JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Hybrid Event

11-13 SEPT, 2023

Valencia
Spain

Venue:
Olympia Hotel, Events & Spa
Carrer Mestre Serrano, 5, 46120 Alboraia, Valencia, Spain

BOOK OF ABSTRACTS

magnus Group

11-13 SEPT

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ABSTRACTS

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PLANT SCIENCE AND AGRICULTURE

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Thank You All...

Welcome Message

Dear congress visitors, it is an honor and pleasure to welcome you! Food — a paramount need for human survival and development. Increasingly tough challenges such as population growth and climate change are putting our agriculture under pressure. The AGRI Global Congress provides an excellent platform to learn about the newest trends and difficulties in cutting-edge research in agriculture and allied fields. In this era agriculture and horticulture have become so finely differentiated that the branches may not even understand each other. However, any progress is actually the result of the combination of multiple disciplines. For example, water shortages will result in agriculture and horticulture unsustainable and eco-environment degraded, while excessive water will destroy agriculture and horticulture, induce geological disasters and damage the eco-environment. Our Suitaiology uses the Long, Wide, High and Deep system-scientific thinking to study the systematic control of water. The AGRI Global Congress promotes exchanges across disciplinary fields, from which every participant would be inspired either philosophically, technically or operationally.

DR. DACHANG ZHANG

Water & Eco Crisis Foundation, United States

Welcome Message

Welcome to the 8th Edition of the Global Congress on Plant Biology and Biotechnology Conference. Welcome to the third largest metropolitan city of Spain. Valencia is famous for its gastronomic culture. It is world famous for the Fiesta Falles and paella valenciana. Be careful, it is all you should eat, not all you can eat.

Your presence here is of utmost importance. You were invited here because you have something important to contribute to the science of plant knowledge. Every year we discover new genetic material in our plant improvement research. This venue offers an excellent opportunity for us to share new knowledge. We have healthy food on the table because of our research regardless of our field of interest. You will leave Valencia, Spain with more knowledge and a better, healthier, happier place. Take advantage of every second, every opportunity to meet your fellow scientists from around the world. Share with one another so that we might all go back home inspired to dig deeper to achieve new discoveries to feed a growing hungry world. Thank you for being here and your great contribution. Thanks a million, to the organizing committee for a wonderful job they have done, making this event a great success.

DR. BENIGNO VILLALÓN

Texas A&M University, United States

Welcome Message

Dear colleagues and general public present at this honorable AGRI & GPMB 2023 events, 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 AGRI & GPMB 2023, 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.

DR. EDGAR OMAR RUEDA PUENTE

Universidad de Sonora, Mexico

Welcome Message

Dear 3rd Edition of Global Conference on Agriculture and Horticulture visitors,

It is an honor and pleasure to write a few welcome notes. Food Science refers to the study of the physical, chemical and biological make up of food and food ingredients. Applied food science encompasses selection, preservation, processing, packaging, distribution, and use of safe food. It involves application of science and technology to fulfil the ultimate goal of production and management of safe and nutritious food. As it plays an important role in maintenance of food safety and security, humankind depends on further development so, we welcome all scientist and researcher works you bring us.

PROF. DR. NELIDA LUCIA DEL MASTRO

Instituto de Pesquisas Energéticas e Nucleares, IPEN/CNEN, Brazil

Welcome Message

Dear AGRI 2023 Congress participants, it is both an honor and a privilege to provide a few opening remarks for our gathering. We are all acutely aware of the pressing challenges facing agriculture, driven largely by the impacts of climate change. Globally, we are witnessing shifts in the patterns of pests, pathogens, and weeds. Increasingly, we find ourselves adapting to new threats by devising innovative strategies for their control. One of the major challenges, particularly in Europe, is the transformation of agriculture in accordance with the European Green Deal's objectives set for 2030. Yet, the overarching goals of reducing the reliance on harmful chemical pesticides, focusing on the conservation of natural resources, and implementing natural mechanisms to regulate agrophages populations resonate universally. These goals are integral to the agricultural development strategies of numerous nations across the globe. Given these challenges, there's an urgent need to amplify our research efforts into groundbreaking solutions for controlling agrophages. I am confident that the Congress will serve as a prime venue for showcasing cutting-edge innovations, facilitating the exchange of knowledge, and nurturing both new and existing collaborations.

ASSOC. PROF. DR. HAB. DARIUSZ PANKA

Bydgoszcz University of Science and Technology, Poland

Welcome Message

We live in a highly unequal world wherein roughly 80% of the natural resources are consumed by about 20 per cent of the world's population and the richest 1% owns half of the world's wealth. Further, the growing consumerism globally puts undue and unnecessary pressure on natural resources. World population is expected to reach 9 billion by 2050 and 10 billion by 2100, and that agricultural production will have to increase by 60% by 2050 to feed them. The agriculture should thus undergo a significant transformation to feed the growing global population. Climate change adds extra challenges in reaching this goal- especially developing countries where food insecurity and poverty are prevalent. In developing countries socio-economic trends like population increase, changing consumption patterns, urbanization, and economic growth result in increase in demand for farm which calls for enhanced and sustainable supply. The Conference is expected to deliberate all emerging issues of global agriculture.

V. P. S. Arora

Venkateshwara Group of Institutions, India

Welcome Message

Dear participants of the Congress,

I am happy to welcome you to the 8th Global Congress, which is so important for all of us, dedicated to developing a holistic vision of sustainable development taking into account achievements in the field of crop production. This topic is especially close to me, as it concerns the search for opportunities to increase crop yields, obtain environmentally friendly products and improve the health and happiness of all people on Earth. Undoubtedly, this can be achieved by developing new safe farming systems with the replacement of chemical pesticides with biological plant protection products created on the basis of natural components isolated from microbial and plant cells that enhance immune and adaptive properties. I am sure that prudence and pain for future generations will lead us to understand true values, noble intentions in understanding that each person is unique and we need you to achieve prosperity for all nations and nationalities. No one should starve and you and I should contribute to this noble mission. It depends on us to make it happen!

Pavlovskaya Ninel Efimovna

Orlov State Agricultural University, Russian Federation

Welcome Message

Honored to be part of the Scientific and Organizing Committee on the 8th Global Conference in Plant Science and Molecular Biology that will take place on the 11- 13 of September, 2023, Valencia, Spain.

You are all welcome to this Great International Scientific gathering informing you on the UpToDate most innovative research worldwide on the issues related to Plant and Environment. Part of the most updated research outcome will be presented with topics related to issues such as ways to increase productivity, how climate change affects performance and ways to conserve water.

Looking forward hearing and interacting with you at this outstanding upcoming scientific event and share your experience.

Dr. Valasia Iakovoglou

UNESCO Chair Con-E-Ect, Greece

Welcome Message

Dear congress visitors, it is an honor and pleasure to write a few welcome notes. Plant science and molecular biology today makes unprecedented progress, since a few years with new Plant science and molecular diversity preservation methods for sustainable deposition and exchange of molecular and biomolecular samples. This opens new opportunities to resilient modern plant scientific and molecular diversity preservation systems to climate change and control, and to achieve higher productivity, quality and profitability (Vijayan Gurumurthy Iyer , 2023). Prediction and assessment of impacts (effects) on the plant science and molecular environment entail a number of technical and professional considerations related to both the predictive aspects and interpretation of the significance of anticipated changes. Impact prediction and assessment for the plant science and molecular biological environment can be called as ecological impact assessment (EIA). EIA can be defined as the systematic identification and evaluation of the potential impacts (or effects) of proposed projects, plans, programs, or legislative actions relative to the physical-chemical, biological, radio-active, cultural and socioeconomic components of the total ecology and environment. Three of the most significant terms are ecological inventory, ecological impact assessment (EIA) and Ecological Impact Statement . Project planning and decision-making process should include the integrated consideration of ecological engineering or technical, economics, environmental, social and other factors. Prior to the entitled Magna Carta for the Ecology and Environment , technical and economic factors dominated the planning and decision-making process (Vijayan Gurumurthy Iyer, 2022). Environmental plant science and molecular biology will be the future basis for sustained success (Vijayan Gurumurthy Iyer, 2007).

DR. VIJAYAN GURUMURTHY IYER

Bihar Institute of Public Administration & Rural Development, Gaya, India

Welcome Message

My esteemed congress delegates, feel extremely priviledged to share my words of welcome. Microbes are said to be the tiniest creature on this planet but their contribution to agriculture in gneral and plant science in particular has indeed created new nich in all disciplines, especially with the introduction of functional genomics, the concepts like nutriomics, rhizosphere hybridization, biofertigation, plant carbon foot print (probability of sloving worlds biggest problem of global warming through invisible living cells as carbon offset technique), microbial concoction, microbial hot spots of rhizosphere, value chain of microbes for extended shelf life etc have already started making deep inroads in providing the signal-based understanding in unlocking the productivity barriers of fruit crops. However, much bigger challenges question our scientific ability in developing agrochemicals free green biology based fruit production system.

Dr Anoop Kumar Srivastava

ICAR-Central Citrus Research Institute, India

Welcome Message

Dear Participants,

It gives me great pleasure to welcome you all to the Agronomy and Crop Science session of AGRI 2023 Conference. As experts in the field of agronomy and its related sciences, you have a significant role to play in shaping the future of our planet with sufficient food supply and security.

This conference provides an excellent opportunity for us to come together, share our knowledge and experiences, and discuss the latest developments in agronomy. I am confident that the discussions and interactions that take place during this conference will help us better understand the challenges facing the food production sector today and find innovative solutions to address them.

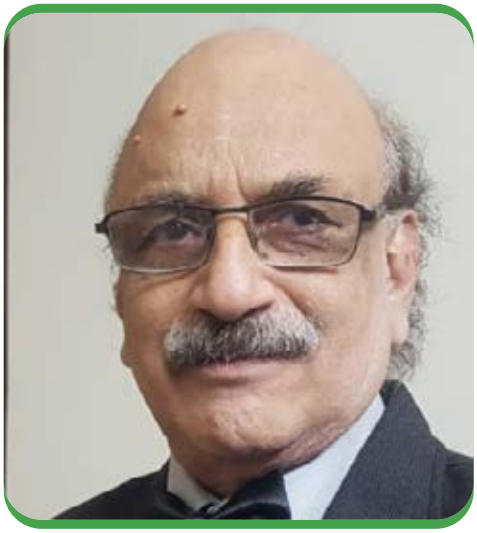
I encourage you to actively participate in the conference sessions, engage in constructive discussions, and make the most of the networking opportunities available. Let's work together to ensure that agronomy continues to meet the needs of our growing population while protecting our planet's natural resources.

Once again, a warm welcome to all of you, and I look forward to fruitful and productive discussions during the conference.

Professor Dr. S. M. Rezaul Karim

Universiti Putra Malaysia Serdang, Malaysia

Welcome Message



Dear congress visitors, it is an honor and pleasure to write a few welcome notes. on agriculture and food security Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. A family is food secure when its members do not live in hunger or fear of hunger. Food insecurity is often rooted in poverty and has long-term impacts on the ability of families, communities and countries to develop and prosper.

Prolonged undernourishment stunts growth, slows cognitive development and increases susceptibility to illness. Today, more than 800 million people across the globe go to bed hungry every night, most of them smallholder farmers who depend on agriculture to make a living and feed their families. Despite an explosion in the growth of urban slums over the last decade, nearly 75 percent of poor people in developing countries live in rural areas. Growth in the agriculture sector -- from farm to fork -- has been shown to be at least twice as effective in reducing poverty as growth in other sectors. Investing in these smallholder farmers—many of whom are women—and the food systems that nourish them is more important than ever. In order to feed a population expected to grow to 9 billion people by 2050, the world will have to double its current food production.

Given scarcity of natural resources and other challenges, the world will need to be more efficient in how it meets this demand. To ensure that people have sufficient food, aligning short-term assistance with a long-term development strategy can help countries feed their own people. By addressing acute need as well as the root causes of hunger, poverty and malnutrition, Agriculture and food systems that ensure availability, accessibility, stability and utilization of adequate and nutritious crops and livestock are central in achieving the food security .

Effective adaptation practices for agriculture and food systems also help safeguard livelihoods, communities, and ecosystems from adverse impacts of climate change. Agriculture and the systems that affect food security provide a domain of adaptation action for governments, communities and stakeholders living with increasing risks in the coming decades. Many countries have included aspects of adaptation and food security in their Nationally food plans and agriculture

Knowledge gaps still exist, and these can pose barriers to countries and specific target audiences in adapting to the impacts of climate change in agriculture and the systems that affect food security. Addressing the knowledge and resilience needs of countries through tailored information for knowledge users is crucial to implementing adaptation action – a key element of food security

Agriculture is a major source of pro-poor growth in developing countries with large rural populations. Meeting future food demand in a sustainable way will require major advances in productivity, market systems, natural resource management and governance.

PROF. DR. Shashi vemuri

Professor Jayashankar Telangana State Agricultural University, India

Welcome Message

I welcome all the participants of AGRI 2023 at Valencia, Spain on Agriculture and Horticulture Conference will be held during September 11-13. The conference will discuss the recent knowledge acquire globally for all aspect of agriculture and horticulture including digital technology, security, health and environment. The conference may allow the renowned global experts to sharing the ideas and gain insight into breakthroughs and solve their research problems by adopting ideas from another. It may discuss many fundamental aspects that underpin all recent technologies developed. I hope that participants certainly benefitted to gather recent knowledge for their future research and commercialization of their products.

J. C. Tarafdar

Indian Agricultural Research Institute, India

ABOUT
MAGNUS GROUP

Magnus Group (MG) is initiated to meet a need and to pursue collective goals of the scientific community specifically focusing in the field of Sciences, Engineering and technology to endorse exchanging of the ideas & knowledge which facilitate the collaboration between the scientists, academicians and researchers of same field or interdisciplinary research. Magnus Group is proficient in organizing conferences, meetings, seminars and workshops with the ingenious and peerless speakers throughout the world providing you and your organization with broad range of networking opportunities to globalize your research and create your own identity. Our conferences and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

Participation from 90 different countries and 1090 different Universities have contributed to the success of our conferences. Our first International Conference was organized on Oncology and Radiology (ICOR) in Dubai, UAE. Our conferences usually run for 2-3 days completely covering Keynote & Oral sessions along with workshops and poster presentations. Our organization runs promptly with dedicated and proficient employees' managing different conferences throughout the world, without compromising service and quality.

BOOK OF ABSTRACTS

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11-13 SEPT

DAY 01

KEYNOTE FORUM

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Can cold atmospheric plasma be used for plant growth improvement and plant protection in sustainable plant production?

Sustainable agriculture with low-input of chemicals and fertilizers is attracting recently more and more attention of producers and researchers in the EU. The main reason of such situation is The European Green Deal – the EU's latest growth strategy concerning environmental degrada-tion and climate change. One of its main components is The Farm to Fork Strategy including especially reduction of pesticides and mineral fertilizers application and also support the development of organic farming. At the same time the food demand is rising. These ambitious challenges need an extensive research, development and innovations. Therefore, a new nonchemical techniques of improving plant growth and resistance to biotic and abiotic stresses must be explored for their potential in this field. One of the most promising is the use of non-thermal plasma for such purposes. As this physical factor is a very complex mixture of ions, atoms, electrons, radicals, molecules, its effect on plants and pathogens is also very complex. Cold Atmospheric Plasma (CAP) is most often generated in air at atmospheric pressure, e.g. corona discharge, dielectric barrier discharge. The high chemical activity of the plasma ensures its very effective action against microorganisms. Thanks to its numerous advantages, cold plasma is more and more commonly applied to food products, biological material and used in medicine. In agriculture, it is used especially for disinfection of seeds, plants, surfaces and tools, boosting seed germination and seedling growth, soil remediation and the production of nitrogen fertilizers. Literature data show that plasma inhibits the growth of many harmful microorganisms, e.g. Aspergillus, Penicillium, Bacillus genera. It is also widely reported in the literature to stimulate seeds and seedlings of various plant species, e.g. wheat, oats, peas, soybeans, herbs. The above-mentioned properties of cold plasma are also confirmed by our own research with the use of patented (P.428969) prototype of DBD plasma generator.

Patent No.: P.428969. Non-thermal barrier discharge plasma reactor for disinfection and/or sterilization of organic products. Inventors: Jan Mućko, Dariusz Pańka, Piotr Domanowski, Sławomir Bujnowski.

Keywords: Cold Plasma, Plant Growth Stimulation, Plant Protection, Disinfection.

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Biography

Dariusz Panka is an Associate Professor in the Department of Biology and Plant Protection at Bydgoszcz University of Science and Technology, Poland. He obtained his PhD degree in 1999 and his Habilitation degree in 2013. He has completed postdoctoral fellowships at the University of Arkansas in Fayetteville, USA (2006) and Stanford University in California, USA. With over twenty years of experience, he is an analytical and detail-oriented Research Scientist. He has led research and teaching activities while also managing Research & Development & Innovation projects. He possesses excellent expertise in fostering collaboration between academia and business. His research primarily focuses on biological methods of plant protection, grass endophytes, mechanisms of increased plant resistance in symbiotic associations with fungal endobionts under stressful conditions, as well as the effects of non-thermal plasma on microorganisms in plant material and food.

Novel applications of radiation technology on the production of biodegradable packaging for the food industry

There is an increasing interest worldwide to reduce plastic pollution and part of the solution would be to replace food-packaging plastics with bioplastics. The packaging is likely the most important method for food preservation due to protects, preserves, while allows the product commercialization and distribution. The packaging's characteristics depend on the food product that is desired to be protected. Today, different materials are employed as packaging materials, such as paper, cardboard, metal, glass and plastics, but this traditional preservation methods produces large quantities of urban solid wastes. To turn on to bioplastics it is especially important the employment of cellulose, starch, pectin and seaweed extract like alginate, carrageenan or agar, and plant-based proteins for the promotion of physical and environmental health. Particularly active packaging is a form of smart packaging, that employs technology that intentionally releases or absorbs compounds from the food or the headspace of food packaging, which extends the shelf life of products by stalling the degradative reactions of lipid oxidation, microbial growth, and moisture loss and gain better than traditional food packaging. Ionizing radiation technology is already applied industrially to induce radiation cross-linking to a great number of products. The interaction of ionizing radiation with biological matter results in the formation of very reactive species and induces molecular chain branching, crosslinking and molecular degradation or scissioning. Edible films and coating can be prepared based on natural materials such as polysaccharides or proteins and one of the proposed novel techniques is to use ionizing radiation technology for that purpose. Combination of ionizing radiation and bio-based active packaging will be a good approach to increase the preservation of the environment.

Audience Take Away Notes

- Ionizing radiation is well known as a mean of sterilization of pharmaceutical and medical items
- Radiation technology is not commonly known by food producers and food technologists
- Present article provides new information related to the production of novel materials based on natural compounds that can be made by mean of radiation technology

Nelida Lucia Del Mastro

Center of Radiation Technology, IPEN/CNEN, Instituto de Pesquisas Energéticas e Nucleares, IPEN/CNEN Sao Paulo, SP, Brazil

Biography

Dr. Nelida Lucia Del Mastro studied Chemistry at the Buenos Aires University (UBA), Argentina, and she received her PhD in Biochemistry at Sao Paulo University (USP). She then spent one year at Microbiology Laboratory, Amsterdam University, and a period at the Argentinean Nuclear Energy Commission (CNEA). In Brazil, she occupied the position of Head of the Radiobiology Division and later Head of Research Groups on Applications of Nuclear Technology on Biological Systems at the IPEN. At present she is a professor on Nuclear Technology at the IPEN-University of Sao Paulo. She has published more than 70 research articles in SCI(E) journals.

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11-13 SEPT

DAY 01

SPEAKERS

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Julia Shanks
The Farmer's Office Marblehead, MA United States of America

Adjusting crop plans to manage climate risk using financial modeling

In the last decade or so, weather patterns have become more extreme and unpredictable. Different parts of the globe have experienced a range of devastating rains, scorching droughts that fuel wildfires, hurricanes, and unseasonable temperatures. Crop plans that made sense a few years ago, may need to be modified to take into consideration the risk of extreme weather events.

Farming has always been a risky venture. With little control over the weather, a freak snowstorm or severe hurricane can wipe out wide swaths of production. And as weather patterns become more erratic, the high value crops are also the highest risk. Climate change has affected agri-business strategies - from deciding what to grow, when to plant, and what infrastructure is needed.

In this session, we will go through 2 case studies of how farmers used financial modeling to evaluate shifting priorities, risk tolerance and profit goals. The farmer in the first case studies grows flowers in California and faces risks of wildfires and drought. The farmer in the second case study grows diversified vegetables in New York and faces threats of severe rain and hurricanes, and is considering the purchase of new infrastructure.

Audience Take Away Notes

- The audience will learn how to consider financial risk in context of climate risk
- The audience will learn how straight-forward financial modeling and frameworks can be used for in these and other scenarios
- For audience members who educate and coach farmers, they will have new tools to use with their clients

Biography

Julia Shanks is the author of The Farmer's Office, a book that coaches farmers to think like entrepreneurs and businesspeople. It provides tools for bookkeeping and financial management geared specifically for farmers. The second edition will be released in 2024. Julia received her MBA from Babson College, Magna Cum Laude, in the United States, and has taught graduate and undergraduate accounting classes at Babson College. She continues to educate farmers and business advisors on topics of farm finances and financial management. She also co-authored The Farmers Market Cookbook which draws on her 15 years working as a professional chef.

Rüdiger Ortiz-Álvarez, Héctor Ortega Arranz[1], Vicente J Ontiveros[2], Miguel de Celis[3], Charles Ravarani[4], Alberto Acedo[4]*, Ignacio Belda[5]

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From science to applications: Microbiome as a bioindicator for management practices

Agroecosystems are human-managed ecosystems adhering to generalized ecological rules. Understanding the ecology behind the assembly and dynamics of soil fungal communities is a fruitful way to improve management practices and plant productivity, particularly, mechanization with ecological computing to analyze the soil microbial networks. Monitoring soil health would benefit from using metrics that arise from ecological explanations that can also guide agricultural management. Beyond traditional biodiversity descriptors, community-level properties can inform about specific ecological situations. Our observations using traditional approaches show results concurring with previous literature: influence of geographic and climatic factors on sample distributions or different Operational Taxonomic Unit (OTU) compositions depending on agricultural management. Furthermore, using network properties, we observe that fungal communities range from dense arrangements of associations to a sparser structure of associations, indicating differential levels of niche specialization. We detect fungal arrangements capable of thriving in wider or smaller ranges of temperature, revealing that niche specialization may be a critical soil process impacting soil health. Low-intervention practices (organic and biodynamic management) promoted densely clustered networks, describing an equilibrium state based on mixed collaborative communities. Thus, we hypothesize network properties at the community level may uncover how human intervention (land use) can affect community structure and ecological processes in agroecosystems impacting food quality production.

Audience Take Away Notes

- The paper provides a novel analytical approach to understanding the impact of biotic and abiotic factors on soil fungal communities
- The audience can learn how the use of metrics from ecological explanations can inform agricultural management and improve soil health and plant productivity
- The research can benefit other faculty interested in expanding their research and teaching in this area. The use of network analysis methods and properties can provide insights into how different levels of farming intensification affect ecological strategies in soil fungal communities
- The research highlights the importance of low-intervention practices in promoting densely clustered networks and equilibrium states based on mixed collaborative communities

Biography

Alberto Acedo is a genomic dreamer, DNA passionate, global biotech entrepreneur, and scientific soul of Biome Makers 'technology. He holds a PhD in Genetic Medicine and Biomedical Applications, specializing in NGS sequencing and machine learning. Alberto is a TEDx, speaker, European Commission Expert, Forbes Technology Council member, and GLOSOLAN (FAO) member. He is recognized as a young AgTech visionary by MIT Technology Review and AgFunder. Alberto holds 10+ patents and has authored 20+ scientific reports. He has extensive experience facilitating research with institutions worldwide. Currently, he is the chair of Soil Biology in the International Union of Soil Sciences (IUSS).

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[4]School of Chemistry, Joseph Banks Laboratories, University of Lincoln, Green Lane, Lincoln, LN6 7DL, United Kingdom

Low-cost in-field determination of soil ion concentration using a portable 3D printed device based on ion-selective electrodes and textile threads

This work reports the fabrication and characterization of a low-cost device for the continuous monitoring of the concentration of plant nutrients based on ion-selective electrodes and textile threads that work in direct contact with soils. Here, we developed a thread-based, microfluidic sensor platform as proof of concept. We utilized traditional polymer membrane-based Ion-Selective Electrodes (ISEs) for nitrate, ammonium, potassium, and pH. Four ion-sensitive membranes for each ion and one for the reference electrode were drop-casted directly on top of a miniaturized, 3D-printed holder. Electrical contact is established via graphite-based contacts link to the electrochemical signal reader via electrical wires. The sensor platform was enhanced by the addition of five 30 cm long textile threads connected to an absorption pad on the opposite side. This is the key innovation as these threads mimic the roots and via capillary action wick the moisture from the soil to the sensing area. The device is placed next to the soil that is going to be analysed inserting the threads in the soil sampling area. Figure 1 illustrates the device.

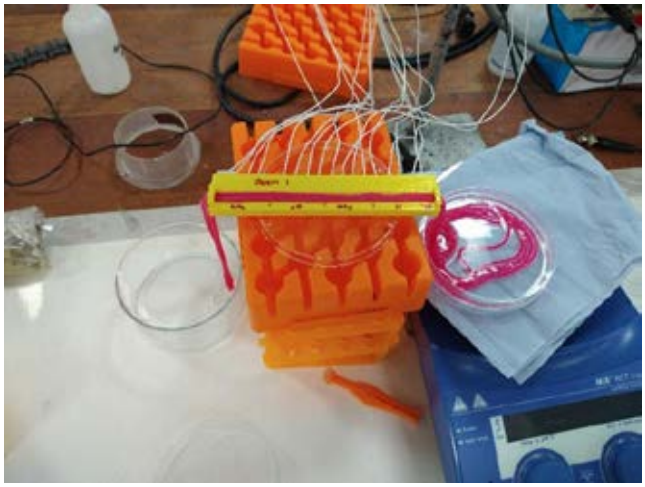

Figure 1: ISEs encased into yellow, 3D-printed case. From left to right, there 4 ISEs for each of ammonium, pH, nitrate, and potassium followed by one reference electrode. Pink threads are wicking fluid from the right hand side using capillary action. The container on the left hand side is used to collect the fluid and evaluate transported nutrients. White wires serve as contact with the data acquisition system.

Preliminary results show that the thread-based sensor system is reproducible and consistently provides a near-Nernstian sensitivity of 55±5 and 50±3 for potassium, -58±1 and -63±2 for nitrate, and 60±1 and 60±12 (mV/decade) for ammonium between $2.8x10^{-6}$ and $1.3x10^{-2}$ M without (directly in solution) and with textile threads respectively. Analysis of soil samples with different soil moisture content (100%, 75%, 50% and 40%) using our low cost device gave a correlation coefficient of $R^2 = 0.91$ for potassium and $R^2 = 0.92$ for ammonium when compared to the values measured using traditional methods such as Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) and Flow Injection Analysis (FIA), respectively. This low-cost device's promising performance is encouraging its use as an extended network to measure soil ion concentration at high temporal and spatial resolution.

Audience Take Away Notes

- This is the result of a research project, thus benefits are mostly intellectual. Practical benefits are expected in a short-to-medium future following thorough testing and evaluation
- The audience will gain ideas for further research
- The device will provide information of soil fertility with significantly improved spatial and temporal resolution than currently possible
- It will assist in understanding nutrient fluxes and design of innovative practices for sustainable use of fertilizers

Biography

Dr. Radu obtained PhD at Auburn University, USA. He spent 5 years as a postdoctoral fellow at Dublin City University, Ireland. Following a short sting at the University of Portsmouth, UK he spent almost 11 years at Keele University, UK. Since 09/2022, Dr. Radu is Associate Professor at the University of Lincoln, UK. Dr. Radu published 50+ peer-reviewed papers, has a portfolio of externally funded projects and developed a strong international network of experts in diverse fields of chemistry, engineering and environmental sciences.

Juliana Lobo Paes*, Myrna Martins Santos Moreira, Frederico Alan de Oliveira Cruz, Thalyta de Oliveira Inocêncio Martins, Vivianne Alves da Silva, Gabriela Rodrigues da Costa

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Monitoring by automation of methane gas with use of anaerobic biodigesters and arduino uno plate

Anaerobic digestion is a technology that provides treatment and recycling of waste, adding economic value with the production of biogas and biofertilizer. However, to determine the methane concentration require high sample feeds and have high added value. The objective of this experiment was to evaluate the performance of the automation of the measurement of methane gas present in the biogas from the anaerobic digestion of cattle manure through the Arduino microcontroller. The proportions evaluated in this experiment were 100:0, 75:25, 50:50 and 25:75 in the Bovine Manure:Water (BM:W) ratio. The physicochemical characterization was carried out in the substrate (zero day of anaerobic digestion) and digestate (145th days of anaerobic digestion). The use of the Tracker® software as a Digital Method (DM) to determine the vertical displacement of the anaerobic digester was evaluated. The comparison with Analog Method (AM) was carried out as a preliminary test to analyze the possibility of adopting the Tracker® software for the analysis. The Biogas Analysis Module (BAM) was structured to monitor methane gas with the MQ-4 sensor using the Arduino Uno board. Module validation was performed by Alfakit®. There was an increase in moisture, pH and ST reduction, but the average values were in accordance with the ranges of values considered ideal. The initial values of DM and AM at zero time of anaerobic digestion showed no difference between the methods. However, at the end of the anaerobic digestion, there were differences in the average length found between AM (14.90 cm) and DM (15.22 cm) and a standard error of 2.15%. The biogas production potential for 100:0, 75:25, 50:50 and 25:75 BM:W was, respectively, 1.41; 1.46; 1.45 and 1.51 L kg^{-1} for the 56th day and 1.37; 1.61; 1.31 and 1.11 L kg^{-1} for 75:25, 100:0, 50:50 and 25:75 BM:W on the 105th day. With the elaboration of the BAM, the GERAR Code – Methane was suitable for the MQ-4 sensor reading to be targeted for methane detection.

Methane concentration in the biogas in descending order detected by the BAM was, respectively, 72.6; 72.2; 69.6 and 67.7% for 100:0, 75:25, 50:50 and 25:75 BM:W on day 56 and 40.1; 38.1; 36.8 and 34.5% for 75:25, 100:0, 50:50 and 25:75 DE:A on the 105th day. By the validation method with Alfakit®, the concentration of methane in the biogas in descending order detected by the BAM was, respectively, 70; 70; 40 and 40% for 100:0, 75:25, 50:50 and 25:75 BM:W on day 56 and 55; 35; 30 and 20% for 100:0, 75:25, 50:50 and 25:75 DE:A on the 105th day. On day zero of anaerobic digestion methane detection was null in both methods. It is concluded that the bovine manure used presented ideal physicochemical characteristics for the production of biogas. The Tracker® software is a good option to measure the displacement of the gasometer, as the DM obtained more accurate values. The GERAR Code – Methane and the BAM obtained adequate functioning, as it allowed the MQ-4 sensor to perform the stipulated functions and to quantify the methane concentration.

Audience Take Away Notes

- The subject of anaerobic digestion, including anaerobic monodigestion and anaerobic codigestion, needs to be researched for its application in anaerobic digester plants.
- This presentation will demonstrate the possibility of adopting data collection systems using low cost electronic devices.
- The system and methodology developed allow the optimization of data collection.
- The digital method using the Tracker® software for the analysis of the displacement of the gasometer influences the calculation of the volume of biogas produced by the anaerobic biodigester.

Biography

Dra Juliana Lobo Paes studied Agricultural and Environmental Engineering in 2006 and graduated as MS in 2008 at the Federal University of Viçosa, Brazil. She received her PhD degree in 2011 at the same Institution. Currently, she is Associate Professor, collaborated professor at the Graduate Program in Agricultural and Environmental Engineering at the Federal Rural University of Rio de Janeiro and permanent professor at the Graduate Program in Digital Agroenergy at the Federal University of Tocantins. She is coordinator of the Group of Renewable Energies and Rural Alternatives (GERAR) and volunteer of Brazilian Women in Solar Energy Network.

Dariusz Pańka[1]*, Małgorzata Jeske[1], Aleksander Łukanowski[1], Anna Baturo-Cieśniewska[1], Piotr Prus[2], Dariusz Rydzyński[3], Katarzyna Szwarc[3], Jean De Dieu Muhire[3], Barbara Wiewióra[4], Grzegorz Żurek[4], Natalia Narewska[5], Robert Karczykowski[6]

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NOVA GRASS - symbiotically modified perennial ryegrass– an innovative protection of grasses

The perspective of limiting the use of plant protection products by 2030, resulting from the principles of the European Green Deal, imposes certain restrictions on agricultural producers. In this situation, an opportunity for agriculture is to use the achievements of science and support the broadly understood cooperation between Science and Business for the fastest possible implementation of new, innovative solutions that support sustainable, environmentally safe agricultural production. Dedicated financial resources are launched for this type of activity. In Poland, a very good example of activities of this nature is Action M16 Cooperation coordinated by the Agency for Restructuring and Modernization of Agriculture under the Rural Development Program for 2014-2020. The aim of this action is to support the creation and operation of operational groups for innovation (EPI) and the implementation by these groups of projects the subject of which is the development and implementation of innovation in the broadly understood area of agriculture and food production and distribution, for sustainable rural development and agricultural production. An example of a project qualified for financing under this Action is the project Introduction to the market of an innovative variety of perennial ryegrass inhabited by symbiotic endophytic fungi. The project is carried out by the EPI consortium under the name Nova garss. The consortium consists of: Bydgoszcz University of Science and Technology (Leader), The Plant Breeding Company Grunwald Ltd., Group IHAR based in Mielno, Plant Breeding and Acclimatization Institute - National Research Institute in Radzików, Kuyavian–Pomeranian Agricultural Advisory Centre in Minikowo and an individual agricultural producer. The result of the implementation of the above-mentioned project will be product, technological and marketing innovation for sustainable agriculture. The specific objectives of the operation are: a) to create an innovative variety of perennial ryegrass inhabited by symbiotic endophytic fungi of the Epichloë genus, b) to develop an innovative technology for the production of grass varieties symbiotically improved with endophytes, c) to develop and implement a significantly improved, innovative marketing strategy for the promotion and dissemination of cultivation and commercialization of innovative varieties of perennial ryegrass.

Due to the presence of selected endophytes in plants, the inhabited grasses will be characterized by higher durability and better growth, higher resistance to water shortages and tolerance to soil salinity, better use of nutrients, higher resistance to infection by pathogenic microorganisms, as well as lower susceptibility to damage caused by insects and nematodes. This will allow producers to be more flexible and comfortable in production in the absence of optimal conditions for plant growth, especially in conditions of uneven distribution of rainfall and water shortages.

Projekt NOVA TRAWA jest finansowany w ramach działania Współpraca, Program Rozwoju Obszarów Wiejskich na lata 2014-2020, Europejski Fundusz Rolny na rzecz Rozwoju Obszarów Wiejskich: Europa Inwestująca w obszary wiejskie.

Keywords: Nova Grass, Epichloë, Endophytes, Perennial Ryegrass, SMOs.

Biography

Dariusz Panka is an Associate Professor in the Department of Biology and Plant Protection at Bydgoszcz University of Science and Technology, Poland. He obtained his PhD degree in 1999 and his Habilitation degree in 2013. He has completed postdoctoral fellowships at the University of Arkansas in Fayetteville, USA (2006) and Stanford University in California, USA. With over twenty years of experience, he is an analytical and detail-oriented Research Scientist. He has led research and teaching activities while also managing Research & Development & Innovation projects. He possesses excellent expertise in fostering collaboration between academia and business. His research primarily focuses on biological methods of plant protection, grass endophytes, mechanisms of increased plant resistance in symbiotic associations with fungal endobionts under stressful conditions, as well as the effects of non-thermal plasma on microorganisms in plant material and food.

Steve O Sullivan
Caliper Content Services, Ireland

A pesticide label author, regulatory agency reviewer and a digital pesticide label walk into a bar

There are many roles that would benefit from the digitization of pesticide labels. Michael is a pesticide label author. He is making many updates to the label of his company's most popular pesticide. Michael needs do this quickly and efficiently. The updates need to be clear and concise to minimize the time to product registration. Elisabeth reviews submissions at the regulatory agency. She has a heavy workload. Collaborating with Michael in a structured digital label would be more efficient.

Audience Take Away Notes

- Provides a definition of digital label
- Discusses the use cases and goals that can be addressed by label digitization
- Discusses how a digital labels addresses the goals of label authors, manufacturers, regulatory agencies, etc.
- Discusses the momentum in the industry to create a standard for a content/data model for a digital pesticide label

Biography

Steve is a solutions architect, content specialist and speaker with a strong background in project management, change management and translation. He is a user advocate and known for his ability to design highly usable (high usability) authoring experiences. Steve's experience spans a variety of industries including investment research, government, manufacturing, aviation, and education.

Rosa Rivieccio*, Stefano Orsini, Erica Mazza, Maria Teresa Cappella, Raoul Romano

Council for Research in Agriculture and Analysis of agricultural economics, Research Centre Policies and Bioeconomy (CREA-PB), Roma, Italy

Success of current measures to promote agroforestry in Italy within the EU Common Agricultural Policy

Scientific evidence, as well as policy institutions at EU level, recognise that agroforestry systems can contribute to climate change mitigation and adaptation, biodiversity enhancement, soil fertility and protection, and can provide opportunities for local rural economy. Therefore, agroforestry is relevant to various European policy targets and areas. In the EU, agroforestry is mainly supported by the Common Agricultural Policy (CAP) Pillar II, i.e. Rural Development Programmes (RDPs).

The aim of the present work is to provide an overview of the level of CAP support that agroforestry practices have received in Italy, and to understand whether CAP facilitated their adoption. In particular, our research is focused on the Italian regions and the two programming periods 2007-2013 and 2014-2022.

The study is based on interviews with the regional managing authorities and survey with farmers in Italy. The aim of interviews and survey was to gather explanations for the adoption or not of policy measures related to agroforestry practices. Also, the analysis considers the main CAP legislation framework for Pillar I and Pillar II, together with the accompanying and transposed legislation, a review of the Monitoring and Evaluation reports, and of scientific literature collected through ISI WEB of Science, Google scholar and grey literature.

The findings suggest that only few Regions activated the measures supporting agroforestry in the programming periods considered, and even in these cases the level of funding used was very low. The reasons for these are related both to the contexts – e.g. cultural landscapes, agricultural structural characteristics – and the overall policy framework for the CAP – e.g. eligibility criteria for the direct payment scheme in relation to tree density, for the greening payment scheme, and the implementation of RDP measures. Some policy recommendations close our presentation.

Audience Take Away Notes

- Effectiveness of the EU Common Agricultural Policy in relation to the promotion of agroforestry
- If and how policies can affect the uptake of agroforestry
- How to better promote agroforestry through the EU CAP

Biography

Dr. Rosa graduated in Geology in 1997 from the University of Naples. She worked in Pedology for almost thirty years, 15 as a freelance, and 15 at CREA, the Research Centre of Agricultural and Environment as a Researcher. She has worked with soil Database, GIS programs and in filed survey, to process soil maps at little and big scale. She received her PhD degree in 2019 in Forest Ecology in Italy. She has been working for three years in the Forest Observatory of CREA Politics and Bioeconomy on various projects, from Forest Information System (Database and Forest map of Italy), naturalistic engineering and Agroforestry.

B. S. Harish[1]*, K. Umesha[1], G. K. Halesh[1], B. N. Maruthi Prasad[1], R. Venugopalan[2], G. Janardhan[2]

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Influence of photo-selective nets and metabolic elicitors on growth, yield and quality of turmeric (Curcuma longa L.)

An investigation entitled Influence of photo-selective nets and metabolic elicitors on growth, yield and quality of turmeric (Curcuma longa L.) was carried out at Tayur village, Nanjangud Taluk, Mysuru district, Karnataka on a farmer's field during kharif 2018-19 and 2019-20. The laboratory work was carried out at the College of Horticulture, University of Horticultural Sciences campus, Gandhi Krishi Vignana Kendra, Bengaluru and also at the College of Horticulture, University of Horticultural Sciences campus, Yelwal, Mysuru. The experiment comprised of twenty treatment combinations consisting of photo-selective nets and metabolic elicitors and was laid out in a split plot design with three replications.

Turmeric crop grown under various photo-selective nets sprayed with different elicitors manifested significant differences in growth, yield and quality during both the years of experimentation. The data on the performance with respect to various parameters recorded at harvest pooled over two growing seasons clearly revealed that, turmeric plants under red photo-selective net with chitosan at 1000 ppm manifested highest plant height and number of leaves per plant (111.48 cm and 25.01 respectively). While, plants grown under blue photo-selective net without any elicitors outperformed as compared to other treatment combinations in respect of number of tillers per plant (6.58). Yellow net with salicylic acid at 100 ppm recorded highest leaf area (6376.39 cm2). The blue net with 1000 ppm chitosan resulted in maximum chlorophyll content (SPAD value 39.13). Open field grown plants treated with chitosan 1000 ppm had highest total phenols (658.60 mg GAE 100-1 g).

The yellow photo-selective net had a most positive impact on the major yield determinant, the number of primary rhizomes per plant (16.68), while the metabolic elicitors had no influence. Supremacy of yellow net was very evident in respect of weight of mother (162.12 g), primary (512.78 g) and secondary (398.73 g) rhizomes per plant, which are considered as the important yield components. Statistical parity in respect of yield was observed due to various nets. However, the yellow net was superior in terms of fresh (58.27 t ha-1) and cured rhizome yield (15.53 t ha-1) and none of the elicitors tried had any significant influence on yield.

The dry recovery, a key parameter, which finally decides the economic output in the form of cured rhizomes, was highest in plants grown under yellow net and sprayed with active dry yeast at 5000 ppm (27.78 %). Curcumin content, the major quality determinant was highest in rhizomes of plants grown under blue net (5.09 %) sprayed with chitosan at 1000 ppm.

Plants grown under yellow net and sprayed with active dry yeast at 5000 ppm gave the highest net returns (Rs. 7,54,830 and 12,45,915 per hectare during 2018-19 and 2019-20 respectively). Under open field conditions, salicylic acid sprayed at 100 ppm resulted in the highest gross and net returns.

Provision of yellow photo-selective net (25 % shade) along with 5000 ppm active dry yeast applied at monthly interval starting from one month after planting up to five months after planting could be recommended for

obtaining highest yield and better quality turmeric with highest net returns. Farmers growing turmeric crop under open field condition may spray salicylic acid at 100 ppm to realize higher yield and net returns.

Audience Take Away Notes

- It's a novel research related to turmeric Curcuma longa L., which will be helpful for producers, processors and pharmaceutical industries as it gives definite results on how the secondary metabolite curcumin can be increased
- Will offer clues and ideas to researchers to try or improvise from here on. The results obtained offers practical solutions for enhancing productivity and quality greatly
- The economic benefits were manifold which was clearly evident in this study

Biography

Dr. Harish B S has completed his Ph D with specialisation in Plantation, Spices, Medicinal and Aromatic Crops from College of Horticulture, Bengaluru, India during 2021. Previously he worked as Quality Assurance Executive at Mother Diary Foods Processing Limited, as Subject Matter Specialist at ICAR- JSS Farm Science Centre at Mysuru and presently as Assistant Professor and Post-graduate coordinator at College of Horticulture, GKVK, Bengaluru. At the university, he was instrumental in developing a 10 hectare demonstration block on medicinal and aromatic crops besides involved teaching. Later at Mysuru, he worked as Extension Leader and played a key role in taking State Agriculture Universities/ICAR institutions technologies to the growers. He has published several books, peer reviewed papers in international and national journals. He has published over hundred popular articles on key issues/technologies in leading dailies and farm magazines. Presently he is involved in teaching, research and transfer of technology activities at Bengaluru. He has got over twenty research papers to his credit in peer reviewed journals. Also involved in establishing research laboratory and guiding post-graduate and doctoral students.

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Nutrigardens- A way forward to achive nutritional food security in rural areas

Food Security is one of the most concerned issue to overcome malnutrition in many parts of India. Further, malnutrition especially in rural womens is major concern as it leads to premature Births, Anemia and very low survival rate. In Developing countries like India Nutrigardens are the ways to achive the best nutrition and health among the individuals. The study was implemented with 25 farm families in rural area. Each family was provided with seed kit and organic inputs. Majority (92 %) of the farm family income ranges between 5 to 10 thousand whereas only few (8 %) had more than 10 thousand. After the nutrigarden intervention the per capita availability of fresh vegetables has been increased to 28.4 % and 100 % change in the practice of organic amendments. Whereas amount spent on purchase of vegetables from market was decreased by 18.52 %. There has been drastic changes in the socio, economic status of the family and cent percent achievement in establishing a pollution free ecosystem around them. Availability of vegetables per person for consumption increased from 60 g to 220 g and improvement in nutritional status was also observed as indicated by BMI.

Audience Take Away Notes

- Presentation of this paper will help the audience to acquire the knowledge on impact of malnutrition and how to combat the issue by using nutrigarden technology
- It gives the complete data on how to improve the quality of life with nutrition
- This Research can be used by other professionals in improving the agronomic practices, improving quality parameters, improve the ecosystem around the houses and also impact on socio economic status of the farmers
- Nutrigarden provides a practical solution to improve the malnutrition and balance the dietary chart of the individuals

Biography

Mr. Basavanagowda M G did his Graduation and Post Graduation in Horticulture from University of Agricultural Sciences, Bengaluru. Presently he is pursuing Phd from Visveswaraya Technological University. From 2006 to till date he is working as Scientist Horticulture at ICAR-Taralabalu Krishi Vigyan Kendra, Davanegere. He is Pioneer in transfer of technology in Horticulture field, Technology Assessment trials, and Frontline demonstrations. He published more than 25 scientific research articles in scientific journals and conferences and more than 150 articles in local languages about farmer's technologies. He is very effective in social media running a YouTube channel.

Vedat Pirinc, Erhan Akalp*
Dicle University Faculty of Agriculture, Sur, Diyarbakir, Türkiye

Ethyl Methane Sulfonate mutagen (EMS) studies in pepper (Capsıcum annuum L.) breeding variety

Researchers are working on methods to increase production in order to meet the nutritional and food needs as a result of the gradual decrease of the plant resources in the world and the increase in the human population. Within the scope of the studies carried out under the name of the Green Revolution, the methods of obtaining more products from the unit area were investigated. The first of these methods is some cultural practices in existing varieties; A limited increase in yield and quality has been achieved through practices such as improving irrigation systems and methods, soil mechanization, fertilizing, and control of diseases and pests. The development of high quality varieties possible with the implementation of seed-based breeding studies, which are the genetic material of yield and quality in plants. Plant breeders benefit from the variations existing in nature and using new techniques and methods to develop new varieties. In the emergence of a new variety, the breeder can benefit from hybrid breeding, which is one of the classical breeding methods, and started to use the mutation breeding method, which is a new method used to obtain a new variety that shortens the long time and excessive labor in breeding period. Mutation can occur spontaneously in nature or it can be done by using chemical and physical mutagens. Mutations obtained artificially in nature occur with the effect of many physical such as various rays (Gamma ray, X-ray, Cobalt 60 etc.) or chemicals such as diethyl sulfate, sodium azide and Ethyl Metal Sulfonate (EMS).

EMS is accepted as the most effective and common among chemical mutagens in mutation breeding, which is frequently used in the development of new varieties. EMS used in plants usually causes point mutations. The selection of the most appropriate mutagen dose applied in plants is extremely important. As the applied mutagen dose increases, the physiologic damage increases with the increasing in the mutation frequency. For this reason, studies are still carried out to determine the most appropriate physical and chemical mutagen dose to be applied in vegetable mutation breeding studies in the world and in our country.

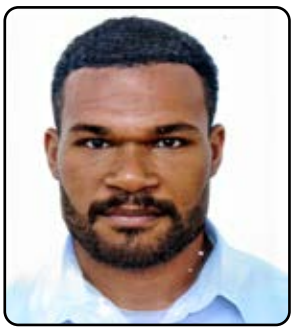
There are many physical and chemical mutagens used to obtain genetic diversity in performing mutation breeding studies in vegetables. Pepper, which has an important place among vegetables, is considered as an effective vegetable in human nutrition in terms of its nutritional content (vitamins, etc.). The pepper has not only common consumption and cultivation but also have wide variation potential. It has a wide variety of potential that can be used for paste, pickling, chili peppers, fresh consumption, roasted, frozen and dried, ornamental peppers and also used in the defense industry. Development of high quality pepper varieties for each of these varieties; it is possible using chemical mutations, results can be obtained in a shorter time. With this study, it is aimed to examine the studies on EMS applications in pepper cultivar breeding. Thus, by compiling the current research results on mutation breeding with EMS in pepper; an attempt was made to obtain a protocol for implementation. Considering factors such as application doses and time used for each variation of pepper with a wide variety potential, it is thought to be reference for future studies. The observations and experiences of our study that still continued in Dicle University of Agriculture Faculty about EMS applying on pepper will be shared.

Audience Take Away Notes

- Doses of EMS that seem acceptable in vegetables are not clear. In this study, it has been revealed which doses can be used in vegetables in general
- Since physical mutagens are difficult to access and apply in mutation breeding, this study will specify all easily accessible chemical mutagens and give information about the recent studies
- The use of the appropriate mutagen dose for breeders who want to work on pepper is recommended by this study
- The most important contribution of this study to give information about our research that carried out in Faculty for two years such as the germination of seed and the morphological and physiological observations obtained until the harvest period of the plants. In addition, it is thought that it will be referance study with results of effective doses with applying time

Biography

In 2012, I graduated from Dicle University, Faculty of Agriculture, Department of Horticulture. Until 2020, I worked as a expertise and organic agriculture controller in companies affiliated to the private sector and the Ministry of Agriculture. In 2019, I started working as a research assistant in my own faculty. I completed my master's degree in 2020. In the same year, I started the doctoral program and I am currently continuing my thesis application studies. I am managing 3 project studies as a consultant in research projects supported by TUBITAK (Scientific and Technological Research Council of Turkey). I took part in the organizing committee of 3 International Congresses.



