads the technology of grafting in Armenia. She is a breeder of pepper, tomato, soybean and basil. Dr. Gayane is an author of more than 25 registered and released cultivars. She is an author and co-author of 85 scientific papers published in National and International journals. She was the coordinator of numerous state and donor funded national, regional and international projects.

Sahel Haghighi[1]*, Forood sharifi[2], Mohamad Azadbakht[3], Zeynab Jafarian[4], Reza tamartash[4]

[1]PhD student in Rangeland Sciences, Sari University of Agricultural Sciences and Natural Resources, Iran
[2]Soil Conservation and Watershed Management Research Institute, Iran
[3]Mazandaran University of Medical Sciences, Iran
[4]Sari University of Agricultural Sciences and Natural Resources, Iran

Investigating vetiver plant eco physiology and shear stress changes in different regions in Iran

By increasing the shear strength of the soil, Vetiver roots increase the stability of the earthen roofs. In general, Vetiver root as a soil reinforcement agent reduces the shear stress in the soil by distributing the load between the soil grains. On the other hand, by converting its tensile strength into force along the cut, it increases the shear strength in the mass. In addition to root density in the soil, this increase is a function of its performance during rupture. Therefore, in order to evaluate the effect of Vetiver root density on the stability of soil terraces, in addition to the mechanical properties of the soil, information on the number, diameter and tensile strength of the root as well as the angle of its shape change in the soil is necessary.

In this study, the effect of Vetiver root on the stability of soil slopes in different regions has been investigated. The basis of the work is the analytical model of the stability of rooted soils, and the required information about soil and roots was obtained through cutting tests on rootless and rooted soils. The location of this research has been in several different climates, slopes and soils. After the completion of each test, in the shear zone of the sample, while counting the number of roots, the diameter and angle of shape change of each one were measured. Also, based on the theory of direct cutting test, adhesion parameters and friction angle of soil mass with roots and without roots are calculated.

After 5 years of Vetiver planting, the amount of humus and organic matter of the soil was measured in the three target areas by repeating 57 samples and compared with the amount of humus and organic matter of the soil 5 years ago. During the same period, direct shear stress was measured in 57 soil samples with Vetiver plant roots and 57 soil samples without Vetiver plant roots in a laboratory environment. The results of this research show that in the semi-arid region, compared to the temperate cold mountainous and humid mountainous regions, the highest amount of humus and organic matter changes in the soil texture was observed. Therefore, in the semi-arid region, due to the increase in humus and soil organic matter caused by the growth of Vetiver plant roots, the shear stress resistance in the soil increased.

Keywords: Soil, Humus, Organic Matter, Vetiver, Shear Stress.

Audience Take Away Notes

- In this research, examining vetiver plant ecophysiology data in the field of agricultural science, natural resource science and environment is very useful and practical for professors and researchers
- This research is a valuable step for a more complete understanding of the vetiver plant and its use
- By studying the shear stress of the vetiver plant in different climatic conditions, a new solution can be provided for the management of pasture and watershed ecosystems

Biography

Sahel Haghighi is a PhD student in Pasture Science and Engineering, studying at Sari University of Agricultural Sciences and Natural Resources, Iran.

Sahel Haghighi[1]*, Forood sharifi[2], Mohamad Azadbakht[3], Zeynab Jafarian[4], Reza tamartash[4]

[1]PhD student in Rangeland Sciences, Sari University of Agricultural Sciences and Natural Resources, Iran
[2]Soil Conservation and Watershed Management Research Institute, Iran
[3]Mazandaran University of Medical Sciences, Iran
[4]Sari University of Agricultural Sciences and Natural Resources, Iran

The place of electrophysiology in sustainable management of rangeland ecosystems using vetiver in Iran

At present, more than 120 countries of the world use the exceptional and unique features of the Vetiver plant for various purposes such as water and soil protection in agricultural fields, stabilization of the slope of the loose slopes of the river walls, water management, revitalization of the lands along the dams, and mines, reviving polluted lands and salt fields, and recently also used for reviving wetlands.

In the investigation of physiological stresses and assessment of abiotic stresses to achieve adaptation relationship in Vetiver plant, enzyme changes ($p \leq 0.05$) that are accessible through ion transport in the cell membrane occur. Studying the biochemical mechanisms of external stimuli by plants and converting them into electrical signals, remembering or transmitting these signals, activating mechanical and chemical devices for defense, plants are constantly exposed to a wide range of disturbances that they adapt to complex systems to understand environmental stimuli and understand signals from other cells for coordinated action. As a result, plants produce different types of intracellular and intercellular electrical signals in response to these environmental changes. These electrical signals can be used as a rapid biosensor to monitor the environment, detect environmental effects, direct and control environmental conditions, and use computational methods to explore opportunities. In this context, electrophysiology has become a valuable tool for rapid measurement and alerting rangeland ecosystem managers before obvious symptoms are observed. Decoding the changes and connecting them to all subsequent steps in the responses of the signaling system leads to the development of new and promising tools for early detection and optimal management of rangeland ecosystems.