Nelson Barau

School of Science and Technology, Physics and Mathematics Department, Pacific Adventist University, Port Moresby, National Capital District, Papua New Guinea

A baseline study of the presence of the radioactive isotope Cs- 137 in the central province of Papua New Guinea

This study is aimed at identifying the artificially produced radioactive isotope Caesium-137 (^{137}Cs) and determining its activity at specific sites across the landscape of the Central Province of Papua New Guinea. Central Province is one of the provinces in Papua New Guinea situated between 9° 30′south latitude and 147° 40′ east longitude. It occupies a total area of 29, 998 km^2 (11, 582/sq mi) which lies over a geological formation comprising a sequence of dark cracking clays on greyer clays, silty- clay alluvium, clay alluvium and reddish brown soil. This work aims to establish the first baseline measurements of 137Cs concentration in soil collected from sites within the Central Province. Representative samples from various locations across the Central Province were collected and analysed. The activity was measured through gamma-ray spectroscopy using a 50 mm diameter Sodium Iodide (NaI) Scintillation detector. The detector was situated in a low- background environment consisting of a cylindrical lead shield of about 6 cm thickness to exclude unwanted ambient radioactivity. Details of the sample collections, preparations and gamma- ray spectroscopy analysis techniques are presented. Out of four sites including a control site, 54 soil samples were taken. Five soil samples from Pacific Adventist University had activity concentrations below the lowest limit of detection and one had an activity concentration equal to 0 while six samples had defined values of activity concentrations ranging from 0.163 ± 1.228 to 0.817 ± 0.248 Bq/kg. All twelve samples for NARI Laloki had defined values of activity concentrations with the range of 0.326 ± 0.616 to 1.31 ± 0.156 Bq/kg. Koitaki had one sample below the lowest limit of detection and all others had defined values of activity concentrations ranging from 0.163 ± 1.228 to 1.963 ± 0.105 Bq/kg. Varirata National Park had one sample below the lowest limit of detection and two samples had activity concentrations equal to 0 while nine samples had calculated activity concentrations ranging from 0.163 ± 1.228 to 1.637 ± 0.126 Bq/kg. The control site had two samples with activity concentrations below the lowest limit of detection while four samples had defined values of activity concentrations ranging from 0.163 ± 1.228 to 0.983 ± 0.207 Bq/kg. It can be concluded from this study that there are areas in the Central Province with measurable levels of the artificial radionuclide ^{137}Cs although these levels are generally lower than some published data for other global sites.

Audience Take Away Notes

- Identify man-made radioactive isotopes in the soils within the terrestrial environment in the Central Province of Papua New Guinea
- Determine the energy levels and activity concentration of isotopes found in the soil
- Compare the radioisotopes found with other related global studies done
- Create a database for baseline data for future monitoring of radioactive levels in the environment
- This research presentation is of great significance as it addresses the terrestrial environment in Papua New Guinea especially Soil Science and Agricultural Chemistry as well as Agricultural Safety and Health. Also, it is of potentially great importance as it provides useful information on the presence

of radioisotopes and their concentrations in the terrestrial environmental of Papua New Guinea. If the terrestrial environment contains high levels of radioactive isotopes then measures may be taken to reduce the concentrations to improve the environment and minimize the negative impacts on consumers of environmental products. In addition, this research is significant because it provides an important contribution to new knowledge of radioisotopes and their concentrations baseline data for the terrestrial environment of Papua New Guinea

Biography

Mr. Nelson Barau received his Master of Philosophy (MPhil) from Pacific Adventist University, Papua New Guinea in 2018. He is currently an Academic at Pacific Adventist University within the School of Science and Technology in the Department of Physics and Mathematics. His research interests are: Environmental Radiation, Agriculture and Crop Modelling (with Advanced Machine Learning and Artificial Intelligence), Applied Physics and Mathematical Physics.

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Bioactive properties of some phenolic compounds fractionated from pomegranate peels crude juice

Phenolic compounds are secondary metabolites in plants and are considered as important natural molecules due to their bioactive properties. The crude juice of pomegranate peels the agro-food by-product was produced by the mechanical pressing without using a solvent. Moreover, phenolic compounds of the resultant crude juice were extracted by Solid Phase Extraction (SPE) then fractionated by Thin-Layer Chromatography (TLC) into their main component. These fractionated phenols were identified using several spectroscopic methods, i.e., Fourier-Transform Infrared Spectroscopy (FTIR), Mass Spectrum (MS) and Nuclear Magnetic Resonance (NMR) spectroscopy. The fractionated polyphenols were subjected to the estimation of their antioxidant, antibacterial and anticancer potentials. Also, the cytotoxicity effects of these phenols on normal cells were estimated to check their safety. The results of FTIR revealed the presence of various functional groups such as OH, COOH, C=C, CHO and C=O. NMR and MS data showed that the five fractionated phenols were, gallic acid, ellagic acid, quercetin, catechin and vanillin. Ellagic acid exhibited strong potential to act as a metal chelator and higher reducing power activity while, vanillin showed high scavenging activity by DPPH method. Gallic and ellagic acids exhibited significant inhibitory activity against all bacterial strains under study when compared to other phenolic compounds. Catechin decreased the viability of MCF-7 breast adenocarcinoma cells and human colon cancer cells (HCT-116). Toxicological potential of phenolic compounds under study revealed no cytotoxic effects at the concentrations used in the present study. Accordingly, bioactive compounds, i.e., phenols from agro-food by-products which recovered using sustainable extraction way, can be used as raw material, or as novel products, with health benefits creating industries with added value.

Audience Take Away Notes

- Agricultural and agro-food industrial processing produce a high amount of wastes and by- products which represent a vital issue for both environment and international economy since they are one of the causes for landfilling to be no longer sustainable. So, the main challenge nowadays is using these non-edible parts as a renewable and cheap source of added value bioactive compounds to introduce new, more sustainable, and natural alternatives to the market
- Several extraction methods have been reported for the recovery of bioactive compounds that use organic solvents which may contribute to toxicity, presenting high volatility and non-renewability. Thus, there is a growing need for green and sustainable alternatives
- Bioactive compounds, i.e., phenols from agro-food by-products which recovered using sustainable extraction way, can be used as raw material, or as novel products, with health benefits creating industries with added value.

Biography

Dr. Layla Tawfeek is a Lecturer of Biochemistry and a Scientific Supervisor of Detergents and Disinfectants Unit studied at Faculty of Agriculture, Cairo University, Egypt. She completed Master of Biochemistry in 2016 also received her PhD degree in 2020 at the same institution. She has a great interest in Biotechnology, Natural products, Green chemistry, and Food safety.

Juliana Lobo Paes*, Beatriz Costalonga Vargas, Guilherme Araujo Rocha, Saulo Emílio Guerrieri Araújo Damm, Maxmillian Alves de Oliveira Merlo, Pedro Luis Belfort Gomes Fernandes

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Anaerobic digestion of wood sector and sewage treatment plant wastes to produce biogas

One of the possible technological routes to compensate for the impacts caused to the environment by the wood sector and sewage treatment plant is Anaerobic Digestion (AD) in biodigesters, transforming waste into energy. The objective of this work was to evaluate the increase in the biogas production, based on the mixture of hydrolyzed wood material (H) with Sewage Sludge (SS). The experiment consisting of Anaerobic Mono Digestion (AmD) and Anaerobic Co-Digestion (ACoD) and Total Solid (TS) and Volatile Solid (VS) analysis was conducted at the Laboratory of Rural Electrification and Alternative Energies. Indian model benchtop biodigesters were used, which were consisting of a water seal containment chamber, fermentation chamber, gasometer and U-tube manometer for the water column. The biodigesters were supplied in batches with 1.7 kg of influent at ratios of 100: 0, 75:25, 50:50, 25:75, 0: 100 H:SS. The product of the vertical displacement of the gasometer by its internal cross-sectional area determined the volume of biogas produced during 13 weeks of Hydraulic Retention Time (HRT), being corrected by combined gas law. Biogas production profile and cumulative biogas yield were evaluated. Biogas production started in the first week, followed by peak production at 50:50, 75:25 and 0:100 H:SS. After the peak, a drop in production is observed until it remains null. The 25:75 and 100:0 H:SS ratios did not show peak production along the HRT. It can be seen that the ACoD process resulted in anticipation of the peak production when compared to AmD. ACoD with 75:25 H:SS caused 39.44% higher biogas production when compared to 0:100 H:SS. The ACoD process with 75:25 H:SS resulted in greater cumulative biogas yield, being 1.208 L kgadded-1, 0.174 L kgTSadded-1 and 0.235 L kgVSadded-1. Concluded synergy between the codigestants, mainly, by adopting a higher proportion of blend of hydrolyzed woody material.

Audience Take Away Notes

- This presentation is about the use of different types of biomass, which are normally considered as environmental liabilities, for energy production through anaerobic digestion
- The subject of anaerobic digestion, including anaerobic monodigestion and anaerobic codigestion, needs to be researched for its application in anaerobic digester plants
- The dissemination of results obtained from research on anaerobic digestion processes with different types of biomass is necessary since many farms and industries with the potential to use anaerobic digesters fail to use them due to lack of information and knowledge, or when they have them in their production system they use inefficiently.
- Finally, this presentation will also address topics such as alternative energy and the circular economy.

Biography

Dra Juliana Lobo Paes studied Agricultural and Environmental Engineering in 2006 and graduated as MS in 2008 at the Federal University of Vicosa, Brazil. She received her PhD degree in 2011 at the same Institution. Currently, she is Associate Professor, collaborated professor at the Graduate Program in Agricultural and Environmental Engineering at the Federal Rural University of Rio de Janeiro and permanent professor at the Graduate Program in Digital Agroenergy at the Federal University of Tocantins. She is coordinator of the Group of Renewable Energies and Rural Alternatives (GERAR) and volunteer of Brazilian Women in Solar Energy Network.

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Valuable resource for fructans genes in Agave angustifolia inferred through transcriptome analyses

The Agave genus covers about 200 species, of which 186 taxa are recognized in Mexico. Plants of A. angustifolia Haw. constitute the raw material for the elaboration of mezcal, and other distillates. Thus, over 750,000 L of mezcal beverage is exported annually to Asia, Europe, United States and Canada. Agave fructans, the main carbohydrate for mezcal production, can be used to prevent or treat several human diseases, and they are used as ingredients to improve color and flavor. Four fructosyltransferase enzymes are implicated in the fructan metabolism: Fructan: Fructan 1-Fructosyltransferase (1-FFT), Sucrose: Sucrose 1-Fructosyl Transferase (1-SST), Fructan: Fructan 6G-Fructosyltransferase (6G-FFT) and Sucrose: Fructan 6-Fructosyltransferase (6-SFT). The objective of this study was to compare the genetic profile of different plant tissues to elucidate the key genes for fructan synthesis of A. angustifolia, and the useful of transcriptomic data for phylogenetic analysis. Total RNA from young leaves, mature leaves, root and stem was purified. Twelve libraries were synthesized and sequenced on NovaSeq system. De novo transcriptome assembly was constructed using Trinity´s software. BLASTp, BLASTx and EggNOG-mapper were used to annotate the agave transcriptome. Differentially expressed transcripts (DETs) were determined using Limma tool. Gene involved for fructan metabolism was validated using RT-qPCR.

For phylogenetic analysis, orthologs among nine species of agave were identified and analyzed using the OrthoVenn3 Server. A total of 358,170 transcripts were assembled; from which, 174,414 had potential coding protein revealing the presence of at least 29,273 genes in A. angustifolia. Multidimensional plots showed that the first three dimensions accounted for 73% of the variability. The first dimension explained the most variation (43%) where a clear separation between root, stem and leaves was revealed. While the separations between the two leaf types were more apparent on the second and third dimensions. The pair wise comparisons between the plant tissues resulted in the estimation of 123,181 DETs (23,978 were up regulated and 79,203 were down regulated). As expected, transcriptome profiles differ between Agave tissues according to their respective physiological function. Moreover, seven fructosyltransferases and invertase´s genes were retrieved from our A. angustifolia assembly. Only 1-SST1 was found to be completely assembled (2896 bp). The remaining genes (1-SST2, 6G-FFT1, 6G-FFT2, 1-FFT, Vinv1 and Cwinv1) were found to be fragmented, composed of 2 to 4 transcripts. However, the expression behavior of the transcripts within the same gene was similar. Globally, the genes 1-SST1, 1-SST2 and 6G-FFT1 were up regulated in stem and roots. Moreover, 1-SST2 was also up regulated in youthful leaf and 1-FFT was only up regulated in stem. Likewise, 6G-FFT2 was up regulated in all tissues except in roots, and Vinv1 and Cwinv1 were up regulated in youthful leaf and roots. Also, the phylogenetic analysis revealed the closeness between A. angustifolia and A. tequilana, both species were classified in the Rigidae agave group. The data presented here provide a publicly available transcriptome resource for A. angustifolia. The results will promote advances in genetic and molecular studies and will facilitate the identification of candidate genes involved in the growth, development, and metabolism of this species.

Audience Take Away Notes

- The first assembly transcriptome resource of Mexican Agave angustifolia is presented
- Biosynthesis and metabolism of carbohydrates, especially fructans, were discussed
- Data obtained is publicly available, so audience can use these data for multiple genetic researches
- The results obtained to broaden our knowledge about the genetics and biology of agave
- The data could be used to evaluate and improve the harvesting and processing conditions of the agaves for more efficient production of Mezcal

Biography

Ernestina Valadez Moctezuma obtained a degree in Biology in 1981 and a Dr. Sci degree in 2001, both from the Universidad Nacional Autónoma de México. She received in 1987 a Master degree in Genetics from Colegio de Posgraduados, México. She is a Professor and Researcher at the Universidad Autonoma Chapingo since 1982 in Molecular Biology, Genetics, Molecular Markers, and Biotechnology areas. Actually, the main researcher lines consisted in differentiation and analysis of genetic variation in Opuntia spp. and Agave sp, principally; nevertheless, and microorganism associated to plants. She has published more than 80 papers in several scientific journals.

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PLANT SCIENCE AND AGRICULTURE

Christopher Atkinson[1,2]*, Marina E.H. Müller[1], Guntram Weithoff[2]

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The susceptibility of gramineous and non gramineous weeds to fusarium culmorum infection

Weeds can play an important role in facilitating the infection of wheat fields with the fungal phytopathogen Fusarium by acting as an alternative host. It has already been shown that infected perennial weeds on the edges of agricultural fields can significantly increase the presence of Fusarium in nearby wheat ears by acting as overwintering vessels for the phytopathogenic fungi. Some empirical studies have also reported that gramineous weeds host more overwintering Fusarium than non-gramineous weeds, but it is unclear whether or not these observations are due to innate susceptibility differences in the weeds. The main objective of this study was to identify differences in the reaction of different weed species to infection by Fusarium culmorum. In order to do this, we grew gramineous and non-gramineous weeds in a climate chamber and infected them with a pathogenic Fusarium culmorum strain through the roots. The plants were analysed after 3 and 9 weeks after infection in order to observe the development of the infection in the rhizo-, endo- and phyllosphere of the weeds over time.

We determined that while gramineous weeds were more infected in the roots than non-gramineous weeds, they were less infected in the shoots. This implies that our hypothesis that gramineous weeds are just generally more susceptible to Fusarium infection cannot be confirmed in this experiment. We also found that the roots were already infected after three weeks and that there was a large increase in the infection load of all weeds between three and nine weeks post initial infection. Despite high infection loads in infected plants, there were no clear visual differences between them and the control plants. The large differences in the mean fungal load detected in the different weed species was also very high. Further research should focus on whether the trends mentioned above are observed when different Fusarium species or strains and other infection methods are used to assess the susceptibility of the different weed species. Alternatively, further research could also focus on exploring how the large differences in the susceptibility of common weed species to fungal pathogens such as Fusarium culmorum could be used for practical ecological applications and phytopathogen infection mitigation.

Audience Take Away Notes

- The audience will be able to better understand future research about the susceptibility of weeds to Fusarium Culmorum infection, and their role in spreading fungal phytopathogens
- Other researchers could use the information in my presentation to aid the selection of weeds to focus on in their research work
- A big design problem faced by researchers is providing farmers and ecologists with recommendations on how best to protect their fields from phytopathogenic fungal infection without destroying vegetation that perform critical ecosystem services. The insight from this work will help address this question
- A big design problem faced by researchers is providing farmers and ecologists with recommendations on how best to protect their fields from phytopathogenic fungal infection without destroying vegetation that perform critical ecosystem services. It provides researchers with an indication of which weeds could be the most and the least promising barriers against Fusarium infection

Biography

Christopher Atkinson studied Biotechnology (Applied Molecular Biology) at the University of Aberdeen and graduated with an Msci in 2020. He then joined the research group of Dr. Marina Müller at the Leibniz Centre for Agricultural Landscape Research in order to pursue a PhD on the topic The Role of Weeds in Phytopathogenic Fungi Dispersal in Heterogeneous Agricultural Landscapes.

Madara Darguza*, Zinta Gaile
Institute of Soil and Plant Sciences, Latvia University of Life Sciences and Technologies, Jelgava, Latvia

Productivity of crop rotation applying different tillage practices

Simple agronomic practises as crop rotation and soil tillage may lead to high yields of winter wheat (Triticum aestivum) and increase productivity of full crop rotation. The research described in this abstract was aimed to compare productivity of crop rotations depending on winter wheat proportion on it and soil tillage used. The field experiments were conducted in the Research and Study Farm Peterlauki (56° 30.658′ N and 23° 41.580′ E), in Latvia in four harvest seasons from 2016/2017 till 2019/2020, within the long-term experiment started on 2009. Three crop rotations which included different proportion of winter wheat were studied (100% wheat (repeated winter wheat sowings), 67% wheat (three year rotation with oilseed rape (Brassica napus spp. oleifera) and two years following wheat), 25% wheat (four year rotation with faba bean (Vicia faba)–winter wheat–oilseed rape–spring barley (Hordeum vulgare)). Each rotation was grown in traditional (TT) and reduced (RT) soil tillage system. TT included mould-board ploughing at a depth till 22 cm, and soil cultivation after ploughing and before sowing, but RT – disc harrowing twice till a depth of 10 cm and cultivation before sowing. Split-plot design was used for arrangement of variants; each variant was four times replicated. Soil type at the site was Cambic Calcisol, clay. Productivity of crop rotation in this experiment was measured by energetic output (GJ ha-1) from production and economical evaluation (EUR ha-1). Yield of oilseed rape was calculated after sample sheaf analysis, but for other crops by direct combaining. Energy output was calculated from included crop's above ground biomass energetic value (detected by ISO 18125:2017) and biomass yield. Economic evaluation was done as income and variable cost balance. The most energetically and economically valuable crops were wheat and oilseed rape. Significantly higher average yields of wheat were obtained in crop rotations 67% wheat and 25% wheat compared to repeated winter wheat sowings. Winter wheat yields after field beans and oilseed rape on average were higher using RT. Energy yields differences depending on the tillage systems were not significant. The significantly highest total energy yields were gained from rotations 67% wheat and 25% wheat with sequence of crops barley–faba bean–winter wheat–oilseed rape harvested in 2017–2020. Total average energy yield from all rotation 25% wheat sequence varaints was reduced by low crop yields and energy output from spring crops (barley and faba bean) in dry 2018 and 2019, but the average energy yield obtained in this crop rotation was not mathematically significantly different from the result of rotation 100% wheat. During experimental period, higher average economic benefit was obtained from crop rotations with diverse crops, mainly due to positive fore-crop effect on winter wheat in rotations, compared to repeated sowing in long term. The highest economic profitability was achieved for a three-year crop rotation with 67% winter wheat and 33% winter oilseed rape using reduced tillage, followed by a four-crop rotation using both soil tillage systems. Both changing prices and changing crop yields affected the economic outcome over the years.

Audience Take Away Notes

- The research results proved sustainability of diversified rotations compared to continuous wheat on productivity
- It is possible to reduce tillage intensity to get competitive productivity from crop rotations.

- Productivity differences between crop rotations were strongly influenced by the meteorological conditions in the study period

Biography

Madara Darguza is PhD student in Faculty of Agriculture in Latvia University of Life Sciences and Technologies. She has joined to the researcher's group of prof. Zinta Gaile at the Institute of Soil and Plant Sciences. Her PhD topic is Productivity of crop rotation depending on wheat proportion in it and soil tillage system. She has a researcher's position at the Institute of Soil and Plant Sciences, and she also is a lecturer at the Faculty of Agriculture from 2018. She has published five articles in the SCI(E) editions.

Mariela Mattos da Silva[1,2]*, Gustavo Henrique Alves Silva[1,3], Rebeca Matos Groner[1,3], Gabriel Rosa de Sousa[1,3], Gislane Chaves Oliveira[1,4], Thaís Araujo dos Santos Gasparini[1,2], Romário de Oliveira Silva Junior[1,4], Diolina Moura Silva[1,2]

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Antioxidative and produtive potencial of Restinga shrub species

The restinga is an ecosystem strongly impacted by anthropic action, such as the Fundão Dam Failure, in 2015. Analyzes under controlled conditions constitute an important tool for defining strategies for repairing the potentially damage of passage of mine tailings from the Fundão Dam through the coastal region, and may also identify patterns of plant development and species with unexplored productive and phytochemical potential for the proposition of mitigation measures. As such, the present work aimed to characterize the photosynthetic and oxidative system among five shrub species from restinga under greenhouse conditions: Chrysobalanus icaco L. (CHRY), Eugenia astringens Cambess. (EUG), Guapira pernambucensis (Casar.) Lundell. (GUA), Myrciaria strigipes O Berg (MYRC) and Psidium cattleyanum Sabine (PSID). For this, we evaluated the changes in the different phases of fluorescence of chlorophyll a emission kinetics of transient OJIP, as well as functional and structural parameters of the JIP test. In the same leaves, the capacity of the antioxidant system was also evaluated. CHRY and GUA plants showed evidence of a decreased photochemical activity, such as a reduced connectivity between adjacent Photosystems II (PSII) at the level of the antenna complexes and a smaller pool of plastoquinone and/or photosystem I (PSI) electron end acceptors per center of active reaction of the PSII, as well as greater sensitivity to the level of Oxygen Evolution Complex on the PSII donor side. In these species, parameters of structure and function of the photosynthetic apparatus indicate that although CHRY and GUA tend to absorb and capture more energy per reaction center in the PSII, part of this energy is released in dissipative processes that may result in less energy flow for electron transport beyond QA and intersystem of the electron transport chain, resulting in the reduction of photosynthetic performance in both species. Among the analyzed species, the representatives of Myrtaceae Family showed higher bioactive functional properties and antioxidant activity, suggesting a great capacity for adjustment of the antioxidant system and biological activity. Thus, the results so far reveal the susceptibility of the photosynthetic and antioxidant system of C. icaco and G. pernambucensis and highlight the myrtaceae species as having the greatest potential for primary and antioxidant productivity, indicating viability of the restinga species evaluated as prospective sources of phytopharmaceuticals.

Audience Take Away Notes

- The study of different species of the restinga ecosystem aims to identify important plant development patterns to propose mitigation measures in impacted environments
- Chlorophyll a fluorescence analysis is an excellent indicator of ecosystem primary production and species screening
- Restinga species are a potential source of natural antioxidants and knowledge of these species provides new ecosystem services to this susceptible Brazilian mosaic of plant communities

Biography

Graduated in Biological Sciences from the Federal University of Espirito Santo (2006) and Master in Plant Biology from the same institution (2009). Completed his doctorate in Plant Physiology (2013) at the Federal University of Viçosa. Has experience with Mechanisms of tolerance to abiotic stress via photosynthetic component response and antioxidant control in cultivated and native plants, as well as in Ecophysiology of fruit plants and Postharvest physiology. Currently, is a Postdoctoral Researcher at Espirito Santense Technology Foundation (FEST), participating in the Aquatic Biodiversity Monitoring Program (PMBA/FEST).

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Chlorophyll fluorescence excitation techniques reveal community-level physiological characteristics of Brazilian Coastal Restinga

The restinga is a coastal ecosystem characterized by the zonation of different functional groups of plants, which are grouped due to the impact of limiting environmental conditions, which, in turn, are attenuated along a spatial gradient in the sea - continent direction. We believe that these conditions are able to bring together similar physiological traits at the community level, therefore, this study has as main objective to provide information about functional characteristics of plants through the analysis of fluorescence signals in two different communities. For this, we developed a field quantitative fluorometry protocol using the multispectral fluorescence induction sensor (Multiplex, Force-A, France) combined with transient chlorophyll fluorescence analysis (Hand-PEA Hansatech Instruments, United Kingdom). Measurements took place in 10 species, five species in each community, herbaceous and shrubby. The results show that plants located in the herbaceous community are characterized by having higher levels of flavonoids, indicating the presence of a metabolic framework capable of promoting tolerance and influencing the efficiency of energy use, as also seen in the highest average values of photochemical performance indexes. On the other hand, lower values were recorded for the nitrogen balance indexes, which was attributed to limiting conditions of nitrogen in coastal soils. As for the shrub community, the highest mean values were found for nitrogen balance, and also for the anthocyanin index, which is possibly linked to defense mechanisms against herbivory. In contrast to the other parameters, the weighted average of the chlorophyll indexes remained practically unchanged and were not informative in the functional characterization of the communities. Proximal sensing using fluorescence techniques proved to be an efficient method to measure physiological characteristics in plant communities, and may complement other methods in functional ecology, providing environmental indicators of the state of the restinga ecosystem.

Audience Take Away Notes

- Fluorescence signals analysis is an efficient non-destructive technique of species screening and provide information about functional characteristics of plants
- Restinga plant mosaic is composed of ecologically plastic species with similar physiological characteristics at the community level, which result in specifics spatial zonation in response to the its different environmental conditions
- Understanding the capacity of plants to respond to variations in the availability of resources is fundamental and would allow an increased comprehension of the balance and dynamics of ecosystem communities, especially for recovery and management projects of impacted areas

Biography

Graduated in Biological Sciences from the Federal University of Espirito Santo (2006) and Master in Plant Biology from the same institution (2009). Completed his doctorate in Plant Physiology (2013) at the Federal University of Vicosa. Has experience with Mechanisms of tolerance to abiotic stress via photosynthetic component response and antioxidant control in cultivated and native plants, as well as in Ecophysiology of fruit plants and Postharvest physiology. Currently, is a Postdoctoral Researcher at Espirito Santense Technology Foundation (FEST), participating in the Aquatic Biodiversity Monitoring Program (PMBA/FEST).

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Differential responses to precipitation peak and metallic stress in species of restinga plants from the Brazilian coastal region

This study aimed to determine whether adverse abiotic conditions were a driver of species spatio-temporal responses or whether adaptive responses are species-specific in restinga vegetation. Due to the sudden event of increased rainfall in January 2020, a scenario conducive to the observed physiological changes occurred, mainly in terms of changes in Chlorophyll a Fluorescence parameters (ChlF). We used analysis of the concentration of chemical elements in leaves, of the Bioaccumulation Factor (BAF) of essential elements and its influence on the photosynthetic response of plants, during three periods of the local rainy season: (1) January/20, (2) January during peak rainfall on the coast (Jan-Pulse) and (3) March/20, after the event. The results obtained showed higher levels of As, Cd, Cr and V in herbaceous plants, while in trees this period did not present significant differences. For BAF of essential elements, Jan-Pulse was favorable to the reduction of element content in the shoot, for BAF_Fe in herbaceous and BAF_Mn in tree species, which may be closely associated with the mobility of these metals, also dependent on soil properties. Changes observed in the chlorophyll content (SPAD index), pointed to a negative impact of high rainfall (Jan-Pulse). In terms of chlorophyll a fluorescence parameters, herbaceous plants showed positive K- and L-bands, indicating lower stability and efficiency in energy use by plants, accompanied by significantly increased energy dissipation values (DI0/RC). In relation to Jan/20, there was an increase in energy dissipation for herbaceous plants, varying between 69 and 148%, while tree plants did not show significant differences. With a similar pattern, the photosystem II performance index (PIABS) of herbaceous plants was also reduced during the Jan-Pulse. The observed results confirm a plant response gradient in relation to the coast, demonstrating that herbaceous plants, although reported as tolerant to the stress conditions inherent to the coastal region, showed losses in chlorophyll fluorescence parameters of the photochemical stage of photosynthesis in response to adverse climatic conditions and to the increased availability of water and meta(loids) in the environment.

Audience Take Away Notes

- Abiotic factors combined with biotic activities can also have a harmful effect on species adapted to adverse and limiting environmental conditions
- Chlorophyll a fluorescence consists of a fast and non-invasive method that allows detecting, in loco, the intensity of the impact of stressors on vegetation
- Even in plants already adapted to unfavorable environmental conditions, the additional effect of metallic stress was detected, mainly in herbaceous species, closer to the shoreline

Biography

Sabrina Garcia Broetto studied Biological Sciences at the Federal University of Espirito Santo, and graduated as MS in 2009. She received her PhD degree in 2013 at University of Sao Paulo. She then joined the research group coordinated by Prof. Diolina Moura Silva, at the Center for Photosynthesis Studies (NEF/UFES). Currently develops research as a postdoctoral researcher in the Aquatic Biodiversity Monitoring Program - PMBA/FEST/UFES.

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The rainfall effect and different levels of chemical elements on chlorophyll a fluorescence parameters in a Brazilian restinga species

The aim of this study was to analyze whether there was a relationship between rainfall and the concentration of bioavailable chemical elements that reached the coastal vegetation, from the tailings plume, released in the Mariana disaster (Minas Gerais, Brazil) that reached the coast in 2015. It was also evaluated whether there was a direct relationship between the increase in rainfall and chemical elements on photosynthetic parameters. This dynamic was evaluated from the fluorescence of chlorophyll a in Byrsonima sericea, a shrubby species, which currently has been used as a model in restinga studies. The results showed that the photosynthetic performance of B. sericea varied seasonally and that there was a direct relationship between the concentration of trace elements in the soil and leaves and precipitation. This relationship determines variability between high metal concentrations (mainly Cu and Fe) and photosynthetic performance indices (PI_{abs} and PI_{total}) and Oxygen Evolution Complex (OEC) activity in Photosystem II (PSII). Potentially combined effects of high concentrations of elements and rainfall regimes caused changes in parameters related to quantum efficiency, specific energy fluxes and performance indices. The data presented in this study conclusively proved that Byrsonima sericea responds to different environmental conditions and that the dry season was more harmful to plants than the wet season in terms of impacts of rainfall regime and metal availability; metal availability also varied according to rainfall patterns and transport via marine aerosols. In addition to the natural stress conditions experienced by the restinga vegetation, such as alternating rigorous rainfall regimes and dry periods, the addition of an imbalance factor such as the presence of trace elements in the soil and leaf tissue, resulted in marked alterations in the photosynthetic metabolism of B. sericea. Finally, the analyzes indicated the use of chlorophyll fluorescence as a fast and accurate analysis, to understand the impacts of trace elements in natural ecosystems affected by events such as the rupture of the Fundao dam.

Audience Take Away Notes

- Chlorophyll fluorescence studies have shown that the tool can be used to quickly and non-destructively analyze vegetation status
- The combined analysis of environmental conditions and physiological responses allows a more accurate interpretation of vegetation status and consequently its vitality
- Analyzes showed that some conditions are physiologically more unfavorable, as is the case when excessive amounts of some trace elements are combined with high precipitation, promoting changes in the structure of the photosynthetic apparatus

Biography

Sabrina Garcia Broetto studied Biological Sciences at the Federal University of Espirito Santo, and graduated as MS in 2009. She received her PhD degree in 2013 at University of Sao Paulo. She then joined the research group coordinated by Prof. Diolina Moura Silva, at the Center for Photosynthesis Studies (NEF/UFES). Currently develops research as a postdoctoral researcher in the Aquatic Biodiversity Monitoring Program - PMBA/FEST/UFES.

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Isolation and identification of plant probiotics for leafy greens

Introduction: Plant probiotic bacteria are plant-associated microorganisms that, when applied in a specific amount, improve the growth and yield of the host plants while also suppressing diseases. These plant probiotics have been shown to improve the production of phytohormones, antibiotics, and lytic enzymes; fix atmospheric nitrogen; and even help in the solubilization of soil mineral nutrients (Rahman et al., 2018). Major general of probiotic bacteria that promote plant growth include Bacillus, Pseudomonas, Acinetobacter, Arthrobacter and Serratia (Rahman et al., 2018).

One example of these probiotics being able to increase the yield of the plant is in strawberries, where the bacteria species Bacillus amyloliquefaciens and Paraburkholderia fungorum increased both the size of the fruits as well as the quantity of the leaves and roots (Rahman et al., 2018). Another example would be broccoli, where the inoculation of PGPR bacteria (Bacillus cereus, Brevibacillus reuszeri and Rhizobium rubi) had shown an increment in chlorophyll, N, K, Ca, S, P, Mg, Fe, Mn, Zn and Cu contents. Crop yield increased by 17%, 20.2%, and 24.3% and chlorophyll content by 14.7%, 14.0% and 13.7% in treatments added with Bacillus cereus, Brevibacillus reuszeri and Rhizobium rubi, respectively (Rahman et al., 2018).

In addition, some PGPR strains are effective in suppressing pest, pathogen and effective as biocontrol agents. Study reported that various Bacillus strains are important in controlling pathogens and improving plant growth due to antagonistic relationships (Rahman et al., 2018). A previous study also showed that PGPR is involved in the production of plant hormones such as Indole Acetic Acid (IAA). The bacteria species most studied and likely to produce this compound are Bradyrhizobium japonicum SB-1 and Bradyrhizobium thuringiensis (Asghari et al., 2020).

This study determined the reproducibility of using three plant probiotics strains (Isolate 4 (Acinetobacter pittii), Isolate 9 (Bacillus altitudinis), and Isolate 8 (Bacillus licheniformis)) on the plant growth of curly kale, Jericho lettuce and Thai basil seeds.

Materials and Methods Plant material: Seeds of curly kales, Jericho lettuce and Thai basil seeds were purchased from Archisen Pte Ltd.

Biocontrol Agents: Three plant probiotics strains (Isolate 4 (Acinetobacter pittii), Isolate 9 (Bacillus altitudinis), and Isolate 8 (Bacillus licheniformis)) were inoculated on the curly kales, Jericho lettuce and Thai basil seeds. These isolates were previously isolated and identified at the Singapore Institute of Technology (SIT), and stored in 20% glycerol at -20˚C. They were revived in a laminar air flow under aseptic conditions with 30 mL of nutrient broth media and placed in an incubator at 30˚C for 72 h. A loopful of colony was put in a 15 mL Falcon tube containing autoclaved distilled water, and an optical density (OD) of 0.9-1.0 was obtained. After that, 1 mL of solution was added to the seeds and immediately covered with the seed tray dome cover.

Raising of Plants: Prior to the addition of plant probiotics, all seeds were first treated with 10% of sodium hypochlorite for 10 minutes, then rinsed three times with autoclaved distilled water for 10 minutes each

and left to dry in the laminar flow. Seeds were sown in a seed sponge (Archisen Pte Ltd.) and inserted into the hole of an individual seed tray, in which each individual compartment was added with 1 mL of probiotic solution. Each seed tray was filled with 100 sponges, in which each sponge contained two seeds.

Growth attributes: The growth attributes of 30-days old curly kale, Jericho lettuce and Thai basil were measured through assessing shoot length, leaf width, leaf size, number of leave and number of germinated seed. The fresh and dry weight of samples were also determined (Khanna et al., 2019).

Determination of moisture content: The determination of moisture content was according to modified method of Lei & Engeseth (2021). Fresh leaves of each sample were weighed and recorded as Wf; then dried at 95° C for 72 h. The dry matter was weighed as Wd. The leaf moisture content was calculated as follows:

Moisture content (%) = (1–Moisture content of dried sampleMoisture conten of freh sample) x 100

Results and discussions:

Enhancement of growth of curly kale, Jericho lettuce and Thai basil by plant probiotic bacteria: Three plant probiotics (Acinetobacter pittii (Isolate 4), Bacillus licheniformis (Isolate 8), and Bacillus altitudinis (Isolate 9) were inoculated on the curly kale, Jericho lettuce and Thai basil seeds. Generally, the application of probiotic bacteria has significantly affected the shoot height in Thai basil, and number of seedlings germinated of curly kales ($p < 0.05$). Application of probiotic bacteria did not significantly enhance number of leaves, leaf length (cm) and width (cm) among curly kale, Jericho, and Thai basil inoculated by plant probiotic bacteria ($p < 0.05$).

The highest shoot height of curly kales (5.00 cm) was observed in the kale treated with isolate 9 and the lowest (3.57 cm) was found in non-treated kale (Table 1). The highest number of leaves were found in kale treated with isolate 4 and 9, whereas the lowest number of leaves was in non-treated kales. The highest leaf length (5.03 cm) was observed in curly kale treated with isolate 4, whereas the lowest (4.70 cm) was observed in non-treated kale. The highest leaf width (4.70 cm) was recorded in kale treated with isolate 8, whereas the lowest (3.57 cm) was recorded in non-treated kale. The highest number of seedlings germinated was recorded in kale treated with isolate 9 and the lowest was found in non- treated kale ($p < 0.05$). In short, kale inoculated with isolate 9 (B. altitudinis) have shown the highest shoot height, number of leaves, and number of seedlings germinated as compared to non-treated control. Isolate 9 is recommended as the probiotic for curly kales.

The highest shoot height of Jericho lettuce (11.87 cm) was recorded in lettuce treated with isolate 9, whereas the lowest shoot height (4.39 cm) was recorded in the non-treated control (9.87 cm). The highest number of leaves were found in non-treated kale, whereas the lowest number of leaves was in kales treated with isolate 4. The highest leaf length (20.53 cm) was observed in lettuce treated with isolate 8, and the lowest leaf length (16.3 cm) was observed in non-treated lettuce. Likewise, the highest leaf width (9.87 cm) was also observed in non-treated lettuce, whereas the lowest leaf width (5.63 cm) was observed in lettuce treated with isolate 4. The highest number of seedlings germinated was recorded in lettuce treated with isolate 4 and the lowest was found in lettuce treated with isolate 8. Overall, isolate 4 (Acinetobacter pittii) was recommended as it produced the highest number of seedlings.

The highest shoot height (2.83 cm) was found in non-treated Thai basil, whereas the lowest shoot height (1.83 cm) was recorded in the Thai basil treated with isolate 8 (Table 1). The number of leaves were the same among treated and non-treated samples. The highest leaf length (3.67 cm) was observed in Thai basil treated with isolate 8, and the lowest leaf length (3.67 cm) was observed in non-treated Thai basil. The highest leaf width (2.43 cm) was also observed in Thai basil treated with isolate 8, and the lowest leaf width (1.83 cm) was recorded in Thai basil treated with isolate 4. The highest number of seedlings germinated was recorded in Thai basil treated with isolate 9 and the lowest was found in Thai basil treated with isolate 4. Isolate 9 (B. altitudini) is the potential probiotic for Thai basil.

Isolate 9 (B. altitudinis) or isolate 4 (Acinetobacter pittii) have consistently proven as the potential probiotic for the growth of curly kale, Jericho lettuce, and Thai basil, which were consistent with the previous literature (Daur et al., 2018; Miljaković et al., 2020; Sunar et al., 2015). A study reported that B. altiudinis enhances up to 40 to 62% of shoot fresh weight in different legumes (Sunar et al., 2015). Study also reported that seeds of Vigna radiata, Cicer arietinum, and Glycine max added with B. altitudinis had increase in root length, shoot length and increase in root and shoot biomass (Sunar et al., 2013). Acinetobacter pittii was also reported to be the most effective plant probiotic to increase the fresh and dry weight of alfafa by 41% and 34%, respectively (Daur et al., 2018). Even though the result was not statistically significant, the usage of B. altitudini or Acinetobacter pittii is recommended as a potential plant probiotic for curly kale, Jericho lettuce and Thai basil.

Effect of probiotic bacteria on fresh and dry biomass: The plant probiotic bacteria had positive effects on the fresh and dry biomass of curly kale (Table 1). The highest fresh weight was observed in curly kale treated with isolate 9 (2.32 g/plant), and lowest fresh weight was in the non-treated control (1.33 g/plant) ($p < 0.05$). The highest dry weight was recorded in curly kale treated with isolate 9 (1.20 g/plant), and the lowest dry weight was recorded in the non-treated control (0.65 g/plant). The highest moisture content (50.08%) was observed in non-treated kale, while the lowest moisture content (42.54%) was recorded in the kales treated with isolate 8 ($p < 0.05$). The wet and dry weight of curly kale treated with isolate 9 were significantly higher than the non-treated control.

The highest fresh weight (4.63 g/plant) was found in Jericho lettuce treated with isolate 8, and the lowest fresh weight (2.91 g/plant) was observed in lettuce treated with isolate 9 (Table 1). Similarly, the highest dry weight (0.86 g/plant) was observed in lettuce treated with isolate 8 compared to the non-treated control, which was not statistically different. The lowest dry weight (0.71 g/plant) was found in lettuce treated with isolate 9 (Table 1). However, the highest moisture content (80.9%) was observed in Jericho lettuce treated with isolate 8, and the lowest moisture content (75.3 %) was recorded in lettuce treated with isolate 9.

The highest fresh weight (1.48 g/plant) was observed in the Thai basil treated with isolate 8, whereas the lowest fresh weight (1.17 g/plant) was recorded in Thai basil treated with isolate 4. The highest dry weight (0.90 g/plant) was recorded in basil treated with isolate 8, and the lowest dry weight (0.72 g/plant) was observed in non-treated basil. The non-treated Thai basil control had the highest moisture content (44.7%), whereas the Thai basil treated with isolate 4 recorded the lowest moisture content (34.8%).

Isolate 8 (Bacillus licheniformis) and isolate 9 (Bacillus altitudinis) have positive effects on the fresh and dry weight of curly kale, Jericho lettuce and Thai basil. Isolate 8 (Bacillus licheniformis) or isolate 9 (Bacillus altitudinis) were beneficial probiotic for the fresh and dry weight of curly kale, Jericho lettuce and Thai basil. The higher fresh weight observed in curly kale and lettuce treated with probiotic is preferable as these fresh vegetables can attain a better price in the market. It is reported that individual lettuce with a higher fresh weight achieves a higher price due to unit (head or bunch) calculation based on weight (Lei & Engeseth, 2021). However, studies also stated that these hydroponically grown lettuce, which had higher moisture content, also experienced higher weight loss during storage and were more perishable, indicating a shorter shelf life is achieved (Lei & Engeseth, 2021).

Table 1. Effects of plant probiotic bacteria (Isolate 4, 8 and 9) on curly kales, Jericho lettuce and Thai Basils ($p \leq 0.05$) (Mean ± SD).

Curly kales	Control	Isolate 4	Isolate 8	Isolate 9
Shoot height	3.57±0.60a	4.17±1.04a	4.17±1.04a	5.00±0.50a
number of leaves	4.33±0.58a	5.33±0.58a	4.67±0.58a	5.33±0.58
leaf width	3.57±0.55a	3.77±0.64a	4.7±1.15a	3.77±0.06a
leaf length	4.7±0.85a	5.03±0.95a	4.73±1.17a	4.77±0.40a
number of seedlings germinated (per 100)	75±1.73a	82±1.53b	92±1.53c	93±1.73d
Moisture content/%	50.08±11.3a	47.86±5.80a	42.54±4.75a	48.32±5.43a
Wet weight, g	1.33±0.23a	1.42±0.04a	1.72±0.13a	2.32±0.37b
Dry weight, g	0.65±0.09a	0.74±0.10a	0.98±0.05ab	1.20±0.22b
Jericho lettuce	Control	Isolate 4	Isolate 8	Isolate 9
Shoot height	9.87±3.65a	10.7±1.59a	11.57±1.34a	11.87±3.67a
number of leaves	9.67±1.53a	8.67±1.53a	9.00±1.00a	9.33±3.21a
leaf width	9.87±3.65a	5.63±1.40a	6.43±1.04a	6.63±0.86a
leaf length	16.3±0.87a	18.67±2.93a	20.53±3.27a	17.37±0.23a
number of seedlings germinated (per 100)	71±3.61a	82±12.5a	64±4.16a	73±2.08a
Moisture content/%	77.9±5.00a	78.4±2.20a	80.9±3.10a	75.3±2.42a
Wet weight, g	3.28±0.86a	3.77±0.26a	4.63±1.50a	2.91±0.62a
Dry weight, g	0.80±0.04a	0.81±0.04a	0.86±0.14a	0.71±0.08a
Thai Basil	Control	Isolate 4	Isolate 8	Isolate 9
Shoot height	2.83±0.29c	2.03±0.06ab	1.83±0.29a	2.60±0.17bc
number of leaves	6.00±0.00a	6.00±0.00a	6.00±0.00a	6.00±0.00a
leaf width	2.10±0.20a	1.83±0.40a	2.43±0.40a	1.97±0.35a
leaf length	3.37±0.32a	2.97±0.61a	3.67±0.12a	3.30±0.44a
number of seedlings germinated (per 100)	64.67±2.89a	61.33±2.52a	62.00±1.73a	65.67±7.77a
Moisture content/%	44.7±3.13b	34.8±0.66a	39.5±3.36ab	37.8±1.83a
Wet weight, g	1.30±0.15a	1.17±0.13a	1.48±0.12a	1.29±0.20a
Dry weight, g	0.72±0.06a	0.76±0.09a	0.90±0.12a	0.81±0.14a

Data are means of three replications. Mean values in a column followed by the same letter do not differ significantly by HSD test at $p < 0.05$.

Conclusions: Based on the reproducibility study, isolate 9 is recommended as the probiotic for curly kale and Thai basil due to the high number of seedlings germinated as compared to control. Between the application of isolates 8 and 4, isolate 4 was chosen as the potential probiotic for Jericho due to its highest number of seedlings germinated. Further analysis in terms of antioxidant content (total polyphenols content), total flavonoid content and DPPH antioxidant scavenging activity should be determined to give a better picture of the benefit of these plant probiotics.

Appendices

Figure 1. Preparation of seeds

Figure 2. Rising of seedling by using the SIF planter unit

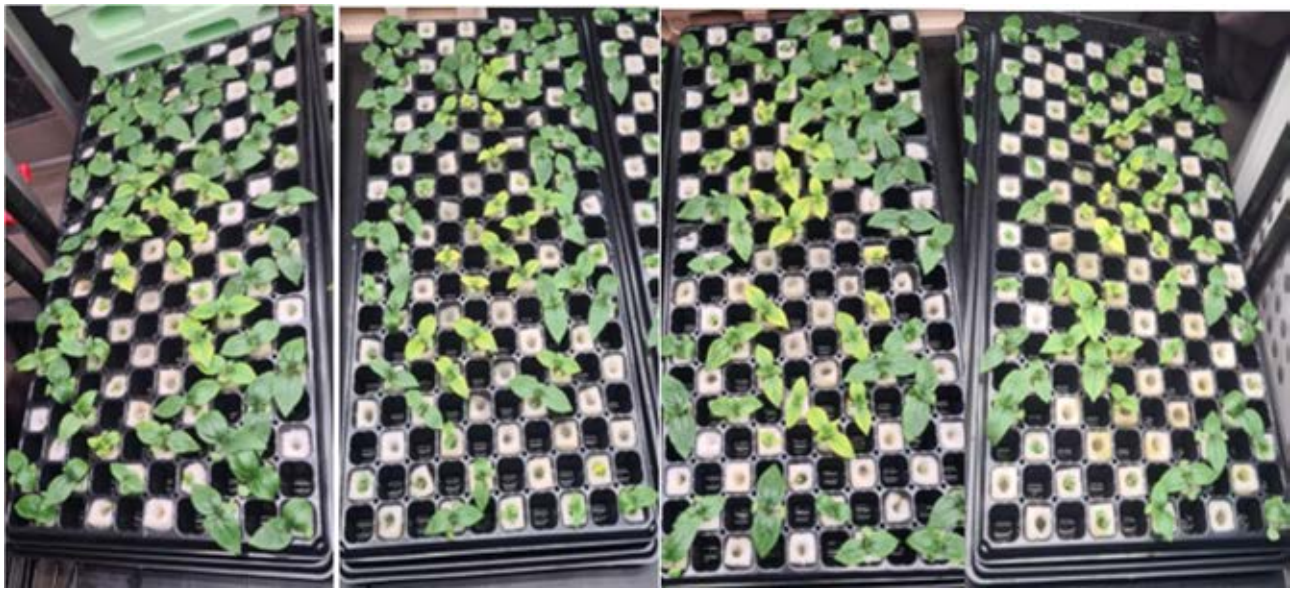

Figure 3. Appearance of curly kales added with different probiotic

Figure 4. Appearance of Jericho lettuces added with different probiotic

Biography

Dr Ryan Tay is an Associate Professor in the Food, Chemical and Biotechnology cluster. He is a Microbiologist by training and has been active in areas related to Food Microbiology and Food Safety. Since joining SIT, he has moved on to research on aquaculture and urban farming technologies with concentration on the use of microbial probiotics. He works closely with engineering cluster colleagues on research projects funded through the SIT Ignition grant, MOE-TIF, Temasek Foundation and SFA grants. He is a member of the IRB, IACUC and IAC committees. He also serves as the working committee member in several national level Working Groups in setting up industry standards and technical guidelines, including as the Technical assessor for the Singapore Accreditation Council.

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Determination of volatile organic compounds from the leaves of Salvia species (S. Officinalis, S. Fruticosa and S. x auriculata) growing on the Island of Vis, Croatia

Dalmatian (Salvia officinalis L.) and Greek sage (Salvia fruticosa Mill.) grow sympatrically on the island of Vis, Croatia. The island of Vis is the only part of Croatia where S. fruticosa occurs, in small, isolated populations, while S. officinalis is distributed throughout the eastern Adriatic coastal region. Both species synthesize essential oils with numerous biologically active compounds that are valued in medicine. Previous studies have shown that on the island of Vis hybridization between these two species occurs repeatedly and that there is a hybrid known as Salvia x auriculata Mill. The occurrence of the spontaneous hybrid has never been documented in the natural environment, but only as a result of breeding programs. Extraction and identification of volatile organic compounds from the leaves of S. officinalis, S. fruticosa, and S. x auriculata were performed using the solid-phase microextraction coupled with gas chromatography-mass spectrometry (SPME-Arrow-GC/MS). A total of 112 compounds were identified, of which 103 were common to all three species. Twelve compounds (camphor, 1-octen-3-ol, 3-thujanone, E-caryophyllene, 1,8-cineole, linalool, α-humulene, ß-myrcene, ß-pinene, thujone, D-limonene, and 4-thujonol), selected based on previous reports and relative abundance (%) in the plant material, were further subjected to analysis of variance and multivariate analysis. The dominant compound in all three species was 1,8-cineole, with the highest relative abundance in S. fruticosa (44.47%), followed by S. x auriculata (42.27%). The significantly lowest relative abundance of this compound was found in S. officinalis (16.59%). Multivariate analysis revealed a clear distinction of S. officinalis which was characterized by higher relative abundance of camphor, α-humulene, 1-octen-3-ol, and D-limonene. In contrast, S. fruticosa and S. x auriculata were characterized by higher abundance of caryophyllene, myrcene, 1,8-cineol, 4-thujanone, and β-pinene and grouped together, suggesting a more similar chemical composition. These preliminary results provide the basis for further detailed analyzes of the chemical profiles of S. x auriculata in particular, which will serve as a background for the selection of genotypes for the development of cultivars with desirable traits.

Audience Take Away Notes

- This is the first report on the chemical characterization of a spontaneous hybrid (S. x auriculata) of two Salvia species (S. officinalis and S. fruticosa), whose existence has not been recorded elsewhere but on the island of Vis, Croatia
- Although there are data on chemical characterization of S. x auriculata in the scientific literature, they are very scarce and focus on S. x auriculata cultivar produced by artificial selection
- In addition, this study used a sophisticated extraction and identification method (SMPE- Arrow-GC/MS) that, to our knowledge, has never been used before in the analysis of volatile compounds in S. officinalis, S. fruticosa, and S. x auriculata
- We believe that the data presented will be a valuable source of information for future research on essential oil diversity, especially in Salvia species

- The results may stimulate future research on possible natural hybridization events in other parts of the world where these two species grow sympatrically
- We also hope that this will lead to new contacts and collaborations with other scientists whose research is focused on similar topics

Biography

Martina Grdisa has worked at the University of Zagreb, Faculty of Agriculture, since 2006, where she was appointed associate professor in 2021. Her scientific interests include medicinal and aromatic plants, conservation of plant genetic resources, and molecular and biochemical diversity analysis. She has been a leader of one national scientific project and was actively involved in the implementation of eight national and six international scientific projects. She is a member of the Centre of Excellence for Biodiversity and Molecular Plant Breeding (CoE CroP-BioDiv), WP08 Dalmatian Pyrethrum / Sage.

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Intercropping of grain legumes, spring cereals and oil crops for increasing land-use efficacy, biodiversity and resilience of agroecosystems

Intercropping is increasing biodiversity, resilience and sustainability of agricultural ecosystems. There are traditional crop mixtures like maize, beans and squash. On small surfaces of grain crops farmers that performs agroecological and organic practices are tending to increase the cultivation of different crops in the same time. On large scale field crops, monoculture is dominant. Industrial agriculture shaped the agricultural equipment, cultivars and inputs to obtain performance from a single crop. In order to overcome the intercropping challenges and offer practical data, in a multi-actor project (DIVERSILIENCE which aims to improve the performance by increasing inter and intra-specific diversity of crops in organic agriculture conditions, across the Europe) farmers and researchers designed and assessed a field experiment of multispecies grains intercrops for Southern Europe from mixtures of two or three crops of: 5 cultivars of field peas, 4 spring wheat breeding lines, one variety of naked oat (Avena nuda) camelina (Camelina sativa) and flax. All possible combinations of this mixed crops are analysed for their functional diversity during two years (2022 and 2023). We need to update our current farming equipment and orientate the breeding objectives for crop mixtures, in order to face the future challenges of climate change and the demands for a more friendly environmental agriculture.

Audience Take Away Notes

- Why is important to maintain and add more biodiversity to agricultural ecosystems
- Challenges that are faced on multi-crop cultivations systems
- A practical example of testing in field mixtures of crops from 3 plant groups: legumes (field pea), cereals (spring wheat and naked oat) and oil crops (camelina and flax)

Biography

Dr. Victor Petcu studied Agronomy at the University Of Agronomic Sciences and Veterinary Medicine, Bucharest, Romania. He finished his phD studies in 2015. From 2017 he is dedicated on organic farming and agroecology research. Research themes in which he published more than 30 scientifical papers: organic agriculture, plant breeding and seed production in organic agriculture, resilience and biodiversity in agroecosystems, sustainable business models for rural areas, soil biology, plant protection and side effects of chemical products, improving cross-compliance norms by technological measures applied on field crops, participatory research, traditional agriculture, sustainable agriculture, ethics in life-sciences.

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A multiple regression model of wheat grain yield in response to meteorological conditions in Gyeongsangnam province, Republic of Korea

We analyzed climate change and the relationship between weather conditions and wheat yield from the 1990/1991 to the 2019/2020 growing seasons. Growth stages of wheat were classified as seedling (phase I, early Nov. to mid-Dec.), overwintering (phase II, late Dec. to early Feb.), tillering (phase III, mid-Feb. to mid-Mar.), stem elongation (phase IV, late Mar. to mid-Apr.), ripening (phase V, late Apr. to late May). Mean daily air temperature during the wheat growing season in 2011-2020 was 0.2 ℃ higher than that from 1991-2000. Mean daily air temperature at the tillering and stem elongation stages was 0.7℃, 0.6℃ higher, respectively in 2011-2020 than in 1991-2000. Precipitation during the wheat growing season in 2011-2020 was 61.7 mm greater than that from 1991-2000. Maximum daily air temperature at the overwintering stage was positively correlated with wheat yield in simple linear regression (R2=0.231, P=0.015), while other weather conditions were not significantly correlated with the yield. A multiple regression model of wheat yield and weather conditions at each growing stage was estimated as follows; wheat yield (Mg ha-1) = 7.60-0.133*Tmax(I)+0.059*Tmax(II)+0.114*Tmax(III)-0.228*Tmax(IV)-0.118*Tmax(V)+0.380*Tmin(IV)-0.132*Tmin(V)+0.001*P(I)-0.005*P(II)+0.002*P(III)-0.007*P(IV)-0.001*P(V). The model parameters having a high variance inflation factor were excluded. A root mean squared error (RMSE) and an adjusted coefficient of determination (R2) for the model were 0.390 Mg ha-1, 0.369, respectively. Considering the poor goodness of fit, other factors such as agronomic practices or a government policy should be necessary for predicting wheat yield.

Audience Take Away Notes

- Climate change is a major issue in sustainability of agriculture. We evaluated changes in weather conditions for 30 years, analyzed correlation between wheat yield and weather conditions, and estimated wheat yield prediction model
- The audience will know how weather conditions during the wheat growing season changed for past three decades in Republic of Korea
- The audience will be helpful to understand what climate change will affect wheat productivity

Biography

Dr. Jongtae Lee studied Agronomy at the Kyungbook National University, Republic of Korea and graduated as MS in 1998. He then joined the soil and fertilizer research group at the Chungcheongnam-do Agricultural Research and Extension Services (CNARES). He moved to Gyeongsangnam-do ARES in 2000 and joined onion research group. He received his PhD degree in 2019 at the Gyeongsang National University. He joined upland crops research group in 2020. He obtained the position of a Senior Agricultural Researcher at the GNARES. He has published more than 30 research articles in SCI(E) journals.

Jongtae Lee, Changhee Son*, Jinyoung Moon, Yeonhyeon Hwang, Youngkwang Kim

Crop Science Division, Gyeongsangnam-do Agricultural Research and Extension Services, Jinju 51733, Republic of Korea

Effects of irrigation criteria on soybean grain yield and irrigation water use efficiencies under subsurface drip irrigation in a silt loam soil

Drought stress and yield instability have been increasing due to climate change. Subsurface Drip Irrigation (SDI) is a system to water crops through buried lines having embedded emitters with certain spacing. The SDI systems are usually installed below tillage depth, which can be intended for multiple-year use. The SDI is considered to be a very efficient irrigation system in terms of crop yield and water use efficiency as well as automated irrigation management. We evaluated the effects of irrigation criteria based on soil water content on soybean grain yield and irrigation water use efficiency under subsurface drip irrigation in a silt loam soil. Irrigation treatments consisted of 3 Soil Water Content (SWC) with 25-26%, 20-21% and non-irrigated plot. SDI driplines were installed at a depth of 0.4 m below ground and 1.2 m spacing below every second ridge. The dripper delivery rate of 1 L h-1 was operated under a pressure of 62-76kPa. Water was provided for10 minutes every 30 minutes from 08:00 to 18:00, from July 1, 2022 to October 23, 2022. Soil moisture sensor was installed at 0.3 m deep below soil surface of ridge and measured for the determination of volumetric SWC. The gross irrigation amounts at 25-26% and 20-21% SWC as irrigation criteria were 529.1 mm and 221.9 mm, respectively. The volumetric SWC at 25-26% soil water content irrigation ranged from 20.0% to 34.2% (25.0% at average), while at the non-irrigated plot ranged from 16.6% to 30.5% (21.2% at average). The differences in the SWC among the irrigation criteria increased as the days without rain got longer. The number of pod per plant significantly increased at 25-26% irrigation criteria compared to 20-21% treatment or non-irrigated plot. However, Soybean grain yield and irrigation water use efficiency were higher at 20-21% SWC irrigation than at 25-26%. The excessive irrigation might enhance vegetative growth, but delay maturing and result in increased incomplete grain. The irrigation criteria at 20-21% volumetric soil water content should be optimal for soybean production in silt loam soil.

Audience Take Away Notes

- Drought stress greatly affects crop yield. Using a subsurface drip irrigation system, the yield of soybeans and irrigation water use efficiency were confirmed according to the soil moisture content
- The audience will know the difference in the yield of soybeans according to the soil moisture content in silt loam soil
- The audience will be helpful in examining the availability of SDI systems in dry areas

Biography

Mr. Changhee Son studied Food technology at the Kyungbook National University, Republic of Korea. He then joined the upland crops research group at the Gyeongsangnam-do Agricultural Research and Extension Services (GNARES). He received Agronomy MS degree in 2023 at the Gyeongsang National University.

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Native greek hop plants: A study of antimicrobial and antiproliferative activity of extracts

Hop is one of the main ingredients in beer that imparts many aromas, flavors, and colors, and is currently extensively investigated for its medicinal potential. In the present study, we investigated aqueous and ethanolic extracts isolated from Greek indigenous plants which were collected from different regions of Central Greece (Livadia, Ypati, and Mavrilo). As controls, Supercritical Fluid Extracts (SFE, CO2-based) from commercially available varieties were used. The profiles of all extracts concerning volatile and non-volatile compounds were analyzed using GC/MS, and the content of chalcones, flavones, and bitter acids were analyzed using LC/MS. Antimicrobial activity tests (Minimum Inhibitory Concentration, MIC, and Minimum Lethal Concentration, MLC) on beer spoilage bacteria (Lactobacilli, Saccharomyces, Aspergillus) were performed with extracts form three regions for the years 2022 and 2023. In all cases we observed that in all cases ethanolic extracts were significantly more potent than the aqueous, and that MIC and MLC was highly dependent on the region of origin and on the year of the harvest. Ethanolic, aqueous and SFE extracts were also tested for their antiproliferative activity on the Hela cancer cell line and IC50 values for 48 and 72 hours of treatment were calculated (we report mean and standard deviation). The IC50 values were 548 (202) and 346 (157) μg/ml for the aqueous extracts of Livadia and Ypati (year 2022), respectively. Ethanolic extracts showed increased antiproliferative activities with IC50 of 90 (62) and 58 (10) μg/ml, respectively. Conclusively, our results corroborate the notion that indigenous hop plants exert differences in a spectrum of biocompounds and antimicrobial and antiproliferative activities, suggesting that the phytogenetic capital of indigenous Greek hop warrants extensive further investigation to uncover potential important health-beneficial properties.

Audience Take Away Notes

- Hop phytoconstituents possess antiproliferative activity on cancerous cell lines
- We present the chemical compound content of extracts of Greek indigenous hop plants
- Greek indigenous hop varieties possess antimicrobial activities against food spoilage microorganisms
- Greek indigenous hop plants organic extracts present antiproliferative activities on cancer cell lines
- Antimicrobial and antiproliferative properties of Greek indigenous hop plants depend on both genotypes and on year crops

Biography

Panagiota Kontou is an assistant professor in the Department of Mathematics, University of Thessaly, Greece (UTH). She holds a B.Sc. in Computer Science and Biomedical Informatics (University of Central Greece), a MSc in Bioinformatics (University of Athens) and a Ph.D. degree in Bioinformatics in 2016, (Department of Computer Science and Biomedical Informatics, UTH). She received two State Scholarships for post-doctoral research. Her research interests include Meta-analysis, Genetic epidemiology, Gene Expression data analysis, Graph Theory, Bioinformatics and Biostatistics. She has published in 35 peer reviewed journals, in proceedings of 48 international and national conferences. She participated in 9 research projects, authored 3 chapters in collective volumes and co-authored a scientific book

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Phytoconstituents of the aromatic plants hop and stevia present antiproliferative activity on cancer cells: A systematic review and meta-analysis

Stevia rebaudiana and hop (Humulus lupulus) are aromatic plants of great importance in agrifood-sector industry, i.e., stevia for its almost zero calorie sweetening power, and hop for the plethora of aromas, tastes, and colours that confers to beer. These two aromatic plants are currently extensively investigated for their medicinal potential. Emerging research and evidence suggest that stevia contains various other compounds with biological activities such as antidiabetic, anticarcinogenic, antihypertensive, antimicrobial or antioxidant. Likewise, phytoconstituents of hop female cones include polyphenols and α- and b-acids that also grant health promoting properties (anticancer, antimicrobial, antioxidant). In the present study a systematic review was performed to evaluate growth inhibition of cancerous cell lines by either pure phytoconstituents found in stevia and hop or by extracts from stevia leaves and hop-cones. Concerning stevia, systematic literature search returned 64 studies from which 7 fulfilled eligibility criteria for meta-analysis and provided data on 40 different studies for 5 cancer types. From 622 articles retrieved from literature search concerning hop, only 55 containing 451 studies for 25 cancer types fulfilled inclusion criteria to be subjected to meta-analysis. As effect estimate the half maximal inhibitory concentration (IC_{50}) was recorded, along with standard deviation. Data on MTT assays were given for stevia compounds and extracts while SRB and Crystal Violet (CV) assays data were also available for hop. Meta-analysis and meta-regression based panoramic meta-analysis was performed, using STATA 13.1 software. Antiproliferative effects were analysed for each method, across studies, for each compound or extract, and cancer type for various time points. Our results on stevia biocompounds suggest that they exert an overall inhibitory effect (48 hours) with IC50: 152.5μg/ml which is mostly attributed to stevia phenolic compounds (IC_{50} 86.0μg/ml) and not to glycosides (IC_{50}: 229.7μg/ml) or diterpenes (IC50: 167.3μg/ml). Moreover, a very high inhibitory activity is observed on neuronal cells (IC50 21.0μg/ml) compared to other cancer types, e.g., gastrointestinal cancers (IC_{50}: 162.6μg/ml). Meta-analysis on hop derived compounds assays data showed that flavonoids exert a remarkable antiproliferative effect on cell growth of cancerous cell lines which is mainly due to Xanthohumol (48 hours treatment, IC_{50} of flavonoids: 30.8μM, IC_{50} of Xanthohumol: 17.9 μM). Importantly, bitter acids show even stronger antiproliferative activity with IC_{50}: 8.2μM. Meta-regression revealed that the results from SRB, MTT and CV methods did not statistically significantly differ (p-value<0.05) and can be used interchangeably. Importantly, every compound either from stevia or from hop exerted higher anti-proliferative effect on cancerous cells compared to normal cells. Our study provides the basis for quantitative estimations of health promoting properties of stevia and hop plants that can guide further investigations to produce novel nutraceuticals.

Audience Take Away Notes

- Stevia and hop phytoconstituents possess antiproliferative activity on cancerous cell lines
- Polyphenols from stevia exert the highest antiproliferative activity
- Bitter acids from hop are even more potent than polyphenols antiproliferative agents

- SRB, MTT and CV methods did not statistically significantly differ (p-value<0.05) and can be used interchangeably
- This study, using the robust methodology approach of meta-analysis, provides the basis for quantitative and statistically significant estimations of health promoting properties of stevia and hop plants

Biography

Panagiota Kontou is an assistant professor in the Department of Mathematics, University of Thessaly, Greece (UTH). She holds a B.Sc. in Computer Science and Biomedical Informatics (University of Central Greece), a MSc in Bioinformatics (University of Athens) and a Ph.D. degree in Bioinformatics in 2016, (Department of Computer Science and Biomedical Informatics, UTH). She received two State Scholarships for post-doctoral research. Her research interests include Meta-analysis, Genetic epidemiology, Gene Expression data analysis, Graph Theory, Bioinformatics and Biostatistics. She has published in 35 peer reviewed journals, in proceedings of 48 international and national conferences. She participated in 9 research projects, authored 3 chapters in collective volumes and co-authored a scientific book.

Adrienn Szeles, Peter Zagyi, Karoly Simon, Eva Horvath*

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Examination of the relative chlorophyll content and yield of maize in different crop years

The correlation between Soil-Plant Analysis Development (SPAD) values and maize yield was examined using two maize hybrids of different genotypes (Armagnac, Fornad) with results from 2016-2022. Our objective was to determine the nitrogen requirement of maize, the optimal timing of nutrient application and the effect of N, on yield. The studies were carried out at the University of Debrecen Latokep Experimental Station in a one and a half hectare long-term experiment. In addition to the non-fertilised (A0) treatment, six fertilisation treatments were applied (spring basal fertilisation: 60 and 120 kg N ha-1, A60; A120). The basal fertilisation was followed by two top dressing treatments in the phenological phases V6 and V12, with an application rate of +30-30 kg N ha-1 (V690 and V6150, and V12120 and V12180).

It can be concluded that SPAD values measured in the different phenological phases (V6, V12, R1) increased during vegetative development. The highest values were measured for all fertiliser treatments in the R1 phenological phase, except for treatments A0, V690, and V12120 in the 2022 growing season. Increasing fertiliser doses increased SPAD values. The highest SPAD value (49.00±8.94) was statistically confirmed for the V12180 fertiliser treatment ($p<0.05$).

Increasing doses of the active ingredient applied during the basal fertilisation significantly positively influenced yield. The A60 treatment resulted in 34.3% and the A120 fertilizer treatment in 75.7% higher yields compared to the A0 treatment on average across years and genotypes. The additional 30 kg N ha-1 applied at the V6 phenological stage resulted in an increase in yield (+12.6%) on average for years and genotypes, but the top dressing applied at the 12-leaf phenological stage had no further yield increasing effect. In most cases, the statistically significant highest yields were obtained with A120 fertilisation for the years and genotypes studied.

The correlation between SPAD value and yield was found to vary between years and genotypes as the phenological stages progressed. The strongest correlations were found in the V12 and R1 growth stages.

Audience Take Away Notes

- The optimal amount of active ingredient and the correct timing of application are important agrotechnological factors in the nutrient supplementation of maize hybrids with different genotypes
- Safe and sustainable production combined with optimal yields is an essential factor for future agriculture
- The period between the phenological phases V12-R1 is crucial for future yield formation, as nutrient supply disruptions can lead to yield losses. It is particularly important to pay attention to possible nutrient replenishment during this period
- The site-specific SPAD values can be used to predict the N supply of maize hybrids, thus helping to plan N application, both in terms of quantity and timing. SPAD values measured between phenological stages V12 and R1 can be used to reliably estimate the expected yield

Biography

Dr. Eva Horvath, graduated as an Agricultural Engineer in Environmental Management at the University of Debrecen, Hungary. In 2018 she joined the scientific work and teaching of the Institute of Land use Engineering and Precision Technology. Her research topic is the ecophysiological interrelationship between precision maize nutrient and water supply connection with the climate change.

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[5]DSc. in Strategic Management, Innovation and Marketing, UFLA

Technological evolution of the SICAR platform and contributions to compliance with the Brazilian forest code

This study aimed to present the improvements implemented in the SICAR platform (Sistema de Cadastro Ambiental Rural) during the year 2022. The initiative, managed by the Brazilian Forest Service in partnership with the Federal University of Espírito Santo, involved research, innovation, and technological implementation to enhance the system. A total of 55 improvements were developed, significantly contributing to the advancement of Brazil's Federative Units in the environmental regularization of rural properties. These improvements have driven efficiency and accessibility in the Cadastro Ambiental Rural (CAR) process, making it more efficient and effective. They have also aided state agencies and property owners in meeting the environmental requirements established by law, thereby strengthening Brazil's commitment to environmental sustainability.

Audience Take Away Notes

- We will present the improvements implemented in the Rural Environmental Registry System Platform, which aims to boost the efficiency and accessibility of the Rural Environmental Registry, which in turn has helped the Federative Units of Brazil in the environmental regularization of rural properties. This platform serves as an example to be followed by other countries that want to strengthen their commitment to environmental sustainability.

Biography

Degree in Mechanical and Civil Engineering from the Federal University of Espirito Santo in 1982. Specialization in Nuclear Engineering from the Federal University of Rio de Janeiro (UFRJ) in 1984. Master's degree in Mechanical Engineering from UFRJ in 1993. PhD in Naval and Oceanic Engineering from UFRJ in 2001. Post-Doctorate in the Postgraduate Program in Civil Engineering (PROPEC) at the Federal University of Ouro Preto in 2010. Coordinator of Research Projects in the production of Land Cover Cartographic Bases, in surveying and preparing Productive Diagnostic Plans for the Rural Productive Sector and in Environmental Regularization of Rural Properties.

BOOK OF ABSTRACTS

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Sabrina Garcia Broetto[1], Isabella Oliveira Britto[2], Alexandre Martins Costa Santos[2], Patricia Machado Bueno Fernandes[2], Jose Aires Ventura[2,3], Diolina Moura Silva[1,2]*, Gerado Rossoni Sisquini[2], Eustaquio Vinicius Ribeiro de Castro[4]

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Molecular and physiological screening of two papaya cultivars infected with Papaya Meleira Virus (PMeV)

This study aimed to evaluate the chlorophyll a fluorescence response in papaya leaves of the 'Aliança' and 'Calimosa' cultivars, potentially contaminated by the Papaya Meleira Virus complex (PMeV) at different developmental stages. The chlorophyll a fluorescence technique and conventional and quantitative PCR techniques were used for the diagnosis and determination of the number of copies of the two viruses in this complex. Simultaneously, for the OJIP curves, the L and K-bands appeared mainly in samples that had the highest abundance of the virus, both PMeV and PMeV2, indicating a lower structural relationship of the photosystem II (PSII) and imbalance between the electrons on the acceptor and donor sides of the PSII, respectively. The diagnosis of sticky disease using the RT-PCR technique confirmed the presence of PMeV and PMeV2 in all evaluated samples, both in 'Aliança' and 'Calimosa'. For the parameters of the JIP test, an increase in absorption per active reaction center, dissipation energy per active reaction center, and dissipated energy flux per cross section was observed. Additionally, there was a reduction in the concentration of active PSII reaction centers per excited cross section, the quantum yield of electron transport from QA– to final PSI acceptors, the flux reduction of end-electron acceptors, and performance indexes in samples with high viral load. This indicates the influence of the presence of the viral complex on the vegetative and reproductive development of papaya. Both cultivars showed a reduction in electron transport efficiency in the final stages of the electron transport chain. These changes were subtler in 'Calimosa', both in the time transition of reproductive development and in the same developmental stage, 210 Days After Transplantation (DAT), when compared to 'Aliança'. It was possible to observe that the impact of the viral presence extended from PS II to the final stages of the electron transport chain, already in photosystem I. The results of this study support the use of chlorophyll fluorescence kinetics for the rapid and early diagnosis of viral infections in crops. It further highlights its significance in studying the specific plant-pathogen interactions that involve photosynthetic peculiarities, despite their complexity.

Audience Take Away Notes

- Chlorophyll fluorescence can be used as a rapid and non-destructive diagnosis of crop health conditions
- Molecular diagnostics integrated with chlorophyll a fluorescence analysis can provide enough knowledge to avoid losses in crop productivity
- Diagnosis performed through chlorophyll a fluorescence can accelerate detection when compared to traditional late methods

Biography

Diolina Moura Silva completed her doctorate in Plant Physiology at the Federal University of Vicosa (UFV) in 1998. She is currently a Full Professor at the Federal University of Espírito Santo. She is also professor-advisor of the Graduate Program in Plant Biology and the Graduate Program in Biotechnology at the Federal University of Espírito Santo. She was the Coordinator of the Graduate Program in Plant Biology from its creation in 2003 until 2007. She works in the area of Plant Physiology and Biotechnology. She is the coordinator of the Photosynthesis Research Center, developing projects focused on the Photosynthesis of cultivated plants and particularly on the ecophysiology of fruit trees. In the context of her scientific and technological production, transient fluorescence of chlorophyll a, Photochemical efficiency, Photosynthesis.

Iva Marković[1], Bernard Jarić[1], Mateja Jagić[2], Dunja Leljak Levanić[2], Jasna Milanović[3], Jana Oklešťková[4], Jitka Široká[4], Ondřej Novák[4], Snježana Mihaljević[1]*

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Transcriptomic approach reveals salicylic acid-dependent expression of host genes in potato-viroid interaction

Viroids are the smallest known plant pathogens that consist of a single-stranded, circular, non-protein-coding RNA molecule and use the host transcriptional machinery to replicate and spread in plants. Because of their global distribution, viroids are capable of causing severe disease in many crops. The pathogenicity of non-coding viroid RNA is mainly due to the combined action of the RNA silencing machinery and other components of the host plant immune response including phytohormone signaling pathways. Salicylic Acid (SA) is a phytohormone involved in the plant immune response against a variety of pathogens. In this study, the importance of SA in the basal defense of Potato (Solanum Tuberosum L.) against the Viroid PSTVd, the causal agent of potato spindle tuber viroid disease, was investigated using wilt-type plants (wt) and transgenic NahG potato plants that cannot accumulate SA. The dynamics of viroid RNA amplification in systemically infected leaves were monitored 1-8 Weeks After Inoculation (wpi) using one-step real-time PCR. Transgenic SA-deficient plants exhibited increased susceptibility to PSTVd compared with wt plants, as evidenced by increased accumulation of viroid RNA and early symptom expression 4 weeks after inoculation. Symptoms on PSTVd-infected NahG plants included small and spindle-shaped young leaves and chlorosis and decay of old leaves, which correlated with increased accumulation of endogenous hydrogen peroxide and decreased callose formation in systemically infected leaves. Transcriptomic analysis identified 958 Differentially Expressed Genes (DEGs) in NahG plants and 753 DEGs in wt plants induced 5 wpi. Gene ontology enrichment analysis revealed significant changes in the expression of genes involved in stress response, pathogen response, regulation of ion exchange, photosynthesis, and protein folding, indicating activation of basal immune response in wt plants after PSTVd infection. Conversely, the expression of genes involved in immune response, peroxidase activity, phytohormone signaling, and transcription factor activity was down-regulated in SA -deficient plants. In addition, the endogenous levels of a number of stress phytohormones were analyzed using UHPLC-MS/MS. Our study showed a significant increase in IAA, JA, and BR in systemically infected leaves in both wt and NahG plants, whereas SA decreased 4 to 7 wpi in wt plants. To confirm that the dynamics of PSTVd disease progression in NahG lines was indeed due to their inability to accumulate SA, exogenous treatment with 2,6-Dichloroisonicotinic Acid (INA), a functional analog of SA, was performed. The protective effect of INA treatment was determined from the delayed accumulation of viroids and the appearance of symptoms in both NahG and wt plants, which was further verified by expression analysis of selected defense and phytohormone signaling genes. Pretreatment with INA reduced pathogen growth in NahG plants to a similar rate as in wild-type plants, suggesting that SA is an important component of the basal defense response of potato against PSTVd.

Audience Take Away Notes

- Potato (Solanum tuberosum L.) is the third most important food crop in the world after rice and wheat in terms of human consumption. Severe strains of PSTVd can reduce potato crop yield by up to 40% by decreasing both the size and number of tubers. Unlike plant resistance to most other pathogens, there

is no known naturally occurring resistance to PSTVd in potato cultivars. Therefore, it is necessary to understand the principles of plant-viroid interactions in order to develop effective systems for crop protection. The new findings have far-reaching implications for understanding the complex host immune system and the multiple functions of noncoding RNAs, and will facilitate the development of effective interventions against diseases caused by viroids

- In this study, response dynamics in the interaction between potato and PSTVd are analyzed using transcriptome analysis and phytohormone profiling to provide a more comprehensive view of phytohormone-mediated responses to PSTVd infection and elucidate their role in disease development in potato. The results improve our understanding of the physiological significance of phytohormone accumulation in the context of viroid infection and provide insight into the interplay between SA and other phytohormones involved in this process. Expression data obtained by RNA-Seq analyzes provide valuable resources for a better understanding of the molecular mechanisms of the response against PSTVd in potato
- Potato plants inoculated with PSTVd are an excellent plant-pathogen system for studying phytohormone signaling function. In addition, studies conducted with the SA-deficient NahG transgenic potato plants highlight the possible defensive role of phytohormone signaling molecules in viroid infection

Biography

S. Mihaljevic has been a senior research associate at the Ruđer Bošković Institute (RBI), Zagreb, Croatia, since 2013. Previously, she studied molecular biology at the University of Zagreb, Croatia, and received her PhD from the same institution in 1999. She then worked in the research group of Prof. S. Jelaska at RBI, Zagreb, and was a postdoctoral fellow for two years supervised by Dr. J. Grima-Pettenati at CNRS, Toulouse, France. She has published more than 30 scientific papers and 6 book chapters. She teaches in the PhD programme at the University of Zagreb and the University of Osijek, Croatia.

Pratima Greedharry*, Kumari Indira Devi Boodhram, Chandasa Koyelas

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In vitro propagation of garlic (Allium sativum L) from meristem culture

The present study investigates in vitro multiplication and bulbification of one imported garlic accession namely VFG158 and eleven local garlic accessions as listed: Beeharry, Boodnah, Bondah, Gooniah, Haulkhory, Ramdhuny, Ramjee, Rampall, Sujeebun, Sujeebun2 and Unuth through meristem culture. The explants were subjected to fourteen shoot multiplication and three bulbification treatments. Positive results for shoot proliferation and suppression of hyperhydricity were noted on six shoot multiplication media: MS basal media with various growth regulators {G (0.25mg/L NAA+0.5mg/L 2iP), G1 (1.5mg/L BAP+0.5mg/L NAA), G2 (0.3mg/L NAA+3mg/L 2iP), G6 (0.5mg/L NAA+2mg/L 2iP), G14(2mg/L BAP+2mg/L NAA) and G15(1mg/L BAP+0.5mg/L NAA)}. The highest number of shoot formation was observed in G2 (0.3mg/L NAA+3mg/L 2iP) and the lowest number of shoot formation was observed in G14 (2mg/L BAP+2mg/L NAA). Genotypic difference in shoot multiplication and hyperhydricity on different media formulation was observed. The highest shoot proliferation was observed in the garlic accession Ramdhuny while lowest shoot proliferation was recorded in groups of similar accessions namely, Ramjee, Sujeebun and VFG 158. Bulblet formation was earlier on bulbification medium B2 (MS enriched with 12% sucrose). Largest and heavier bulblets were obtained on medium B5 (MS supplemented with 2mg/L BAP+1mg/L GA3 and enriched with 90% sucrose). A reliable protocol for rapid shoot regeneration and multiplication from meristem-tip culture and bulblet formation from multiple shoots clumps was optimised.

Keywords: Bulblet formation, Garlic, Growth hormones , Hyperhydricity, Tissue culture.

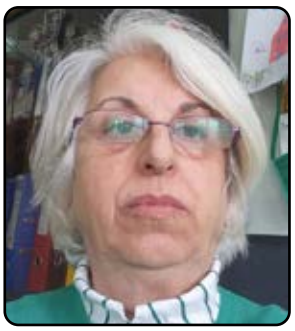
Abbreviations: BAP- 6-Benzylaminopurine, GA3- Gibberellic acid, 2iP- 6-(γ,γ- Dimethylallylamino) purine, NAA- α-Naphthalene acetic acid.

Audience Take Away Notes

- Overview on in vitro propagation of garlic
- Provide virus-free and quality seed to the farmer's community
- Increase the standard of living of farmers with increase in productivity and quality of garlic by using clean planting material

Biography

Pratima Greedharry studied Horticulture with Business Management at University of Mauritius, Mauritius and graduated in 2003. She then joined the Food and Agricultural Research and Extension Institute (previously known as Food and Agricultural Research Council) as Assistant Research Scientist in 2006. She is an Australian Award scholar and graduated as Master of Biotechnology in 2020 from Royal Melbourne Institute of Technology (RMIT), Australia. She is presently a Research Scientist and working at the Tissue Culture laboratory.



Gülay Kılıç, Berna Tunali*

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Determination of prevalence, pathogenicity, races and vegetation compatibility groups of fusarium oxysporum f.sp lycopersici and F. Oxysporum f.sp radicis lycopersici obtained from tomatoes in central Black Sea Region of Turkey

Fusarium oxysporum is a ubiquitous species complex of soil-borne plant pathogens, each of which includes many different highly host-specific forms. Fusarium Oxysporum f.sp. Lycopersici (FOL), which is a wilting agent and F. Oxysporum f.sp. Radicis Lycopersici (FORL) causing root rot in tomatoes, are two destructive and common soil borne pathogens in Turkey. Survey studies included five provinces in the Central Black Sea region in Turkey. In the isolations made from diseased plant samples taken from the surveyed areas, FORL isolates were found in every province studied. Among the provinces, the highest number of FORL was obtained from Samsun, followed by the provinces of Tokat, Amasya, Çorum and Ordu. In FOL isolates with three different races, FOL-1 was isolated from Tokat and Samsun provinces, FOL-2 was isolated from Tokat province only, and FOL-3 was isolated from Tokat, Samsun, Amasya and Ordu provinces. When the isolates with a high disease severity index are examined, it is seen that these isolates also negatively affected the root length, stem length, root fresh weight, stem fresh weight, root dry weight, stem dry weight values. The remarkable detail about these isolates is that most of the isolates with high disease severity index are FORL isolates. Nit mutants were obtained from 53 of the 79 FOL-FORL isolates obtained. Matching analyzes were performed using reference isolates in order to determine the Vegetative Compatibility Groups (VCG) of these 53 isolates. As a result of the matching tests, 6 of the FORL isolates from Samsun and Tokat provinces matched with VCG 0091-I reference isolate. FOL isolates did not match with reference isolates. Isolates that did not match any reference isolate could not be defined as a separate VCG because they were incompatible (HSI) among themselves. It was decided to reconsider the VCG studies.

Audience Take Away Notes

- Viewers will learn that both diseases are present in Turkey
- It will be understood that all three races of FOL have been detected in the Central Black Sea region
- They will see that it is important to solve this problem, which FORL is difficult to deal with, but is becoming increasingly common
- Since the isolates used in the research are kept, other universities will be able to benefit from their studies.
- The audience will able to understand what they learned

Biography

Dr. Berna Tunali studied Agricultural Faculty at the Ankara University, Turkey and graduated as MS in 1979. I was joined the research group of Cereal Diseases laboratory at the Plant Protection Central Research Institute of Ministry Agriculture. I received my PhD degree in 1992 at the same institution. After eight years obtained the position of an Associate Professor at the same Institute. I have been working at Ondokuz Mayıs University since 2005. I became a professor in 2006.

Patricia Bourguignon Soares[1]*, Mariela Mattos da Silva[2], Sabrina Garcia Broetto[2], Natã Carlos Lira Madeira[1], Diolina Moura Silva[1,2], Gerado Rossoni Sisquini[2], Eustaquio Vinicius Ribeiro de Castro[3]

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Visual analytics as a technological tool for communicating of monitoring the risk situation and dangerous alert of restinga vegetation

In 2015, in Mariana-MG, Brazil, a headwater region of the Rio Doce Watershed, the mineral tailings dam bursted, releasing an estimated 60 million m^3 of tailings. The mud tailings contaminated almost the entire length of Rio Doce's tributary, a 663.2 km impact, in addition to reaching a large extension of the Atlantic Ocean and sensitive regions in the coastal zone, such as the restinga ecosystem, duping several essential elements such as iron, manganese, copper, zinc, and others, but in high concentration they become toxic. This work proposes to evaluate the parameters that indicate the restinga's vegetation vitality, calculate the risk situation and dangerous alert, and elaborate a communication and monitoring tool technology. Species collected from 2019 to 2021 that represent the restinga's vegetation formation group were used, being Ipomoea imperati and Canavalia rosea; Allagoptera arenaria and Guapira pernambucensis; Protium heptaphyllum and Manilkara salzmannii, representing the herbaceous, shrubland, and arboreal formations, respectively. Then, a survey was carried out of the parameters that can indicate the vitality of the restinga vegetation, i) reproduction, analysing the flowering and fruting; ii) primary productivity, from photosynthesis analysis; iii) oxidative stress, analysing MDA and SOD enzyme; and iv) primary metabolism, evaluating proline and ascorbate levels. Risk situation and danger alert were calculated by the parameters obtained, and these data were reported in interactive visual analytics, showing the results obtained in the last years. Therefore, the use of visual analytics could be able to evaluate the evolution of this environmental disaster in restinga ecossystem and useful to proposal future actions to solve the effects caused by the contamination of heavy metals.

Audience Take Away Notes

- The determination of parameters that act as bioindicators of plant vitality can help other researchers who wish to monitor species that may be under some type of risk
- Risk situation and danger alert calculations can be applied to both fauna and flora that are in situations where environmental disasters have occurred
- Visual analysis can be a didactic tool to communicate scientific data to the lay community helping to solve environmental problems

Biography

Master in Civil Engineering from UFES, with the title Science, Technology & Innovation Indicators: Analysis of the Scientific and Technological Production of the Knowledge Area in Civil Engineering in the Web of Science , completed in 2014. Postgraduate degree in Oil and Gas Management from FAESA and a degree in Business Administration from Faculdade Estacio de Sa de Vitoria (2004). Currently, is PhD student in Biotechnology program of UFES and acts as Project Manager at Fundacao Espirito Santense de Tecnologia - FEST, managing Research and Development projects developed within the scope of the Federal University of Espirito Santo.

Danijela Poljuha[1]*, Mirela Uzelac[1], Barbara Sladonja[1], Josipa Bilić[2], Ivana Šola[3], Maja Mikulič Petkovšek[4], Slavica Dudaš[5]

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Dr Jekyll and Mr Hyde: Two-faced invasive plants

The economic costs of the ecological harm caused by Invasive Alien Plant Species (IAPS) are substantial. However, it is important to recognize that IAPS also hold considerable social, economic, landscape, and ecological value, contributing to various ecosystem services. One crucial factor influencing their invasive capabilities is the phytochemical composition, which primarily drives their environmentally detrimental effects. Conversely, this abundance of phytochemical compounds represents a vast and largely untapped potential for extracting active ingredients, offering significant opportunities for their utilization as phytopharmaceuticals. This presentation will provide an overview of the results of the research project NATURe as an ALLY: Alien invasive plants as phytopharmaceuticals – NATURALLY (IP-2020-02-6899) funded by the Croatian Science Foundation. The results of the first LC-MS phytochemical screening and biological activity testing of IAPS extracts in the Istria region (Croatia) will be presented. The presentation will shed light on the possible utilization of investigated IAPS (Ailanthus altissima (Mill.) Swingle, Robinia pseudoacacia L., Helianthus tuberosus L., and Solidago canadensis L.) as potential sources of phytopharmaceuticals.

Audience Take Away Notes

- Given the current difficulty in preventing the introduction and spread of alien species, we are confronted with the demanding objective of establishing and sustaining balance within the New Ecosystems. This presentation will propose innovative approaches to achieve sustainable management of invasive species
- The presentation aims to explore how invasive plants can serve as providers of new ecosystem services, offering valuable insights into their potential utilization as a source of phytopharmaceuticals
- By presenting these results, we aim to raise awareness of the importance of invasive species management, thereby contributing to the broader understanding of the significance of global climate change's impact and highlighting the need to enhance resilience and adaptability in response to these consequences

Biography

Dr. Poljuha graduated from molecular biology at the Faculty of Science, University of Zagreb (Croatia), where she also holds a PhD degree in natural sciences in the field of biology. She has worked as a researcher at the Faculty of Science, University of Zagreb, The Institute of Agriculture and Tourism Porec, and The Materials Research Center METRIS Pula. She has participated in 29 national and international projects and has published over 50 scientific papers. She is the founder of two laboratories and a Biotechnical Department. Her research interests are focused on invasive plants' phytochemistry, plant genetics, and molecular markers' application in the conservation of plant genetic resources. She is also involved with the popularization of science.

Gislane Chaves Oliveira[1], Partrícia Bourguignon Soares[2], Sabrina Garcia Broetto[1], Mariela Mattos da Silva[1], Natã Carlos Lira Madeira[2]*, Diolina Moura Silva[1,2], Gerado Rossoni Sisquini[2], Eustaquio Vinicius Ribeiro de Castro[3]

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Characterization of bioactive compounds and antioxidant activity of pulp and seed of Eugenia astringens fruit

The Myrtaceae family is one of the most common in Brazil, about 50% of the species are endemic to the Atlantic Forest. The species of this family previously studied showed a high nutritional and antioxidant potential. The proposal of this work is characterizing the bioactive compounds and antioxidant activity of fruits of a specie present in the restinga of the Brazilian coast, Eugenia astringens. The fruits were collected in July 2021, and the ethanolic extract of ripe fruits of E. astringens collected in the restinga of the north coast of Espírito Santo/Brazil, was evaluated for the concentration of pigments carotenoids and anthocyanins; phenolic compounds, and its antioxidant activity, obtained by the FRAP method. The results showed that in ripe fruits of E. astringens, the anthocyanin contents were about 49.8 mg 100 g-1 of fresh weight, while the carotenoid contents were about 1.6 mg 100 g-1. Phenolic compounds presented higher concentrations than those previous species of the same genus reported in the literature, showing values of 227.65 mg g-1. The antioxidant activity analysis, by the FRAP method, showed differences between the parts of the fruit. The pulp contained 44.11 µmol g-1 of fresh weight, while the seeds had about 91.38 µmol g-1. The highest values found for seeds compared to the pulp in the antioxidant activity analysis are also described in studies with native fruit trees of this genus. Therefore, we concluded that this specie may be considered a promising source of bioactive compounds, especially phenolic compounds and anthocyanins, with the prospect of being considered a functional food and promising material for various sectors of industry. The amounts of phenolic compounds and anthocyanins present in E. astringens bring the prospect of being considered a possible material for be applied various sectors of industry.

Audience Take Away Notes

- The methodology can be replicated for analyzes of other species
- The fruits have antioxidant potential, being able to serve the food, pharmaceutical and medicinal industries
- They are still unexplored fruits and new research can be suggested for the use of this species

Biography

PhD in Chemistry from the Federal University of Espírito Santo (UFES), graduated in Chemistry from the Federal Institute of Espírito Santo (IFES) and Master in Chemistry from the Federal University of Espírito Santo (UFES). Has experience with NMR, FT-ICR MS, GC-MS and FT-IR experiments applied to petroleum, asphalt materials and natural products. Currently, is a Postdoctoral fellow at FEST/UFES, participating in the Aquatic Biodiversity Monitoring Program Environmental (PMBA).

Itji Diana Daud[1]*, Muslimin Sepe[2], Ahdin Gassa[1]

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Effect of growing media on pathogenicity Beauveria bassiana (Balsamo) Vuillemin in against Tribolium castaneum (Tenebrionidae: Coleoptera)

Tribolium castaneum is a significant pest in wheat flour but can attack other processed food ingredients. The presence of T. castaneum causes physical and chemical changes in processed products. Physical damage in the form of color changes in processed products, while chemical damage in the form of lipase and benzoquinone enzyme activities originating from secretions T. castaneum which causes processed products to taste spicy. Alternative pest control T. castaneum In addition to the use of insecticides, biological control can also be carried out. Biological control can be carried out by using entomopathogenic fungi such as Beauveria bassiana. This study aimed to determine the differences in the virulence levels of entomopathogenic fungi B. bassiana on various growing media in controlling pests T. castaneum. Virulence test B. bassiana to T. castaneum was conducted at four levels of conidial density, namely 10^5, 10^6, 10^7, and 10^8 conidia/mL. Each treatment consisted of three replications. Observations were made on daily mortality and for interpretation of the data used probit analysis. The observation results show that the mortality of T. castaneum was highest at a conidia density of 10^7 reaching 44.44% on PDA media. Cumulative mortality on the 7th day after treatment significantly differed between the three media. Probit analysis shows the LC_{50} value from B. bassiana was 5,896 × 10^7 conidia/mL on PDA media and 15.19 × 10^6 conidia/mL on rice media. At a density of 107 conidia/mL, The LT_{50} values from B. bassiana on PDA media was 13,136 days while on rice and corn media it was 22, 41 days, and 98,415 days respectively. The results of this study indicate that B. bassiana has higher infectivity on PDA media against T. castaneum compared to rice and corn media.

Keywords: Infectivity, Conidia Density, Mortality, Lethal Concentration.

Audience Take Away Notes

- B. bassiana densities of 10^8 and 10^9 conidia/mL applied directly to cocoa pod-sucking insects (Helopeltis sp) before being fed could result in a mortality of 100%. However, the application after being fed can only cause mortality of 86–92%. Meanwhile, the optimal density of conidia of the fungus B. bassiana to control T. castaneum imago in Indonesia has not been reported. Therefore, it is necessary to conduct research on the effect of the conidia density of B. bassiana on the mortality of T. castaneum
- Biological control of T. castaneum with bioinsecticides is another alternative. Besides having a strategic meaning in terms of scientific development, especially regarding the biological control of
- T. castaneum, it is also safe for the environment as well as for humans and livestock. The use of bioinsecticides in the form of B. bassiana against T. castaneum is a new discourse that has not been used in Indonesia. Therefore, this research is expected to contribute to providing initial data on the ability of B. bassiana to control T. castaneum. Especially about the age of death of T. castaneum after infection
- This research is expected to be able to contribute to efforts to overcome warehouse pest attacks from T. castaneum by utilizing the potential of B. bassiana isolates through the formulation and optimization of bioinsecticide products as a substitute for chemical insecticides

- This research is expected to contribute to data on the potential of B. bassiana as a producer of extracellular chitinase enzymes, methods of isolating chitinase enzymes, and data on the characteristics of the chitinase enzymes produced

Biography

Prof. Dr. Ir. Itji Diana Daud, MS studied plant pests and diseases at the Faculty of Agriculture, Hasanuddin University, Indonesia and graduated as Bachelor degree in 1985. I then continued my Master's degree in environmental biology at the Bandung Institute of Technology, Indonesia and graduated in 1990. I continued my Doctoral degree in biological control at Hasanuddin University, Indonesia in 2003. I obtained the title of Professor in 2009. I have published more than 32 research articles in several journals.

Myroslava Vovk

M. Gryshko National Botanical Garden NAS of Ukraine, Laboratory of Medical Botany 01014, Timiryazevskaya str. 1. Kyiv, Ukraine

The anatomical and morphological structure of generative and vegetative spheres of conophytum aequale L. Bolus (Aizoaceae, Ruschioideae) in oder to study the evolutionary adaptation to arid conditions and searching criteria for genus systematization and phylogeny

Genus Conophytum is unusually large group of leaf succulents of Southern Africa's arid flora and considered taxonomically complex. Species number still varies up to 290. There is not enough data of floral anatomy and morphology of these species, although its structure helps to determine genus relationship with other genera and its place among Aizoaceae. Conophytum have a number of structural features caused by adaptation to arid conditions. Vegetative body, so-called corpuscle, formed by leaf pair in result of congenital merging and its degree is species-specific. Flower's ovary completely submerged in the thickness of corpuscle and just perianth, column and stamens come out. This arrangement is an example of evolutionary adaptation to arid conditions. Object of my detailed research is C.aequale L. Bolus in flowering stage. For permanent microscopic preparations were made series of microtome sections of 10-15 μm thickness made from paraffin-embedded material, which subsequently stained with Hematoxylin by Delafield and Safranin by Curtis. Leaf pair not completely merged, forming a two-lobed corpuscle of heart shape. Xeromorphic leaves are smooth, internodes strongly shortened. Outer wall of epidermis has a crystalline layer, which covered with a thin layer of cuticle and epicuticular wax, and cells look like papillae. Along epidermis is more or less evenly distributed cells containing metabolic products. Flower of C.aequale has a double perianth, multi-petal corolla of staminodial origin, 5-membered calyx, a multi-stamen androecium, a 5-nested gynoecium, and a lophomorphic nectar ring. Forming of petal-stamen tube is typical for Conophytum, but length of tube and column is several times longer than size of the ovary. Ovary completely submerged in thickness of corpuscle reliably protected from external environment. Bright, multi-petaled corolla protruding outward attracts pollinators, while the calyx loses its protective function and becomes very thin, almost filmy, unlike other members of Ruschioideae, which sepals can be thickened and very hard. In fact, calyx of C.aequale looks like an elongated vagina with petal-stamen tube inside. Sepals separated just outside of corpuscle and have only 2-3 mm long. Petal-stamen tube is sandwiched between the leaves, so has flattened ellipse shape, and only leaving out gradually acquire a spherical shape. Inferior ovary and five carpels are congenitally merged together to form a syncarpous gynoecium. Placentation is basal-parietal. In apical part of each nest, a False Median Septum (FMS) develops, dividing its cavity in half so that visually, not 5 but 10 nests observed in the cross section. Lower edge of FMS is located in area where ventral margins of carpels open and their cavities connected to each other by ventral slits. Above the margins of carpels close again to form ventral canals, which also involve FMS. Apical parts of carpels formed ovary roof in form of pentagon, which gradually turns into very long column. Between ovary roof and petal-stamen tube a lofomorphic nectaries ring lies. Ovary of C.aequale is homologous to previously studied Lampranthus haworthii and Delosperma echinatum ovaries, which proved that formation of epigyny in Ruschioideae occurs due to the invagination of receptacle. In ovary wall of C.aequale, loops of receptacle bundles also found, indicating its invagination. Also occurs deformation of carpels, when their ventral parts moved in basal-parietal position, dorsal parts shortened, but apical parts are only slightly

deformed (FMS remain in apical position, unlike in L.haworthii where its moved to central position). Ovary of C.aequale occupies an intermediate position because degree of placentas displacement is intermediate between basal (Delosperma) and parietal (Lampranthus) type of placentation.