Keywords: Environmental Stresses, Electrophysiology, Signal, Vetiver.

Audience Take Away Notes

- This research can be used as a basis for continuing and expanding research in relation to the knowledge of plant physiology
- This research is a valuable step in expanding the science of plant cell and molecular biology
- By using the technology and science of plant electrophysiology in this research, a new solution can be presented for the comprehensive management of the pasture ecosystem

Biography

Sahel Haghighi is a PhD student in Pasture Science and Engineering, studying at Sari University of Agricultural Sciences and Natural Resources, Iran.

Kenoni Moyo[1]*, Zenzile Peter Khetsha[1], Manare Masowa[1], Elmarie Van Der Watt[2]

[1]Department of Agriculture, Central University of Technology, Free State, Bloemfontein, Free State, South Africa
[2]Department of Soil- and Crop- and Climate Sciences, University of the Free State, Bloemfontein, South Africa

Eco-organic system and silicon-based biostimulant as a strategy for vegetable production under multistress conditions in South Africa: A review

Plants get exposed to multiple stresses throughout their phenological growth stages. At most, these stresses are attributed to single or combined stresses like salinity, water deficits, wounding, mineral deficiencies, potting bag size, soil/root media density and type, soil pH, and the type of production system employed. Multistress factors have been widely reported to reduce the plant growth and development, strength, yield, and quality of horticultural crops globally. In the literature, reports extensively recommended the use of silicon-based biostimulants to improve the growth and development of commercial horticultural plants; however, little has been reported in South Africa on the recovery response mechanisms of beetroot (Beta vulgaris L.), lettuce (Lactuca sativa L.), tomato (Solanum lycopersicum L.), and kale (Brassica oleracea L.) grown under multi-stress conditions treated with silicon-based biostimulants, and using the cheaper eco-friendly production systems. In South Africa, most silicon-based biostimulant production companies reserve their novel concoctions as their company secrets; thus, many of the products are never tested in public to ascertain and monitor compliance with the Fertilizers, Farm Feeds, Agricultural Remedies, and Stock Remedies Act 36 of 1947 in South Africa. On the other hand, emerging farmers and smallholder growers are failing to afford existing agricultural insurance options, thereby affecting their yields against the commercially developed farmers. Although the government aids farmers, the assistance does not cover all costs associated with the multistress losses. Some farmers and growers adopted advanced production systems; however, at most, these systems are costly and rely primarily on electricity as a source of power, which is a challenge in South Africa. This review explains various production systems used by commercial and emerging farmers, and the smallholder growers in South Africa to reduce costs related to multistress losses. Moreover, an alternative eco-organic production system containing the application of silicon-based biostimulant as a novel idea for commercial vegetables grown under extreme multi-stress conditions is recommended for emerging farmers and smallholder growers in South Africa. Future studies should be based on eco-friendly production systems in vegetable production in line with Sustainable Development Goals, to combat poverty and improve the livelihood of the African countries.

Audience Take Away Notes

- This review provides insight on the reduction of expenses related to the production systems that use expensive synthetic fertilizers, especially in hydroponics production systems
- The horticulture sector in South Africa, especially emerging growers may use the information for setting indexes on biostimulants concentrations, types, and the application frequencies on selected multistress factors
- Audience will take home the effectiveness of the eco-organic production system with biostimulants as an innovative aid when growing vegetables under multistress conditions

Biography

Moyo Kenoni is a registered master student in the Department of Agriculture at Central University of Technology, Free State. He was awarded his first qualification, a Diploma in Crop Production, at Fort Cox Agriculture and Forestry Training Institute in 2021. He obtained his Advanced Diploma in 2022 and his Postgraduate Diploma in 2023 in agriculture from Central University of Technology. He is a registered SACNASP candidate under the category of natural scientist (agriculture). He worked as a project coordinator in 2021, promoting food security through a vegetable garden in Witbank. In 2023, he worked as an advisor in the Department of Agriculture, Land Reform, and Rural Development. He is currently busy with his thesis, focusing on the use of eco-organic systems and silicon-based biostimulants as a mitigation strategy for vegetable crops grown under multi-stress factors in South Africa.

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