Audience Take Away Notes

- This research helps to learn more about group of succulent plant Ruschioideae, its variability and systematisation
- In this research investigated in detail morphology and anatomy of genus Conophytum allows noted a number of adaptations to arid conditions and water stress
- Studying of flower structure of Ruschioideae species, showed that evolutionary adaptations went on the way of inferior ovary forming, i.e. an epigyny, goes by invagination of the receptacle, changing the type of placentation from central-angular to basal-parietal, and formation of elongated ventral canals
- The mechanisms of epigyny formation may serve as a clear criterion for the systematization and fhylogeny of complex taxonomic groups

Biography

Higher education degree: Myroslava Vovk studied at the I.Franko Lviv National University, Ukraine. Graduated in 1994 with Diploma of Higher education on speciality Biology, Chemistry, Botany. Diploma project with honors.
Postgraduate degree: I.Franko Lviv National University, Biology faculty, Department of Botany. Completed postgraduate studies in 2000 and continued to work on the topic: Morphological interpretation and tendencies of evolutionary specialization of flower Aizoaceae Fenzl. Obtained the position of Senior laboratory assistant at the D.Halytski Lviv National Medical University, Department of Biochemistry till 2008. Then had a maternity leave by three children. Then obtained the position of Senior engineer at the M. Gryshko National Botanical Garden NAS of Ukraine, Laboratory of Medical Botany. Now have a temporary break in work because of the war in Ukraine. I'm scientist with more than 20 years of scientific experience in biology, biochemistry and medicine. Participated in 20+ scientific conferences, congresses and workshops. 20+ published abstracts and scientific articles.

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

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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 $CuCl_2$ 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'.

Qian Chen*, Jiali Li, Han Yang, Jianping Qian

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A dynamic shelf-life prediction method considering actual uncertainty: Application to fresh fruits in long-term cold storage

Shelf-life is an important tool for visually conveying remaining food quality. However, the traditional printed shelf-life is a fixed value based on a stable environment, whereas food supplies undergo long-term dynamic conditions. Moreover, the accumulating effects of real-world uncertainty will lead to stochastic changes in remaining shelf-life in a probabilistic manner. Therefore, we proposed a novel dynamic shelf-life prediction method integrating the kinetic reaction and stochastic process. First, to predict practical changes in Food Quality Indices (FQIs), we established the stochastic kinetic model, which combines basic deterministic modeling with zero-order reaction and the Arrhenius equation, and stochastic factor modeling with the Wiener process. Second, we conducted real-time probability analysis of remaining shelf-life to quantify the potential degeneration of food quality based on the established model. By using datasets monitoring firmness and Vitamin C of Kiwifruit in long-term cold storage to verify the performance of our proposed integrated model, we showed that our method was more accurate in modeling stochastic changes in FQIs than the traditional reaction model, resulting in mean absolute error, mean absolute percentage error, and Root Mean Squared Error (RMSE) less than 0.2136, 0.0162, and 0.7402, respectively. Furthermore, the shelf-life probability analysis was efficient, with relative RMSE 5.26% and computing time 0.047 s. This valuable food quality information can be provided to managers or customers to reduce food loss and waste.

Audience Take Away Notes

- A dynamic shelf-life prediction method considering actual uncertainty is proposed
- Mean absolute error, mean absolute percentage error and root mean squared error of stochastic kinetic model are less than 0.2136, 0.0162, 0.7402
- Relative root mean squared error of shelf-life prediction reaches 5.26%
- The running time of the proposed algorithm is less than 0.047s

Biography

Dr. Chen studied Control Theory and Applications at the Beijing Technology and Business University, China and graduated as Master in 2020. He then joined the research group of Prof. Qian at the Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences (IARRP-CAAS). He received his PhD degree in 2023 at the same institution. He has published 5 research articles in SCI(E) journals.

El-Hacene Balla
Faculty of Nature and Life Sciences, University of Bejaia, 06000, Bejaia, Algeria

Comparison study between the semi-automatic press and the super press for olive crushing: Case of seddouk locality (Northeast Algeria)

The olive industry is of great importance and interest for the populations in Algeria. The cultivation of the olive tree is a legacy of the ancestors, which builds a great wealth but became a source of pollution caused by its by-products after trituration.

This work is devoted to the study of the environmental situation generated by the olive industry; a survey is conducted at the Daïra of Seddouk in oil mills. After study and statistical analysis, the following results were obtained, 54 functional oil mills counted among 76 existing oil mills in 5 communes that constitute the constituency. These mills received 108.104 quintal of olive of 4 varieties, which are in order of abundance: Azeradj, Chemelal, Aimel and Tefahi.

The pressure trituration represents 71%, by centrifugation 29%, of all the varieties taken together. The extraction by centrifugation gives 23884 hl of oil, i.e. 71%, whereas the pressure process produces 9527 hl, i.e. 29%. The centrifugation process produces more waste 51270 hectoliters of margine and 30762 quintals of olive, 16935 hl of margine and 9357 quintals of pressure-produced cucumber. The margines are thrown into the wild; on the other hand, the valorization of the olive pomace remains very insignificant.

Biography

El-Hacene Balla studied Agronomy at the Mostaganem University, Algeria and graduated as engineer (option Phyto and Zootechnical) in 1987. He then joined the research group of Prof. Akamalkhanov Chafakat Assamovich at the Agronomic University of Russia. He received her PhD degree in 1994 at the same institution. After then he rejoin the Faculty of life and nature sciences as teacher-researcher (University of Bejaia, Algeria). He has published many research articles in indexed journals.

Sihle Pokwana
Department of Environmental Science, Rhodes University, Grahamstown, South Africa

Evaluating social effects of arable field abandonment in communal areas in South Africa

Cultivation in rural areas contributes to agricultural stability and food security at household, community, and national levels, and also in maintaining diversity of rural landscapes (Scherr et al. 2007; Diaz et al. 2011). Moreover, cultivating fields gives rural communities a sense of belonging and identity; it brings communities together and gives a sense socio-economic stability through agricultural productivity (Shackleton and Luckert, 2015). However, field cultivation is declining in many rural areas due to a number of factors. This poses significant changes for the future and uncertainty of food and livelihood security of rural areas. It poses threats to the natural environment and to local livelihoods. This calls for research to understand the processes and implications. Increasing field cultivation of rural areas in South Africa could be a strategy against the high levels of poverty and food insecurity (Rogan, 2017).

Reversing or limiting field abandonment is essential also in meeting sustainable development goals on poverty reduction and protecting life on land. The sustainable development goals on poverty eradication aim to end poverty in all its forms for all people everywhere. Moreover, on protecting life on land, they state that biodiversity must be protected, and ecosystems stabilized. These will assist in increasing agricultural productivity and assist in eradicating extreme poverty for rural communities. Therefore, it is essential to conduct research that will seek to inform the reasons behind diminishing field cropping in communal areas of South Africa, despite pro-agricultural policies nationally (Shackleton et al. 2019). This research must be undertaken at appropriate spatial and temporal scales which will include knowledge from the ground with long term analyses (Shackleton et al. 2019). Moreover, it is important to evaluate which actors are most affected by agricultural field abandonment, is it the small-scale farmers who have discontinued farming, their households, agricultural supply companies or local institutions, this understanding will provide information for more targeted responses from policy makers, local and higher institutions (Shackleton et al. 2019).

Audience Take Away Notes

- Identify any trends in field cultivation in the rural areas of South Africa
- Compare livelihood strategies of farming households with those households who have given up agriculture and determine how livelihoods and household's dynamics have changed within the households who have ceased cultivation.
- Determine the importance of agriculture by evaluating whether livelihoods have improved of otherwise with the decrease in cultivation
- This will help the audience decide whether there is a need to invest in agriculture for the future, whether the youth should be encouraged to take up agriculture or they should be motivated to take up skills in other sectors. This research will be useful as it will help decide whether agriculture is a subject that needs more attention or less in current years. It will look at the drivers and pressures of ceasation or uptake of agriculture and how its play an important role in shaping livelihoods

Biography

Ms. Sihle Pokwana studied Bachelor of Science in Agriculture majored in Crop Science and Horticultural Science at the University of Fort Hare in South Africa and graduated in 2016, during the same year of graduation she took up Honours in Bachelor of Science in Agriculture Horticultural Science and graduated the Honours 2017. In 2017 while doing an internship at Gauteng Department of Agriculture and Rural Development under a unit of risk and disaster management she was at the same time pursuing Masters in Forest Management and the Environment at University of Pretoria in South Africa supervised by professor Paxie Chirwa and Philip Tshidzumba which she obtained in 2019. After graduating for Masters she went on to register PhD in Environmental science with Rhodes University which she is currently finalising under the supervision of professor Charlie Shackleton. Currently she works as an assistant director monitoring and evaluations at National Disaster Management Centre in South Africa.

Andressa Ferreira Alves[1,2], Gislane Chaves Oliveira Silvares[1], Romario de Oliveira Silva Júnior[1], Thais Araujo dos Santos Gasparini[1], Cassio Vinicius de Souza[1,2], Giovanny Moraes Metzcker de Souza[1], Sabrina Garcia Broetto[1], Diolina Moura Silva[1]*, Gerado Rossoni Sisquini[1], Eustaquio Vinicius Ribeiro de Castro[3]

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Photochemical efficiency of hose culture CV. Palmer in an agroforest system

This study aimed to evaluate ecophysiological parameters in mango plants of the Palmer cultivar in two cropping systems: Agroforestry (AFS) and Conventional (Conv). AFS can serve as an alternative to conventional agriculture, preventing soil degradation, enhancing soil fertility regeneration, and increasing agricultural production. We utilized photosynthesis, transient fluorescence of chlorophyll a, and gas exchange measurements to compare the two systems. Mango plants (Mangifera indica L.) cultivar Palmer with five years of planting, grafted on cultivar Oil and cultivated in the municipality of Aracruz-ES-Brazil were used. Eight mango trees were randomly selected for each treatment in a completely randomized design. Measurements were taken during the dry period with mild temperatures (August and September 2020) and the rainy period with high temperatures (October to January 2021). The transfer of excitation energy between the reaction centers (dVG/dt_0) and the closing of the reaction centers (dV/dt0) were higher in the conventional treatment plants (1.07 and 1.54) in relation to the SAF (0.81 and 0.44) showing that under the agroforestry system the plants showed greater efficiency in the process of reduction and reoxidation of Quinone A (QA) in photosystem II (PSII) even under the stress of mild temperatures and drought. The efficiency with which electrons can move to the electron transport chain (ΨE0) was lower in the conventional treatment (0.34) than the SAF (0.48). The greater biodiversity and soil coverage in the SAF contribute to better water availability for plants, reducing the impacts of the dry period on PSII efficiency.

Audience Take Away Notes

- This study can be applied to other plant species as well
- These analyses can serve as important tools for the diagnosis and evaluation of the quality of commercial fruits
- Diagnosis through chlorophyll a fluorescence can provide faster detection compared to traditional methods that are typically conducted at a later stage

Biography

Diolina Moura Silva completed her doctorate in Plant Physiology at the Federal University of Vicosa (UFV) in 1998. She is currently a Full Professor at the Federal University of Espírito Santo. She is also professor-advisor of the Graduate Program in Plant Biology and the Graduate Program in Biotechnology at the Federal University of Espírito Santo. She was the Coordinator of the Graduate Program in Plant Biology from its creation in 2003 until 2007. She works in the area of Plant Physiology and Biotechnology. She is the coordinator of the Photosynthesis Research Center, developing projects focused on the Photosynthesis of cultivated plants and particularly on the ecophysiology of fruit trees. In the context of her scientific and technological production, transient fluorescence of chlorophyll a, Photochemical efficiency, Photosynthesis.

Happy Bango[1]*, Maboko S Mphosi[1], Kagiso G Shadung[2]

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[2]Department of Biological and Agricultural Sciences, Sol Plaatje University, Private Bag X 5008, Kimberley, 8300, South Africa

NPK fertilizer requirements for Jatropha zeyheri indigenous tea under microplot conditions

Jatropha zeyheri is an indigenous crop to South Africa, which contains tea brewing and medicinal properties commonly utilized by local communities in rural areas of South Africa. Indigenous teas have been receiving much attention due to their health benefits. Domestication and commercialization of indigenous herbal teas have gained popularity in recent years. However, domestication of J. zeyheri will require optimum NPK fertiliser mixture to improve yield and quality. Therefore, the study was intended to determine whether different fertiliser application rates would optimize yield parameters of J. zeyheri tea under microplot conditions. At two-leaf stage, J. zeyheri seedlings were transplanted into 25 cm diameter plastic pots. Each pot was filled with heated-pasteurised sandy soil and Hygromix at 3:1 (v/v) ratio and placed in a spacing of 0.30 m ×0.30 m inter-and intra-row spacing. Treatments, viz., 0, 2, 4, 8, 16 and 32 g of NPK 2:3:2 (22) fertiliser mixtures were arranged in a randomized complete block design, with five replications. Treatments were initiated a week after transplanting, and 130 days after that, treatments had highly significant effects on leaf width, contributing 66% in TTV, whereas significant effects were reported on vine length, stem diameter, leaf length and dry root mass contributing 61, 67, 68 and 49% in TTV, respectively. NPK fertilizer rates did not affect chlorophyll content, NDVI, dry shoot mass, number of leaves and leaf area index. Jatropha zeyheri yield variables when exposed to increasing fertilizer rates displayed positive quadratic relations. Use of fertilizers had setbacks when applied inappropriately leading to inconsistent results. However, determining optimum fertilizer requirement for J. zeyheri was a strategical solution for inappropriate application. Jatropha zeyheri fertilizer requirements were optimized at 3.30 g fertilizer/plant, which shows that J. zeyheri requires a minimum amount of NPK fertilizer to stimulate growth.

Keywords: Botanicals, Fertilizer, Jatropha Zeyheri, Primary Nutrients, Tea Yield.

Biography

Mr. Happy Bango hold a Bachelor of Science in Agriculture (Plant Production) and Master of Science specialising in Horticultural Sciences both completed at the University of Limpopo, South Africa in the academic year 2016 and 2019, respectively. Mr. Bango has a great experience in the field of Horticulture and Agronomy (field crops). Mr Bango hold a certificate in Project Management: Principles and Practices completed at the University of Stellenbosch Business School - Executive Development in 2021. Mr. Bango has completed writing his PhD thesis, and currently awaiting for assessment results from examiners. In 2019, Mr. Bango worked at the University of Limpopo, Limpopo Agro-food Technology Station (LATS) as an intern. After term, he joined DST-NRF internship program which placed him at the University of Venda in South Africa. Mr. Bango worked as a research assistant at Westfalia Fruit Estate, Technological Research Unit for a year. Currently, he is based at the University of Limpopo working as an Operational Officer of a centre of excellence called Limpopo Agro-Food Technology Station. Mr. Bango is an author and has published several articles in peer reviewed journals. Through his research work, he was awarded NRF Scarce Skills Bursary and TIA SAB Seed fund in the academic year, 2021 and 2023, respectively.

Regina Menino[1]*, Iva Lopes[2,3], Paula Fareleira[1], Olga Moreira[4,5,6], Daniel Murta[2,3]

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[2]EntoGreen, Ingredient Odyssey SA, Santarem, Portugal
[3]CiiEM-Multidisciplinary Research Center of Egas Moniz, Monte de Caparica, Portugal
[4]Polo de Inovacao da Fonte Boa, INIAV, 2005-424 Vale de Santarem, Portugal
[5]CIISA - Faculty of Veterinary Medicine, UL, Portugal
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'Mixed fertilizer/plant' interaction on different soils

In the context of the conventional vs. organic farming debate, exacerbated by the urgent need for new solutions to safeguard the environment and reverse climate change, without compromising the promotion of global food security, several testimonies, with a scientifically-backed experimental basis, predict the need to complement organic fertilisation with a chemical complement, in many cases, in proportions of up to 75%. Not with standing its decisive effect in improving and maintaining the physical and microbiological characteristics of agricultural soils, relatively low contribution of organic fertilizers in macronutrients for plants requires the use of large amounts to meet the needs of plants in the optimal fertilization of crops. On the other hand, the current and prospective availability of this type of fertiliser is not sufficient for generalised use on a global level, making its judicious utilisation extremely important. To this end, in each specific situation, the option should be selective so as to make the most of it, by choosing the most suitable 'soil/plant' binomials and, within these, the most convenient 'organic/chemical' ratio.

As there are numerous associations between 'climate, soil and crop', that may condition options, the systematisation of knowledge in this area should involve the assessment of paradigmatic combinations that, in turn, inform local experimentation in the concrete situations faced by farmers. To this end, it will be important to gather comparative experimental results, obtained in different croplands in the world, for combinations of 'soil, climate and crop', with chemical, organic or mixed fertilization regimes - the latter eventually in different proportions.

As a contribution towards this goal, we intend to show in this communication the effect Hermetia illucens L. (Black Soldier Fly - BSF) larvae-derived frass (an organic fertiliser) obtained from the biodigestion of bovine slurry, on the production of ryegrass (Lollium multiflorum Lam.), on sandy, calcareous and clayey soils (specifically, a Gleyic Podzol, a Haplic Calcisol and a Haplic Fluvisol) in an Atlantic/Mediterranean climatic situation. For that purpose, a pot trial was designed with 15 factorial combinations of the factors soil type and type of fertilization. The fertilization regimes were exclusive chemical fertilization, exclusive organic fertilization with frass and mixtures of organic fertilizer complemented with mineral fertilizer in the proportions of 25%, 50% and 75%.

Audience Take Away Notes

- In addition to confirming the need for rigorous scrutiny when formulating the fertilization of its crops in the additional perspective of organic fertilization and an eventual chemical complement, this study highlights the advantage of choosing the appropriate organic fertilizer, taking into consideration the feasibility of implementing the composting of the waste from farming and/or livestock and/or forestry, in order to integrate the farm into a circular economy system
- Based on knowledge of the type, and respective composition, of the soils at his disposal, of information on the composition of the organic and chemical fertilizers available to them, of the locally recognized

needs for the foreseeable levels of nutrient export by the crops, and the information provided to them in local experimentation, the farmers will have the appropriate knowledge for the formulation of crop fertilization. On the other hand, in the case of adequate farm size and, in particular, when reconciling agriculture with horticulture and, especially, livestock farming, farmers may opt for a circular economy system, where in situ composting, by advanced systems, may provide a sustained economy that is respectful to the environment, contrary to climate change and that is in harmony with world food security

- The prompt availability of nutrients in adequate doses and formulations throughout the development of plants is one of the advantages of chemical fertilizers, provided that they are used accurately, but with an eventual negative interference in the physical and microbiological characteristics of the soil, particularly when used improperly and for prolonged periods. On the other hand, organic fertilizers contribute in a remarkable way to sustain soil fertility, to the extent of their interference in the physical and microbiological characteristics of the soil, either by improving its structure, or by the interactions of its microbiome with the root systems of the plants. We can thus assume that the former are 'plant fertilizers' and the latter are, primarily, 'soil fertilizers'. In this way, the complementarity of these two types of fertilization seems to be a valid option, particularly in soils with low retention capacity for plant nutrients (and water), where nutrient leaching to underground aquifers is aggravated. This complementarity, however, depends fundamentally on the physical characteristics of the soil, particularly its texture. Thus, while in some types of soil the chemical supplement may not have a considerable effect, as in some clay soils with a good structure, in sandy soils its effect on the productivity of crops is progressive and very pronounced
- As mentioned in the previous question, organic fertilizers, although being limited in readily available plant nutrients, which makes it necessary to use large quantities per unit of surface area (thus increasing the cost of production), have a beneficial effect (both immediate and delayed) on all aspects of soil fertility. This effect, however, is variable for the different types of compost, either by the nature of the organic waste composted or by the composting technique. When, if necessary, their possible nutrient deficit (particularly in nitric N) is adequately covered, they provide an edaphic environment appropriate for maximizing production, as they promote an increase in the balance of the soil microflora - particularly of the microorganisms that stimulate plant growth or fix atmospheric N, at the same time as fostering a more favorable phytosanitary environment. However, in these features, the differences between different compounds can be striking, so it is imperative to know the composition and history of their production
- The question is particularly relevant, but we have not had the opportunity to address it yet. Nevertheless, in another study we have already had the opportunity to test different composting techniques of the same organic substrate on the same crop and have seen significant differences in yield. However, not only but particularly in circular farming systems, the availability of organic fertilizers is not unlimited and, in this situation, the most advisable option is to give preference to their use, in the most appropriate proportion, for the soils that are likely to respond most positively, all the more so because these are the soils that most need an improvement in their physical characteristics in the short and long term. In addition, in any soil/plant situation that calls for mixed fertilization, the proportion of chemical fertilizer should not exceed the minimum needed to maximize production
- Many less-enlightened farmers fertilize their crops according to standard recipes for different crops, without considering the type of soil on which they grow them. On the other hand, because of the chemical vs. organic fertilization dispute, their choices are radical, without realizing that the two options can be complementary, guaranteeing immediate profit without neglecting the deferred. The demystification of the extreme arguments on either side is an added value for the farmer, since, by im-

plementing more correct fertilization techniques, the benefit lies in production savings and increased and safer yields

- Any initiative in the field of recycling organic waste of any origin, in order to give it a productive potential in the context of food security and at the same time mitigate its potential harmful effect, in the context of environmental degradation and climate change, is an undeniable added value. In this chapter, the present communication is supported by a preliminary test with scientifically evaluated results, which will allow us to contribute to the consolidation of other results, obtained in other scientific research centers, and to the possible justification of other projects in the pursuit of the optimization of fertilization of agricultural, horticultural and forestry crops. At the same time, the essay to which this communication refers may constitute didactic and reference material for further initiatives
- Designing the fertilization of a crop in a given situation, in order to maximize the production of a given crop without compromising (and possibly even increasing) the resilience of soil fertility, is a challenge that requires in-depth knowledge of a wide range of conditions, including the rates of plant nutrient demand and the rates of soil nutrient delivery in plant-available form. But the simple equilibrium of these conditions is not enough, insofar as the capacity of the soil to retain nutrients and its hydraulic conductivity, as a function of climatic conditions (particularly rainfall), alter randomly the eventual balance of these two phenomena; furthermore, the rates of mineralization of the nutrients contributed by organic fertilizers are difficult to adjust to the rates of assimilation by the plants, so that, even with organic fertilization, part of these fertilizers is lost through leaching, particularly in soils with low retention capacity. So, an approximation to the optimum is only possible through the information provided by scientifically confirmed experimentation for the soil/plant binomials in question
- Yes, it will improve the accuracy of a design, or provide new information to assist in a design problem
- List all other benefits
    - At the philosophical level
    - Further contribution to demystifying the myths of extreme positions in the conventional vs. organic contention
    - Further alert for the advantage of circular economy systems in agricultural holdings
    - At the technical level
    - Additional contribution to highlight the different behavior of a compost on different soil types
    - Additional contribution to highlight the effect of complementing organic fertilizers with chemical fertilizers
    - Proposal for the rational rationing of the scarce resource in organic fertilizers

Biography

Dr. Regina Menino studied agronomy at Evora University, Portugal and graduated as Agronomist in 1992. She then started working in Soil Science and Plant Nutrition, in the National Institute of Agrarian and Veterinarian Research, I.P., in the micronutrient's laboratory. She received her PhD degree in 2005, at the Technical University of Lisbon, Portugal, working on the same field but with macronutrient's, in particular with nitrogen. At the present she is working with organic byproducts, researching its agronomic value as organic fertilizers, having published a book chapter and some articles on this subject.

Ayman Mohamed Abd El Razek
Breeding and Varieties, Agriculture Research ICenter, ARC, Giza, Egypt

Genotype X environment interactions and stability analysis for yield and sucrose of some promising sugarcane clones

Two field experiments were carried out at two locations, i.e. Shandweel Research Station (Sohag Governorate) and Kom Ombo Research Station (Aswan Governorate) for the two successive seasons 2018/2019 and 2019/2020 (two plant cane) to evaluate 7 sugarcane genotypes for the stability of its performance for economic characteristics. The tested genotypes were six promising sugar cane clones namely G 98-28, G99-160, G84-47G, 2003-47, G 2003-49 and G 2003-38 along with commercial variety GT 54-9. In both seasons plant cane was planted during the second week of March and harvested after 12 months in each location. The trial was laid out in a Randomized Block Design (RBD) with three replications at each location. The genotype x location interaction for cane yield and pol% indicated that genotypes ranking differed and the magnitude of differences between genotypes changed from one environment to another. The second order interaction was not significant for both traits. Shandweel location surpassed Kom Ombo location in cane yield; however, Kom Ombo location produced higher value of pol% compared with Shandweel location. Promising clones 2003-47 and G 2003-49 and commercial variety GT54/9 were significantly superior to the rest of genotypes for cane yield. While the lowest cane yield was produced by G99-160 and G2003-38 clones. The promising clone G2003-47 had the best performance for Pol% content. The promising clones G2003-47 and G2003-49 and commercial variety GT54-9 could be classified as stable. However, G98-28 and G84-47 clones are consistent but were low in cane yield. This study suggests that the stability analysis can contribute with supplementary information on the performance of new sugarcane selections prior to release for commercial cultivation and increases the efficiency of cultivar development programs

Keywords: Sugarcane, Stability, Genotypes X Environments, Yield and sucrose.

Biography

Prof. Dr. Ayman Mohamed Abd El-Razek is working as Professor and department head (Plant Breeding and Genetic and Varietal Maintenance Dept.) at Agriculture Research Center ARC, Egypt. He did his Ph.D. in Plant Breeding in 2003. He attended studies and training programs in India, China and United States. He has published 45 research papers. He is Member and Regional Coordinators for the Regional Office for Middle East IAPSIT- ROM (The International Association of Professionals in Sugar and Integrated Technologies) and Member of The Egyptian Association of Sugar Professionals, The Egyptian Society of Sugar Technologists (ESST), Fidelity of Sugar Crops Council, The Egyptian Association of Applied Sciences (ESAS), The Egyptian Association of Agricultural Economics

Hilda Sanga[1] Aleksandar Radu[2]*

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Chemical analysis of Tanzanian soils subjected to four different irrigation schemes

This work reports on the chemical analysis of soils collected from four agricultural regions in Tanzania subjected to four different irrigation schemes. We aim to obtain detailed chemical information in order to evaluate soil fertility and thus provide data-driven insight into the development of appropriate fertilization management which will hopefully lead towards improvement of crop yield. We performed XRD, XRF and ICP-AES analysis (with Ion Chromatography analysis in the pipeline) and are presenting some of the main data and concomitant conclusions.

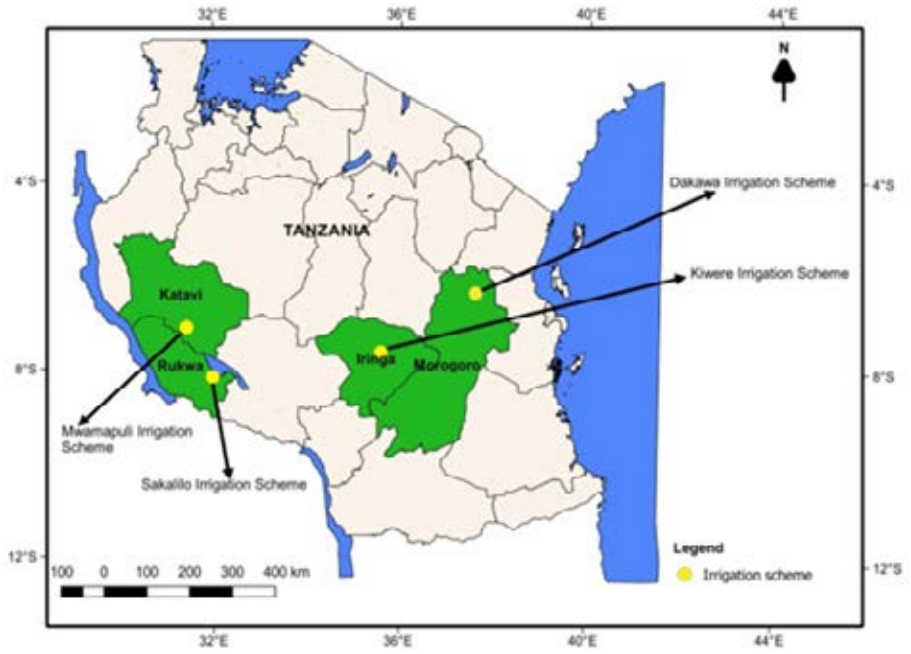

Figure: Geographic location of the studied irrigation schemes in Tanzania

Audience Take Away Notes

- This is the result of a research project, the benefits are mostly intellectual
- The audience will gain ideas for further research
- The data will provide information on soil fertility and assist in designing innovative practices for the sustainable use of fertilizers

Biography

Dr. Radu obtained PhD at Auburn University, USA. He spent 5 years as a postdoctoral fellow at Dublin City University, Ireland. Following a short sting at the University of Portsmouth, UK he spent almost 11 years at Keele University, UK. Since 09/2022, Dr Radu is Associate Professor at the University of Lincoln, UK. Dr Radu published 50+ peer-reviewed papers, has a portfolio of externally funded projects and developed a strong international network of experts in diverse fields of chemistry, engineering and environmental sciences.

Sami Ali Metwally[1]*, Bedour Helmy Abou Leila[2], Hussien Ibrahim Abdel Shafy[3]

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[3]Water Research and Polluted Control Department., National Research Centre, Dokki, Cairo, Egypt

Greywater reuse for sunflower irrigation previously radiated with helium-neon laser: Evaluation of growth, flowering, and chemical constituents

This study was carried out at the pilot plant area in the National Research Centre during the two successive seasons, 2020 and 2022. The aim is to investigate the response of vegetative growth and chemical constituents of sunflowers plants irrigated by two types of wastewater, namely: black wastewater W1 (Bathroom) and grey wastewater W1, under irradiation conditions of helium-neon (He-Ne) laser. The examined data indicated that irrigation of W1 significantly increased the growth and flowering parameters (plant height, leaves number, leaves area, leaves fresh and dry weight, flower diameter, flower stem length, flower stem thickness, number of days to flower, and total chlorophyll). Treated sunflower plants with 0 to 10 min. recorded an increase in the fresh weight and dry weight of leaves. However, the superiority of increasing vase life and delaying flowers were recorded by prolonging exposure time by up to 10 min. Regarding the effect of interaction treatments, the data indicated that the highest values on almost growth parameters were obtained from plants treated with W1+0 laser followed by W2+10 min. laser, compared with all interaction treatments. As for flowering parameters, the interactions between W2+2 min. time exposure, W1+0 time, w1+10 min., and w1+2 min. exposures recorded the highest values on flower diameter, flower stem length, flower stem thickness, vase life, and delaying flowering.

Biography

Prof. Dr. Sami Ali Metwally Ornamental Plants and Woody Trees Department, Agricultural and Biological Research Division, Ameen and member of the Agricultural and Biological Research Institute at the National Research Center, Dokki – Giza- Egypt.

EDUCATION: In 2010 Ph.D in Agricultural Sciences, Horticulture Floriculture (Ornamental Plants and Woody Trees) Department, Faculty of Agriculture, Zagazig University, Egypt. 2004 M.Sc. in Agricultural Sciences, Horticulture Floriculture (Ornamental Plants and Woody Trees) Department, Faculty of Agriculture, Cairo University, Egypt. 1992 B.Sc. in Agricultural Sciences with very good with honor grade (83.58%), Department, Horticulture, Faculty of Agriculture, Ain - Shames University, Egypt 1998 Diploma in computer .

PRACTICING EXPERIENCE:

• From 1992 to 2004 about 14 years with many companies and free businesses in design landscape and gardens in modern city –production and maintenance of indoor ,outdoor plants and gardens, Reclaimed new desert lands and farms.
• Application of tissue culture techniques of some economi cal plants 1995- 1998 - Traditional Propagation of ornamental plants and woody trees 1992-2004 - Plant improvement through tissue culture and Traditional Propagation techniques on ornamental plants and forest trees.2004 till now.

Islam Zeb*, Mehboob Alam
Department of Horticulture, The University of Agriculture Peshawar Pakistan

Microbial analysis of ready to eat leafy vegetables collected from various areas of district swat, Khyber Pakhtunkhwa

The contamination of leafy vegetables with microbes and heavy metal toxicity is one of the world's most serious environmental issues. Despite the fact that leafy vegetables are well known around the world for their many health benefits. A study was done to determine the microbiological condition of leafy vegetables including Lettuce, Cabbage, Coriander and Mint from different Swat regions (Matta, Khwazakhela, Mingora and Kabal). The study was conducted in the Environmental Horticulture Laboratory at the University of Agriculture Peshawar, Department of Horticulture during the 2018-19 academic year. The experiment was designed using the RCBD method, with one factor and three replicates. Lettuce, Cabbage, Coriander and Mint were found to have the highest bacterial group maximum range for TBC (5.58, 5.56, 5.52 and 5.49 log cfu g-1), Enterobacteriaceae (5.49, 5.46, 5.43 and 5.41 log cfu g-1), E. coli (4.08, 4.04, 4.13 and 4.03 log cfu g-1) Salmonella (4.05, 4.03, 4.04 and 4.02 log cfu g-1) and Listeria (4.01, 3.71. 3.94 and 3.79 log cfu g-1) was recorded for the vegetable's samples collected from Mingora location while lowest values of Lettuce, Cabbage, Coriander and Mint for TBC (4.70, 4.66, 4.61 and 4.61 log cfu g-1), Enterobacteriacae (4.61, 4.56, 4.54 and 4.53 log cfu g-1), E. Coli (3.70, 3.51, 3.61 and 3.53 log cfu g-1), Salmonella (3.60, 3.55, 3.57 and 3.51 log cfu g-1) and Listeria (3.45, 3.15, 3.35 and 3.25 log cfu g-1) was getting for Matta location. The conclusion was reached that the bacterial groups were most prevalent in the vegetables gathered from the Mingora region since all the microorganisms analyzed exhibited a significant difference.

Audience Take Away Notes

- Ready-To-Eat vegetables (RTEs) include those vegetables which are normally consumed in their raw state
- RTEs constitute a suitable and convenient meal for today's lifestyles because they need no cooking or processing
- RTEs are rapidly developing segment of the fresh food industry
- RTEs are nutritionally well recognized components in diet
- Their consumption is associated with a healthy lifestyle
- World Health Organization (WHO) encourages consumption of at least 400 g of fruit and vegetables per day (excluding potatoes and other starchy tubers) for the prevention of various human diseases

Biography

This is Dr. Islam Zeb. I did my PhD in 2023 from the department of Horticulture, The University of Agriculture Peshawar Pakistan and worked on Microbial and heavy metals analyses in irrigation water and vegetables collected from various areas of district Swat, Khyber Pakhtunkhwa. Over the course of three years, I completed and work as a Research Assistant in the project Employing plant growth promoting bacteria in phytoremediation of foodborne pathogens and toxic metals from wastewater. for a period of three years. I also did a project on Kiwi fruits and different Apple cultivars. Recently I appointed as Agriculture Officer in Agriculture Extension wing at Agriculture Research Institute Peshawar Pakistan.

Xiujing Xing
Provivi, Inc Santa Monica, CA, United States of America

Synthesis and application of insect phermone for pest management

Provivi™ is an emerging agricultural biotech company employing insect pheromones as the basis for comprehensive pest management. Insect pheromones are chemicals that act as highly selective attractants for insects, enabling the management of harmful pests without harming advantageous insects. These substances provide non-lethal, species-specific insect control through disrupting mating cycles, leading to decreased pest populations and a significant reduction in crop destruction and losses while preserving beneficial insects. Herein, we present our inventive method for synthesizing pheromone active ingredients from sustainable plant oils through green chemistry. This approach significantly reduces waste while maintaining high selectivity.

Audience Take Away Notes

- Introduction of Provivi and what we do
- Introduction of how pheromone works for pest management
- Green chemistry synthesis of pheromone active ingredients

Biography

Dr. Xiujing Xing graduated in 2020 as a PhD in chemistry from University of Pennvylvania, with focused research on synthesis of novel nickel-based organometallic complexes; After graduation, she spent one year at UC Davis working on catalytic trasnfer hydrogenation with aluminum complexes as postdoc scholar; She joined provivi on Dec 2021 as a senior scientist in R&D at Provivi, co-founded by Nobel Laureate Dr. Frances Arnold and co- founders Pedro Coelho and Peter Meinhold, focusing on the synthesis and application of phermone in pest management.

Andrew Littell
Director of Sales and Marketing, Bloomfield AI, United States

Crop digitalization: Deep learning, plant-level knowledge and the future of specialty crop farming

Since the dawn of agriculture, crop monitoring and inspection remains a mainstay of every farmer's routine. Today, many farmers visually inspect their crops armed with a variety of tools to help ensure ideal plant health and performance. Although human visual inspection remains an essential part of agriculture, it has many challenges and many limitations. Research over the last decade or so has assessed the applicability of computer vision and deep learning to address the crop inspection challenge [Nusk2011, Nusk2014, Blom2009, Herr2015]. These approaches have shown tremendous promise, they are only just now beginning to go beyond the research phase into commercialization. Around 2015, image processing methods using deep neural networks began to replace the earlier classical computer vision approach, providing both better performance and more generalizable results. Again, through the early work of the CMU team, a StalkNet [Bawe2018] architecture was developed, which combines an RCNN feature detector with a GAN based pixel segmenter. To date, StalkNet has been trained to measure dozens of widely varying features in different crops, ranging from leaf necrosis to fruit ripeness to sorghum seed size for grain yield. The first market Bloomfield has chosen to address is grape growing and vineyard inspection, but we see CEA as a natural next step in the progression of our technology and a large opportunity. Flash combines high-resolution flash lighted stereo RGB images with a cloud-based deep learning pipeline to inspect and assess the health and performance of each and every plant in a field or grow, one plant at a time. The result, so far, with Bloomfield's vineyard customers is yield estimation, pest/disease detection, labor saving and digitalization. This comprehensive analysis forms the foundation for Bloomfield's health and performance assessment of each geo-located plant, one plant at a time through a web-based dashboard accessible via tablet, cellphone or computer. Bloomfield's approach to inspecting and assessing plants contrasts sharply with the visual inspection which includes sparse subjective judgements of randomly sampled plant data.

Audience Take Away Notes

- How the latest developments in AI can help growers improve the quantity, quality and consistency of yields
- Understand the evolution of crop digitalization and
- Appreciate where research opportunities are emerging

Biography

Andrew Littell, Director of Sales and Marketing, Bloomfield AI, United States

Charith Raj Adkar Purushothama[1]*, Teruo Sano[2], Jean Pierre Perreault[1]

[1]RNA Group/Groupe ARN, Departement de Biochimie, Faculte de Medecine des Sciences de la Sante, Pavillon de Recherche Appliquee au Cancer, Universite de Sherbrooke, Sherbrooke, QC, Canada

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Strategies to manage hop latent viroid in the cannabis industry

The term viroid describes the class of plant pathogenic non-coding RNA molecules similar to, but different from viruses. The hop latent viroid, first isolated from hops, is known to cause duds disease in cannabis plants. This disease is characterized by malformation of susceptible cultivars and severe yield loss. According to the survey conducted in 2021, more than 90% of tested cannabis-growing facilities in California were contaminated with HLVd. It has been estimated that it could cause losses of up to 4 billion US dollars annually for the cannabis industry in North America. Recent findings will be discussed related to disease management and crop protection strategies including on-site diagnosis methods for quick action plans.

Biography

Dr. Charith Raj Adkar Purushothama is an adjunct professor at Universite de Sherbrooke and a biotech entrepreneur focusing on developing on-site diagnostic kits and novel crop protection strategies. He has helped several horticulture industries develop in-house plant disease diagnosis laboratories for biovigilance and mitigate pathogens through integrated pest management. He holds an M.S. degree in Microbiology and Ph.D. in Plant Virology. He is well-recognized in the field of Viroid and non-coding RNA biology. He has authored 60+ scientific reports and presented findings at more than 30 international conferences.

Borja Barbero Barcenilla
Texas A&M University, United States

Spaceflight and microgravity response of plant telomeres and telomerase

To realize NASA's goal of human colonization of Mars and the Moon by 2050, plants will be required for food production, carbon dioxide removal, oxygen production and water purification. Understanding plant adaptation to spaceflight is therefore essential for human space expansion. While little is known about plant responses to spaceflight, transcriptomic data showed the upregulation of multiple stress response pathways, including genomic and oxidative stress. Telomeres are essential structures that safeguard genome stability and are an important biological marker of survivability. Prior studies revealed that astronauts aboard the International Space Station (ISS) experienced increased telomere length and oxidative damage to their genomes during spaceflight. Here we set out to investigate telomere length homeostasis in relationship with cellular stress in Arabidopsis thaliana seedlings grown for 12 days either in orbit aboard the ISS, or under simulated microgravity conditions produced by a random positioning machine. We report a substantial increase in telomerase enzyme activity in seedlings grown under spaceflight conditions as compared to both 1g ground controls and simulated microgravity. Despite the dramatic increase in telomerase activity we did not detect a significant change in telomere length. However, we found elevated levels of 8-oxoguanine in the DNA of seedlings grown aboard the ISS, as well as increased mitochondrial DNA, consistent with oxidative damage. These findings support previous omics analyses predicting spaceflight-induced oxidative stress in Arabidopsis. We postulate that increased telomerase activity in space-flown Arabidopsis is a response to excess ROS generated from the ionizing radiation environment of low Earth orbit, and may reflect a broader role for telomerase in the stress response. Altogether, our data indicate that plants have a robust mechanism of telomere maintenance, resulting in negligible telomere length fluctuations during spaceflight and microgravity conditions. These observations suggest that plants may be well-equipped to survive the stresses imposed by interstellar colonization.

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.

Priyanka Kushwaha[1]*, Alexandria Tran[2], Diego Quintero[2], Miranda Song[2], Qi Yu[2], Ruth Yu[3], Michael Downes[3], Ronald M Evans[3], Alicja Babst Kostecka[1], Julian I Schroeder[2], Raina M Maier[1]

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[2]School of Biological Sciences, Department of Cell and Developmental Biology & Department of Bioengineering, University of California San Diego, La Jolla, CA 92093, United States of America

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Relationship between plant gene expression and microbial community diversity in remediation of acidic metalliferous mine tailings using compost amendment

Successful phytoremediation of acidic metal-contaminated mine tailings requires amendments to condition tailing properties prior to plant establishment. This conditioning process is complex and includes multiple changes in tailings properties. Particularly, little is known about the plant genetic response during remediation, or how this response influences soil microbial diversity (and vice versa). The objective of this project was to identify relationships between tailing properties and plant stress response genes during growth of Atriplex lentiformis in compost-amended (10%, 15%, 20% w/w) mine tailings. Analyses included RNA-seq of plant root-gene expression, 16S rRNA gene amplicon sequencing for bacterial/archaeal communities, metal concentrations in substrate and plant tissues, and phenotypic responses of plants to stress. Differences in plant stress gene expression and microbial diversity were observed as a function of compost amendment. For example, the expression of root-associated plant stress genes and the abundance of acidophilic microbes (e.g., Fe/S, and S oxidizers) were highest in the 10% compost treatment. As compost levels increased, plant stress genes were down-regulated and microbial richness increased as did the presence of plant-growth-promoting bacteria and N2-fixers. Importantly, the expression of plant stress genes had strong positive correlations with abundant microbial taxa at each compost level. Results suggest there are strong plant-microbiome associations that drive the success or failure of the revegetation process. Such data are essential for development of better remediation management strategies for metal-contaminated sites.

Audience Take Away Notes

- The audience will learn about plant stress genes and bacterial/archaeal taxa that shifts in abundance during remediation of acidic, metal-tailings
- This research could be implemented for other plant species that have potential for phytoremediation of metal-contaminated sites
- This research helps lay the foundation for understanding plant-microbial interactions for phytoremediation purposes

Biography

Dr. Priyanka Kushwaha received her BSc. (Honors) in Biochemistry from the University of Delhi, India in 2009 and MSc. in Forensic Science from the Guru Gobind Singh Indraprastha University, India in 2011. She received her Ph.D. degree in Biochemistry from the Florida International University, Miami, FL, USA (2 016). Her postdoctoral research was conducted in the Department of Environmental Science at the University of Arizona, Tucson, AZ, USA (2017-2022). She is now a Research Scientist at the University of Arizona, and her research focuses on soil microbial ecology and plant-microbial interactions.

Jose Maria Alvarez De La Puente
The Ohio State University, United States of America

Use of biochar as peat replacement in ornamental containerized bedding plant production

An increase in atmospheric CO_2 concentration may change Earth's mean temperature and precipitation. Whilst soil carbon sequestration is widely recognized, much of the research on greenhouse gas emissions and carbon sequestration has been conducted in row crop and forest systems. Notwithstanding, managing soils of ornamental horticultural crops judiciously may reduce emissions and increase soil organic carbon stocks. Therefore, three greenhouse experiments were designed to test the hypothesis that it is possible to grow commercial quality plants of Petunia hybrida and Pelargonium peltatum using biochar and vermicompost as partial substitutes of peat based growing media. The first experiment focused on determining the feasibility of growing these plants with commercial quality using 24 different biochar / vermicompost mixes. The second experiment was conducted on the 5 best growing media from the first experiment, and evaluating the physiological plant attributes when growing those species with the selected mixtures. During the third experiment, leachates from the containers were collected to determine whether less nutrients were lost by irrigation when growing species on the selected media. The results from the first experiment indicated that the best biochar and vermicompost mixture could store up to 88.7 g of CO_2e per each 800 cm^3 container, first in the container itself, and then in the garden's soil after transplanting. The second experiment demonstrated that some of the best 5 mixes showed a similar or better physiological response than that of the plants grown in the control. Using the best media resulted in a significant reduction in both the amount of nitrates and the volume of leachate from the irrigation in the third experiment. The results suggest that vermicompost and biochar can be used as peat substitutes in the ornamental containerized bedding plant production to store carbon in garden soils for adaptation, and mitigation of anthropogenic climate change.

Biography

Jose M. Alvarez de la Puente. Forestry Engineer with Ph.D. in Industrial and Environmental Science and Technology by the Agroforestry Sciences department of the University of Huelva. Visiting scholar at the CFAES Rattan Lal Center for Carbon Management and Sequestration (C-MASC) of the Ohio State University. Works on the carbon footprint improvement in the containerized plant sector.

Pete W. Jacoby
Department of Crop & Soil Sciences, Washington State University, Pullman, WA, United states of America

Direct rootzone irrigation for enhancing drought resilience of winegrape vineyards

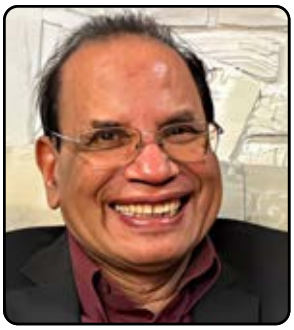
A novel system for delivering subsurface drip irrigation has been developed, improved, and verified through peer-reviewed research publications over the past eight years. Water savings and improved grape quality have been documented from in-field experiments conducted under hot dry growing conditions within commercial winegrape vineyards in Washington State, USA. Presenter will summarize findings from currently published data including enhanced crop water productivity, effect of water volume on yield and quality of grapes, impacts on rates of deficit irrigation on vine physiological activity, impacts of surface and subsurface irrigation on vine root architecture, use of soil water sensors to schedule irrigation intervals and water volume per application, and current research on maintaining constant levels of vine stress with automated irrigation driven by sensors measuring soil water content and matric potential. Major research findings to date include: 1) Direct Root Zone (DRZ) subsurface drip irrigation saved 23-34% of the water used for Surface Drip (SD) irrigation; 2) red wine grapes under DRZ had less acidity, higher Brix, higher tannin, and higher anthocyanins than grapes irrigated by SD; 3) white wine grapes had increased Yeast Assimilable Nitrogen (YAN) under DRZ versus SD; 4) DRZ vines had higher physiological activity during mid-day measurements of photosynthetic activity and atmospheric carbon exchange than SD irrigated vines; 5) DRZ vines had fewer roots in the upper soil profile than SD vines and DRZ vine developed deeper roots than SD vines, as determined by mini-rhizotron digital imagery; and 6) UAV remote sensing was shown to be highly correlated with xylem pressure potential.

Audience Take Away Notes

- Methods to enhance crop water productivity with subsurface drip irrigation will be demonstrated.
- How to increase drought resiliency in winegrape vineyards
- Growers and vineyard managers can enhance winegrape quality while reducing water use
- Audience will learn methods to thwart global warming impacts for crop production
- Research faculty will learn how to use DRZ subsurface drip irrigation to expand their research and enhance educational outreach

Biography

Dr. Jacoby holds a BS from Texas A&M University and MS and Ph.D. degrees from the University of Wyoming. During his early career, he served as Extension specialist and Research scientist at the University of Arizona and Texas A&M Agri-Life. He served in administrative positions at the University of Nebraska and Washington State University before returning to a research position at WSU. He developed a method of applying subsurface irrigation known as Direct Root Zone (DRZ), and research associated with this method to conserve water in winegrape vineyards has been published in high impact international scientific journals.



Pramod K Gupta
Trees for The Future LLC, Federal Way WA 98023, United States of America

Clonal production of douglas-fir via Somatic embryogenesis

The Douglas fir is a very important tree of North America, occurring from British Columbia to Washington, Oregon, and California. Douglas-fir propagates naturally from seed. Asexual methods of propagation of proven superior genotypes have not been very successful due to poor rooting and plagiotropic growth of cuttings. Success has also been achieved with somatic embryogenesis in Douglas-fir. Clonal propagation via somatic embryogenesis is currently applied to many horticultural and forestry species and many papers has been published and patents have been granted on somatic embryo development, maturation and germination. However, plantlet production via somatic embryogenesis is still not commercialized for any conifer species. Large- scale clonal production via somatic embryogenesis of Douglas -fir has been done at KF-Bioplants India. Several hundred thousand plantlets have been shipped to Weyerhaeuser company for clonal field trials. Large-scale clonal production of Douglas-fir will be discussed in this presentation.

Biography

Pramod Kumar Gupta retired after working for 30 years a senior scientist and lead the research project on somatic embryogenesis of conifer in the division of Forest Biotechnology at Weyerhaeuser Company, Federal Way, Washington, USA. From 1984 - 1987, I was a postdoctoral fellow in Prof. Don Durzan's laboratory, University of California Davis, where he worked on the development of a somatic embryogenesis system, protoplast regeneration, cryopreservation, and genetic transformation with several conifer species. I received my Ph.D. on Tissue Culture and biochemical studies in Eucalyptus at the National Chemical Laboratory (NCL), Pune, India in 1982. I joined the plant tissue culture group at National Chemical laboratory, Pune in 1975. At NCL, I developed clonal propagation methods for several tree species such as Teak, Eucalyptus, and Bamboo.I have published over 100 papers in international journal and wrote several articles for many tissue cultures books. I have over 25 patents on somatic embryogenesis in conifer and also a co-editor of book Somatic Embryogenesis in Woody Plant Vol. 1 to 7. In 1987, I was selected as an associate fellow of Indian Academy of Sciences for his original research in plant tissue culture. Recently I have received George Mendel award for his outstanding contribution in the vegetative propagation of trees from Mendel University Brno, Czech Republic. Now I have my own consulting company: Trees for the Future LLC.

Stanisław Małek, Odunayo James Rotowa*

Department of Ecology and Silviculture, Faculty of Forestry Science, University of Agriculture in Krakow, Poland

Sustainability: Inward search for outward survival

Organic peat has been the major component of the substrate used in forest nurseries and gardens because of its perfect physical, chemical and biological properties for plant cultivation. Nevertheless, the carbon content in peat, when spread on plantations, quickly turns into carbon dioxide, totaling greenhouse gas levels and leading to the destruction of treasured ecosystems. Awareness of the significance of peatland conservation with a special focus on the environment has become a force to reckon with, which therefore led to the search for alternative organic substrate medium to peat. These situations, therefore, necessitate the need to also develop new fertilizer products from a new recipe with materials that are readily available, extremely cheap or totally free, sustainable and environmentally friendly. The developed substrates were adapted to the nutritional requirements of the forest tree seedlings (Quercus robur, Fagus sylvatica, Pinus sylvestris etc), and their suitability under monitoring. Although the trend of the study promises to be for an extended period, so far, however, substrates mediums developed under this study have proven; to possess qualities not worse than the substrate based on high peat, guarantee quantity and reliability of supplies. In addition, the fact that the new technology is cheaper and readily available, the components would partially or completely replace high peat in the substrate formula.

Biography

Odunayo James Rotowa, University of Agriculture, Poland.

Sidahmed H M[1,2]*, ALmahi A A[2], Arpad Illes[1], Saada N El Mahi[2], Nagy Janos[1]

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Effect of biofertilizer on growth and yield components of lupine (Lupinus Termis L)

Studies were carried out on the effect of inoculation on the growth and yield of Lupinus termis. The plant was grown on the Farm of Shambat in Sudan. in two seasons 2016-2017. The experiments were conducted in a randomized complete block design with three replications. The parameters assessed included investigating plant height(cm), number of leaves per plant, number of branching per plant,50% Flowering, number of pods per plant, fresh weight, dry weight, and yield/Kg. The results showed the highest value of yield recorder in dose 2N and control. However, the highest plant height(cm) value was obtained in dose 2N and control. While the number of leaves per plant, number of pods per plant, number of flowers per plant, fresh weight, and dry weight, all these characters scored in dose 2N and control.

Keywords: Lupinus, yield, inoculations, growth.

Biography

Hajer Mohamed Ibrahim, University of Debrecen, Hungary

BOOK OF ABSTRACTS

11-13 SEPT

DAY 03-VIRTUAL ROOM 01

KEYNOTE FORUM

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Phenotype and quantitative traits - initiation and coordination of growth reactions, cultures of hormone-inhibitors and stimulants

The balance status of a plant is a fundamental value. It is precisely its constant adjustment by the balance of hormones that allows not only adapting to stressful weather conditions, they control all the quantitative indicators of the plant, which are called yield elements in agronomy. They create a phenotype according to weather conditions. It is the hormones that make possible the life of a plant as an autotrophic organism.

The study of the influence of exohormones, trophic substances of intact species and crops on the phenotype, the elements of productivity showed that they regulate the growth and development of the endogenous program in combination with natural and weather conditions. Auxin/ethylene balance triggers a block of programs and genes. The hierarchy of initial apical and secondary meristems, adding together with photoreceptors the phenotype and seed productivity corresponding to natural conditions, mutually compensating the elements of productivity on the next stems, branches, apexes. The stages of development come from the order of ontogeny, but also from all factors of nature and agricultural technology. Ethylene hormones cause the same growth responses as drought, and the productivity of temperature and rainfall is directly related to the stimulation of auxin in the apexes of indeterminate species and grains of the next stem dominance. The whole complex of hormones, genes and signal transmission works in harmony. The variability of the phenotype and quantitative traits of plants is determined by the susceptibility of the regulatory system to match the changing conditions of the year.

The balance of hormones governs the direction and order of stem growth and coordinates the entire plant. Insufficient work of the auxin of the apical meristem of the main stem should be compensated by additional doses of nitrogen, without which the yield is lower than the adapted varieties. A tall winter barley variety does not require a good predecessor without reducing yield potential. This speaks of coordination and ontogenetic reactions in the plant as a whole. Signaling reactions require the sufficiency of the previous development for the transition to the next phase of development. One gene is not the solution to the problem. Auxin divides into primary and secondary meristems in the company of other hormones and gene activity. This is logical and requires the consistency of all endogenous and exogenous additional signals. The endogenous regulation system is guided by hormonal interrelated and constant in time and space inside and outside the plant.

On an intact plant of rapeseed, barley, wheat, the influence of an exogenous hormone on auxin, and hence on the whole block of

Vashchenko Viktor Fedorovich

Yelets State University, Russian Federation

Biography

Vashchenko Viktor Fedorovich studied Master of Science, breeding at the Voronezh Agrarian University, defended his master's degree at the Moscow Institute of Agriculture and was a doctoral student at Yelets State University. He worked there as an assistant professor. Published more than 80 scientific articles in journals, 2 monographs in Europe and the Russian Federation.

development, was established, and this is a nonspecific physiological reaction, since the plant switches according to the type of weather development. The regulatory system integrates the perception of a signal (food, environment, soil), transfer, activation of genes to an acceptable phenotype for given conditions and does not dominate over it, and the plant breeder takes into account the most important productivity factors and the period of their application or their unreasonableness. During the formation of the embryo, the peaks of hormones are located as in the plant stage. The initial apex cell of one stem is inhibited, while the other becomes active from an inhibitor hormone. The biomechanism works gradually on environmental factors, determining the orthotropic position of the stem, the distribution between the stems, the productivity of the plant or sowing, depending on the distance between them. The plant reacts, accumulates quantitatively, the agro- climatic potential of each species is different, each phase is adaptive to the species and has an impact on seed productivity.

Regulation occurs quantitative signs of phytohormones. The hormonal balance of stimulating inhibitors is determined by the limitation of stem growth, the end of its growth in height, orthotropy, the transition of apical dominance to the next stem of cereals, the number of grains in the next stem, and the illumination of a plant with the same set of active genes, possibly a whole fan of gene activations. Ethylene removes the action of acusin, cytokinin, as growth moves to another apex.

Selection in the light of the hierarchy of regulatory systems is represented by the definition of regulatory patterns. For the plant breeder, the creation of conditions for combining costs during the period of dominance of apexes and the expansion of the productive potential of the species.

Plant physiology - The theoretical basis of crop production

In order to achieve the goals of FAO to increase the sustainability of food production and agriculture, it is necessary to solve the problems of nutrition, health and the environment, combined with the rapid spread of accessible information and communication technologies, support the global exchange of information, knowledge and know-how.

One of the priority directions for the implementation of this goal is the development of a scientific component for the development of new means of protecting crops from pests and diseases based on molecular diagnostics and the creation of biological means of protection. In this regard, the development of knowledge in the field of plant physiology, which is the scientific basis of modern crop production, is especially relevant.

The Department of Biotechnology of the Oryol State Agrarian University named after N.V.Parakhin has been developing research on organic farming and the development of plant protection products against diseases and pests with the use of new natural biologically active components that play an immune-modeling role in increasing plant resistance for 25 years.

These include lectins, protease inhibitors, bioflavonoids, phytobiotics avenacin and gordecin, antioxidant enzymes and vitamins. One of the most important problems of the modern agricultural complex is the fight against weeds, the main drugs against which are chemical agents that adversely affect the environment. In order to create biogerbicides, we are investigating apoptosis factors that are effective in suppressing weeds. For pest control and the development of plant protection products, it is very important to create diagnostics of pathogens of grain, leguminous and vegetable crops.

To create biological products, the selection of the fungus-antagonist Trichoderma ssp. and the creation of strains with enhanced synthesis of trichodermin is carried out. The department selected a strain of trichoderma deposited in the All-Russian Collection of Industrial Microorganisms (BRC VKPM) SIC Kurchatov Institute as a strain of Trichoderma aprobrunneum F-1434 with antifungal and antibacterial activity. The metabolites of the strain are included in the composition of biological means of protection of grain and vegetable crops that have been successfully tested in the fields of the Orel region, increasing the resistance of crops to fusarium disease of the root system and ear, septoria, etc. diseases.

Pavlovskaya N E

Ministry of Science and Higher Education of the Russian Federation, the Federal State Budget Educational Institution of Higher Education, Orlov State Agricultural University. N.V. Parakhina, Department of Biotechnology. G. Eagle, Russian Federation

Biography

Pavlovskaya Ninel Efimovna began her scientific activity after graduating from Tashkent State University in 1961 after defending her doctoral thesis in 1987, she headed the photosynthesis laboratory of the Institute of Experimental Biology at the Institute of Experimental Biology of the An UzSSR. In 1994, Pavlovskaya N.E. moved to Russia in The Eagle, where she headed the biochemistry laboratory of the Institute of Legumes and Cereals. Since 1994 he has been working at the Orlov State Agricultural University. In 2001, for the first time in Orla, the Orlov Regional Biotechnology Center of Agricultural Plants was established in Orlov State Agricultural University, equipped with modern equipment.

Enhance seedling transplant while save water

The predicted climatic alterations due to increased temperature levels indicate that the arid and semi-arid ecosystems will experience increased levels water scarcity. Hence, restoration efforts for those regions like the Mediterranean will further experience many transplanting failures associated with higher frequency and intensity of drought events. Safeguarding those ecosystems are of crucial importance due to their increased biodiversity levels. It is very encouraging that research has indicated that seedlings that experience a period of water stress, triggers ques that equipes better the seedlings to overcome adverse growth conditions, e.g. enhance root growth. So, based on the conducted experiment, seedlings of forest species were subjected to a range of irrigation treatments for a period of a month. The results showed that seedlings that were treated with reduced water frequency prior to transplanting, were able to successfully maintain their growth and were associated with increased root growth levels. Consequently, by pretreating the seedlings with reduced water prior to transplant triggered increased root growth that maintained the welfare of the transplanted seedings while we also saved water through reduced irrigation frequency levels.

Audience Take Away Notes

- Increasing transplanting success
- Reduced water utilization in arid (semi-arid) ecosystems
- Understand the species effect

Valasia Iakovoglou*, Nikolaos Tsakiris, George Zaimes

UNESCO chair Con-E-Ect, Drama, Greece

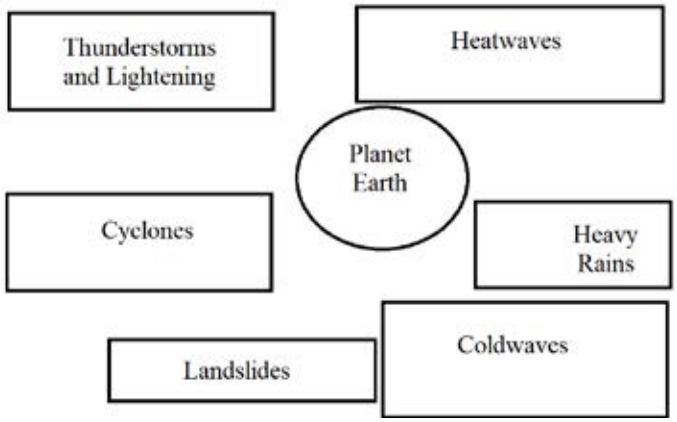
Biography

Dr. Valasia Iakovoglou 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 ten international journals and a reviewer in more than fifteen with one of them being the Intergovernmental Panel on Climate Change (IPCC). She has more than 100 publications (such as books/book chapters and peer-reviewed scientific papers). She is active in many scientific societies such as the Mediterranean Experts of Climate and environmental Change (MedECC) and associations such as the Association of Inter-Balkan Woman's Cooperation Societies (AIWCS) of UNESCO Center, where she serves as General Secretary Board Member. Since 2018 she is the Director of the Ecotourism Sector of the UNESCO chair Con-E-Ect.

Green chemistry applications for the climate change and control with a case study and check on design and development of gin rollers used in Indian cotton double roller gins towards sustainable industrial development

Climate and weather changes are serious threats and should be controlled effective, efficient and combined managerial approach. The world has been experiencing extreme weather events due to climate crisis for about 90% of the days. Though the year, different parts of the world reeled in floods, heat waves, and cyclones giving adverse environmental health effects on plant, animal and human health. Global temperatures are now not to breach 1.5 ℃ of warming within the next five years as per the EI Nino, Neutral and La Nina phenomena.

In 2023, India experienced 365 days of extreme weather events like heat waves, cold waves, heavy rains, floods, cyclones, landslides, thunderstorms and lightening and others. As per the publication and citation of techno-economic-environmental impact study and check conducted, extreme climate and weather will become increasingly intense and frequent. The damage that this would cause to our ecosystems will be irreversible. National climate policy Act (NCPA) process is suggested that will integrate different policies and laws to protect environment, climate, weather, biodiversity and sustainable development of its people as the climate change is real and deed to be controlled.



Climate Change is a serious threat and should be controlled effectively and efficiently by conducting Environmental Health Impact Assessment (EHIA) process. Green chemistry is discussed titled 'Indian cotton Double Roller (DR) ginning industries using Chrome Composite Leather Clad (CCLC) rollers and design and development of green chemistry rollers towards Sustainable Industrial Development (SID)'. SID can be defined as the industrial development which meets the needs of the present without compromising the ability and efficiency of future

Vijayan Gurumurthy Iyer

Bihar Institute of Public Administration & Rural Development (BIPARD), Gaya, Bihar, India

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering with Specialization in Green Chemistry at the Indian School of Mines, Dhanbad, India and post graduated as Master of Technology, M. Tech., in 1998. He received his Ph.D. degree in Environmental Science and Engineering in 2003 at the same institution. He has served in Indian Council of Agricultural Research (I.C.A.R.) with effect from 22.05.1985 (FN) to 10.02.1998 (FN). In the year 2006, he joined the post-doctoral ellowunder research guidance of Prof. Nikos E.Mastorakis at the World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece. After ten years of postdoctoral research supervised by Prof. Nikos E Mastorakis, WSEAS, Athens, Greece he obtained the position of Professor at the Institute of Technology, Haramaya University, Harar, Ethiopia, East Africa. He has published more than 445 research articles in recognized journals and conference proceedings with his h.index of 55 and total number 3000 citations in his credit.

generations to meet their own needs. Environmental Impact Assessment Process (EIA process) can be defined as the systematic identification and evaluation of the potential impacts (effects) of proposed projects, plans, programs, or legislative actions relative to the physical-chemical, biological, cultural, and socioeconomic components of the total environment. The objective is to conduct Environmental Health Impact Assessment (EHIA) process that is to systematically identify and evaluate potential environmental health impacts of CCLC rollers used in Indian CCLC Double Roller (DR) ginning industries with relative to the physical -chemical and biological can be referred as entitled natural or biophysical environment and the cultural and socioeconomic environment represents entitled man-made environmental components of the total environment.

Most of the cotton ginning operations areperformed by using DR ginning machines which serve an important role in the Indian cotton ginning industries. The rollers used are made of CCLC covering fixed to a shaft. The CCLC contains about 18,000 to 36,000 mg/kg (ppm) (1.8 %-3.6%) of chromium particles. The chromium stabilizes the CCLC by cross linking the collagen fibres in chromium leather tanning industries. Chromium salts, especially chrome alum and chromium (III) sulfate are used in chromium-tanning of leather. Chromium tanned leather contains between 3 to 5% of chromium, which is tightly bound to the proteins. For certain types of projects, such as nuclear power plants, it may be necessary to address psychological impacts on nearby residents as per reference entitled Can Change DamageYour Mental Health? Nature, Volume 295, January 21, 1982, pp.177-179 for the necessity to address psychological impacts on nearby residents and reference entitled An Environmental Health Impact Assessment (EHIA) process published by World Health Organization (WHO) titled 'Health and Safety component of Environmental Impact Assessment 'from WHO publication, Copenhagen in 1987. Although the form of chromium used for tanning is not toxic hexavalent variety, there remains interest in the management of chromium in the tanning industry such as recovery and reuses, direct / indirect recycling, use of less chromium or 'chrome-less tanning is need to be practiced to better manage chromium in tanning with respect to green chemistry. Chromium salts or chromates in contact with skin, lungs and stomach result in dermatitis and lung and esophagus cancer and brain tumor among Indian gin and textile mill workers. Brief or occasional contact may not pose a problem. Potassium dichromate is a chromium salt or chromate and is a common metal making up a significant part of the earth's crust. The most common home exposure of chromate is leather. The majority of leather goods, including shoe and gloves, are tanned with chromates. It is necessary to avoid chromate tanned leather gloves, and shoes. Vegetable tanned leather gloves and shoes or plastic shoes and Oak Bark -Tanning in the traditional manner is recommended compare to chromate tanned leather. For those with shoe dermatitis from chromate and leather, wearing heavy socks or reducing perspiration and moisture may help to reduce dermatitis. The amount of chromium found in all skin layers due to chromium permeation through human skins in diffusion cells. In ginning factories, when the seed-cotton is processed in DR ginning machine, the lint cotton is contaminated with hexavalent and trivalent chromium dust of about 140 to 1990 mg/kg (ppm), Cr (VI) and Cr (III) which is carcinogenic substance against the safe limits of 0.1 ppm. Ion chromatographic method and atomic absorption spectrometry method are employed for determining chromium content in all samples and Chromium (VI) found more with increased total chromium concentration in samples due to increasing level of application of potassium dichromate and is found cancer among all skin dermatitis workers. The percentage of chromium found During the cotton ginning process due to persistent rubbing of CCLC over stationary knife the chromium particles are adsorbed into lint cotton such that the spun yarns and woven fabrics get contaminated about 100 to 200 ppm which according to eco-standards should not be more than 0.1 ppm. The CCLC rollers used in cotton roller ginning machines get powdered during the ginning process. As chromium is a specific dust, gin and mill workers and residents are directly exposed to this carcinogenic substance and are vulnerable to environmental health hazards. To offset this problem, pollution-free eco-friendly washers/rollers both for laboratory and commercial studies have been fabricated and experimented.

Green chemistry attempts are made to alternate dust-producing grinding CCLC ginneries. Environmental Health Inventory (EHI) serves as the basis for evaluating the potential environmental health impacts both beneficial and adverse of a proposed action. Environmental Health Impact Statement (EHIS) describes the affected environmental health or environmental health setting without the project. Green Design and development of the EHI is an initial step in the EHIA process of climate control as the climate change is real. It is concluded that EHIA process (CCPA) as green chemistry is conducted for certain projects, plans, programs, legislative actions, policies in the project planning and decision-making process.

Audience Take Away Notes

- The audience will be able to understand and creative sustainable environment climate change and control requirements for the sustainable development
- The audience shall understand and create environmental pollution and control environment
- This research can be very much used to apply knowledge, skills, and attitudes for the climate sensitive generic, climate sensitive industry and climate sensitive municipality applications
- The green chemistry application shall provide a practical solution to unsafe cotton ginning chromium contamination and pollution problem and solution
- The paper will improve the accuracy, timeliness and reliability of sustainable environmental design, and provide new information to assist in a green design problem
- Sustainable industrial development, Sustainable generic development, Sustainable source specific development

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering with Specialization in Green Chemistry at the Indian School of Mines, Dhanbad, India and post graduated as Master of Technology, M.Tech., in 1998. He received his Ph.D. degree in Environmental Science and Engineering in 2003 at the same institution. He has served in Indian Council of Agricultural Research (I.C.A.R.) with effect from 22.05.1985 (FN) to 10.02.1998 (FN). In the year 2006, he joined the post-doctoral fellow under research guidance of Prof. Nikos E. Mastorakis at the World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece. After ten years of postdoctoral research supervised by Prof.Nikos E Mastorakis, WSEAS , Athens, Greece, he obtained the position of Professor at the Institute of Technology, Haramaya University, Harar, Ethiopia, East Africa. He has published more than 445 research articles in recognized journals and conference proceedings with his h.index of 55 and total number 3000 citations in his credit.

An assessment of environmental quality loss function deployment for Indian double roller cotton ginning environment

In this paper, an assessment of environmental quality loss function deployment is presented. Indian double roller cotton ginning environmental quality loss function concept that combines resource inputs, product or service cost, target and environmental climatic stewardship variations and social inclusivity. Cotton ginning prosearch is investigated (Vijayan Gurumurthy Iyer, 2007).

Introduction: Environmental quality can be defined as the quality that the environmental loss imparted to society from the time a product or service take place. Environmental and Societal losses include failure to meet customer requirements, failure to meet ideal performance, optimum performance and hazardous poisonous harmful environmental toxicological side effects (Vijayan Gurumurthy Iyer, 2007).

Environmental Quality Loss Function Concept:

Customers perceive quality as meeting the target rather than just meeting the specifications.

There are three common environmental quality loss functions in Cotton ginning prosearch is parented (Vijayan Gurumurthy Iyer, 2007).

1. Nominal - the - best.

2. Smaller - the - better.

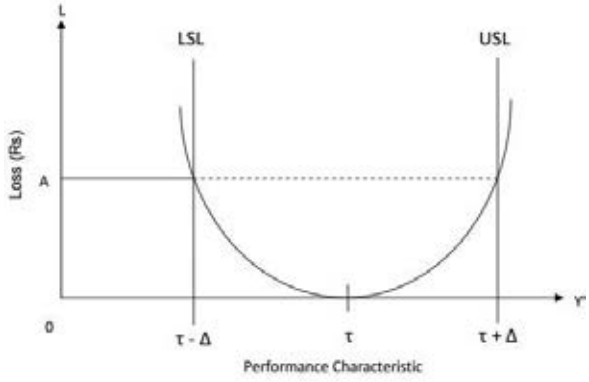
3. Larger - the – better

NOMINAL – THE – BEST:

The cotton ginning quadratic function which is called the Nominal – the – best type.

LSL is lower standard level, (-6σ included Prosearch attempted for Zero defect)

USL is upper standard level, Six Sigma, (+6σ included Prosearch attempted for Zero defect).



Quadratic Loss Function

Vijayan Gurumurthy Iyer

Bihar Institute of Public Administration & Rural Development Gaya, Bihar-23001

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering with Specialization in Green Chemistry at the Indian School of Mines, Dhanbad, India and post graduated as Master of Technology, M.Tech., in 1998. He received his Ph.D. degree in Environmental Science and Engineering in 2003 at the same institution. He has served in Indian Council of Agricultural Research (I.C.A.R.) with effect from 22.05.1985 (FN) to 10.02.1998 (FN). In the year 2006, he joined the post-doctoral fellow under research guidance of Prof. Nikos E. Mastorakis at the World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece. After ten years of postdoctoral research supervised by Prof.Nikos E Mastorakis, WSEAS, Athens, Greece, he obtained the position of Professor at the Institute of Technology, Haramaya University, Harar, Ethiopia, East Africa. He has published more than 445 research articles in recognized journals and conference proceedings with his h.index of 55 and total number 3000 citations in his credit.

Quadratic Environmental Loss: The quadratic function is shown in figure. In this situation, the loss occurs as soon as the performance characteristic, y, departs from the target □.

At τ, the loss is Rs. 0.

At Lower Standard Level, LSL (or) USL, the loss is Rs. A.

The quadratic environmental loss function is described by the equation L = k (y - τ) 2,Where, L = Environmental cost incurred as quality deviates from the target.

y =Environmental Performance characteristic

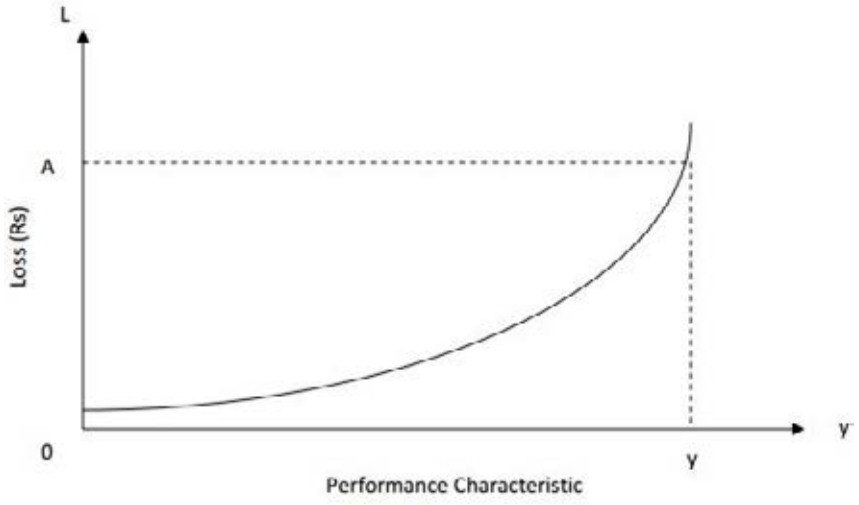
τ = target

k = Environmental Quality loss coefficient

The loss coefficient is determined by setting Δ = (y – τ), the deviation from the target. When Δ is the USL (or) LSL, the loss to the customer of repairing (or) discarding the product is Rs. A.

Thus,

$K = A / (y - \tau)^2 = A / \Delta^2$.

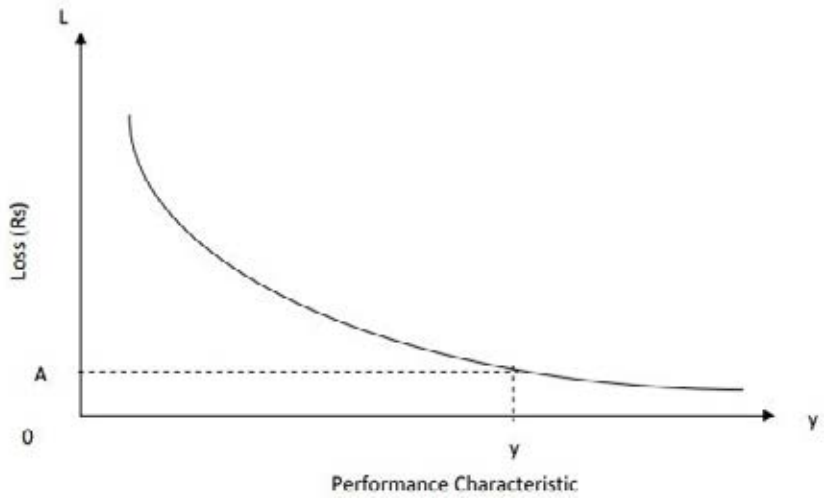


SMALLER – THE – BETTER:

The following figure shows the cotton ginning smaller – the – better concepts.

The target value for smaller – the – better is 0. There are no negative values for the seed-cotton performance characteristic. The radiation leakage from a microwave appliance, the response time for a computer, pollution from an automobile, out of round for a hole etc. are the performance characteristics for this concept.

LARGER – THE – BETTER:



The following figure shows the concept of the Larger – the – better.

In the Larger – the – better concept, the target value is ∞ (infinity), which gives a zero loss. There are no negative values and the worst case is at y = 0. Actually, larger – the – better is the reciprocal of smaller – the – better. The performance characteristics in Larger – the – better are bond strength of adhesives, welding strength etc. (Vijayan Gurumurthy Iyer, 2007).

Environmental quality loss function: The environmental product or service quality loss function and for methodologies to optimise quality at the design stage considers environmental quality loss all the way through to the customer, including harmful to environment, cost of scrap, rework, downtime, warranty claims and ultimately reduced market share (Vijayan Gurumurthy Iyer, 2007)..

Environmental Quality Loss Function: The Environmental Quality Loss Function gives a environmental financial value for customers' increasing dissatisfaction as the product or service performance goes below the desired target performance. Equally, it gives a financial value for increasing costs as product performance goes above the desired target performance. Determining the target performance is an educated guess, often based on customer surveys and feedback. The environmental quality loss function allows financial decisions to be made at the design stage regarding the cost of achieving the target performance (Vijayan Gurumurthy Iyer, 2007).

Environmental Quality through Robust Design Methodology: The environmental quality through robust design, not quality through inspection. The environmental design process into four stages:

System design - involves creating a working laboratory gin model

System design - involves creating a working prototype

Parameter design - involves experimenting to find which factors influence product performance most.

Tolerance design - involves setting tight tolerance limits for the critical factors and looser tolerance limits for less important factors.

Sustainable environmental Design methodologies allow the designer through experiments to determine which factors most affect product performance and which factors are unimportant.

The designer can focus on reducing variation on the important or critical factors. Unimportant or uncontrollable —noise factors have negligible impact on the product performance and can be ignored (Vijayan Gurumurthy Iyer, 2007).

Conclusion : The Design methodologies are set up experiments that are tested a range of combinations of factors for example seed-cotton double roller ginning performance using new roller covering engineering materials for seed-cotton employing double rollers for double roller gins. The assessment of ginning performance that resulting effective and efficient from each of these trials duly assessed for environmental quality. A statistical analysis of results that found most important factors are, for example ginning lint output, plastic contamination, chromium pollution and contamination, synergy impacts, Environmental Impact Assessment (EIA) parameters, Climate Impact Assessment (CIA) parameters, fibre quality, yarn quality, seed contamination, optimum linter performance and cotton dust and byssinosis. With this profound knowledge system and skill, it is necessary to design zero defect ginning process that ensures the successful seed-cotton ginning performance that maintains fibre quality preservation, seed quality preservation, the environmentally friendly lint cotton, cotton seeds, and zero waste (Vijayan Gurumurthy Iyer, 2007).

Acknowledgment: The author is thankful to the honourable and respected Director General (DG) of Administrative Training Institute (ATI) and Bihar Institute of Public Administration & Rural Development (BIPARD), Gaya, India for providing necessary sustainable administrative facilities to publish this manuscript.

Keywords: Cotton, Environment, Gin, Prosearch, Quantity, Quality, Roller.

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering with Specialization in Green Chemistry at the Indian School of Mines, Dhanbad, India and post graduated as Master of Technology, M.Tech., in 1998. He received his Ph.D. degree in Environmental Science and Engineering in 2003 at the same institution. He has served in Indian Council of Agricultural Research (I.C.A.R.) with effect from 22.05.1985 (FN) to 10.02.1998 (FN). In the year 2006, he joined the post-doctoral fellow under research guidance of Prof. Nikos E. Mastorakis at the World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece. After ten years of postdoctoral research supervised by Prof.Nikos E Mastorakis, WSEAS , Athens, Greece, he obtained the position of Professor at the Institute of Technology, Haramaya University, Harar, Ethiopia, East Africa. He has published more than 445 research articles in recognized journals and conference proceedings with his h.index of 55 and total number 3000 citations in his credit.

Paradigms of green biology based fruit production system

Different fruit crops sequestering atmospheric carbon in their perennial framework display their ability to moderate climate change-related issues on one hand and elevate the crop fertilising ability via microbes as part of green biology on the other hand. Better responsiveness of soil microbial biomass over chemically available nutrient pool to response of nutrient input, has led to renewed interest in measuring the quantum of nutrients held microbially. Long term data accrued through response of organic manuring versus inorganic fertilizers demonstrated that important soil quality indices like soil microbial diversity, soil microbial biomass nutrients (C_{mic}, P_{mic}, and N_{mic}) and organic carbon fractions displayed significant changes, coupled with statistically significant differences in quantum of fruit yield and fruit quality parameters. These studies led to development of microbial consortium (Paneibacillus alvei MF113275; Bacillus pseudomycoides MF113272; Micrococcus yunnanesis, MF113274; Acinetobacter radioresistens, MF113273; and Aspergillus flavus, MF113270) displaying encouraging results in both nurseries as well as well grown-up orchards as best management practice to cut down the rate of CO_2 release compared to inorganic fertilizers for storing larger proportion of plant-derived C in long term pools in the soil and reducing the exposure of such stored C to lesser decomposition, in addition to better post-harvest shelf life of citrus and other fruits. The other approaches involving multiple microbial inoculation along with enrichment of organic manures through inorganic fertilizers known as substrate have further been highlighted to provide an understanding of mechanism involved in C stabilization in soils for regulating soil C sequestration and associated nutrient dynamics under INM-based production system in perennial fruit crops. We also evaluated rhizopheree hybridization approach for developing biochemically more active rhizosphere translating into elevated accumulation of nutrients and development of fruit quality. These green biology assisted fruit production system would go a long way in exploiting the role of microbes in unlocking the productivity potential.

A. K. Srivastava

Principal Scientist (Soil Science), ICAR-Indian Agricultural Research Institute, Gogamukh 787034, Assam, India

Biography

Dr. A.K. Srivastava is currently perched as Principal Scientist (Soil Science) at ICAR-IARI, Assam. He has extensively pursued research work on different aspects of fruit nutrition like nutrient constraints analysis of citrus orchards by developing DRIS-based soil-plant nutrient diagnostics, orchard efficiency modeling, targeted yield-based site specific nutrient management exploiting spatial variability in soil fertility, citrus rhizosphere specific microbial consortium and soil carbon loading, INM module, fertigation scheduling, nutrient mapping using geospatial tools, nutrient dynamic studies, transformation of soil microbial biomass nutrients within citrus rhizosphere and soil fertility map as decision support tool for fertilizer recommendation. Dr. Srivastava has delivered 118 invited/keynote lectures and recognized as Visiting Scientist/Professor at Huazhong Agri. Univ., Yangtze University, China and AREEO, Iran. Dr. Srivastava is an accomplished editor of highly peer reviewed journals and write of books like Advances in Citrus Nutrition by Springer and Diagnosis and Management of Nutrient Constraints in Fruit Crops by Elseviers.

The science of nutritional foods for heath and other wellness information about cardiovascular diseases and cancers

Forty years of Plant Science Research and exercise has transformed me from a Plant Pathologist/Virologist/Pepper Breeder to a student of the science of foods for health, and a human disease prevention information gatherer. The USA wastes over $3.5 trillion trying to keep its sick citizens from dying, but they still die too soon. Cardiovascular diseases are a group of disorders of the heart and blood vessels that include heart attacks and strokes, are acute events mainly caused by a blockage that prevents blood from flowing to the heart and brain. Cancer is a disease or group of diseases in which abnormal cells divide uncontrollably and destroy healthy body tissue. The cardiovascular diseases, cancers, obesity, and diabetes rates in our country have reached tsunamic proportions. A weak immune system results in many human diseases (heart, hypertension, high blood sugar, diabetes, pancreas, liver, kidney failure, dementia, and cancers). The metabolic syndrome is the result of inflammatory factors such as high triglycerides, low HDL, high LDL, and fructose overdose. Abundant scientific evidence shows that we can maintain a healthy longevity by following simple lifestyle rules. Food is the most important medicine in the world. Conversely, food is the most important poison in the world. Two main sources of food are animals and plants. Animal food provides saturated fats, proteins, fiber, and some carbohydrates. Plant food provides unsaturated fats, proteins, fiber, vitamins, minerals, antioxidants, and mainly low glycemic index carbohydrates. One should limit to no consumption of processed polyunsaturated vegetables oils as they may contain triglycerides trans fatty acids and omeg-6 fatty acids. These oils include canola seed; corn seed; cotton seed; safflower seed; soybean seed; and sunflower seed. Food is digested down to three main macromolecules: proteins, lipids, and carbohydrates. A perfectly balanced meal must contain the right proportions of these macromolecules in a block. These are 9g protein, 7g fat, and 1.5g carbohydrates for every meal. The average number of blocks may be three to four per meal. Important vegetables, fruits, good vegetable fats (i.e., avocados, nuts, among others), and fat animal products are available. These are: Meats, peppers, tomatoes, onions, garlic, avocados, potatoes, rice, legumes, nuts, spices, coconut, and olive oil, etc. Both food sources provide sufficient essential nutrients but require a dramatic lifestyle change including daily exercise to reduce the metabolic syndrome by at least 80%. Good scientific evidence proves adequate cholesterol and saturated fats do not cause cardiovascular diseases. Cancers cannot be prevented but immunotherapy procedures are eliminating many cancers. So, eat food, not much, mainly vegetables, meats, minimize fruits and grains with high glycemic sugars, exercise daily, and live healthily ever after.

Benigno Villalon

Professor Emeritus, Texas A&M University, Plant Pathologist/ Virologist/ Geneticist, Vegetable Breeder Weslaco, Texas

Biography

Dr. Ben Villalon graduated from High School in 1954. He joined the United States Marine Corps,1954-1958. Worked as a Technician at the Texas Agricultural Experiment Station, 1958-1960. He attended Texas A&M University 1960-1969. He received B.S. Agronomy, M.S. Horticulture/ Genetics/Vegetable Breeding, Ph.D. Plant Pathology/Virology. He did tomato/strawberry breeding, University of FLA, Homestead, FLA, 1969-1971. Ben was called back to Weslaco, Texas A&M university to solve the devastating multiple virus diseases on bell peppers 1971-1996. Thousands of multiple virus resistant different pepper genotypes were shared with the Capsicum research and industry scientists. For over 50 years he has studied the science of nutritional foods for health. Both Ben and his wife Emma are avid runners for over 50 years.

Biotechologies experiencies: Cannabis spp. As a new form to produce under dry arid ando deserts zones

Arid and semi-arid zones occupy a little more than half of the territory in Mexico. It is estimated that they house some six thousand plant species, of which about 50% are exclusive to our country. The Seris (COMCAAC), an Amerindian people living in the west-central Mexican state of Sonora, have been promoting sustainable agricultural production systems. The application of bioderivatives of crustacean exoskeletons such as chitosan (QUI) and microorganisms that promote plant growth, endomycorrhizal, symbiont, beneficial, and antagonist, in some crops have shown to be an alternative in agricultural production systems, obtaining improvements in crop yields. However, currently, with the aim of promoting new products and under the production of secondary metabolites of the cannabinoid family, interest in Cannabis spp. has been taken with emphasis, especially due to the limitation of studies on the effect of these bioderivatives such as QUI and microbial under conditions of aridity and salinity and use of seawater.

Keywords: PGPB, Salinity, CBD.

Edgar Omar Rueda Puente

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

Biography

Edgar Omar Rueda Puente 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.

Plant response to a new pest of corn the stink bug Diceraeus Furcatus

Over the last decades, Argentine and Brazilian farmers have adopted no-tillage cultivation systems and multiple cropping, which have decreased the abundance of traditional pests, such as Nezara viridula, and favored the development of some stink bugs of secondary importance, like Diceraeus furcatus. No-till farming leaves the soil undisturbed, to mitigate erosion, and sufficient crop residue on the field, which is used by D. furcatus as a shelter under unfavorable conditions, and as a shelter against insecticides. Moreover, implementing multiple cropping systems increases crop rotation from soybean to corn, and places overwintering adults of D. furcatus in contact with corn seedlings in spring. Attacks of this stink bug species produce deformation and abortion of corn seedlings, resulting in up to 50% corn yield reduction. The increasing abundance of D. furcatus intensifies the damage on developing pods and seeds of soybean, becoming a primary pest of soybean, and a new pest of corn. Here we summarize the current knowledge about D. furcatus, its biology, life cycle, and geographical distribution pattern in South America. Additionally, we describe the general causes and consequences of D. furcatus as a new pest of corn that emerges from crop stubble. Then, we provide an overview of the chemical control, natural enemies, and possible agronomical practices to improve sustainable crop production methods to control this pest. I addition, I will present the volatiles organic compounds that guide stink bug to find and feed on corn seedlings.

Audience Take Away Notes

- They can induce corn defenses to decrease stink bug damage
- Learning the mechanism of plant responses to herbivory will help to manipulate plant responses against insect pests
- Studying corn seedlings responses to herbivory can be used a model of plant responses against herbivory and help to study similar responses in other crops

Jorge A. Zavala

Catedra de Bioquimica/ Instituto de Investigaciones en Biociencias Agricolas y Ambientales, School of Agronomy, University of Buenos Aires and CONICET, Argentina

Biography

Dr. Zavala studied Agronomy at the University of Buenos Aires, Argentina and graduated as MS in 2000. She then joined the research group of Prof. James at the Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences (IGIC-BAS). He received his PhD degree in 2004 and a two-year postdoc at the Max Planck Institute for Chemical Ecology, Jena, Germany. After two year postdoctoral fellowship at the University of Illinois at Urbana-Champaign supervised by Profs May Berenbaum and Evan DeLucia, USA he obtained the position of an Associate Professor at the University of Buenos Aires, School of Agronomy. He has published more than 70 research articles in SCI(E) journals.

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11-13 SEPT

DAY 03-VIRTUAL ROOM 01

SPEAKERS

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Xiang Lu[1,2]*, Qian Zuo[2], Meiliang Zhou[2], Kaixuan Zhang[2], Jianping Cheng[1]

[1]College of Agriculture, Guizhou University, Guiyang, China
[2]Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, Beijing, China

Tartary buckwheat serine/threonine-protein kinase FtAUR3 enhance plant salt resistance

Tartary buckwheat is an environmentally friendly crop but sensitive to salt stress, and salt stress result in water loss, stomatal closure, affect photosynthesis and metabolism, and reduce yield and quality of buckwheat. Thus, it is crucial to understand the mechanism of buckwheat salt tolerance. In this research, we identified a serine/threonine-protein kinase Aurora-3 family (FtAUR3) gene that is significantly associated with salt tolerance of Tartary buckwheat by Genome-Wide Association Analysis (GWAS). And transcriptome analysis shows that the FtAUR3 was up-regulated in response to salt stress. So we carry out the overexpression of FtAUR3 in buckwheat hairy roots and Arabidopsis thaliana, and we found that transgenic plant can enhanced salt tolerance compared to wild type plants. Taken together, these results demonstrated that FtAUR3 may be critical to regulate Tartary buckwheat resistance mechanism to against salt stress. Our results can provide reference for the study of plant resistance to salt stress.

Audience Take Away Notes

- This research can help people know more about the plant salt tolerance
- This research can give a new perspective about serine/threonine-protein kinase regulated plant development
- This research can help breeders to breed salt resistant varieties

Biography

Mr. Xiang Lu studied crop genetics and breeding at the South China Agricultural University, Guangzhou and graduated as master in 2020. he then joined the research group of Professor Jianping Cheng at the College of Agriculture, Guizhou University. In 2021, he joined the buckwheat gene resource innovation research group of Dr. Meiliang Zhou at the Institute of Crop Science, Chinese Academy of Agricultural Sciences. His Major Research Interest is to develop crop varieties for better response to stressful environments (such as salt and disease).

V H Elec*, C A E Cadorna, J D Rey

Plant Molecular Phylogenetics Laboratory, Institute of Biology, College of Science, University of the Philippines Diliman, Quezon City, Metro Manila, Philippines 1101

Decoding the genetic diversity of Philippine strawberries through genome-wide molecular marker analysis

Strawberry (Fragaria x ananassa Duchesne ex Rozier) is an economically important fruit crop grown commercially worldwide due to its known distinct flavor and nutritional value. It is an octoploid with a high degree of heterozygosity and belongs to the family Rosaceae. Moreover, strawberries are mostly cultivated in temperate or colder regions such as US, China, Japan, and Korea. In the Philippines, it is cultivated in highland areas of the Cordillera Administrative Region (CAR). However, varietal development in strawberry is slow despite of increasing market demand due to scarcity of genetic resources. The absence of genetic characterization of strawberry germplasm is also the current drawback to properly assess the genetic diversity of the core collection for crop improvement. Thus, molecular characterization of the Philippine strawberry core collection is essential to boost productivity and improve sustainability of strawberry industry. In this study, 219,239 SSR markers were generated in silico in which 72.9% are unique. A subset was utilized for marker validation and molecular characterization of the 26 strawberry cultivars available in the germplasm. Interestingly, all selected markers produced amplicons wherein most are informative or polymorphic. Furthermore, clustering analysis revealed that all cultivars could be separated into groups which were consistent with their geographic origin. Using whole genome sequence analysis, potential microsatellite markers were developed for several strawberry cultivars which provides a significant genetic tool for strawberry molecular breeding. Lastly, deciphering the genetic diversity of the core strawberry germplasm would provide a basis for a precise and cost- effective breeding strategy.

Audience Take Away Notes

- The presentation showcases the use of genome-wide molecular markers, specifically SSRs to explore the genetic diversity of Philippine strawberries, providing valuable insights and potential for breeding applications
- The findings highlight the presence of unique genetic profile in strawberries that can be harnessed to enhance desirable characteristics such as flavor, disease resistance, and yield, offering opportunities for the development of improved strawberry varieties
- Provide other researchers and institutions molecular markers informations that could be used their own breeding program

Biography

Ms. Venus Elec studied MS Plant Breeding minor in Molecular Biotechnology at the University of the Philippines in Los Banos. She has been involved in extensive molecular breeding programs for the development of varieties in the Philippines and Southeast Asia affiliated in Philippine Rice Research (PhilRice), IRRI and Corteva Agriscience. She has been implementing the use of marker technologies in gene discovery, mapping population development and native trait introgression programs. Currently, she is a PhD candidate at the University of the Philippines, Diliman working on the genetic characterization of strawberry germplasm.

Mengyu Zhao[1,2]*, Di Yang[2], Yanrong Hao[2], Yuqi He[2], Meiliang Zhou[2], Yu Meng[1]

[1]College of Landscape Architecture and Tourism, Hebei Agricultural University, Baoding, China
[2]Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, Beijing, China

Cloning of a transcription factor gene FtDREB6 in tartary buckwheat (Fagopyrum tataricum) and identification of its function in drought resistance

AP2/ERF transcription factor family members have been identified to play important roles in abiotic stress responses. In this study, the full-length coding sequence of the FtDREB6 gene was cloned with a length of 615 bp, which encodes for 204 amino acids residues, with a molecular weight of 22.7 kDa and an isoelectric point of 4.96 from tartary buckwheat (Fagopyrum tataricum (L.) Gaertn.) cultivar Pinku 1. The sequence of FtDREB6 represented higher homology with Arabidopsis thaliana (L.) Heynh. AtERF043 by the sequence alignment on TAIR website. FtDREB6 gene was showed without the transcription activity by transactivation analysis. Moreover, by transforming the coding sequence of FtDREB6 into A. thaliana by Agrobacterium-mediated transformation approach, transgenic FtDREB6-overexpressing plants showed significant increase on the drought resistance. The expression vector containing FtDREB6 gene was transformed into Agrobacterium rhizogenes (Riker et al.) Conn A4, which was subjected to infect explant for inducing the hairy roots. Under D-Mannitol treatment, the superoxide dismutase activity and catalase activity in overexpressing hairy roots were significantly higher than that of the control, and the content of malondialdehyde was significantly lower than the control. These results indicated that FtDREB6 was involved in responses to drought stress, which provided a reference for future deciphering the molecular mechanism for drought tolerance in tartary buckwheat.

Audience Take Away Notes

- This research can help people know more about the plant drought tolerance
- This research can give a new perspective about AP2/ERF transcription factor family regulation of abiotic stress response provides reference
- This research can help breeders to breed drought resistant varieties

Biography

Ms. Mengyu Zhao studied landscape architecture at the Hebei Agricultural University, Baoding and graduated as master in 2022. She then joined the research group of Professor Jingjun Ruan at the College of Agriculture, Guizhou University. In 2020, she joined the buckwheat gene resource innovation research group of Dr. Meiliang Zhou at the Institute of Crop Science, Chinese Academy of Agricultural Sciences. Her Major Research Interest is to develop crop varieties for better response to stressful environments.

Enrique Figueroa Luque
Departamento de Biologia Vegetal y Ecologia, Facultad de Biologia, Universidad de Sevilla, Sevilla, Spain

Does the expansion of Limoniastrum monopetalum facilitate the maintenance of the parasitic species cistanche phelipaea in Mediterranean Estuaries

Limoniastrum monopetalum is a wild shrub (Plumbaginaceae), growing naturally in coastal salt marshes and new sandy deposits in estuaries of the Mediterranean coast. This species shows a high colonizing capacity in the sandy deposits growing in the form of successive hooks. Additionally, it exhibits a high potential for competition with other scrub species in the succession of estuarine habitats due to its special form of growth, developing a center of up to 2 meters in height and a surrounding surface motivated by decumbent stems of 40 cm in height, generating individuals up to 50 square meters of total area. Cistanche phelypaea (Orobancheae) is a holoparasitic species that inhabits the sandy deposits of Mediterranean estuaries. The set of host species of Cistanche phelipaea is reduced, the most important being Limoniastrum monopetalum, Arthrocnemum macrostachyum, Atriplex halimus and Halimione portulacoides. These species are part of the succession in the ecotones between dunes and marshes of the Mediterranean estuaries. Through the use of the stable isotope δ13C we have determined the reality of Limoniastrum monopetalum as a host species for Cistanche phelypaea. Using aerial photographs (1952-2022) we have revealed the colonization capacity of Limoniastrum monopetalum of the sandy deposits in the Marismas del Odiel Natural Area and Biosphere Reserve (Huelva, SW Spain), going from 162 to 594 individuals between 1952 and 2022. Its expansive capacity in the colonizing process of sandy deposits is very high, as well as its potential as a competitor species in estuarine ecotones. The surface of the individuals of Limoniastrum monopetalum ranges from 0.05 to 56.6 square meters. The ecotones between dunes and marshes constitute the habitat where the greatest number of stems of Cistanche phelipaea appears. From the point of view of the analysis of a system of biogeography of islands, the ecotone acts as a continent supplying a rain of propagules on the system of islands formed by individuals of Limoniastrum monopetalum colonizing through propagules supplied by the habitat of ecotone identified as continent. Limoniastrum monopetalum individuals as islands are found at a distance of the ecotone ranging from 8 to 83 meters. The number of stems of Cistanche phelipaea that appear in individuals of Limoniastrum monopetalum decreases with distance from the ecotone ($r^2 = 0.60$; $p<0.005$) showing a distance effect in the proposed island biogeography model. The relationship between the number of Cistanche phelipaea stems and the size of the stand shows less correlation although also statistically significant ($r^2 = 0.46$; $p<0.005$) since there are individuals (islands) of Limoniastrum monopetalum with different sizes at varied distances from the ecotone (continent as propagule source). Despite the dependence on the host species, the permanence of Cistanche phelipaea is ensured by the expansion of Limoniastrum monopetalum. Predicted climate change scenarios also favor Limoniastrum monopetalum due to its photosynthetic capacity at temperatures above 30°C.

Audience Take Away Notes

- The research that I present shows a highly irreplaceable methodology in similar cases to investigate the maintenance of parasitic species in relation to their hosts in a model like an island biogeography system

- I show an experience applicable to different cases related to a system between parasitic and host species
- I believe that the experience shown can be used in similar cases and also has an important didactic content
- The problem of maintaining parasitic species throughout the succession with loss of host species is a widespread issue in certain habitats. This communication shows an example where the path is to facilitate the expansion of guests
- A methodology is shown that combines ecological techniques (diachronic studies, field sampling) with molecular methodologies (isotopes) to efficiently determine the relationship between a host and a parasitic species in a successional framework
- I think it is a very didactic case to use in teaching ecology

Biography

Enrique Figueroa Luque PhD Student Department of Plant Biology and Ecology at the University of Seville (Spain). Degree in Biology from the University of Seville. Master's degree Environmental Engineering from the University of Seville. Environmental Consultant at Strategic Consulting for Services and Territories (CESYT). He has published 5 books related to the city and urban green infrastructure. He has published 4 Q1 level articles in the Science Citation Index. He has published 13 articles related to the urban ecosystem, including ecological, health and social aspects. He has carried out stays in relation to investigations carried out in Panama, Argentina and Sweden. As a member of the working group, he has received the 2015 San Francisco de Asis Research Award from the Andalusian Academy of Environmental Sciences and Social Sciences and in 2022 the Award for the Best Urban Gardening Project, awarded to the Sant Cugat del Valles City Council by the Association Spanish Parks and Gardens.

F K Chaudhary

Associate Research Scientist (Entomology) Centre for Oilseeds, Research Sardarkrushinagar Dantiwada Agricultural University Sardarkrushinagar, Gujarat, India

Cow urine enriched botanicals: Green weapon against golden fly in muskmelon

Muskmelon is native to Persia, Iran and a secondary center including the northwest provinces of India including Kashmir. In India, its popularly known as Kharbujam (खरबुजम्) in SANSKRIT. High fiber and water content are a great natural healer for people suffering from indigestion, constipation and other digestive issues. Rich source of vitamins, minerals and antioxidants help to keep human body healthy and radiant. Muskmelon is so named because of the delighful odor of the ripe fruits. Melon fly, Bactrocera cucurbitae a dipterous fly popularly known as SONERI MAKHI (Golden fly) among farmers is a serious and economic threat of muskmelon in India. The first report on melon fruit fly was published by Bezzi (1993) in India. The extent of losses varies between 30 to 100% depending on the cultivar and the season. Adult female lays egg under the fruit rind in mass. Hatched out maggots tunnel through the flesh as they feed and allow decay to easily spread through the fruit. The injudicious uses of agrochemicals proved fatal for lives and environment on the earth. According to Ayurded, extract of any plant drug in cow urine increases the potency of drug to many folds. Keeping in view, the present research work was planned using locally available phyto-extracts enriched with cow urine against the melon fly infesting muskmelon. Leaf extract of Azadirachta indica, Parthenium hysterophorus, Annona squamosa, Ipomoea carnea, Lantana camara, Jatropha gossypifolia, Clerodendrum phlomidis and calotropis gigantea were evaluated. Equal quantity of leaves of different botanicals (gm) were mixed in fresh water (ml) and kept overnight. Next day the leaves with water crushed thoroughly in grinder and filtered with fine muslin cloth. This filtrates was used as stalk solution to enrich cow urine @ 10% + 10% with normal water. The first spray was imposed on initiation of pest and subsequent two spray were executed at 10 days interval. The observations on fruit damage (%) were recorded before and 10 days after each spray. The healthy fruits yield (q/ha) was also recorded. Among the various treatments, cow urine + Azadirachta indica leaf extract (10% + 10%) proved as green, eco-friendly and acuminated weapon against melon fly recording least fruit damage (5.38 %) and producing higher fruit yield (81.62 q/ha) of musk melon.

Audience Take Away Notes

- Theme of this work will encourage the audience/ scientists to work on locally available and eco-friendly alternate of pests management
- The audience/ scientists/ listeners of this global meet can also initiate parallel work on insecticidal property of the plant extract with wish they are dealing as part of their routine research work. The outcome may change the scenario of pests management in agriculture globally
- Definitely, the beneficiaries of this programme can also be counterpart of GREEN GLOBE by developing an eco-friendly insect pests management tactics based research
- Must, the treatments described in this research work are locally available, cost effective, easy to prepare/ execute by common men/farmers on farm and eco- friendly, which are the need of current

agriculture to produce safe and palatable food

- It will be useful to reduce the pesticide load against voracious and notorious pests which are major constraints in production of poison free food and save our worthy nature
- There are tremendous scopes to integrate this tactics in organic/ natural farming worldwide to nourish vast human population safely

Biography

Dr. F. K. Chaudhary did post-graduation in the subject of Agricultural Entomology from G.A.U., Anand, Gujarat, India in 1987 and Ph. D. degree in 2006. He joined as SMS (PP) in S. D. Agricultural University, Deesa, and Gujarat, India and awarded with Effective Transfer of Plant Protection Technologies to the Farmers by GAAS, Gujarat during 2019. In 2008, he appointed as Associate Professor (Entomology) in same institute and headed as University librarian. He bears 30 years of teaching/ research/ extension experience and published 40 research articles in national/ International journals/e-journals and 50 popular articles in vernacular language for the welfare of farming society. Two book chapter are in his name too. He guided seven M. Sc. (Agri.) and five Ph. D. degree students. Recently is working in I C A R, New Delhi sponsored research project on Oilseeds as Associate Research Scientist (Entomology).

Halil Koyu[1]*, Serdar Demir[2]

[1]Department of Pharmaceutical Botany, Faculty of Pharmacy, Izmir Katip Celebi University, Izmir, Turkey

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Subcritical water extraction of Raphanus sativus 'red meat' radix: A sustainability goal challenge

The identification of natural sources with neurotherapeutic potential has been important due to the increasing incidence of neurodegenerative diseases. Neurodegenerative diseases are defined as a group of disorders that cause loss of function in the nervous system, the most common of which is Alzheimer's disease, followed by Parkinson's disease. Because of their critical role in the pathogenesis of neurodegenerative diseases, the discovery of compounds that can inhibit acetylcholinesterase, butyrylcholinesterase and tyrosinase activity has been the main approach to research. While ongoing studies focus on the discovery of bioactive metabolites, sustainable management and efficient use of natural resources are also critical for sustainability goals to reduce solvent, raw material and energy consumption and process duration. In this context, subcritical water extraction of a mass-produced plant source, red meat radish (*Raphanus sativus* Red Meat), was investigated for acetylcholinesterase, butyrylcholinesterase and tyrosinase inhibitory potential and bioactive content. Quantitative analysis for total phenol, flavonoid and anthocyanin content was performed spectrophotometrically. Previously optimized parameters for subcritical water extraction as 160 °C, 30 min, 10 solvent:solid ratio at 200 bar pressure were applied for radish extraction. The subcritical water extract was determined with 27.57 mg GAE/g and 3.76 mg QE/g extract for total phenol and flavonoid contents, respectively, while anthocyanins were not found. IC^{50} values for acetylcholinesterase, butyrylcholinesterase and tyrosinase inhibitory activities were determined as 0.71 mg/ml, 2.13 mg/ml and 1.21 mg/ml, respectively. On the basis of the crude extract, weaker activity was observed compared to reference drugs as galantamine and kojic acid. As discovered with a potential of contained bioactive groups and activity, subcritical water extracts of Raphanus sativus Red Meat radix can be considered as a valuable source for future isolation studies aiming to obtain fractions and compounds with enzyme inhibitory activity.

This study was supported by IKCU Scientific Research Projects Funds under section of priority areas project [Grant No: 2018-ÖNAP-ECZF-0009].

Audience Take Away Notes

- Use of subcritical water as an advanced system for the extraction of plant sources
- Study design for the extraction optimization
- Effect of extraction parameters on content and bioactivity
- Potential use of the plant extracts for the inhibition of disease related enzymes
- Investigation of the medicinal uses of a mass-produced plant source for sustainability goals

Biography

Dr. Koyu studied Pharmacy at Yeditepe University in Istanbul, graduating with a BSc in 2006. He then worked as a public pharmacist in his own pharmacy until 2012. He obtained his MSc degree in 2010 and PhD degree in 2017 from the Department of Pharmaceutical Botany, Ege University, Izmir. In 2017, he received the position of Assistant Professor at Izmir Katip Celebi University. His main area of expertise is extraction of plant sources using advanced extraction technologies such as supercritical carbondioxide, subcritical water and microwave systems. He has published research articles (SCI-E), book chapters and pharmacopoeia monographs.

Chiara Broccanello*, Diana Bellin
Department of Biotechnology, University of Verona, Verona, Italy

Landscape genomics of durum wheat (Triticum turgidum L. ssp durum) Algerian landraces to elucidate the genetic basis of adaptation: A pilot study

On-going climate change threatens agricultural production and is subjecting crops to stresses they have rarely experienced. Its impact in agricultural production varies depending on the climatic zone and on the type of cultivation and production system. The Mediterranean basin is recognized a climate change hotspot and climate projections warn that extreme drought events will become more frequent and severe, and winter precipitation will decrease, leading to drier springs. One of the crops that will be most affected by climate change is durum wheat (Triticum turgidum L. ssp durum) and, consequently, the major Mediterranean producing countries are having to face the consequences that these changes can have on wheat production. Here, we integrated geographic information system, climatic conditions, and genetic information, of 188 durum wheat landraces coming from Algeria, to identify patterns of selection. The relationship between genotype and environment was also used to predict the spatial distribution of adaptive genetic variants in future climates. This combined landscape genomic analysis allowed the identification of genomic regions related to drought, heat, and salinity stress response in this species, but also possible new donor landraces for breeding programs.

Audience Take Away Notes

- The presentation explains an innovative method of data analysis for obtaining SNPs associated with resistance to abiotic stresses induced by climate change, which has never been used in wheat for the moment
- The results presented can be the starting point for other research in wheat or even other species

Biography

Chiara Broccanello is a Temporary Assistant Professor in Agricultural Genetics at the Department of Biotechnology of the University of Verona. She is graduated at the University of Padova in 'Food Biotechnology' and she obtained a PhD in 'Animal and Food Science' in the same University. The main research area involved the identification of molecular makers for resistance to biotic and abiotic stresses in cultivated plants. She published more then 30 peer-reviewed articles.

Vashchenko Viktor Fedorovich
Yelets State University, Lipetsk, Russian Federation

Paradigm of adaptation and agro-climatic potential, growth and development intact plant

Plant hormones control plant growth and development from embryogenesis without IAA glycosides without turning on gene expression from storage substances to reproductive development. The initial cell of the apex is able to choose, through hormones, the path and degree of response in response to the conditions for the implementation of organogenesis by growth and development from the initial cells of the primary and secondary meristem, including turning on genes in the complex, stepwise metabolism of the secondary meristem, which is the basis of adaptation as a condition for survival and replacement plant productivity. The development of all terrestrial tissues is controlled by the apical meristem, which balances cell proliferation and differentiation to maximize survival. Meristem activity is adapted to prevailing conditions through a poorly understood integration of developmental signals with environmental and nutritional information, a key regulator of meristem maintenance. At high temperature, in young rice panicles, the content of IAA decreased and the content increased. The environment develops and affects the plant phenotype. Due to the drought, the level of IAA decreased to 72%. Hormones function in response to the environment.

In plants, the development of all aboveground tissues is controlled by the shoot apical meristem, which balances cell proliferation and differentiation to ensure lifelong growth. To maximize fitness and survival, meristem activity adjusts to prevailing conditions through the integration of developmental cues with environmental and nutritional information. For example, sugar signals affect function by altering the levels of a key regulator for proper coordination of meristem activity. This is a universal mechanism for the regulation of physiological processes and ensures the adaptation of the body to environmental conditions. Plant growth proceeds only in the presence of a whole range of light conditions, suitable temperature and soil moisture, the presence of organic and mineral nutrients, etc. growth hormones, like enzymes, are specialized in increasing the plasticity of the cell membrane. One group of cells in this case becomes the senders of the signal, while the other receives it. Hormones adapt plants to environmental conditions. The synthesis of tryptophan and auxin did not change in the mutants; there are several such pathways. IAA can bind to sugars, amino acids, forming inactive forms. Growth regulation, metabolism in organogenesis and morphogenesis and phenotype with the same genes, they form adaptation to the conditions of the year and agricultural technology, and agricultural technology is biologically substantiated. Observations show that temperature modulates endogenous IAA levels. Mutants in aspects of auxin signaling result only in a change in sensitivity to seed germination. ABA prepares for the environment by inhibiting growth, ethylene by reversing the order of dominance of stems, conifers stops growth forever, so it is not able to restore the status of auxin. Receptor proteins play a role in the adaptive response to light as a result of the interplay of signaling and metabolism. The combined action of two phytohormones, auxin and cytokinin, with ROS signals and their reactions to environmental changes allow plants to regulate their development and growth. Auxin in the apex is transported to the apex from the coleoptile from the shoot apical meristem. It is in the apical meristem that the synthesis of auxins is concentrated. IAA can be irreversibly destroyed specifically, non-specifically. Specific non-specific pathways of transport and synthesis of IAA in the plant

show regulatory and non-deterministic as a result of the regulation of secondary metabolism on adaptive processes of growth and development.

Hormone in metabolism with regulators, receptors and genes response to the environment. Apex perceives the induction of agroclimatic potential and constitutes the adaptive potential of the species. From it follows the placement of crops and agricultural technology. Agrobiological diagnostics looks at the structure of yields on the area in the dynamics of the growing season and puts the necessary intensification or potential above the species. The balance of all regulators coordinates various cellular processes, as it is a consequence of signal perception. The work of the transgene is changed by secondary metabolism. As a result, all the properties of the plant change. It is more complex than adding the building blocks of gene expression! Breeding still seems to be art yet! Adaptive varieties combine tall stature and productivity and do not lie with the ethephon and make its productivity higher than the varietal one! Biosynthesis, degradation, and conjugation are processes that regulate auxin homeostasis in plants. Derivation from the protein tryptophan points to pathways of secondary regulation and metabolism as the main complexity of plants and a hierarchy of complex subordination. The IAA conjugate stored in seeds at maturity is ready for transformation in response to changing conditions. The plant has the peculiarity to exist self-sufficiently in the medium immobile, changing the activity of the apical meristems of the apexes or initiating the initial cell in the secondary meristem.

In rapeseed, one branch stops in the umbrella phenotype, in nettles, lateral shoots grow. In cereals, when favorable weather conditions are restored, the elements of seed yield compensate each other mainly due to productive stems and the number of grains per plant at optimal sowing density, if there has not been a catastrophic increase in the number of stems, the grain may be frail. More stable seed mass. It is not clear how the activation of the gene is regulated. Growth adaptation by a hormone to drought and an exogenous ethylene producer reveals an identical phenotype of rapeseed (panicle) and barley (absence of the last interlode). A complex mechanism of secondary metabolism is involved. It fully evaluates the possibilities of growth and development and, in balance with other hormones, to slow down or turn on all the apical meristems and secondary initial cells after precipitation in plants with an indeterminate apex and another one in cereals, to differentiate from physiological tissues after the initial cell.

Ethylene stops apical growth, dominance status, as soon as weather conditions appear, it moves to another stem and growth resumes. Management occurs as a process of adaptation in time and conditions. The process of adaptation has created a self-sufficient and self-developing mechanism. This is quite economical in terms of the number of secondary molecular reactions. In grain winter crops, spring in the temperate zone with a slow rise in temperature and sufficient humidity alternating from a neutral status of hormone balance, as everyone knows, ensures the development of the main element of productivity - productive stems and you can be sure of a fruitful year.

The hormone gives a sensitive connection with the weather - climatic conditions. It shapes growth and development. Molecular reactions occur with the participation of other molecules, stepwise, interconnected and interdependent, with transfer, which is typical for interaction with DNA activity and for secondary metabolism. The concentration of ROS affects the activity of enzymes that absorb ROS, lipid peroxidation, and the expression of genes involved in photosynthesis and abiotic stress. Transcription factor proteins are co-regulators of cytokinin responses to the environment and are involved in the regulation of other transcriptional responses. The Central Committee affects growth depending on the combination in the balance sheet and the environment, this is a fine-tuning. At the dose and phase of exogenous ethylene on barley, when in the phase of 2 nodes and an ethephon of 2 l/ha, up to 10 stems were formed, which were not provided with seeds. CK concentrations naturally decrease in response to adverse conditions as it stimulates cell growth.

Most of the conflicting data was obtained as a result of physiological studies, genetic studies, at the level

of an intact plant, a different picture is revealed. Thus, ethylene is considered to thicken the stem, while at the level of crops it is visually visible that this is a stop of the stem growth and lodging does not occur due to the absence of the longest last interlode and erectoid ear, since ear nastia also does not occur. The first ear is limited in the growth of grain content, and growth occurs in the second productive ear, and if the weather conditions are sufficient, there can be hundreds of ears, they are limited by the optimal density of plants on the area. The rest of the hormones occupy the corresponding activity in the direction of growth from the balance of auxin/ethylene. Interactions between phytohormones reconfigure plant growth and development.

The hormone cannot prevent stress because it is a reaction to the environment. This paradigm plays a central role in regulating plant development. Water deficiency is cured by a wide range of morphological and biochemical changes. CK is related to ABA by feedback, since one is a growth promoter and the other is an inhibitor. The auxin/kinetin ratio decides whether the root or stem grows. Plants maintain hormone levels at different developmental stages in a complex and balanced way through biosynthetic and metabolic rates, cellular and subcellular localization, signal sensing and signal transduction pathways transport and responses, complex interactions among all pathways involved. In crop programs, sophisticated adaptive breeding programs can form the basis of many aspects of crop improvement.

Biography

Vashchenko Viktor Fedorovich studied Master of Science, breeding at the Voronezh Agrarian University, defended his master's degree at the Moscow Institute of Agriculture and was a doctoral student at Yelets State University. He worked there as an assistant professor. Published more than 80 scientific articles in journals, 2 monographs in Europe and the Russian Federation.

Elena Mateos Martínez

Department of Plant Biology and Ecology, School of Biology, University of Seville, Spain

Effect of autumnal senescence on the photosynthetic efficiency of urban deciduous trees

The change in pigmentation of the leaves of deciduous trees has an effect on the photosynthetic capacity during the autumnal senescence process and, therefore, the contribution to carbon dioxide removal is altered by changes in the photosynthetic efficiency of the leaves. Five deciduous species of urban trees widely represented in cities (Celtis Australis, Fraxinus angustifolia, Melia azedarach, Platanus hispanica, Koelreuteria paniculata) were chosen to study their leaf phenology during autumnal senescence and the variation in leaf pigment content. The total chlorophyll content and the chlorophyll a/b ratio decrease during autumnal senescence in all species studied. The average Chl a degradation value in yellow leaves compared to green leaves is 74.17% and the average Chl b degradation value in yellow leaves compared to green leaves is 46.90%. The content of carotenoids in the leaves remains constant during autumnal senescence for most of the species, except in the case of Koelreuteria paniculata, which shows a significant increase in carotenoids in yellow leaves compared to green leaves. The decrease in the chlorophyll content and, therefore, the change in pigmentation in the autumn leaves, causes a loss of photosynthetic efficiency, observing lower values of maximum quantum yield of PSII (Fv/Fm) in the yellow leaves compared to the green leaves, both in measurements carried out in the morning (predawn) about noon. Regarding the value of the PSII quantum yield, differences are observed between green and yellow leaves in the morning, with green leaves being more effective. The Non-Photochemical Quanching (NPQ) values increase with the degradation of chlorophylls, being higher in yellow leaves compared to green leaves, and observing a greater increase in midday values due to the high intensity of solar radiation and possible photoinhibition of the leaves. The knowledge of how the CO_2 absorption values are diminished during the autumnal senescence process and its quantification is interesting to define the functionality of the deciduous trees that are part of our cities in relation to the mitigation of climate change from the balance between deciduous and evergreen species.

Audience Take Away Notes

- The study presented shows a methodology applicable to other plant species to quantify the evolution of pigment content and how it causes effects on the photosynthetic process
- The results obtained in the investigation demonstrate the role of pigment content (chlorophylls and carotenoids) in the photosynthetic process during autumnal senescence
- The methodology used in the study can serve as a model for similar studies as well as teaching material on the role of urban trees during autumnal senescence
- This study provides ecophysiological data of different urban deciduous species that can be used to establish tree management in order to develop climate change mitigation plans
- The methodology shown integrates measurements of pigment content and is related to measures of physiological stress such as chlorophyll fluorescence in order to establish relationships and increase knowledge of the effect of pigment degradation during autumnal senescence on the photosynthetic process

Biography

Elena Mateos Martínez studied Biology at the Seville University, Spain and graduated as MS dregree in 2017. Master in Environmental Analysis and Management at the Malaga University, Spain. PhD student at University of Seville in the research group of Ecology, Cytogenetics and Natural Resources. Researcher for the Research Foundation of the University of Seville since 2019. She has published several articles in relation to ecophysiological aspects of urban green infrastructure and its role as a carbon dioxide sink. Participated in the research project in collaboration with the city council of Sant Cugat del Valles, Barcelona, for which the Association of Public Parks and Gardens awarded the first prize in 2022.

Lea Vojta*, Hrvoje Fulgosi
Institute Ruđer Bošković, Division of Molecular Biology, Laboratory for Molecular Plant Biology and Biotechnology, 10000 Zagreb, Croatia

Thylakoid rhodanase-like protein in chloroplast inner envelope forms complexes with FNR and Tic62 and its absence from thylakoids enables plants to better cope with oxidative stress

Thylakoid Rhodanase-Like Protein (TROL) is located at the end of the photosynthetic electron transport chain, at the vicinity of photosystem I, where it facilitates the transfer of electrons from Ferredoxin (Fd) to NADP+ via the dynamic binding of Ferredoxin: NADPH oxydoreductase (FNR). In the absence of TROL the distribution of high-energy electrons is directed towards Reactive Oxygen Species (ROS) scavenging pathways, rather than to the NADP+ reduction. Therefore, trol plants show increased stress resistance along with significantly elevated ROS detoxification. TROL is one of the few so far known dually localized chloroplast proteins. Besides being localized in the thylakoid membranes as the 66 kDa mature form, it has also been found in the inner envelope membrane of chloroplasts as the 70 kDa precursor. By engineering the presequence processing site, a single amino acid exchange of Ala67 to Ile67 has been introduced to TROL, leading to inhibited processing, and resulting in protein incorporation at the single membrane location: in the inner envelope membrane. We have created Arabidopsis mutant plants, containing TROL protein just in the inner envelope (TROL-IE) to reveal its role in this compartment. TROL-IE interacts with FNR and Tic62, as shown by Western, TAP/MS, and BN-PAGE analyses. Also, TROL-IE plants seem to have increased total NADP in chloroplasts, as well as increased NADP+/NADPH ratio in physiological conditions, when compared to the WT. Like trol plants, TROL-IE mutants show a decreased amount of detected superoxide anion in comparison to the WT, in physiological conditions, indicating stronger capacity to manage oxidative stress.

Audience Take Away Notes

- TROL is localized both in thylakoids, where it participates in the regulation of photosynthetic electron utilization, as well as in inner envelope of chloroplasts, where its function is unknown. This work attempts to resolve this
- By directed mutagenesis of the TROL presequence, we managed to arrest the protein in inner envelope and to subsequently engineer plants with single-localized TROL with the aim to study its function in this compartment
- In this research, we use the variety of molecular biology and biochemical methods for protein engineering, determination of protein interactions, topology, tracking the import and localization inside the chloroplasts, as well as determining different ROS and NADP content
- We provide new insights into photosynthetic electron distribution mechanism and the regulation of photosynthesis
- Our results might lead to the improvement of the production of oxidative stress-resistant plants

Biography

Lea Vojta was born in 1979, in Zagreb, Croatia. In 2002 she got her diploma degree in Molecular Biology at the University of Zagreb. The same year she started her PhD at the Ludwig-Maximilian University Munich, on the topic Protein import into chloroplasts. In 2006 she obtained her doctoral degree in cell biology and returned to Croatia. She is working at the Ruđer Bošković Institute as a Senior Research Associate in the Laboratory for Plant Molecular Biology and Biotechnology. Her main research interest is the regulation of photosynthesis.

Zenzile Peter Khetsha[1]*, Karabelo Moloantoa[2], Manare Masowa[1], Moosa Mahmood Sedibe[1]

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[2]Discipline of Microbiology, School of Life Sciences, College of Agriculture, Engineering and Science, University of KwaZulu-Natal, Durban, KwaZulu Natal, South Africa

Abscisic acid and methyl jasmonate concentration and application periods on the essential oil biosynthesis of simulated hail-damaged rose geranium (Pelargonium graveolens L'Her. cv. 'Bourbon')

Extreme abiotic stress factors such as hail, defoliation, salinity, and moisture stress can affect biosynthesis of essential oils. This study aimed to investigate the potential use of two plant stress hormones: Abscisic Acid (ABA) and Methyl Jasmonate (MeJA) on essential oil biosynthesis of simulated hail-damaged rose geranium (Pelargonium graveolens L'Her.). The study was conducted in a 72m2 temperature-controlled greenhouse, using a 5 x 2 factorial treatment design, which was arranged in a randomized complete block design. Treatments comprised four levels of two plant stress hormones at 75 µM (ABA), 150 µM (ABA), 10 mM (MeJA), 20 mM (MeJA), and a control, applied in two different application periods (daily application for either seven or 14 days). The simulation of hail damage was through 100% defoliation, with the decapitation of the terminal buds. The results showed that using 10 mM (MeJA) for a shorter period (seven days) increased the recovery of the essential oil yield compared to the 14 days application period. Citronellol, geraniol and linalool were significantly affected by the application of the two plant stress hormones. Geraniol esters were partially improved by the application of MeJA at 10 mM. Citronellol to geraniol ratio, a determining factor of essential oil quality, was better when MeJA was applied compared to ABA. Application of MeJA at 10 mM may improve the essential oil biosynthesis of hail damaged rose geranium plants.

Audience Take Away Notes

- This study assist conclusion showed that plant stress hormones in isolation improves some of the important essential oil compound linked to the perfumery industry; however, crucial compound declined significantly, although the quality was favored when one specific plant stress hormone was used
- Horticulture discipline may use the information for setting indexes on which plant stress hormones works better in isolation for selected stress factors
- Study proved that using sole synthetic plant stress hormone may be expensive and should be used with other synergistic plant growth hormones for better improvement of plants grown under stress state

Biography

Zenzile Peter Khetsha is a senior lecturer in the Department of Agriculture, Central University of Technology, Free State. He obtained his Doctor Technologiae: Agriculture at Central University of Technology, Free State, followed by a Postgraduate Diploma in Higher Education (Rhodes University) and Postgraduate Diploma in Leadership Development (Stellenbosch University). He is a Certificated Natural Scientist with SACNASP and a recognised Fertilizer Advisor with FERTASA. His area of research focus is on the development of mitigating strategies for stressed aromatic & medicinal plants and has authored at least ten research articles since 2020.

Ashok Kumar*, Prashant Deo Singh, Kunal Ahluwalia
Sardar Vallabh Bhai Patel University of Agriculture and Technology, India

ICT application for prediction of physical properties of soil for digitization

The use of Information and Communication Technologies (ICTs) in modern agriculture has transformed farming on a different scale which has resulted in increased competence and reduced costs. It has also created decision making tools that increase agricultural productivity and manage natural resources. The natural resources of most countries are under threat, and many nations are gradually worried about attaining environmental sustainability through efficient use of land and water resources. To overcome these problems land and water resources must be studied thoroughly and their records must be maintained digitally. Health status of every field must be recorded in soil health card because maintenance of soil health has become a major threat due to declining nutrients response, decreasing organic carbon, increasing bulk density due to high soil compaction, and reducing moisture retention capacity. Soil physical properties altered soil environment, which may greatly influence growth and production of crops. It is now well established that unless the soil physical, chemical, and biological environment is maintained at its optimum level, the genetic yield potential of a crop cannot be realized. Soil health includes study of soil chemical, biological and physical properties. Without studying physical properties, soil health card does not have any meaning. Among the physical properties estimation of bulk density is easy, requires fewer instruments and moreover has strong (positively or negatively) correlation with other physical properties. This relationship can be helpful to predict the other properties by developing an ICTs application, based on regression equation without applying extra cost and time. In this application bulk density, which is a crucial property influencing soils' other properties has been used as an independent variable. The study indicates a strong negative correlation (r= -0.936 to - 0.999) between bulk density and different physical properties. Data shows that predicted value of different physical properties through regression equation developed in this study are close to observed values. Therefore, prediction of physical properties is reasonable also the estimation of physical properties is costly and time consuming. Measurement of soil properties continuously of each location throughout the sphere is difficult for digitization of global soil resources. Therefore, for digitalization of global soil resources, it is necessary to have a strong ICT base system that can predict soil properties of a given location easily and can be stored digitally.

Under this study an application has been developed to predict infiltration rate, hydraulic conductivity, porosity, aggregate stability, and moisture limits with accurate and cost-effective manner from bulk density of soils. Prediction of properties through application is found easy and quick and will be useful because predicted values can be used to prepare the soil health card. To prepare soil health card all the properties including chemical, biological, and physical values must be shown in health card and rating of these properties in 100 scale parameters must be presented. The average of these rated values is reflected as health status of the soil.

Biography

Dr. Ashok Kumar did his B.Sc. Agriculture in 1980, Master in Soil Science in 1982 and PhD in Soil science in 1986 from Govind Ballabh Pant Agriculture University, Pant Nagar Uttarakhand (India). He has 32 years of experience in the field of soil science as teacher, researcher, and extension officer. He had been Professor, Soil Science, SVPUA&T. Meerut since 23rd March 2005 to June 2021. He administered five projects funded by various agencies. He visited Japan, USA, Malaysia, two times Dubai (UAE) and presented his research papers. He has received various awards and appreciations from various societies and governments organizations. He has been nominated as a member of UP State Council of Science and Technology, U.P by the Governor of Uttar Pradesh for three years. Member of Research Advisory Committee of CTRI, Rajahmundry nominated by DG ICAR for three years. Member of Board of Governors of Motherhood University, Roorkee, Uttarakhand (India) for three years. Expert member of board of studies of B.V.R.I College of Dr. Bhim Rao Ambedkar University, Agra. Presently Dr Kumar is working as Director of Shri Ram College, Muzaffarnagar since April 2022.

Burcu Sumer Tuzun

Department of Pharmacognosy, Faculty of Pharmacy, Ege University, Bornova, Izmir, Turkey

Volatile components of centaurea scleroiepis boiss and its in-vitro biological activities

Centaurea is an important and widespread genus in Asteraceae. There are 194 species in Turkey of which 118 them are endemic. There are various studies on essential oils and fatty acids of the genus Centaurea. The genus Centaurea is recognized as having significant potential in both conventional systems and drug development. It has traditionally been used for asthma, abdominal pain, headache, hemorrhoids, diarrhea, rheumatoid arthritis, stomach, antipyretic, astringent and antibacterial uses.

Centaurea genus contains intensely phenolic structures and flavonoids. In addition to these, sesquiterpene lactones, lignans, alkaloids are rarely seen. It shows a wide variety of biological activities with its rich chemical content. In studies with Centaurea species, antioxidant, antimicrobial, antiproliferative, hepatoprotective, anti-inflammatory, antiulcerogenic, antiplasmodial and enzyme inhibitor activities were observed. Free radicals can alter lipids, proteins, and DNA and trigger many diseases. However, outside help is required to scavenge free radicals if the defense defense system is insufficient. Antioxidants protect the body from oxidative stress by scavenging free radicals. In this study, the essential oil of Centaurea scleroiepis Boiss. Collected from Batman, Turkey was obtained by hydrodistillation using a Clevenger-type apparatus. GC and GC/MS analyzes of the essential oil from were determined the identification of 75 components representing 87.63% of the oil. Major 9.99% 2-penthanethiol; 9.07% Trimethylamine oxide; 4.24% Benzeneacetaldehyde; 5.72% Cyclohexen-1-one was detected. It has been determined that the major components of this endemic species, which is very similar to Centaurea kurdica, are different. DPPH, ABTS and superoxide scavenging activity of methanol extract and essential oil were evaluated. The DPPH, ABTS and superoxide radical scavenging activity of the essential oil were determined as 100.02, 78.98, 16.54, respectively.

Audience Take Away Notes

- Phytochemistry of an endemic species of Centaurea
- Volatile components of Centaurea scleroiepis Boiss
- The content and in vitro activities of the unstudied Centaurea species will be evaluated

Biography

Dr. Sumer Tuzun studied at the Ege University, Turkey and graduated as pharmacist in 2011. She then started to doctarate programme at Pharmacognosy Department. She received PhD degree in 2015. She is currently preparing for associate professorship. She has published 15 research articles. Her fields of work include natural products, substance isolation from natural products, various in-vitro biological activities, nanoparticles, green synthesis.

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Climate Resilient Agriculture (CRA) techniques for climate change adaptation

Climate change is considered as one of the major environmental problems of present century which includes change in average weather conditions and occurrence of extreme weather events as well. This may be due to natural internal processes or persistent anthropogenic activities viz. increased industrial emissions, fossil fuel combustion, deforestation, biomass burning, change in land use and land management practices etc. which have resulted in an increased emission of harmful green houses gases (CO_2, CH_4, N_2O) into the atmosphere. Thus, it is high time to move to alternate Climate Resilient Agriculture (CRA) practices to cope up with the continuing and upcoming negative effects of climate change. Krishi Vigyan Kendra, Vaishali along with the technical support of Borloug Institute of South Asia (BISA) is running Climate Resilient Agriculture (CRA) Programme since Rabi 2022-21 in which five villages of the Patepur block of Vaishali district of Bihar State namely, Neerpur, Bajitpur, Bardiha, Rasalpur and Repura, have been adopted. In these village CRA techniques such aslaser land levelling, direct sowing of crops using zero tillage machine and bed planters, intercropping, rain water harvesting, adoption of early maturing and drought tolerant varieties of certain crops, inclusion of nutri-cereals such as pearl millet, finger millet, foxtail millet etc in cropping system, cultivation of green manuring crops such as dhaincha, cowpea, green gram etc, are practiced in farmers field in an area of 595 acres in kharif season, 623 acres in rabi season and 350 acres in summer season. After about 2 years of intervention of this program, the results of different crops in Rabi 2021-22 and Kharif 2022-23 has sown increase in yield and B:C ratio as compared to conventional cultivational practices and local varieties indicating that adoption of such techniques can help the farming community to adapt with the effects of changing climatic conditions maintaining sustainability in production as well as profitability levels. Climate Resilient agriculture practices including improved access and utilisation of technology and mechanisation, increased use of resource conservation technologies, adoption of climate resilient crops and varieties, tend to reduce hunger and poverty in the face of climate change for forthcoming generations.

Audience Take Away Notes

- The importance of implementation of such a program at such a broad level especially in those areas where the effects of climate change has shown visible effects and impacts
- The positive results of adoption of CRA technologies in different crops and cropping system in both kharif and rabi season
- Success stories of farmers discussion the economics of their production before and after the implementation of this project in their field

Biography

Sunita Kushwah completed graduation and postgraduation from G.B.P.U.A.T., Pantnagar in Agriculture and Vegetable science in the year 1999 & 2001. I have completed my doctorate from R.A.U., PusaSamastipur in Horticulture (Olericulture) in the year 2005. I also completed PGDAEM from MANAGE, Hyderabad in the year 2011. I have fourteen years experience in the field of extension, research and teaching. I discharged my duties in the capacity of scientist and Head of KVK. I had 30 research papers and 4 proceeding papers in reputed national and international peer reviewed and

NAAS rated journals. I have published 23 technical bulletins, 29 popular articles, 7 news bulletins, 20 book chapters, 5 pamphlets and 15 technologies in different books and magazines. I have edited and written 4 books. I am life member of 10 reputed organizations, societies and working as a Reviewer, Associate Editor and Member of editorial board of NAAS rated peer reviewed National and International Journals and being a part of different committees during conferences & seminars events. I received 22 awards from different national and international organizations for my work. I received 5 best oral & poster paper presentation awards. I received appreciation letter from Ministry of Agriculture. Govt. of India.I implemented and monitored 22 projects funded by State, University and Govt. of India. I delivered 43 lectures as a resource person at different places. I have conducted 2303 programmes of different activities among the farmers and total beneficiaries approximate 143100. I have delivered 40 Radio and TV talks.

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Bio management of plant parasitic nematodes to enhance crop production in India

Phytonematodes induce about Rs. 21 billion only in 24 crops covered under AICRP on Nematodes in India. However togather with other crops, it would be Rs. 100 billion plus annually. Root-Knots, Cysts, Stunt, reniform, Lance & burrowing nematodes are major ones. chemical nematicides are not only hazardous to human health but pollute atmosphere and soil environment leaving residues in crop produce. Hence, bio-nematicides are safer and environmentally eco-friendly. Application of 25 kg Purpureocillium lilacinum (Pl)@ 25 kg + Carbofuran 1 kg/ha significantly reduced RKI (1.8) with maximum banana fruits. Pl @ 25 kg spore dust with carrier/ha (10^9cfu/g) either with poultry manure @ 10t/ha or mustard or neem cake @ 2 t/ha reduced gall index and gave higher brinjal fruit yield (ICBR 1:18.5). Neem cake enriched with Pl @ 10 kg/ha reduced PCN and increased potato tuber yield by 88.2%. Seed treatment with Pseudomonas fluorescens (Pf) @10 g/kg seeds followed by Pf soil application @ 2.5 kg/ha decreased soil and root population of Reniform by 74.2 and 53.9 % in cotton. Pf @ 20g/m2 applied in nursery and subsequently transplanting treated seedlings in field reduced RKN on seedlings &increased 38.45% tomato yield (ICBR 1:2.90), 27.27 %. Brinjal yield (ICBR 1:2.5) & 37.75 % Chili yield (ICBR 1:3.0). Field application of Pl and Pf each @ 2.5 kg/ha along with 2.5 t FYM/ha reduced RKN by 32.01 & 35.67% and increased okra pod yield by 92.97 and 71.24%. Seed treatment of Pl @ 20 g/kg seeds coupled with Pf soil application @ 2.5 kg/ha reduced 35.45% RKN, 72.75% stem rot and increased 38.88 % ground yield. Even seed treatment with Pl @ 20g/kg seeds reduced 74.87% Reniform and increased 67.80% cotton yield (ICBR 1:68.74).

Biography

Dr. D. J. Patel Born on June 5, 1944 at village Sapawada, Ta. Idar, Dist. Sabarkantha. Received B. Sc.(Agri.) degree with first class in 1967 and M. Sc.(Agri.) & Ph.D. in Plant Pathology with specialization in Plant Nematology with first class in 1972 & 1976 as in-service. Joined as Senior Research Assistant (Plant Pathology) in Bidi Tobacco Research Station, Institute of Agriculture, Anand on June28,1967. Subsequently served as Instructor in Plant Protection, Nematologist, Professor& Head, Dept. of Nematology, In Charge Director of campus at Anand & Navsari and retired as Principal & Dean, B. A. College of Agriculture, AAU, Anand on June 30, 2004 after serving for 38 years in the fields of education, research, extension education and administration in Agriculture. Published 240 research papers in national and international journals, 9 book chapters, 3 bulletins & 3 review articles. Received 4 national and international trainings in Nematology. Presented 148 research papers in national & international seminars, attended 93 national & international workshops/seminars/symposia, 22 memberships in scientific societies. Received 10 awards/medals, served in more than 24 scientific & educational institution, worked as Presidents of Nematological society of India & Indian Society of Mycology & Plant Pathology. Worked as expert s inscientific panels, members of several QRTs, Chairman of QRT on AICRP ON Nematodes. Guided 8 M.Sc. (Agri.) and 6 Ph.D. students in Plant Nematology. Delivered several radio talks/door darshan programs for farmers. Organized several scientific seminars/ workshops/ farmer's training programs. Visited USA, UK, Germany, Israel, China, Uganda, Kenya, Malawi, Tanzania Nepal. Presently working as advisors/consultants in few firms.

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Environmental Health Impact Assessment (EHIA) process and green chemistry for the Indian chromium leather tanneries towards sustainable industrial development

In this research, Environmental Health Impact Assessment (EHIA) process and green chemistry is discussed for the Indian chromium leather tanneries towards sustainable development as Indian cotton (DR) ginning industries are using Chrome Composite Leather Clad (CCLC) rollers. Sustainable industrial development can be defined as the industrial development which meets the needs of the present without compromising the ability and efficiency of future generations to meet their own needs. Environmental Health Impact Assessment Process (EHIA process) can be defined as the systematic identification and evaluation of the potential environmental health impacts (health effects) of proposed projects, plans, programs, or legislative actions relative to the physical-chemical, biological, cultural, and socioeconomic components of the total environmental health. The objective is to conduct Environmental Health Impact Assessment (EHIA) process and green chemistry that is to systematically identify and evaluate potential environmental health impacts of CCLC rollers used in Indian CCLC Double Roller (DR) ginning industries with relative to the physical -chemical and biological can be referred as entitled natural or biophysical environment and the cultural and socioeconomic environment represents entitled man-made environmental components of the total environment. Most of the cotton ginning operations are performed by using DR ginning machines which serve an important role in the Indian cotton ginning industries. The rollers used are made of CCLC covering fixed to a shaft. The CCLC contains about 18,000 to 36,000 mg/kg (ppm) (1.8 %-3.6%) of chromium particles. The chromium stabilizes the CCLC by cross linking the collagen fibres in chromium leather tanning industries. Chromium salts, especially chrome alum and chromium (III) sulfate are used in chromium-tanning of leather. The research is conducted to investigate specifically on chromium (III) and Chromium (VI) and health effects of the workers. Chromium tanned leather contains between 3 to 5% of chromium, which is tightly bound to the proteins. For certain types of projects, such as nuclear power plants, it may be necessary to address psychological impacts on nearby residents as per reference entitled Can Change Damage Your Mental Health? Nature, Volume 295, January 21, 1982, pp.177-179 for the necessity to address psychological impacts on nearby residents and reference entitled An Environmental Health Impact Assessment (EHIA) process published by World Health Organization (WHO) titled 'Health and Safety component of Environmental Impact Assessment 'from WHO publication, Copenhagen in 1987. Although the form of chromium used for tanning is not toxic hexavalent variety, there remains interest in the management of chromium in the tanning industry such as recovery and reuses, direct/ indirect recycling, use of less chromium or 'chrome-less tanning is need to be practiced to better manage chromium in tanning with respect to green chemistry. Chromium salts or chromates in contact with skin, lungs and stomach result in dermatitis and lung and esophagus cancer and brain tumor among Indian gin and textile mill workers and the working condition of Indian chromium leather tanning industries and leather related facilities. The chemicals that are employed chemicals in leather industries are hazardous and need to be free from hazardous nature that is green chemistry. Based environmental health impact assessment (EHIA) results and realizing the importance of green chemistry and working condition in Indian tannery

and chrome leather related facilities should be sustainable for the environmental development of our country. Brief or occasional contact may not pose a problem. Potassium dichromate is a chromium salt or chromate and is a common metal making up a significant part of the earth's crust. The most common home exposure of chromate is leather. The majority of leather goods, including shoes and gloves, are tanned with chromates. It is necessary to avoid chromate tanned leather gloves, and leather shoes. Vegetable tanned leather and eco-friendly gloves and shoes or plastic shoes and Oak Bark -Tanning in the traditional manner is recommended compare to chromate tanned leather. The main investigation is adverse health conditions of the workers and local environment that being polluted by toxic hexavalent and trivalent chromium and still being employed in Indian leather industries. For those with shoe dermatitis from chromate and leather, wearing heavy socks or reducing perspiration and moisture may help to reduce dermatitis. The amount of chromium found in all skin layers due to chromium permeation through human skins in diffusion cells. In ginning factories, when the seed-cotton is processed in DR ginning machine, the lint cotton is contaminated with hexavalent and trivalent chromium dust of about 140 to 1990 mg/kg (ppm), Cr (VI) and Cr (III) which is carcinogenic substance against the safe limits of 0.1 ppm.

Ion chromatographic method and atomic absorption spectrometry method are employed for determining chromium content in all samples and Chromium (VI) found more with increased total chromium concentration in samples due to increasing level of application of potassium dichromate and is found cancer among all skin dermatitis workers. The percentage of chromium found during the cotton ginning process due to persistent rubbing of CCLC over stationary knife the chromium particles are adsorbed into lint cotton such that the spun yarns and woven fabrics get contaminated about 100 to 200 ppm which according to eco-standards should not be more than 0.1 ppm. The CCLC rollers used in cotton roller ginning machines get powdered during the ginning process. As chromium is a specific dust, gin and mill workers and residents are directly exposed to this carcinogenic substance and are vulnerable to environmental health hazards. To offset this problem, pollution-free eco-friendly washers/rollers both for laboratory and commercial studies have been fabricated and experimented. Green chemistry attempts are made to alternate dust-producing grinding CCLC ginneries. Environmental health inventory (EHI) serves as the basis for evaluating the potential environmental health impacts both beneficial and adverse of a proposed action. Environmental Health Impact Statement (EHIS) describes the affected environmental health or environmental health setting without the project. Green Design and development of the EHI is an initial step in the EHIA process. It is concluded that EHIA process as green chemistry is conducted for certain projects, plans, programs, legislative actions, policies in the project planning and decision-making process. As the author has looked in to the chemicals that leather tanneries use in the past and present specifically in chromium and public health and occupational health hazards, a sustainable policy measures should be needed to control environmental pollution and contamination in Indian leather tannery environment.

Key words: Assessment, Chemistry, Chromium, Decision, Eco-Friendly, Environment, Green, Health, Inventory, Leather, Planning, Tannery.

Audience Take Away Notes

- The audience will be able to understand and creative sustainable environment of green chemistry in industries, source specific and generic environment
- The audience shall incorporate green chemistry environment in their job
- This research can be very much used to apply knowledge, skills, and attitudes during the day-to-day faculty research and teaching as well extension applications
- The green chemistry application shall provide a practical solution to a problem that could
- simplify or make a designer's job more efficient
- The paper will improve the accuracy, timeliness and reliability of sustainable environmental design,

and provide new information to assist in a green design problem

- Sustainable industrial development, Sustainable generic development, Sustainable source specific development

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering with Specialization in Green Chemistry at the Indian School of Mines, Dhanbad, India and post graduated as Master of Technology, M. Tech., in 1998. He received his Ph.D. degree in Environmental Science and Engineering in 2003 at the same institution. He has served in Indian Council of Agricultural Research (I.C.A.R.) with effect from 22.05.1985 (FN) to 10.02.1998 (FN). In the year 2006, he joined the post-doctoral fellow under research guidance of Prof. Nikos E.Mastorakis at the World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece. After ten years of postdoctoral research supervised by Prof. Nikos E Mastorakis, WSEAS, Athens, Greece, he obtained the position of Professor at the Institute of Technology, Haramaya University, Harar, Ethiopia, East Africa. He has published more than 445 research articles in recognized journals and conference proceedings with his h.index of 55 and total number 3000 citations in his credit.

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Temperature-induced phytochemical adaptations of broccoli and consequences on the biological effects of its extracts

Plants have developed various mechanisms to adapt to changing environmental conditions, including rapid responses at the metabolic and biochemical levels. These responses help them survive and thrive in the face of sudden and intense variations in weather conditions caused by climate change. Broccoli (Brassica oleracea) is rich in vitamins, β-carotene, dietary fibers, polyphenols, and glucosinolates, phytochemicals known for their anticancerogenic activity. All these compounds contribute to the nutritional and health benefits of broccoli. Broccoli, like many plants, is adapted to specific climatic conditions, and variations in temperature and other environmental factors can affect its phytochemical profile. These phytochemical perturbations can have consequences not only on the plant's health and survival, but also on the potential biological effects and nutritional value of the plant and its products for human consumption. In the scope of our work, we investigated the influence of hot and cold water stress on the metabolism of young broccoli (Brassica oleracea L. convar. botrytis (L.) Alef. var. cymosa Duch.) plants with the aim to unravel the intricate biochemical responses and adaptations that occur in these plants under adverse temperature conditions. Precisely, we (i) defined the susceptible and resistant parameters of this plant during low and high temperature water stress, (ii) determined the degree of metabolism change of broccoli due to these two types of stress, (iii) checked if there are trade-offs between the production of different phytochemicals, and (iv) determined the degree of change in the biological effects of broccoli extracts due to the types of stress. By examining changes in phytochemical profile and biological activity of control and stressed broccoli extracts, we sought to gain a deeper understanding of how these stressors impact the overall health, nutritional content, and potential resilience of broccoli crops. Our findings may have significant implications for optimizing cultivation practices, enhancing crop yields, and ensuring the nutritional quality of broccoli in the face of climate change and variable environmental conditions.

Audience Take Away Notes

- They will get the info on how to grow broccoli plants enriched with certain bioactive compounds by changing the growing temperature only
- The study may provide valuable insights into how broccoli plants respond to temperature stress, helping potential breeders develop more resilient broccoli varieties
- Yes, this research that other faculty could use to expand their research or teaching
- Practical solution in terms of exact info on how to grow broccoli plants enriched with bioactive compound/s of interest
- Yes, based on the data further more detailed analyses could be designed and performed
- List all other benefits.
    - Scientists, breeders, farmers

Biography

Dr. Ivana Sola, Assoc. Prof. works in Laboratory for Phytochemistry at the Department of Biology, Faculty of Science, University of Zagreb. Her main scientific interest is plant specialized metabolism plasticity under different environmental conditions. Currently she is a leader of one international and two national projects, collaborator on two scientific and one infrastructural national project. She is a coauthor of 29 scientific papers, 1 manual, and participated in 73 international congresses. She teaches Fundamentals of Phytochemistry, Plant Anatomy, Plant Bioactive Substances, Plants in Phytotherapy, Molecular Biology of Plants, and leads the Laboratory Professional Practice.

Dandjinou Luc Houemagnon
Songhai Center, Benin

Restoring our soil for a new and a sustainable agriculture: Anabiosis a possibility

A comprehensive analysis of today's interconnected crises – encompassing issues such as food insecurity, poverty, unemployment, environmental/Land degradation, and climate change – reveals their inseparable nature. Addressing these challenges, requires a comprehensive, an inclusive, a holistic, a systemic and broad-based approach, especially considering the global ever growing population, particularly in Africa, and the dwindling and deteriorating land due to excessive use of inorganic fertilizers, pesticides, and herbicides. Existing solutions often offer fragmented and surface-level remedies that prove insufficient due to attempts at tackling systemic issues piecemeal. At best, these solutions merely act as temporary fixes, akin to band-aids. In most cases, however, they inadvertently give rise to further complications. Agriculture, however, holds the key to radical and sustainable solutions by embracing a systemic approach. Recent advancements in science and other domains have introduced fresh frameworks for understanding human dynamics and our planet's intricacies.

This emerging systemic paradigm offers novel technological orientations rooted in principles like Synergy, Symbiosis, Complementarity, and Supplementary, inspired by the power of biomimicry. Science underscores the critical role of land – a vital resource for food, water, and health – necessitating a comprehensive strategy to address challenges like desertification, land degradation, food security, biodiversity, groundwater stress, and water quality. It becomes imperative that by implementing diverse mitigation strategies, we can transform deteriorating ecosystems into resilient, regenerative, and sustainable agro-food systems, ultimately achieving more and better with less in a sustainable manner. Such a shift not only transforms our food production methods but also catalyzes change in our values and society, highlighting the importance of innovative approaches. This is what the Songhai Center has engaged in for over 35 years by designing a concrete Model with its Integrated Production System "Zero Waste" by dancing with nature (Agriculture from primary to tertiary sector, Agroindustry, Technologies, Energy and Services all connected) to address current crises.

Biography

Luc Houemagnon possesses over five years of diverse experience, including hands-on involvement in agripreneurship, agribusiness training projects for women and youth, and multidisciplinary work. Since 2021, he has held the position of Programmes and Partnership/Cooperation Officer at the Songhai Center, an esteemed International Non-Governmental Organization Headquartered in Porto-Novo, Republic of Benin. It focuses on sustainable development, establishing resilient agro-food systems, human capital retooling, seeding, training, capacity building and creating sustainable and viable socio-econimical communities. He is also the Chief Executive Officer at Global Success Venture, concentrating on Oriented Youth Education, Training, Entrepreneurship, and Employment (YETEE) programs and agribusiness. Luc is an active member of the Conscious Food Systems Alliance (CoFSA), a movement of practitioners in food, agriculture, and consciousness convened by UN Development Programme. He received training as a formator and Trainer under the GIZ ABF/ATVET Project and is presently engaged in research related to agriculture and rural development.

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Soil bioremediation method using Abelmoschus esculentus (OKRA) culture inoculated with fluorescent bacteria

Soil contamination with toxic metals has become a serious global problem, with the potential to impact human health via the food chain. One promising solution is phytoremediation, the use of plants to reduce the presence of hazardous substances in the environment. This study aims to identify microorganisms that can improve seed germination and plant development in contaminated soils. Okra seeds were inoculated with individual bacterial strains and selected bacterial consortia (multistrain inoculants) and analyzed the effects and tolerance of the seeds to certain copper sulfate solutions. The study found that inoculation with multistrain bacteria is an efficient technique to increase crop tolerance and enhance phytoremediation processes. Inoculation with individual Pseudomonas bacteria did not benefit seed germination, but when okra seeds were inoculated with multistrains, their seedling vigor and emergence significantly improved, particularly under stressful conditions. The study found that the positive effects of okra seed inoculation were most pronounced under stress, indicating the importance of using inoculants in contaminated soils. In addition, the study found that inoculation with multistrains promoted vegetal development, particularly in fresh and dry biomass of the root, root length, and root volume. The organic matter dose factor (vermicompost) had significant effects on the weight of fresh and dry biomass of fruit and aerial part, fruit length, and fruit width, variables related to the quantity and quality of the harvest. The research concludes that the selection of plant growth-promoting rhizobacteria and their inoculation through multistrains can generate favorable results in the field. This approach can increase crop tolerance to toxic metals, enhance phytoremediation processes, and improve the quantity and quality of the harvest. The study provides a promising avenue for combating the problem of soil contamination with toxic metals, which has the potential to impact human health and the environment.

Key words: Copper sulfate (CuSO4), rhizobacteria, organic matter, bioaugmentation, spectrophotometer.

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 until 2022. He has been selected for the originality of his research, presented as the best paper and oral presentation from 2003 until 2022 in international congresses in USA, Dubai, France, England, Germany, Mexico, Nederland, 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.

Susmita Shukla
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Growing towards a greener future: Plant science driving sustainability

Creating a sustainable vision for progress in plant science is crucial for addressing the challenges our planet faces, such as food security, climate change, and environmental degradation. By focusing on sustainable practices and advancements in plant science, we can develop innovative solutions that promote a more resilient and efficient agricultural system while preserving the health of our planet. Here are key elements to consider when creating such a vision by important varying point of view. Enhancing crop productivity by developing plant varieties with improved yields, disease resistance, and tolerance to environmental stressors is essential for sustainable agriculture. Emphasizing research in plant breeding, genetic engineering, and biotechnology can lead to the creation of crops that require fewer resources while producing higher yields. Sustainable crop protection from reducing reliance on chemical pesticides is crucial for minimizing the negative environmental impact of agriculture. Emphasizing integrated pest management techniques, such as biological control, crop rotation, and precision agriculture, can help manage pests effectively while minimizing chemical inputs. Conservation and restoration of biodiversity by preserving and restoring biodiversity is vital for maintaining healthy ecosystems and supporting sustainable agriculture. Encouraging research on the conservation and utilization of plant genetic resources, as well as promoting agroforestry and native species cultivation, can enhance biodiversity and ecosystem services. Climate change resilience as climate change poses significant challenges to agriculture, including extreme weather events, water scarcity, and shifting pest and disease patterns. Advancing research on climate-resilient crops, optimizing water management techniques, and adopting precision agriculture technologies can help mitigate the impact of climate change on plant productivity. Sustainable farming practices for promoting sustainable farming practices, such as organic agriculture, regenerative farming, and agroecology, is essential for reducing the environmental footprint of agriculture. Encouraging the use of cover crops, crop rotation, efficient irrigation, and soil conservation techniques can enhance soil health, water quality, and ecosystem services. Digital agriculture and data-driven solutions for harnessing the power of digital technologies, such as precision farming, remote sensing, and machine learning, can revolutionize plant science and enhance sustainability. Collecting and analyzing data on plant growth, soil health, and weather patterns can optimize resource allocation, minimize waste, and improve decision-making in agriculture. Stakeholder collaboration and knowledge sharing for collaboration among scientists, farmers, policymakers, and other stakeholders is crucial for translating research into practical solutions. Facilitating knowledge sharing, promoting interdisciplinary research, and establishing partnerships between academia, industry, and government can accelerate progress in plant science for sustainability. Education and public awareness in creating awareness about the importance of sustainable plant science and its impact on global challenges is key to fostering public support and engagement. Promoting science literacy, providing accessible information, and encouraging sustainable practices at the individual level can drive positive change and support sustainable agriculture. By embracing these elements and striving for continuous innovation and collaboration, we can create a sustainable vision for progress in plant science that addresses global challenges, ensures food security, and protects the health of our planet for future generations.

Keywords: Sustainable Agriculture, Food security, Conservation, biodiversity.

Audience Take Away Notes

- This talk will impart great knowledge to the audience and will ignite scientific minds to develop new approaches in the field of agriculture and establish a sustainable ecosystem
- The audience belonging to the scientific community will be able to have their entrepreneurial vision to innovate and meet sustainable development goals. They can get diverse jobs in the field of agriculture or plant biotechnology, artificial intelligence etc
- This research can contribute to the research and teaching groups related to this domain
- It may aid in getting a practical solution to the problem by developing and incorporating new technologies to ameliorate agricultural practices
- It may provide new information for developing strategies for assisting in a design problem
- Skill development
- Knowledge sharing
- Technology transfer

Biography

Dr. (Mrs.) Susmita Shukla is M.Sc and PhD in Biotechnology and has more than 20 years of vast experience of teaching and research in leading Universities and Institutes. She is actively involved in mentoring, guiding, supervising graduates, post graduates students and PhD scholars. Her broad research area is in vitro clonal propogation of elite medicinal and economic tree species, embryo rescue, secondary metabolite production, mass multiplication through tissue culture and transgenics. She has developed robust micropropagation protocols of some rare and endangered tree species, medicinal starch yielding, horticultural crops such as Olea europeae, Punica granatum, Stereospermum suaveolens, Sterespermum personatum, Citrus, Indigenous Musa varieties etc. and involved in establishment of in vitro regeneration via direct and indirect mediated genetic transformation Systems. She is recipient of various prestigious award as IASc-INSA-NASI fellowship, DBT travel grant Women Scientist BioCARe, Best Young Scientist Award, Scientist of the Year Award, Best Oral presentation award, Best Educator award etc. She has run successfully Projects funded by Biotech Industry and DBT (Department of Biotechnology, Govt. of India). She has published research papers in reputed National and International journals. She has presented her research work in National and International conference and filed patent of commercial use. She has delivered invited speech in National and International Forum and has organized National, International seminars/conferences, Indo-African Training Program for African Professionals etc. Dr. Shukla's Lab's focuses on production of quality planting material by altering the plant hormones for growth and developments and in development of transgenic plants specifically underlying biotic and abiotic stress tolerance.

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BS963-p-protect-streams-4-sea: A collaborative effort for a clean Black Sea

Efforts have been made to improve the conditions of the Black Sea, since it is considered one of the most degraded regional closed seas. Nonetheless, not much research has been conducted on the input of streams and rivers as major sources of sediment and litter pollutants. Nature-Based Solutions (NBS) are cost-efficient ways, while providing environmental, economic and social benefits. Further, the presented study is targeting the Black Sea region and is aiming in estimating the effect of land use alteration on the surface erosion based on erosion pin measurements. Four were the studied land uses: rangeland, agricultural land, schlerophylous vegetation and riparian vegetation areas at the study area of the Aggitis basin, Greece. It was hypothesized that nature's nature-based examples, like the riparian areas, would indicate the lease soil loss. Indeed, based on the data, riparian areas, were the ones contributed the least sediments compared to the other land uses. This shows that mimicking nature and implementing nature-based solutions at the local and watershed scale favors reduction of soil pollutants.

Audience Take Away Notes

- How the cooperative program works for the Black Sea region
- Understand the input of nature-based solutions
- Sustainable management requires the understanding of nature

Biography

Dr. Valasia Iakovoglou 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 ten international journals and a reviewer in more than fifteen with one of them being the Intergovernmental Panel on Climate Change (IPCC). She has more than 100 publications (such as books/book chapters and peer-reviewed scientific papers). She is active in many scientific societies such as the Mediterranean Experts of Climate and environmental Change (MedECC) and associations such as the Association of Inter-Balkan Woman's Cooperation Societies (AIWCS) of UNESCO Center, where she serves as General Secretary Board Member. Since 2018 she is the Director of the Ecotourism Sector of the UNESCO chair Con-E-Ect.

BOOK OF ABSTRACTS

magnus Group

11-13 SEPT

DAY 03-VIRTUAL ROOM 01

POSTER

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Sophia Thao*, Kristopher Blee
Biological Sciences, California State University, Chico, CA, Butte County

Investigating the co-localization of histone H3 and mitochondria in A. Thaliana

Histone H3 hosts post-translational modifications responsible for nucleosome formation and gene regulation in eukaryotic cells. De novo synthesis of histone H3 occurs in the cytosol before being trafficked to the nucleus. A previous study had incubated crude histone fractions with mitochondrial extracts and performed SDS-Page with anti-H3 antibodies. The results indicated a binding affinity between histone H3 and the mitochondria. The experimental protocol involved incubation of histone H3 with purified mitochondria, and therefore may not accurately represent histone H3 activity in living cells. The purpose of this study is to visualize histone H3 and mitochondria to determine any histone H3 trafficking to mitochondria in intact cells. Transgenic Arabidopsis thaliana plants containing mCherry tagged histone H3 proteins have been cross bred with plants containing YFP tagged mitochondrial transit peptide from yeast cytochrome c oxidase IV. The source of the mCherry-histone plant line revealed its histone H3 was located in both the cytoplasm and nucleus of root cells. The research group that produced the YFP-mitochondria had found that the mitochondria was present in any given cell. Fluorescent images from our lab suggest the presence of tagged proteins within root cells and support the success of the fluorescent tags. Anthers of receiving flowers were removed during early development to prevent self-fertilization. Pollen grains of mature donor flowers were then introduced to isolated stigmata in order to perform the cross. After maturation, hybrid seeds will be collected for subsequent plant growth. Images of parent and offspring root cells will be used to determine the location of histone H3 and the mitochondria. We predict that after layering images of the same cell with different filters, we will find that histone H3 co-localizes with the mitochondria in living cells. The co-localization of histone H3 and mitochondria will provide more insight into the functions and structure of the histone H3 protein.

Audience Take Away Notes

- Fluorescent microscopy
- Plant growth and development
- Cross fertilization of A. thaliana
- Protein signaling and binding activity
- Using fluorescent tags to determine co-localization/binding activity

Biography

Ms. Sophia Thao is a current graduate student at California State University, Chico. She previously graduated from the same institution with a BS in Cellular and Molecular Biology where she worked for the research group under Dr. Dave Keller. Now she's working on her MS degree in Biology with Dr. Kris Blee as her academic advisor. She currently works as a peer mentor for undergraduate students who wish to pursue graduate school. She hopes to continue working in research at the industry level.

Hyun Sook Lee[1]*, Hyunjung Chung[2], Su Kyung Ha[3], Hyun Su Park[3], Chang Min Lee[3], Ji Ung Jeung[3]

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Genetic analysis of rice blast resistance in Korean japonica rice variety ‘Saeilpum’

Rice blast disease is one of the major causes of yield loss. The most economical method to manage rice blast disease is to cultivate resistant rice varieties. However, the rapid evolution of the rice blast fungus Magnaporthe oryzae makes the introduction of various resistant genes into rice varieties a never-ending challenge for rice breeders. 'Ilpum' rice known for its excellent taste, has been mainly cultivated in the Gyeongbuk province of South Korea since its development in 1990, for 30 years. However, 'Ilpum' is susceptible to rice blast disease and bacterial leaf blight. To address this, 'Saeilpum' was developed from a cross with 'Ilpum' and 'SR30064-B2-B1-B8-20-2-1-61-21' lines. 'Ilpum' exhibited a score of 5 (susceptibility) in the blast nursery test, while 'Saeilpum' showed strong resistance with a score of 2. 'Saeilpum' is resistant to all Korean bacterial leaf blight races, K1, K2, K3, and K3a (data not shown).

For the identification of blast disease resistance genes in the 'Saeilpum', a target capture sequencing panel containing 2565 SNPs, including 1225 SNPs informative for japonica and 1339 SNPs informative for indica, was utilized with 94 lines in F5 generation derived from crosses between 'Ilpum' and 'Saeilpum'. Only 125 SNPs were observed between the parental lines with 68 SNPs located in the 0.3~15.2Mb region on chromosome 12 and the 21 SNPs in 24.4~28.9Mb region on chromosome 11. Interestingly, the bacterial leaf blight resistance gene, Xa4 was located in the end of chromosom 11, suggesting an improvement in bacterial leaf blight resistance in 'Saeilpum.' The blast resistance of 94 F5 and F6 lines was evaluated in a blast nursery test in 2022 and 2023. Using the resistance score of 94 F5 lines, a QTL was detected near 10Mb on chromosome 12. Analysis of variance showed that the ' chr12_10607554' marker linked with Pita2 was strongly associated with blast disease with the phenotypic variance of 80% ($p<0.001$). Therefore, Pita2 was suggested to be the blast resistance gene in 'Saeilpum'. These results will be beneficial for breeding of blast resistance rice in Korea. The research was funded by the Rural Development Administration(RDA) of South Korea, grant number PJ01683002.

Audience Take Away Notes

- This presentation provide methods for genetic analysis of genetic resources
- The information of molecular marker of this presentation is helpful in rice breeding program
- The information of varieties resistant to the rice blast can be shared and used in breeding program

Biography

Dr. Lee studied plant pathology and plant cell technology at Chungnam National University, South Korea and graduated as MS in 2006. She graduated with a major with Environmental Life Science major and received her PhD degree from Tohoku University, Japan in 2010. She worked as a researcher from 2011 to 2021 in the Lab. of Plant Molecular Breeding at Chungnam National University, South Korea. Her major area is QTL analysis for yield stability and seedling development in rice.

11-13 SEPT

DAY 03-VIRTUAL ROOM 02

KEYNOTE FORUM

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Crop security: The key to food security

As the world population escalates and arable land shrinks worldwide, crop security is the key to food security in the short and long term. Urban sprawl combined with climate change effects challenges ensuring enough food for consumption and adequate nutrients to sustain human health. Crop security and, thus, food security can be achieved through sustainable soil management practices that include preserving soil fertility and health, biodiversity both above and below ground, selection of climate-smart crops, and crop management practices. The FAO's five action point approach to Climate-Smart Agriculture (CSA) provides a model for crop security by sustainably increasing agricultural productivity, adapting and building the resilience of agri-food systems to climate change, and reducing climate change impacts. This paper discusses the importance of crop security, challenges stemming from unsustainable farming practices, including monoculture and inefficient irrigation methods, loss of genetic diversity, frequent extreme weather events, and how proven practices at the field, farm, and ecological scale could ensure crop security and sustainability.

Audience Take Away Notes

- The audience will learn about food security, safety and crop security
- This will help the audience in their jobs in planning the crops, cropping pattern as per the food needs
- Various workers as per their country and state requirements can work on it

Shashi Vemuri*, Akhila E

Formerly at Dept of Entomology, PJTSAU, Hyderabad, Telangana, India

Biography

Prof Shashi vemuri studied Entomology and Insect Toxicology at Agricultural University, Hyderabad, India and graduated as MS in 1980. He then joined the research group of Pesticide residues determination at Agricultural University and had his doctoral program 1983. Had one year postdoctoral fellowship in USA and obtained the position of an Associate Professor and later Professor and Senior Professor in Entomology. He has participated in number of internal conferences in various countries and has published more than 160 research articles. Recived various awards and recognitions at State and national level.

Production of green hydrogen from farm and food wastes: A project for generation of low-cost renewable energy and eco-friendliness

Usage of green hydrogen fuel for transportation is of utmost necessity to reduce the Greenhouse Gas (GHG) emission everywhere including Malaysia. Combustion of hydrogen fuel does not produce any GHG and is economic when organic wastes are used. The farm and food wastes are leading to severe environmental problems in the country due to improper use of the wastes. Therefore, utilization of these wastes for production of renewable green energy i.e., hydrogen is essential for the country. First of all, a biohydrogen production plant is needed. The farm wastes (rice straw, cornstalks, vegetable residues etc.) are collected from the agricultural and vegetable farms, and are filtered out of non-digestible woody materials from the feedstock. These are crushed with a mechanical crusher and are treated in pasteurizers with water to make it 8% solution. The food wastes (cooked waste rice, waste curry, kitchen wastes etc.) are collected from hotels and restaurants, and are filtered out of plastic, rubber, wood, and other non-digestible materials. The pre-treated food wastes are grinded and added to the farm wastes in the digester at the rate of 10% by volume. The whole feedstock is agitated by the agitator of the digester at a temperature of 25 to 27 ^{0}C and pH of 5.5 to 5.6. The bacterial inoculum is added to the digester. The substrate is incubated anaerobically for a period of 15 days while it produces H_2 gas which are transferred to Pressure Swing Adsorption (PSA) system for purification. The purified H_2 gas is collected under high pressure in appropriate steel-made tanks for using as fuel.

Audience Take Away Notes

- Pollution control or reduction is concerned to everybody in most of the countries and this project will show how we can reduce the pollution by using green energy i.e., bio hydrogen instead of fossil fuel
- A vast mass of agricultural and food wastes will be reduced from ecosystem, which is important for pollution control
- This will also help the audience to improve their understanding about using the wastes for producing valuable outputs

Sarker Mohammad Rezaul Karim

Department Crop Science, Faculty of Agriculture, Universiti Putra Malaysia, Selangor, Malaysia

Biography

Professor Dr. S. M. Rezaul Karim is an Agronomist with specialization in Weed Science having teaching and research experience of more than 35 years. Prof. Karim obtained his M. Sc. Ag in Agronomy from Bangladesh Agricultural University (BAU), Mymensingh in 1981, M. Phil from University of Reading, England, UK in 1991, PhD from University of Aberdeen, Scotland, UK in 1999. He is an author of five books of Weed Science and three book chapters in the same discipline. He has published more than 110 papers in reputed journals. Prof. Karim joined Universiti Putra Malaysia as IOI Chair on 12 November 2021.

Nanofertilizer: Key player for global farming and higher food production

Nanofertilizers are at the leading age of a rapidly developing field of nanotechnology. It can be synthesized through physical, chemical, aerosol and biological techniques. It has the potential to control release of nutrients, site targeted delivery, reduction in toxicity and nutrient use efficiency. It can be applied to the plants through foliage, soil, under drip, sprinkler, hydroponic, aeroponic and aquaponic. The uptake rate of nanonutrients by plants also depends on their shape and sizes. In general, small sizes of nanoparticles can be penetrating through the cuticle while larger nanoparticles can penetrate through cuticle-free areas such as hydathodes, the stigma of flowers and stomata. The requirement of nanofertilizers are 30-100 times less than chemical fertilizer, it is 4-20 times more efficient than chemical fertilizer with 2-4 times less costly. It has triggering effect of plant and microbial enzymes and improves the solubility of insoluble nutrient in soil and has effective duration of nutrient supply. It can influenced polysaccharide production to polysaccharide producing organisms resulted more soil aggregation, moisture retention and soil carbon build up. The average improvement of yield, irrespective of crops and soil types, varies between 24-32% as compared to 12-18% under chemical fertilizers. Unlike chemical fertilizer, it has ability to maintain the soil health like organic fertilizers. Nanofertilizer has proved to be very safe with recommended doses of application. It protects plants from abiotic and biotic stresses and can overcome all major problems with conventional fertilizers. It can be used in all stages of plant growth i.e. from the seed treatment to grain storage. It can make as nano-bioformulations to protect biofertilizers and increase its efficiency. It has the potential to prevent environmental (soil, air, water) pollution and has ability to mitigate climate change. Nanofertilizer has been implicated in the protection of plants against oxidative stress as they mimic the role of antioxidative enzymes such as Superoxide Dismutase (SOD), Catalase (CAT) and Peroxidase (POX).

Audience Take Away Notes

- Nanofertilizers may prevent environmental (air, water, soil) pollution and help to mitigate climate change
- It has the potential to reduce chemical fertilizer application and can compromise with biofertilizers
- Nanofertilizers are very safe with recommended doses of application and can maintain soil health
- It can increase the nutrient use efficiency and crop yield over chemical fertilizer as well as draw more profit with much lower investment
- It can protect plants from biotic and abiotic stresses and help to increase the efficiency of biofertilizer also potential as key player for global food production

J C Tarafdar

Former UGC-Emeritus Professor & ICAR-Emeritus Scientist ICAR-CAZRI, Jodhpur, Rajasthan, India

Biography

Dr. J. C. Tarafdar did his M. Sc. and Ph. D. degrees in Soil Science and Agricultural Chemistry from Indian Agricultural Research Institute, New Delhi and Post Doctorate from Institute of Agricultural Chemistry, Goettingen, Germany. He has made original and well recognized contribution on mobilization of native phosphorus. He is successfully developed biosynthesized nano nutrients and nano induced polysaccharide powder for agricultural use. Dr. Tarafdar has published 379 research articles including 42 book chapters and five books. He has four patents and 73 new organisms in his credit. He has to his credits >8600 citations and 44 h-index. Dr. Tarafdar has been placed amongst the top 2% scientists, across all sciences in the world, by Stanford University, USA.

Small mammals in a Baltic country, 1975–2022

We will review the results of an analysis of small mammal trapping and owl pellet analysis in pre-Soviet and post-Soviet Lithuania (the most southerly of the three Baltic States in Northern Europe), covering the period 1975–2022. Based on the decades-long period, we analysed changes in small mammal diversity and proportions within the main trophic groups. The large increase in granivores, from 6.9% in 1975–1980 to 45.4% in 2011–2020, and over 50% in 2021–2022, coincided with a decrease in omnivores and insectivores. The proportion of herbivores increased to a lesser extent. At the species level, there was a significant decrease in the proportion of common voles, bank voles and common shrews, accompanied by notable increases in the proportions of yellow-necked mice and striped field mice, the latter from 1.0% in 1975–1980 to 25.3% in 2021. The increase in diversity and the decrease in dominance occurred in the aftermath of changes within the country after 1990 changes in land ownership, the dismantling of the system of large-scale collective farming, the abandonment of former agricultural land, changes in forest use, etc.) and have not subsequently changed. Since climate change, land use and local disturbances may affect the structure and diversity of animal communities in the long term, a key question is: can we link changes in small mammal communities to large-scale changes in agriculture, or is there a multi-factorial interaction?

Audience Take Away Notes

- It is not known whether similar changes in small mammal communities have occurred in other post-Soviet countries – this is the first such presentation
- As small mammals are both agricultural pests and part of ecosystem services, they require integrated pest management measures targeting specific groups
- Knowledge of the key drivers of change can help in planning small mammal management measures

Linas Balčiauskas*, Laima Balčiauskienė

Nature Research Centre, Vilnius, Lithuania

Biography

Prof. Linas Balčiauskas received his PhD in zoology/biology, 1988, and Dr. Hab in biology, 2008. Currently working as leading researcher and the Head of the Laboratory of Mammalian Ecology in Nature Research Centre, Lithuania. Research experience: hoofed, semi-aquatic, carnivore and small mammal ecology, threatened species, large carnivores, spatial distribution, habitat analysis, population management and computer modeling, biodiversity and ecological diversity, road ecology, human dimensions of mammals. Published more than 80 research papers in SCI/SCIE journals, and over 200 times presented at national and international conferences.

Drought stress induced redox biology of flag leaf and its impact on kernel aroma quality and productivity of some indigenous aromatic rice cultivars of Rarh West Bengal, India

Drought induced aroma stability and yield of IARCs (Indigenous Aromatic Rice Cultivars) which necessitates substantial attenuation of reduction of kernel quality and yield potential through reprograming of redox metabolic in contributory flag leaf was seldom studied and hence have been investigated. Drought induced shift in redox homeostasis during grain filling stage of some IARCs of Rarh regions of West Bengal and stress withdrawal (after six days) was done through redox landscaping of flag leaves. The results revealed tilt in the magnitude of redox homeostasis (assessed in terms of accumulation of O_2.-, H_2O_2, oxidation of DCFDA, ROS- scavenging property, non-protein thiol compounds, redox osmolytes, stability of antioxidant pigments, ROS-antioxidant interaction index, efficacy of central redox hub (RboH- ascorbate – glutathione/ catalase pathway) and by monitoring sensitive biomarkers oxidative stress (accumulation of hydroperoxide, free carbonyl compounds, thiobarbituric acid reactive substances, conjugated diene). The experimental Cultivars (Badshabhog and Tulaipanji) proficient with regulating ROS-antioxidant interaction dynamics at metabolic boundary or interface in flag leaf and able to avert oxidative damage of flag leaf instigated improved restoration of aroma profile, particularly 2-Acetyl-1-Pyrroline (2AP) content, important agronomic characters, productivity (seed yield) and other kernel qualities than the other cultivars studied (Jamainadu and Sitabhog). Further, germplasm -specific relative assessment of metabolites shared by redox Osmolyte Proline and (2AP), displayed metabolic cross-talking towards significant regulation of drought- induced oxidative stress and renewal of aroma production. Capability of maintenance kernel quality (aromatic compounds), agronomic characters, productivity (seed yield) under drought stress through redox-regulatory drought acclimatory events of flag leaves in experimental IARCs is suggested.

Audience Take Away Notes

- The work that will be presented here might help the audience in understanding and speculating germplasm-specific interaction with drought stress towards differential redox responsiveness and tolerance with key role of genetic regulation of redox-regulatory events of flag leaves as determinant of grain yield stability and aroma quality
- The sensitive traits of Redox Biology explored here in this investigation by the presenter and his team may be further explored as important genetic marker for breeding program associated with crop improvement program of fragrant rice

Soumen Bhattacharjee

Plant Physiology and Biochemistry Research laboratory, UGC Centre for Advanced Studies, Department of Botany, The University of Burdwan, Burdwan, West Bengal, India

Biography

Soumen Bhattacharjee, Professor & Coordinator, UGC Centre for Advanced Study and former Head, Department of Botany, The University of Burdwan, India, has an academic and research career for more than two and half decades. Dr. Bhattacharjee also had the privilege of working as Senior Scientist, Indian Council of Agricultural Research. The research interest of Dr. Bhattacharjee center around Plant Redox Biology and crop improvement, with more than fifteen doctoral research scholars associated with his lab in last ten years. He has more than 150 publications with citation of more than 3200 with H-index and I10 index 25 and 45 respectively.

Indian agriculture @75: Development issues and challenges

Agriculture is an important sector of Indian economy, accounting for about 20% in Gross Value Added (GVA) and registering a growth of around 4 %. Growth in allied sectors including horticulture, livestock, dairying and fisheries have been the major drivers of overall growth in the sector. The sector is also the largest employer of workforce contributing employment to about 50 % of the total workforce in the country. Agriculture and allied sectors provide food and nutrition security to the nation. In the 75th year of its Independence of the country, it is important to assess the achievements and identify development challenges the sector confront. This will enable to build a future growth strategy for Indian agriculture and its allied sectors.

Marginal and small farm sizes constitute more than 85% of the operational holdings in India. It is time to develop impactful programmes to support and empower them with knowledge for sustainable and climate resilient production. The Government of India has brought significant reforms in the agriculture sector which will go a long way in building efficient value chains and ensuring better returns for farmers. With independent India turning 75, Indian agriculture also needs to be transformed and reoriented to be smart and sustainable. Towards this, there is an immense need to promote interventions that help in achieving the sustainable development goals target.

As we embark on a new era of agriculture with enormous pressure to produce more food from less land with shrinking water and other natural resources, there is an urgent need to strengthen the existing agricultural value chain. Country needs to evolve smart and sustainable agriculture that aims to bring all key stakeholder and policy makers on a common platform to ideate on implementable strategy. The paper also highlights priorities and develops segment wise visions with a clear set of recommendations.

Audience Take Away Notes

- Understand Indian Agriculture from historical perspective
- Learn agriculture growth during 75 years of Independence
- Learn the contribution of Agriculture in Indian economy
- Learn problems and challenges of Indian agriculture
- Roadmap for smart and sustainable agriculture in India

V. P. S. Arora

Principal Advisor, Venkateshwara Group of Institutions, Uttar Pradesh, Formerly Professor, Dean, Vice Chancellor

Biography

Dr. V. P. S. Arora, Professor Emeritus and Advisor, Sharda University, Gautam Budh Nagar, Uttar Pradesh till recently, served G B Pant University Pantnagar for over 33 years as Assistant Professor, Associate Professor, Professor, Head of Department of Agricultural Economics and Dean College of Agribusiness Management. Dr. Arora was the founder Dean of College of Agribusiness Management and its flagship Program of MBA (Agribusiness), first of its kind under the ICAR-SAU system of the country. He successfully undertook international consulting projects of IRRI (Philippines), OECD (France), APO (Japan), and FAO (Rome). Dr. Arora has over 46 years of professional experience in academics at reputed national and global institutions of higher learning. Dr. Arora served Alemaya/ Haramaya University, Ethiopia as Visiting Professor for a period of four years (2000-02 and 2017-19). Dr. Arora served Kumaun University (a State University of Uttarakhand) as its Vice Chancellor (2009 -2012), Pro-Chancellor and

Vice Chancellor of Shri Venkateshwara University Uttar Pradesh, Pro-Chancellor of Venkateshwara Open University, Itanagar, and Mentor/ President, Centre for Education Growth and Research, Dr. Arora has honour of addressing UN University, Tokyo on Agricultural Policies in South Asia, and OECD Member Countries on India's Agricultural Policies (at OECD, Paris). Dr. Arora successfully conducted 13 Research Projects and 7 Consulting Projects, supervised 24 PhD Scholars, authored/ edited / reviewed 10 Books, 21 chapters in Books, and over 100 research papers. He was the Chief Editor of two CEGR Text Books entitled Higher Education: Leadership and Management and Research Methodology. Dr. Arora has been conferred with numerous awards and honours including Dr. Rajendra Prasad Award for best original book in Hindi (1994-96), Life Time Achievement Awards (2009 and 2020), Uttarakhand Ratan Award (2011), Higher Education Leadership Award (2016), Outstanding Alumnus Award of Pantnagar University (2020), Outstanding Alumnus Award of College of Agriculture (2019) and Best Paper Awards. He had been the Conference President of Indian Society of Agricultural Marketing (2010), and Conference President of Agricultural Economics Research Association (2013). He has been Vice President (as also on the Editorial Board of journals published thereby) of professional societies like Indian Society of Agricultural Economics, Indian Society of Agricultural Marketing, and Agricultural Economics Research Association.

Suitaiology: Systematic control of water in mountainous regions for sustainable development

Mountainous areas play a vital role for eco-environment, agriculture, forestry, tourism, and water supply. However, extreme weather events such as heavy rainfall, floods, and droughts, as well as the resulting geological disasters, endanger the mountain environment, ecology and economy.

Our efforts to combat floods and droughts is an Asymmetrical Competition (AMC) with the forces of nature. The fragmented static research in existing water sciences, resulting in narrow thinking, limited societal awareness and separated strategies for flood and drought protection, cannot effectively direct this competition. Human interventions cannot solve the water problems effectively, but may harm ecosystems and increase disaster vulnerability.

In response to this gap, the new water science-Suitaiology focuses on, instead of just water itself, more on the state and trends in the dynamic interactions between water and other members of the Water-Human-Environment (WHE) system, which is called the water situation. Suitaiological studies explore that the water's natural situation is primarily destructive, and water Dimensionality-Reduction-Attacks (DRA) can wreak havoc, such as floods, droughts, erosion, and geological hazards.

Although humans cannot control the forces of nature and natural disasters, Suitaiology's insights equip us the ability to weaken the natural destructive situation of water and to create water resources by dimension adjustment and situation transformation, harmonize the needs of humans and eco-environment, achieve sustainable management of water, and secure the delicate balance within the WHE system.

Dachang Zhang

Water & Eco Crisis Foundation (WnECF), San Jose, California 95129, United States of America

Biography

Dr. Dachang Zhang received the B.S. and M.S. degrees in hydrogeology & Engineering Geology from the Changchun Institute of Geology and Chinese Academy of Sciences in 1982 and 1985 respectively, then became a researcher at Chinese Academy of Sciences. After his PhD degree in geography from the University of Vienna in 1996 with significant contributions to a national water project of Austria, he was a postdoctoral fellowship and researcher at the University of Waterloo, Canada from 1997-2000. And then, he worked as a consultant in Canada and U.S.A. and become a License Professional Geologist of the State of California in 2007. He also worked for the University of Bijie, China, as a Professor and the Deputy Dean of the Academy for Bijie Experimental Region for water management and rural development in impoverished mountainous areas from 2008 to 2014. He is the Founder and President of the Water &Eco Crisis Foundation, USA, since 2010. In 2012, Dr. Dachang Zhang and his team set out to create a new water science—Suitaiology, which was first released at the 1st Edition of Global Conference on Agriculture and Horticulture (AGRI 2021) in 2021.

BOOK OF ABSTRACTS

magnus Group

11-13 SEPT

DAY 03-VIRTUAL ROOM 02

SPEAKERS

JOINT EVENT ON

PLANT SCIENCE AND AGRICULTURE

Gun Mardiatmoko
Forestry Department, Faculty of Agriculture, Pattimura University, Ambon, Indonesia

Drone mapping of the potential of sago forest for food security and management of climate change

The area of the sago forest on the small island of Ambon (Eastern Indonesia) is around 471 ha, which are scattered across the island. The most presence of sago is in Lehitu District 239 ha, Salahutu District 168 ha and Leitimur Selatan District 44 ha. Detailed research was carried out in Tulehu Village, Salahutu District by mapping a sago forest with a drone covering an area of 127 ha. The flying height of the drone is 150 m, with Front overlap and Side Overlap each of 80% with a total of 1,211 photos and GSD resolution of 3 cm/pix. The PIX4D Mapper application is used to obtain Orthomosaic raster map results and Digital Elevation Model Data or Digital Surface Model Data. From the drone coverage obtained, digitizing polygons was carried out for all forest sago palms. By using the Orthomosaic map at the research location, a land use analysis was carried out. Forest sago onscreen delineation is carried out to classify Sago and Non-Sago land use. Identification of sago trees using the Onscreen delineation technique for each sago tree from Orthomosaic data based on the sago tree height class using the Data Digital Surface Model. The results of the classification based on tree height obtained the number of sago plants from the growth rates of seedling, sapling, poles and trees respectively: 100, 818, 3,332 and 3,709 trees. In the classification of sago forest (initial research), 5 sago samples were taken from various growth stages to determine the biomass content and sago starch content. Biomass content ranges from 48.1 kg to 761.6 kg and the average production of sago starch is 545 kg/tree. Thus, the biomass content of sago forest plays a role in tackling climate change. Also, the high content of sago starch will be useful for food security in the study area.

Keywords: Sago Forest, Drone, Biomass, Climate Change.

Audience Take Away Notes

- This research will help the audience to be able to do sago forest conservation for food security and management climate change
- This research can be developed more broadly in other faculties, especially those that focus on sago conservation or renewable natural resources to achieve the SDGs
- This research will be very useful, especially for stakeholders in the sustainable management of natural resources

Biography

Dr. Gun Mardiatmoko, MP studied forestry management (S1 and S2) at the Faculty of Forestry at Gadjah Mada University in Yogyakarta and graduated from the doctoral program (S3) at USAMV, Bucharest, Romania. He is a lecturer at the Department of Forestry, Faculty of Agriculture, Pattimura University in Ambon from 1986 until now. So far, her work activities include teaching students, research and community service. The results of research and writing of books have been carried out a lot and details of their work can be found through Google searches. In general, his research focuses on handling climate change through mitigation and adaptation.

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Effect of different cutting intervals on the nutritive value, in vitro dry matter degradability and intake relative palatability indices of macrotyloma axillare legume residues and grass hay in boer goats

Generally, forage legumes are well-known for enhancing feeding value, due to their high Crude Protein (CP), vitamins and minerals. In tropical southern Africa, climate change is worsening the challenge of feed shortage from natural pastures. The main aim of the current research was to determine the effect of different cutting intervals on the nutritive value, in vitro dry matter degradability, intake and relative palatability indices of Macrotyloma axillare legume residues and grass hay in Boer goats. The current study was conducted under the North West University experimental farm (Molelwane), North West Province, Mafikeng, South Africa. Macrotyloma axillare legume was planted as monoculture in December 2021 in a large area under irrigation. Legume was cut in different interval (30, 60 and 90) days. Blue buffalo (cenchrus cilliaris) grass was harvested at post flowering stage. For grass and all cuttings, legume samples were ground to pass through a 1-mm sieve, oven dried and placed in an airtight containers pending chemical analysis. A total of castrated ten (10) male Boer goats (weighing 20.4 ± 3kg) were used. Rumen fluid was collected from a fistulated Bonsmara cow to evaluate in vitro degradability, the cow was fed Macrotyloma axillare legume and cenchrus cilliaris grass hay. Feeds were used as treatments and goats as replicates in a completely randomized design. One-way analyse of variance was used to analyse the data attained from the experiment using the GLM of SAS (2010) in a completely randomized design. Significant ($P<0.05$) variations were observed in intake and palatability among the grass and different cutting intervals throughout the experimental trail. Based on the findings, the 60 day cutting interval had highest crude protein, IVDMD, intake and palatability and lowest fibre contents. The results of this research proved that inclusion of Macrotyloma axillare legume in boer goats feed can meet their nutritional requirements. In conclusion, this suggest that Macrotyloma axillare cut at 60 days can be included in ruminants diets as protein supplement for ruminants fed low quality grasses. There is a need to assess the productivity of ruminants fed the Macrotyloma axillare legume forage harvested at 60 day.

Keywords: Feed Sources, Nutrition, Small Ruminants, Forage Legume, Feed Intake and Degradability.

Audience Take Away Notes

- The study would be able to give a clear image into the practical as it would have been explained in the methodology. There is a need to assess relative palatability indices of forages
- Once the audience will learn the importance of feeding strategies. The direct impact is to the proportion of the diets during feeding. The animal preferences on diets can be technically introduced as part of the experimental practical to undergraduate students
- The searching of alternative sources of protein for animal nutrition still creates a gap in literature. Therefore, apart from the available information, there is still a need to evaluate the nutritive value, intake and relative palatability of legumes in small ruminants

Biography

Mr. Sipango Nkosomzi completed his BSc degree in Agriculture (Animal Production Sciences, 2013-2018) and MSc degree Agriculture in Animal Sciences at the University of Fort Hare in year (2018-2020), Alice Campus, Eastern Cape Province, South Africa. He is currently registered, enrolling and pursuing his final year PhD in Agric. Animal Science, at North West University, Faculty of Natural and Agricultural Science, Department of Animal Science, Mafikeng Campus, North West Province, South Africa. Mr. Sipango has published more than 6 manuscripts as both first author and co-author in accredited peer international SCI journals.

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Legume residues can enhance the quality of maize straw silage

Maize (Zea mays) straw silage is one of the most commonly used feeds across the world, due to its high-energy content. However, it contains low Crude Protein (CP) content of <7 g/kg DM. To meet the nutrient requirements for ruminants, the CP of maize straw silage must be increased to required levels. Cowpeas and lablab residues (leaves and vines) are widely used as protein source for livestock in South Africa, after fruit harvesting. However, legumes cannot be ensiled alone due to their high buffering capacity and their low Water Soluble Carbohydrates (WSC), with the risk of producing butyric acid. Mixing maize and legume forage for silage production is a feasible strategy for increasing the CP of maize silage to provide adequate fodder during dry periods. Therefore, the objective of this study was to enhance the quality of maize straw silage using legume foliage. Four legumes species (Lablab purpureus and Vigna unguiculata (Dr Saunders, betswit, and indigenous cowpea varieties)) were grown at North-West University farm (Campus field). Maize was also planted in the same fields but different plot. Harvesting was done after the reproductive stage (After fruits harvest). The proportion of legume to maize was 20:80% (Maize-Lablab (ML), Maize-Indigenous cowpea (MI), Maize-Betswit (MB) and maize-Dr Saunders (MD)). Maize alone (M) was used as control making up five treatments. Silages were opened after 45 days, and samples were taken for chemical composition (AOAC, 2012), In Vitro Dry Matter Degradability (IVDMD), fermentation characteristics analysis and aerobic stability test. All data were subjected to a one-way analysis of variance (SAS, 2010). For a statistical test, significance was declared at $P<0.05$. Maize-lablab had the highest ($P<0.05$) CP content (116.0 g/kg DM) than other silages. Maize-Dr Saunders had highest ash content (160.9 g/kg DM) than other silages. Maize-Betswit had the lowest ($P<0.05$), Neutral Detergent Fibre (NDF), Acid Detergent Fibre (ADF), and Acid Detergent Lignin (ADL) content (493.1, 365.2 and 118.6 g/kg DM, respectively) when compared with other silages. The MI had the lowest ($P<0.05$) Ether extract content (21.0 g/kg DM) and Carbon Dioxide (CO_2) concentration (5.4 g/kg DM) when compared to other silages. The highest ($P<0.05$) IVDMD was recorded for ML silage from 24 hrs up to 72 hrs. The lowest ($P<0.05$) pH (3.66) was recorded for maize silage. All silages had similar ($P>0.05$) amounts of Lactic Acid (LA), Water-Soluble Carbohydrates (WSC), yeast and mould counts. All the legumes foliage were capable to be used in silage in enhancing low-maize straws for the sustainability of livestock, especially during the dry season. In this study, maize-lablab silage performed better in terms of CP and IVDMD (24-72 hr). The CP content of MD, MB, MI and ML was greater than 80 g/kg DM, which is considered enough for optimal ruminal microorganisms' activity. The silages had low pH values, which is a good indication of well-preserved silage. The inclusion of legumes to maize straw showed that legume foliage could stimulate LA production, which could influence the bacterial community from diverse forages and can be ascribed to the high buffering capacity of legumes.

Key words: Aerobic Stability, Animal Nutrition, Crude Protein, Rumen Fermentation.

Audience Take Away Notes

- Audience would be able to put what they learn into practical as it would have been emphasized in the methodology section. There is a hand on task that needs a proper application of ensiling methods
- Once the audiences learn the proper management practices required. The final factor that may directly

influence nutrition is the formation of moulds and mycotoxins in silage and once fed to animals, this will have an influence in the economics status of the farmers

- Technically, this can be introduced to students as part of experimental exposure during their studies
- Feed scarcity during winter and drought times is a challenge to developed and developing countries, hence as part conservation methods, the use of silage can be a part of mitigation strategy to minimize feed shortage during those times
- Continuous assessment of legumes using different conservation methods can be vital for the productivity of animals. Even though there is no additional new information added to the study, in an attempt to understand the potential nutritive value that the legume can provide to livestock, there is therefore a need for continuous screening of the herbaceous legumes species to ensure that local farmers can contribute to animal protein production in the country in a sustainable manner

Biography

Mr. Hawu studied Animal Science at the North-West University, South Africa and graduated as MSc in 2022. He enrolled his PhD degree in 2022 at the same institution. He has published more than 7 research articles in SCI(E) journals.

Dr. Subhas Chandra Datta

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Ecology of biomedicine physiology in agriculture horticulture enhances food-security wildlife-biodiversity-conservation science-technology-communication issues

The past two decades have seen several viral epidemics, causing significant loss of human lives. In the 'Azadi Ka Amrit Mahotsav in India', the recent COVID-19 epidemics emerge as serious-global-threat to human civilization, public health, agriculture, horticulture, travel, socioeconomic, education, and even clinical research, ecological balance, food-producing systems, and climate regulation, enrolment, classroom hunger and malnutrition, socialization, attendance, and retention rates, and women employment playing a vital role in the education of underprivileged children also. On the other hand, recently conventional vaccines have had high production costs, and complex purification processes, and have not always had bio-safety in issues, time-consuming, and bio-safety test commercial production issues, and weakening the ability of vaccines to prevent pathogens causing diseases. It has no specific therapeutics or effective treatment options. Though the middle and upper classes are able to manage, low-income households are really suffering. So Government of India wants to reorient the COVID-19 crisis by developing policy initiatives. So it is focused on the consumption of nutritious and traditional medicinal weed, vegetables, fruits, and spices as regular meals for the preventive measures against human diseases that are naturally infected with different pathogens-caused diseases and significantly decrease food production, and it will improve the accuracy of a design, or provide new information to assist in a design problem. Though pesticides are the most effective means of control, they are costly and not environmentally friendly, and toxic. So, it is emphasized on the multiple-intercropped weed vegetable fruits plants of the 4 plants, viz., amaranth, cucumber, cowpea, and okra plants, and determines the effects on pathogens infected diseases; Root Knot and Mosaic Virus. After harvesting, of these 4 plant species, amaranth and cucumber received maximum infection, forming the Eco-Friendly Highly- Economical Potential-Biomedicines Cover-Catch Weed-Vegetable-Fruits-Crop-Plants, conserving Biodiversity-Sustainable Climate-Health-Development Green-Socio-Economic-Implications Agriculture- Horticulture, though all are highly susceptible to pathogens, the large audience including farmers will be able to learn, use and enjoy the double benefit; by controlling diseases, and by marketing, and this will help the audience in their job. In biomedicines, weed-vegetables-fruits, and spices (ginger, turmeric, and garlic) OR the plant-Mosaic-Virus has been developed as antigenic epitopes derived from the vaccine targets-COVID-19 infectious epidemic disease agents, and the chimeric virus particles, use in vaccine formulations or treatments, as list all other benefits; cost-effective emergency-healthcare easily-available safe-edible prepare-able easy-applicable future-personalized-potential-biomedicines act as Preventive- Measures and Safe-Alternative to Live-Replicating-COVID-19 Vaccines, by increasing our natural immune system, which is one of the milestone events amidst many important changes in the past decade that have necessitated formulation of a new outlook and strategy for preventing Future-Pandemic-Pathogens of 21st-Century-Advances-Research-Diagnosis-Treatment-Control Enriching Food-Security Agriculture- Horticulture Wildlife-Biodiversity-Conservation Green-Socio-Economy Medical-Science and Technology- Communication-Applications-Innovation-Issues, based on the theme—Vision 2040 that would help policy- makers. The scientist and other faculty could

use it to expand their research or teaching also. It is proved that the weed-vegetables-fruits, and spices 'Biomedicines' production fully depend on agriculture- horticulture production, showing Ecology of Biomedicine Physiology in Agriculture Horticulture Enhances Food-Security Wildlife-Biodiversity-Conservation Science-Technology-Communication Issues. And it clues together our experts in infectious disease diagnostics, surveillance, vaccine development, and therapeutics, which will enable a swifter and more focused response to the next global pandemic, and future immunotherapy design in type-2 diabetes and other inflammatory conditions also. And in the future ultra highly diluted combined biomedicines may be used for the 'Vaccine Nationalism Equity and Passport for All', and this provides a practical solution to a problem that could simplify or make a designer's job more efficient.

Audience Take Away Notes

- Through publication and awareness, the audience will be able to use what they learn from the presentation, The Ecology of Biomedicine Physiology in Agriculture Horticulture Enhances Food-Security Wildlife-Biodiversity-Conservation Science-Technology- Communication Issues, and Prevent Future-Pandemic
- The large audience will be self-sufficient by cultivating and harvesting the medicinal weed, vegetables, fruits, and spices as regular meals for the preventive measures against human diseases, and also for the preparation of medicine, income from export and import, etc. opening paths for jobs
- Yes, vide different publications as common medicinal weed, vegetables, fruits, and spices as regular meals, and bioactive components enriching Agriculture-Horticulture-Forestry-Biodiversity-Wildlife-Conservation-Environment-Socioeconomy-Clinical-Treatment-Methods Medical-Science Global-Health Geospatial-Information-Management Technology- Communication-Geography-Socioeconomy-Issues
- It has been already proved different forms of medicinal weed, vegetables, fruits, and spices, provide a practical solution to a problem that could simplify or make a designer's job more efficient for; the most-cost-effective-easily-manufacture-able-easily-applicable-easily-available-and-side-effects-free-eco-friendly-medicines improving Agriculture-Horticulture
- It will improved and focused the accuracy of a design, or provide new information to assist in a design problem on the consumption of nutritious and traditional medicinal weed, vegetables, fruits, and spices as regular meals for the preventive measures against human diseases that are naturally infected with different pathogens-caused diseases and significantly decrease food production, and it will improve the accuracy of a design, or provide new information to assist in a design problem. Though pesticides are the most effective means of control, they are costly and not environmentally friendly, and toxic. So, it is emphasized on the multiple-intercropped weed vegetable fruits plants of the 4 plants, viz., amaranth, cucumber, cowpea, and okra plants, and determines the effects on pathogens infected diseases; Root Knot and Mosaic Virus. After harvesting, of these 4 plant species, amaranth and cucumber received maximum infection, forming the Eco-Friendly Highly-Economical Potential-Biomedicines Cover-Catch Weed-Vegetable-Fruits-Crop-Plants, conserving Biodiversity-Sustainable Climate-Health-Development Green-Socio-Economic- Implications Agriculture-Horticulture, though all are highly susceptible to pathogens, the large audience including farmers will be able to learn, use and enjoy the double benefit; by controlling diseases, and by marketing, and this will help the audience in their job. In biomedicines, weed-vegetables-fruits, and spices (ginger, turmeric, and garlic) OR the plant- Mosaic-Virus has been developed as antigenic epitopes derived from the vaccine targets- COVID-19 infectious epidemic disease agents, and the chimeric virus particles, use in vaccine formulations or treatments, as list all other benefits; cost-effective emergency- healthcare easily-available safe-edible prepare-able easy-applicable future-personalized- potential-biomedicines act as Preventive-Measures and Safe-Alternative to Live-Replicating- COVID-19 Vaccines, by increasing our natural immune system, which is one of the milestone events amidst many important changes

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- inflammatory conditions also. And in the future ultra highly diluted combined biomedicines may be used for the 'Vaccine Nationalism Equity and Passport for All', and this provides a practical solution to a problem that could simplify or make a designer's job more efficient
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Biography

Dr. Subhas Chandra Datta, Ph.D., Researcher, Editors, Reviewers, and headmaster, expert in Agriculture- Horticulture-Pathology-Geospatial-Ecosystem-Technology, Alternative-Traditional-Biomedicines, Education, Environment-Plant-Protection-Biotechnology, Sericulture-Entomology, Tissue-Culture, Nematode-Control, Bio-agents-Allelopathy,

Behavioral-Science, Clinical-Treatment-Methods, Physiology-Research, Science-Technology-Communication Biodiversity-Wildlife-Conservation-Socioeconomy-Environments, and Homeopathy (evidence-by-more-than-107 publications-and-books). He has expertise in evaluation and a passion for improving the health-and-wellbeing. His open and contextual evaluation- model-based-on-responsive-constructivists create new pathways for improving healthcare, and he has built this model after 29 years of experience in research, evaluation, teaching, and administration both in research-and-education-institutions. His 1st-plant-based biomedicines in plant-homeopathic forms 'Cina' achieve the 'World's Top-Most-Articles' in the 'Public-Medical-Health of WHO'. His valuable work has got patented under the 'Central-Silk-Board (CSB)' in 2005. He is an honorary member of the different a- prestigious organizations.

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Development of quinoa (Chenopodium quinoa) as a new multi-purpose crop in Israel

Quinoa (Chenopodium quinoa Willd., Amaranthaceae) is an environmental stress-resilient crop of increasing global importance. Quinoa grains exhibit high nutritional value as they have a high protein level, contain all the essential amino acids, are gluten-free and are also rich in bioactive compounds. Quinoa is also evaluated worldwide for its potential use as a forage crop due to the high nutritional value of the entire plant for livestock. In a previous study, six quinoa accessions were sown in northern Israel at two different winter dates for two years using scarce irrigation. In plots sown in November 2016 and 2017 or January 2017 and 2018, hay Dry Matter (DM) yield ranged from 8,820-12,310, 5,270-8,850, 11,480-12,710 and 10,190-12,340 kg·ha-1, respectively; grain yield ranged from 3,220-4,730, 1,540-2,220, 4,010-5,630 and 4,280-6,360 kg·ha-1, respectively; straw yield ranged from 4,580-9,180, 550-1,000, 5,230-6,420 and 3,220-4,170 kg·ha-1, respectively. Quinoa hay and straw quality were high, as crude protein concentration reached 19.9% and 10.6%, respectively with an In Vitro DM Digestibility (IVDMD) of 75.8% and 54.2%, respectively. The high quinoa hay biomass and grain yield, as well as high hay quality, suggest a high prospect for quinoa cultivation in Israel and other Mediterranean countries, as a dual-purpose crop for grain production and livestock feed. In another study, we evaluated the row-spacing effect on quinoa growth, yield, and grain quality under Mediterranean conditions. We hypothesized that lower row spacing would reduce quinoa stem diameter and increase yield, but may reduce grain quality. Two quinoa accessions were sown in Northern Israel with 16, 26 or 80 cm between rows during two consecutive years, on November and January each year. Plant density at harvest ranged from 22-260 plants m-2. Plant height and stem diameter ranged from 77-126 and 6.3-10.5 cm, respectively. Hay, grain and straw yield ranged from 2,259-17,979, 1,604-4,266 and 1,212-3,660 kg·ha-1, respectively. Grain Protein Content (PC) ranged from 5.2-14.2 and Thousand-Grain Weight (TGW) from 2,033-3,446 mg. Plant density, hay, grain and straw yield were negatively correlated to row spacing. Stem diameter was positively correlated to row spacing, while there were no correlations between this parameter and plant height, grain PC or TGW. Results indicated that 16 cm between rows might be optimal, as this produced the greatest yields without affecting grain quality. However, as it may result in plant lodging, 26 cm row spacing should also be considered.

Audience Take Away Notes

- The presentation will provide a wide scope over an under-utilized stress-resilient crop
- The presentation will provide a glimpse of novel aspects of quinoa cultivation
- The presentation will show the pipeline for developing a new crop

Biography

Dr. Lior Rubinovich is a principal investigator at Migal Research Institute, Northern Agriculture R&D, currently working in the field of mitigation of climate change adverse effects in crop plants. His research topics include plant physiology, molecular genetics and introduction and breeding in subtropical and field crops, mainly avocado and quinoa. Lior earned his PhD in Plant Sciences at the Faculty of Agriculture, Hebrew University of Jerusalem. He accomplished his postdoctoral fellowship at Migal Research Institute in the field of the production of valuable health-promoting biomolecules using in-vitro cultures. His scientific achievements include publications in prestigious international peer-reviewed scientific journals and international provisional patents.

Augusta Costa[1]*, Carla Nóbrega[1,2]

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Preferential allocation of currently assimilated carbon in young cork oaks (Quercus suber L.)

Understanding the allocation of currently assimilated carbon by leaves in young cork oaks (Quercus suber L.) is crucial to determine the main physiological factors limiting growth in field conditions, under a changing climate. In this study, for the first time, allocation patterns of recently assimilated carbon by leaves in branches at different positions on the shoots of six-year-old cork oaks were assessed through 14CO2 pulse- labeling in late spring (end-May). Our results showed that source leaves retained most of its own current produced carbohydrates, with top branches source leaves retaining the highest amount (64.4%) as compared to either lower (49.4%) or middle (41.7 %) branches source leaves. The greatest percentage of the available current carbohydrates exported from source leaves was found in the root system, ranging between 17.2% and 36.7%. These findings support our conclusion that in young cork oaks, the root system displayed the greatest sink strength for the available current carbohydrates in late spring within the growing season due to its large biomass, and mainly when other strong sinks such as developing leaves are no longer competitive. Under Mediterranean environments in a changing climate, these results are mostly needed for better understanding cork oak survival and growth and for adequate forest management practices towards cork oak woodlands conservation.

Keywords: Mediterranean Evergreen Oak, Cork Oak, 14C-Photoassimilates, Whole-Plant Carbon Source-Sink Relationships.

Audience Take Away Notes

- This is an innovative study on the investment of available current carbohydrates produced by branches leaves in three different positions on shoots, to plant growth and maintenance in late spring
- This research emphasizes the importance of leaves in lower positions for the development of the deep root system of Q. suber which allow the trees to access deep water resources to overcome hot and dry summers in Mediterranean climate
- This study would be of interest to the researchers and academics working on carbon economy of woody plants, in particular, the Mediterranean species

Biography

Augusta Costa is a researcher with expertise in Forestry and Environmental Sciences, working at National Institute of Agrarian and Veterinary Research, I.P. (INIAV) and at NOVA/University of Lisbon, Center for Environmental and Sustainability Research (CENSE). Her research focuses on the forest management and ecology of Mediterranean oak forests with cork oak (Quercus suber L.) specifically on the ecological and economical sustainability of cork oak woodlands, from tree to landscape level. She has published more than 40 papers in scientific journals (WoS) of a total of more than 80 scientific publications.

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Department of Soil and Water Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, India

Interpolating salinity and water logging status using spatial analysis tools

The purpose of this study to overlay salinity and waterlogged maps of observed data at three soil depths and water table depths and predicted data at root zone and transition zone and water table depth for 10th and 20th year over land use land cover map was performed. The electrical conductivity and water table maps had been individually overlaid on land use land cover maps. IDRISI Selva software was used to perform this task. LULC maps were exported from ERDAS Imagine 9.2 to Arcgis 10.1 where it was reclassified by using spatial analyst tool. Further, reclassified map of LULC along with all salinity and waterlogged maps were exported to IDRISI Selva. In IDRISI Selva, maps were reclassified on the basis of severity levels of salinity and waterlogging. The resultant maps of observed EC at three soil depths (0-30 cm, 30-60 cm and 60-90 cm) had shown more area of barren land, wheat and mustard under non saline class (0-2 dS/m) while EC maps of root zone predicted data of 10th and 20th year included maximum area in low salinity zone (2-4 dS/m). The predicted EC maps of transition zone for 10th and 20th year had shown major part under non saline area. Water table maps had showed maximum area in safe zone (> 3 m). After generating prediction maps of both observed and predicted values for 10th and 20th year of EC and water table depth values quantification of severity levels was carried out in GIS environment. The EC and water table depth maps were individually overlaid on land use land cover maps. The resultant maps of observed EC at three soil depths (0-30 cm, 30-60 cm and 60-90 cm) showed more area of barren land, wheat and mustard under non saline class (0-2 dS/m) while EC maps of root zone predicted data of 10th and 20th year consists maximum area in low salinity zone (2-4 dS/m). The predicted EC maps of transition zone for 10th and 20th year displayed major part under non-saline zone. Water table maps showed maximum area in safe zone (> 3 m).

Keywords: Electrica Conductivity and Water Table Maps, LULC Maps, ERDAS Imagine 9.2, IDRISI Selva Sofware, Arcgis 10.1.

Audience Take Away Notes

- Agriculture is a prominent economic sector in several countries and problem of salinity and waterlogging has become major problems in several areas. The methodology is helpful to identify, analyze, deal and prevent further expansion of the problem
- The problem causes severe crop losses and effect economy benefit in any area. It can even make land out of production. Hence identification of problem and its severity is quite important for all those working in this field. Detecting the problem in large is quite cumbersome and time consuming job. Interpolation can easily and quickly identify problem in large area by collecting data from selected observation points
- The paper is quite significant for agriculture field experts to analyze salinity and waterlogging status of an area and reclassify severity levels in GIS environment
- Further for dealing with the problem quantification enables to select suitable treatment for the area.

If the area comes under safe zone prevention measures could be recommended to the stake holders. In case of moderate zone change in cropping pattern with proper irrigation management practices could be implemented. While for severe conditions implementation of properly designed sub-surface drainage system could be implemented

- All above significances and benefits will be helpful for all the representatives who are diligently working in this field (agriculture, engineering, horticulture etc) for betterment and advancement of agriculture sector

Biography

Dr. Upma Sharma studied Agriculture Engineering at the Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, India and completed UG and PG in year 2010 and 2013. She joined the project as SRF under Prof. R. C. Purohit for 6 months. She received her doctorate degree in 2020 at the same institute. In year 2015 she has joined state government service in the Agriculture Department as Junior Engineer. She has attended around 4 conferences and paper publication, 11 training and seminars, has 1 research publication in irrigation and drainage journal, presented 2-2 papers national and international level.

Koffi Christophe Kobenan*, Malanno Kouakou, Kra Norbert Bini Kouadio, Kouadio Emmanuel N'goran, Brou Julien Kouakou, Nogbou Ferdinand Amangoua

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In vitro and molecular docking evaluation of larvicidal effects of essential oils of five aromatic plants on the fall armyworm spodoptera frugiperda JE. Smith (Lepidoptera: Noctuidae) from ivory coast

Faced with the serious consequences resulting from the abusive and repeated use of synthetic chemicals, today rethinking crop protection is more than necessary. It is in this context that the essential oils of the Lamiaceae Ocimum gratissimum and Ocimum canum, the Poaceae Cymbopogon citratus and nardus and a Rutaceae Citrus sp. of known chemical compositions were experimented. The evaluation of the larvicidal potential of the essential oils was done by the method of topical application of the test solutions, on the L_1-L_2 stage larvae from the first generation of S. frugiperda obtained after rearing in an air-conditioned room. Lethal concentrations (LC_{10}, LC_{50} and LC_{90}) were determined after 48 h. After assessing the larvicidal potential of essential oils, molecular docking was carried out to study protein-ligand interactions and their propensity to bind to insect enzyme sites (AChE). The essential oil of O. gratissimum was the most effective with the lowest lethal concentrations (LC_{10} = 0.91 %, LC_{50} = 1.91 % and LC_{90} = 3.92 %). The least toxic oil to larvae was Citrus sp. (LC_{10} = 5.44 %, LC_{50} = 20.50 % and LC_{90} = 77.41 %). Molecular docking revealed that p-cymene and thymol from O. gratissimum essential oil are structurally similar and bind to the AChE active site via predominantly hydrophobic interactions and a H-bond with Tyr374 in the case of thymol. The essential oil of O. gratissimum constitutes a potential candidate for the development of biological insecticides for the fight against insect pests and for the protection of the environment.

Keywords: Essential Oils, Docking Molecular, Larvicidal Effect, Maize, Spodoptera Frugiperda.

Biography

Koffi Christophe Kobenan is a Researcher - Agronomist and Entomologist at the National Centre for Agronomic Research (CNRA) / Cotton Program / Cotton Research Station in Bouaké since April 11, 2022. Koffi completed his studies June 2020 : PhD Agrophysiology – Entomology- University Félix HOUPHOUËT-BOIGNY, Abidjan, Ivory Coast.

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Prediction equation for brinjal crop in mannadipet soil series of Puducherry

To apply soil test based fertilizer recommendations, the soils are to be tested after each crop. Hence it has become necessary to predict the soil test values after the harvest of the crop. It is done by developing post-harvest soil test value prediction equations making use of the initial soil test values, applied fertilizer doses, yields and uptake of nutrients obtained following the methodology outlined by Ramamoorthy et al. (1971).The post-harvest soil test values were taken as dependent variable and a function of the pre-sowing soil test values and the related parameters like yield, uptake and fertilizer doses.

The functional relationship is as follows:

YPHS=f (F, ISTV, yield/uptake)

Where, YPHS is the post-harvest soil test value; F is the applied fertilizer nutrient and ISTV is the initial soil test value of N/P/K. The equation will take the mathematical form,

YPHS= $a+b_1F+ b_2IS+b_3$ yield/uptake

Where, a is the absolute constant and b_1, b_2 and b_3 are the respective regression co-efficients. Using these regression equations, the post-harvest soil test values of N, P and K were predicted after brinjal crop.

The results indicated that under NPK alone treatments, in the case of prediction of $KMnO_4$-N, 87.7 and 87.8 per cent of the variations for $KMnO_4$-N was accounted by the fruit yield and nitrogen uptake respectively. With respect to Olsen-P, the variation was 76.8 per cent with fruit yield and 77.8 per cent with phosphorus uptake. The variation of NH_4OAc-K was 89.2 per cent with fruit yield and 90.8 per cent with potassium uptake were accounted by soil potassium and fertilizer potassium, yield and uptake respectively.

When the field was imposed with NPK + FYM @ 6.25 t ha-1, 81.4 and 80.6 per cent of the variations for $KMnO_4$-N was accounted by the fruit yield and nitrogen uptake respectively. The variation in post-harvest soil nitrogen was accounted by soil nitrogen, fertilizer nitrogen, fruit yield and uptake of nitrogen. With respect to Olsen-P, the variations were 87.1 and 85.9 per cent with brinjal fruit yield and phosphorus uptake were accounted by soil phosphorus and fertilizer phosphorus. The variation of NH_4OAc-K was 84.7 per cent with fruit yield and 84.8 per cent with potassium uptake were accounted by soil potassium and fertilizer potassium, yield and uptake respectively.

When the field was imposed with NPK + FYM @ 12.5 t ha-1, 99.8 per cent of the variations for KMnO4-N was accounted by the fruit yield and nitrogen uptake respectively. With respect to Olsen-P, the variation was 80.9 and 78.0 per cent with fruit yield and phosphorus uptake respectively. In the case of NH_4OAc-K the variation was 90.2 and 87.8 per cent with fruit yield and potassium uptake. Significantly higher R^2 `values recorded for the post-harvest soil test values prediction equations proved that these equations can be used with much confidence for predicting the soil test values after rice.

Key words: Post harvest soil test value, Brinjal yield, Uptake.

Biography

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Influence of crop management on stability rye yield and some grain quality traits

In this presentation, we will discuss a comprehensive study conducted to evaluate the performance of hybrid and population rye cultivars under two different crop management intensities: moderate intensity management (MIM) and high intensity management (HIM). The aim of the study was to assess grain yield, quality, yield components, and variety stability across two growing seasons (2018-2020) at three distinct locations (Choryń, Laski, and Sobiejuchy) within DANKO Plant Breeding Ltd in Poland. Our findings reveal intriguing insights into the advantages of hybrid cultivars over population cultivars in terms of grain yield. The hybrid cultivars consistently outperformed their population counterparts, exhibiting yield increases ranging from 15.0% to 18.1%, depending on location and crop management intensity. However, it was observed that the protein content of hybrid cultivars experienced a slight decrease of 3.0% for MIM and 6.5% for HIM compared to population cultivars. Throughout the study, we also identified key yield components that significantly influenced the overall yield, regardless of cultivar type. The number of spikes emerged as the most influential factor, followed closely by the weight of a thousand grains and the number of grains per spike, showing their importance in determining yield potential for both hybrid and population cultivars. Additionally, we conducted a stability analysis utilizing the ranking sum of the Shukla variance and the mean of the relative performance (Ysi) of a genotype relative to a standard check. The outcomes revealed a low degree of stability for hybrid cultivars, which led to further investigation into stability patterns. The understanding of stability patterns is crucial for making informed decisions regarding variety selection and resource allocation, especially within the context of sustainable resource management. Overall, our research highlights the potential role of rye cultivation in sustainable resource management practices. By adopting hybrid cultivars, farmers and stakeholders can enhance grain yield and optimize resource utilization. However, careful consideration of protein content and stability is essential for striking a sustainable balance between productivity and nutritional quality. During the presentation, we will delve into the details of our methodology, present key data and results, and discuss the implications of our findings. The insights from this study are expected to contribute significantly to the development of resource-efficient crop management strategies, ultimately supporting the sustainable utilization of agricultural resources. Our research can provide valuable guidance for stakeholders involved in sustainable resource management, contributing to the promotion of sustainable food security and resource-efficient agricultural practices. We look forward to sharing our findings and engaging in productive discussions with the audience regarding the potential benefits and challenges of adopting hybrid rye cultivars for sustainable agriculture.

Audience Take Away Notes

- **Performance Comparison of Rye Cultivars:** The presentation will provide a comprehensive understanding of the performance differences between hybrid and population rye cultivars under varying crop management intensities (MIM and HIM). Attendees will gain insights into the specific yield, quality, and yield component variations observed in each type of cultivar across different locations.

- **Impact on Resource-Efficient Crop Management:** The presentation will explore how the adoption of hybrid cultivars can contribute to resource-efficient crop management strategies. Attendees will learn how hybrid cultivars can lead to enhanced grain yield and optimize resource utilization, which can be of great significance for farmers and stakeholders looking to maximize productivity while managing resources sustainably.
- **Stability Analysis for Variety Selection:** The presentation will delve into the stability analysis conducted using the ranking sum of the Shukla variance and the mean of the relative performance (Ysi) of a genotype relative to a standard check. Attendees will gain insights into the identification of stability patterns and how these patterns can assist in making informed decisions regarding variety selection and resource allocation. This knowledge can be applied in various agricultural contexts to ensure consistent performance and stability of chosen cultivars.
- **How attendees can use this knowledge:** Farmers and Agronomists: Farmers and agronomists can utilize the findings to make informed decisions on which cultivars to choose based on their specific location and crop management intensity. The insights gained will help them optimize crop productivity while considering factors like grain yield, quality, and stability.
- **Plant Breeders and Researchers:** Plant breeders and researchers can use this research as a foundation for further investigations into rye cultivar improvement. The findings can guide the development of new hybrid cultivars with enhanced traits and stability, leading to better crop varieties in the future.
- **Policy Makers and Agricultural Industry:** Policy makers and stakeholders in the agricultural industry can use this knowledge to promote the adoption of hybrid cultivars and sustainable resource management practices. The insights can contribute to more efficient agricultural policies and strategies focused on food security and resource optimization.
- **Educators and Students:** Faculty members and students in agricultural sciences can use this research as a reference for teaching and expanding their knowledge in crop management and breeding. The presentation can serve as a valuable case study and real-world example for understanding the performance and stability analysis of crop varieties.
- **Sustainable Resource Management:** The findings contribute to the broader goal of sustainable resource management, ensuring the responsible use of agricultural resources to support long-term environmental and economic viability.
- **Food Security and Nutrition:** By optimizing grain yield and considering protein content, the research contributes to enhancing food security and nutritional quality, addressing global challenges related to food production and distribution.
- **Designers and Engineers in Agriculture:** Professionals involved in designing and engineering agricultural systems can benefit from the insights on crop performance and stability. This information can lead to more efficient and effective agricultural practices, ultimately benefiting both the industry and the environment.

Biography

Mr. Abu Zar Ghafoor studies at Sichuan Agricultural University, China and graduated as MS in 2021. He then joined the research group of Prof. Marcin Studnicki at the Institute of Agriculture, Warsaw University of Life Sciences. He is currently studying in 3rd year of my PhD at Warsaw University of Life Sciences. He has published 13 research articles in well know peer reviewed journals.

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Underutilized horticultural crops for nutritional security

The global horticultural industry has grown several-folds in the last 50 years. World fruit production is estimated at 676.9 million tonnes, while vegetable production has been estimated at 879.2 million tonnes. Global annual consumption of flowers is estimated in the range of 40 - 60 billion US $ with China and India amongst the highest producing countries. The horticulture industry is flourishing and opening up new prospects of R & D, skill and employment generation due to current awareness about the changing lifestyle, dietary habits, processing and exportation. The challenges of overcoming malnutrition to majority of the global population are yet to be fulfilled, hence horticulture has major role to play. Indian Horticulture sector has been the mainstay of Indian Agriculture with a contribution of about 30 per cent to the agricultural GDP from about 14 per cent area and 40 per cent of total export earnings in agriculture as a whole. Horticulture production increased 13-folds from 25 million metric tons during 1950-51 to 331 million metric tons during 2020-21 surpassing food grain production. Currently, with 18% area, this sector contributes to about 33% of the gross value-added in the agricultural GDP of the country. India ranks second in production of horticultural crops contributing to about 12% of world's fruit and vegetable baskets. India has vast diversity of underutilized horticultural crops of economic importance and several of which are yet to be mainstreamed.

The present day's agriculture is relying less than 100 plant species to provide food and nutrition to more than 90 percent of the population. There are more than 12,500 edible plant species in the world. Out of these, about 7,000 species have been used to a significant extent by humans at some point in time. A large number of horticulture edible species remain neglected. In the present situation, the horticcultural production must look for the sustainable use of the available diversity in the exotic and neglected under-utilized horticultural crops. The presentation will provide an opportunity to know the underutilized horticultural crops of India that will be used for researchers, teachers, extension workers, policy makers, traders and entrepreneurs to discuss various strategies to achieve nutritional security in India and world.

Audience Take Away Notes

- Audience will go for germplasm exchange and cultivation
- Underutilized horticultural crops taken for other faculty to do research viz., nutritional studies, molecular work, human health benefit and value addition
- This will provide a practical solution to a problem of nutritional security
- It will provide new information to assist in a design problem

Biography

Dr. C. Ravindran, working as Associate Professor and Head, Horticultural Research Station, Tamil Nadu Agricultural University, Kodaikanal, Dindigul District, Tamil Nadu, India. His contribution towards the FAO Hortivar data base, Global Horticulture Assessment, Global Consultations on Farmers' Rights has been noteworthy. He has published more than 5 Books, 15 Research papers, 10 Book Chapters, 30 popular articles in several reputed National & International Journals. He is author/editor/co-editor of 5 journals, He is life member of several national scientific societies' viz., HSI, SAH, SPH, ISAH, ISVS, HHDS, NESA, and International Society for Horticultural Science (ISHS), World Association for Soil and Water Conservation (WASWAC) and Asia-Pacific Chemical, Biological& Environmental Engineering Society (APCBEES). He has handled several research projects by different Funding Agencies across India. He awarded with various awards by prestigious institutions, Organization and societies across India (12 Nos) and abroad (3 Nos).

Sire Diedhiou[1]*, Yaya Diatta[1], Arfang Ousmane Kémo Goudiaby[1], Mariama Dalanda Diallo[2], Ibrahima Ndoye[3], Saliou Fall[4]

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Effects of organic amendments on the dynamic and composition of herbaceous species in a saline environment in lower Casamance (Senegal)

The present study aims to characterize the weed flora in the saline lowlands paddy filed of Enampore. Rainfed rice production is characterized by low yields due to salinity and weeds being major constraints. The trials were conducted in 2020 and 2021 in two sites (Selecky and Essyl). Surveys and observations were conducted before, during and after rice sprouts emerged. This work resulted in the identification of 24 species in 22 genera and 11 families. The dominant families are represented by the Poaceae (25%) and Cyperaceae (25%). Dicotyledons and Monocotyledons represent 50% each. This study reveals that 16 species are common to both test sites and 13 species to both areas (saline and non-saline). However, the frequency of weeds decreased between years and zones. The number of species listed in non- saline conditions is respectively 20 in both 2020 and 2021 against 16 species in saline conditions at the same period. Organic amendments had no significant effect on the diversity and composition of grasses ($P>0.05$). The Shannon index indicates that diversity is generally low but higher in non-salineareas. The Beta index is higher in sites than in areas. This suggests that within sites individuals are evenly distributed among the different species.

Key words: Weeds, Salinity, Organic Amendments, Rice Cultivation, Enampore.

Biography

Sire Diedhiou joined the University Assane Seck of Ziguinchor in 2013, Sire has been involved with studies related to Soil Microbial Ecology and Fertility in Senegal and in particular in the South of Senegal. Sire has worked previously at CIRAD and IRD research institutes in topics involving the management of soil fertility and plant nutrition.

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Functional and species composition of understory plants varies with mistletoe-infection on host trees in a semi-arid African savanna

Mistletoes are a keystone species that influence plant and resource heterogeneity in semi-arid savannas. They enhance nutrients underneath tree canopiesvia high leaf turnover, nutrient-rich litter, and highly decomposable leaf litter, which also facilitate host litter decomposition; and through droppings and other debris from birds and animals visiting the mistletoes. Further, mistletoes reduce their hosts' competitive edge, thus creating microhabitats that support higher understory species richness. However, little is known on how understory species and functional trait assemblages, in both canopy and intercanopy spaces, are affected by varying mistletoe intensities. This study examined whether there were variations in species composition, species and functional diversity of understory plants within high- and low mistletoe-infection canopy patches and theiradjacent intercanopy spaces. A 'mistletophily index', which calculated the affinity of each species to each of the four different microhabitats, was developed. The four microhabitats had significantly different species compositions, and subcanopy patches had significantly higher species richness and diversity, and functional diversity, compared to their adjacent intercanopy spaces. While 34% of the recorded species had a strong affinity towards canopy patches,9% were associated intercanopy spaces. Intercanopy spaces were mainly dominated by high grazing value grasses and V. karroo juveniles, whilst canopy patches of high mistletoe-infection had significantly higher grass (of mixed grazing value), forb, and tree diversity. High animal disturbances contributed to the elevated species richness and species and functional diversity (by reducing understory competition) within high mistletoe-infection canopy patches compared to the other microhabitats. High volumes of animals passing through to the high mistletoe-infection trees could have contributed to the different species composition of high- compared to low mistletoe-infection intercanopies. Decreaser grasses associated with low-intermediate disturbance were abundant in low mistletoe-infection canopy patches. Nonetheless, species richness and diversity, and functional diversity, increased with increasing mistletoe infection, thus grass, forb and tree species diversity were 17% to 43% higher and functional diversity indices were 0.5% to 28% greater in high- compared to low mistletoe-infection canopy patches. Consequently, 15% and 10% of the recorded species showed a strong positive affinity to high and low mistletoe infection canopy patches, respectively.Variations between high and low mistletoe-infection canopy patches, are attributed to higher decomposition rates from the relatively higher mistletoe litter turnover, leading to canopy patches with higher soil nutrients and increased nutrient cycling rates. Subsequently, high mistletoe-infection canopy patches had a higher occurrence of species that favour semi-shade, high soil moisture and nutrients and those that are prevalent on disturbed sites. Therefore, by enhancing spatial heterogeneity, variations in mistletoe infection facilitate biodiversity and to a lesser extent vegetation structural diversity in these semi-arid savannas. This study contributes to understanding the extent to which mistletoes may be more of a friend than a foe. Certainly, overly-high mistletoe densities may kill the host, but by keeping parasite

densities in the mid-range, local environment enrichment can be encouraged. Therefore, it is crucial to improve our ability to harness mistletoe positive ecological effects. Thuscomparative work is currently being done in Bushbuckridge South Africa to improve this understanding.

Biography

Dr. Tsitsi Maponga is aNational Research Foundation-funded postdoctoral researcher at the South African Environmental Observation Network, under the primary mentorshipof Dr. Dave I. Thompson and her former PhD supervisors. Tsitsi has a PhD in Plant Ecology (2021) from the University of the Witwatersrand under the supervision of Professor Ed. T.F. Witkowski and Professor Hilton G.T. Ndagurwa. She obtained her MSc in Sustainability (Environment & Development) at the University of Leeds in the United Kingdom,funded by the Canon Collins Trust and her BSc (Hons) was in Forest Resources and Wildlife Management from the National University of Science and Technology, Zimbabwe.

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Crop modeling for future climate change adaptation

Crop susceptible to drought and heat stress is increasing due to climate change. Consequently, new analytical strategies are urgently required to determine sources of adaptation, and pyramid them into new sustainable cultivars for food security. Here we offer an overview on how modeling analytical tools serve to predict crop adaptive responses to ongoing climate change. First, we will describe how climate data meets ecophysiology modeling in order to forecast in situ stresses. Second, we will encourage coupling these climate-based ecophysiological inferences with genomics, as proxy to model standing natural adaptation already contained within current crop landraces, and their wild relatives. Third, we will discuss genomic-enabled modeling alternatives to optimize the introgression of such adaptive genetic variation into elite customized cultivars. Finally, we will prospect alternative models that could boost de novo adaptive variation, such as in silico breeding models, speed breeding, and genome editing. Throughout this compilation of case studies and reflections, readers will be able to identify the need for more robust high-resolution ecological data, combined with explicit empirical summary statistics of the genomic diversity within crop genepools. Only then, ecophysiological-based models would meet genomic-enabled predictions of the adaptive potential in current crops, empowering sustainable food security in the face of climate change.

Audience Take Away Notes

- Predict crop adaptive responses to ongoing climate change
- Determine sources of adaptation, and pyramid them into new sustainable cultivars
- Indeed, model standing natural adaptation contained in current crops
- Indeed, optimize genomic-enabled predictive breeding of customized crops
- Empowering sustainable food security in the face of climate change

Biography

Dr. Andrés J. Cortés holds an Associate Research position as Geneticist at the Colombian Agricultural Research Corporation (AGROSAVIA), CI La Selva. Dr. Cortés graduated as Plant Geneticist (PhD) from Uppsala University (Sweden), and as Biologist (BSc Hons, MSc) from Universidad de los Andes (Colombia). His research experience dates back to the International Center for Tropical Agriculture (CGIAR – CIAT), the University of Fribourg (Switzerland), the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL – SLF), and the Swedish University of Agricultural Sciences (SLU). Dr. Cortés is interested in investigating the genetic adaptive potential in plants and trees of agro-ecological interest using genomic, evolutionary, and ecological tools.

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Argonaute 5 (TaAGo5) gene functions in wheat-Russian wheat aphid interaction

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 Kurdjomov, Hemiptera, Aphididae is one of the most devastating aphid pests affecting wheat cultivation in South Africa and other regions. Studies on small RNA that regulate genes imparting resistance to wheat against Diuraphis noxia have predicted an Argonaute 5 (TaAGO5) gene as a possible role player in the resistance response. Functional characterization revealed that TaAGO5 is crucial in regulating the response to infestation by Diuraphis noxia. Knockdown of TaAGO5 by 22% in Diuraphis noxia resistant wheat resulted in a completely susceptible phenotype. The fecundity and stress levels of Diuraphis noxia feeding on these silenced plants were similar to aphids feeding on the susceptible controls. Thus, TaAGO5 is crucial in the defense response by wheat plants during aphid feeding and this is similar to Nicotiana benthaminia plants experiencing arthropod herbivory. Additionally, TaAGO5 was differentially regulated by the Barley Mosaic Virus (BMV) used in the functional characterization. This provides evidence that TaAGO5 could play a role during virus infection of wheat. The role of AGO5 proteins in plant responses to arthropod herbivory and virus infection is known for dicotyledonous plants. Here, we present data that indicate that this role of TaAGO5 is conserved in wheat and possibly for monocotyledonous plants. These observations extend our knowledge on the roles of AGO proteins in plant resistance.

Audience Take Away Notes

- The audience will be able to adopt and use the Virus-induced gene silencing method that I learned from this study. They will be able to silence genes and determine their functions in plants
- 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 used the VIGS method to silence genes. This method is an effective tool for gene function analysis in plants. It is easy to perform this technique and is not that expensive
- This study provides new information on gene silencing in monocotyledonous plants

Biography

Dr. Phumzile 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.

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Assessing the effectiveness of digital farm field school extension approach for technology dissemination to tea smallholdings in Sri Lanka

The tea smallholding sector plays a dominant role in the tea industry in Sri Lanka. However, they faces many constraints such as lack of technology, scarcity of skilled labor and inputs, low productivity, high cost of production, etc. In searching viable mechanism to address the above issues, Farmer Field School (FFS) Approach was implemented as a pilot project by Tea Smallholding Development Authority (TSHDA) in Sri Lanka through the Rehabilitation of Degraded Agricultural Lands Project (RDALP) funded by Food and Agriculture Organization (FAO). Due to COVID- 19 pandemic situation, FFS programs were conducted in virtual platform and named as a Digital Farmer Field School (DFFS). Learning and knowledge sharing sessions of DFFS were conducted via Zoom by creating approximately 30 WhatsApp groups, with the participation of farmers, extension officers. This study aims to assess the effectiveness of the Digital Farmer Field School (DFFS) extension approach to improve the adoption rate of cultural practices toward increasing tea smallholdings' land productivity and income generation. The stratified purposive sampling technique was performed to select 50 tea smallholders who participated in DFFS programs and another 50 farmers who have not attended the same programs (NDFFS Group) in five Grama Niladhari Divisions in the Kandy district. A cross-sectional field survey was administrated to collect primary data using a pretested survey instrument and validated its internal consistency by applying a reliability test (Cronbach alpha value of 0.8224). A scoring system, 5-point Likert scales, and indexes were developed to measure variables, and descriptive analysis, hypothesis testing, and multiple regression model was used to explain its relationship. The result shows there was a significant difference between DFFS and NDFFS tea smallholders on the ICT literacy index ($t = 12^{***}$), the Knowledge and adoption index related to agricultural practices ($t = 10.69^{***}$), the productivity of land ($t = 2.429^{**}$) and average monthly income from tea land ($t = 2.5005^{**}$). The multiple regression model is fitted significantly ($P < 0.05$). R square of the model expresses that 92% proportion of the variance in DFFS effectiveness is explained by ten independent variables in the model. Accordingly, organizational assistance ($r=0.375^{***}$), facilitation conditions ($r=0.199^{**}$), effort expectancy ($r=0.213^{**}$), income generated from tea land ($r=0.4378^{***}$) and social factors such as age ($r=0.138^{**}$), gender ($r=2.459^{**}$), work force as family members ($r=1.049^{*}$) education ($r= 1.312^{ns}$) and affordability for ICT use ($r=0.000$ ns) are positively correlated with degree of effectiveness whilst experience ($r=-0.348^{ns}$) is negatively correlated with the same. The result of study revealed that organizational assistance, effort expectancy and facilitation conditions highly influence on the effectiveness of digital farmer field school. DFFS participants have gained a considerable ICT literacy when compare with NDFFS farmers. This study proved that the DFFS approach is effectives an agricultural innovation and dissemination platform for improving farmers' knowledge and changing their attitude for the adoption of cultivation practices towards improving tea smallholdings' land productivity and income generation in Sri Lanka. DFFS is an Information and Communication Technology (ICT) based digital learning environment for farmers and other stakeholders in the rural knowledge system and needed policymakers' attention to implementing DFFS approaches to technology transferring and attract diversified farmer groups and other stakeholders in the different sectors of the Sri Lanka as well as the globe.

Keywords: Adoption, Effectiveness, Digital Farmer Field School, ICT Literacy, Tea Smallholders.

Audience Take Away Notes

- Importance of application of Digital platform for technology transfer to the rural farming community in tea smallholding sector in Sri Lanka as modern Information and Communication Tools (ICT) play an important role in improving the availability of market information and agricultural development with advancement of ICT Sector
- Due to COVID-19 pandemic physical gathering of conventional technology transferring methods such
- as seminar, field day, farmer field visits, group discussion were restricted and digital farmer field schools was initiated in digital platform as an alternative option to technology dissemination
- Digital Farm Field School and ICT usage is a novel experience for tea small holding sector in rural areas. Therefore, this study was mainly focus on investigation on the effectiveness of DFFS conducted by Tea Smallholder development Authority
- The study results revealed effort expectancy and facilitation conditions are highly influence on the effectiveness of digital farmer field school and DFFS participants have gained a considerable ICT literacy when compare with NDFFS farmers
- This study proved that the DFFS approach is effectives an agricultural innovation and dissemination platform for improving farmers' knowledge and changing their attitude for the adoption of cultivation practices towards improving tea smallholdings' land productivity and income generation in Sri Lanka
- The DFFS is anticipated as one of the rural innovations that can reduce the difficulties of Tea extension officers traveling to visit the tea small farmer groups in remote areas an insufficient number of extension workers to assist the farmer groups and to overcome the disconnect between agricultural and environmental issues
- DFFS is a Information And Communication Technology (ICT) based digital learning environment for farmers and other stakeholders such as researcher, extension officers, inputs and service providers, transport and market agents etc., in the rural knowledge system providing an up-to-date communication platform, rural services, and information as an alternative and complementary system to conventional rural extension service
- This study was mainly focus on investigation on the effectiveness of DFFS in tea smallholding sector. There are several DFFS programs have been done also in other crop sectors in Nuwara-Eliya and Badulla Districts in Sri Lanka and further studies on social impact on DFFS in different sectors could be carried out in future
- DFFS is an effective technology dissemination tool according to this study, therefore DFFS also can be applied to replace existing conventional technology dissemination up to some extent
- Relationship between effectiveness of DFFS and its' affordability to access via mobile devices or ICT instruments are somewhat questionable specially for rural farming community due to unexpected increasing trend of cost of the devices under volatile market situation prevailing crisis situation of the country. Hence, government or doner agency should make an intervention to initiate sound IT environment for easy accessibility to DFFS Programs such as establishing ICT center, IT based farmer club, IT saloon with free WIFI zones in smallholding gathering common places
- Development of user friendly activities in DFFS Approach are required with the IT technology advancement compared to the activities designed for conventional FFS Approach
- Digital platform for technology transfer play an important role in improving the availability of updated market information and agricultural development
- DFFS becomes best option for developing interaction between farmer and extension officer as well as among peers attached to each Whats App groups as physical gathering is restricted by covid 19 pandemic health guidelines

- The DFFS is anticipated as one of the rural innovations that can reduce the difficulties of extension officers traveling to visit the farmer groups in remote areas
- The DFFS is best solution for any extension system having an insufficient number of extension workers to assist to farmer
- The DFFS approach is cost effective compare to the conventional extension methods as it has more coverage within short period of time
- The DFFS also helps to overcome difficulties of staff traveling to remote areas to meet farmers and DFFS provides relevant extension services to rural farmer groups

Biography

Dr. Lalith Amathunga Head/Department of Export Agriculture, Uva Wellassaa University of Sri Lanka, is a dedicated Agricultural Extensionist and environmentalist graduated as B.Sc. Agriculture from University Ruhuna in 1987 and he obtained his Master degree of M.Sc. Environmental Science from the University of Colombo in 2000 specializing in the impact of climate change on tea productivity. He doctored in the field of Agricultural Extension specializing in Public-Private Partnership Extension in the tea sector from the University of Peradeniya in 2015. He worked as a Senior advisory officer at Tea Research Institute in 1991- 2010 and Senior Manager Tea Extension at John Keells Group in 2011-2020, and currently working as a Senior Lecturer in Uva Wellassaa University of Sri Lanka.

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

Fusarium wilt disease- A threat to cucurbits

Fusarium wilt is a common vascular wilt fungal disease of cucurbits which poses a serious threat to its cultivation. It is responsible for causing huge economic losses to cucurbits around the world. Cucurbits are one of the oldest cultivated vegetable crops which are rich in vitamins, minerals as well as dietary fibre. Among cucurbitaceae family, the most important crops which are infected by Fusarium wilt disease are cucumber, watermelon, muskmelon, bitter gourd, pumpkin, bottle gourd etc. Fusarium wilt caused by Fusarium oxysporum is a soil-borne fungus which produces resting spores that can survive in the soil for many years. This pathogen, F. oxysporum has a high level of host specificity, which is classified as a formae specialis. The formae speciales are morphologically similar, but they are strictly host-specific like in cucumber (F. oxysporum f. sp. cucumerinum), bittergourd (F. oxysporum f. sp. momordicae), muskmelon (F. oxysporum f. sp. melonis) etc. All stages of the plant growth are susceptible to the fungus, and disease symptoms may appear in the form of yellowing of the leaves, stunted and poor growth, chlorotic foliage, and defoliation. In case of high disease severity, whole root become dark brown in colour, soft rot symptoms develop near the crown and it ultimately lead to death of the plant. The disease is favoured by high temperature as well as warm moist soils. F. oxysporum attacks vascular tissues of the plant and chokes the vessels with the spores thereby, preventing the water uptake by the plants. The pathogen causes losses to cucurbits in terms of quality as well as quantity because along with the reduction in yield it reduces the sugar content of the fruits and make them appear dull also which reduces the market value of cucurbits. The long-term survival of Fusarium in the soil and the evolution of new races make its management difficult. Although there are resistant varieties available, but the threat of more new virulent strains or mutations to harm formerly resistant crops is of major concern.

Audience Take Away Notes

- Audience will be able to know the importance of the disease and the losses caused by them. This knowledge will help them to prevent the losses caused due to 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 its importance and the management practices which they can follow
- Yes, 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 my presentation will help understand the root-cause of the problem
- Yes, it will definitely provide new information on the topic which will help the researchers to expand their research.
- The listeners specially 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, the problems as well as solutions of the topic

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 seven ongoing major research projects at IARI and has also successfully completed three 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 Dr. Rajendra Prasad Excellence Scientist Award, Young Scientist Award in Plant Pathology, Research Excellence Award etc. She is a life member of many renowned societies.

Vir Singh
Department of Environmental Science, GB Pant University of Agriculture and Technology, Pantnagar-263145, Uttarakhand, India

Cultivating resilience: The synergy of farmers and nature in Himalayan agriculture

The Himalayan Region, with its awe-inspiring landscapes embracing extreme biodiversity and diverse ecological niches has nurtured unique agricultural practices that showcase an exceptional interplay between farmers and nature. Himalayan farming communities have thrived for centuries despite many challenges posed by marginality, fragility, and high degree of inaccessibility in mountain areas, in addition to extreme climates, and complex environmental dynamics.

This study examines the profound significance of indigenous knowledge and traditional farming practices that have been consciously preserved and transmitted across generations. These practices serve as vital adaptive strategies that enable farmers to tackle adverse conditions, maintain crop diversity, and manage natural resources efficiently.

By integrating diverse natural resources, traditional wisdom, informal experimentation, and innovations, Himalayan farmers have established sustainable agroecosystems that serve as model for resilience amidst climate change and other physical and biotic pressures. Climate change remains a prominent concern in the Himalayan Region often referred to as Earth's Third Pole. Impacts of climate change on precipitation patterns, temperature regimes, production performance, etc. pose challenges to Himalayan agriculture and highlight the resilience demonstrated by farmers who have devised methods to cope with these fluctuations while safeguarding their traditional farming systems.

One of the mountain agriculture's key features reveals farmers' harnessing symbiotic relationships between biodiversity conservation and agricultural sustainability that contributes to fostering a healthy ecosystem that enhances resilience against environmental stressors. By empowering mountain farmers, promoting gender equality, and recognizing traditional ecological knowledge of the farmers, we can further contribute to enhance food security, food sovereignty, and ecological security of mountain farmers in addition to cultivating resilience in mountain agroecosystems.

Keywords: Agroecosystems, biodiversity, Himalayan agriculture, resilience, sustainability

Audience Take Away Notes

- Exposure to the Himalayan unique agricultural systems would help the audience to replicate mountain experiences in other regions
- This is the research that the participants may like to include in their research programs and teaching
- Farming system-based, biodiversity-centric, resilience-cultivating, and sustainability-oriented agriculture, as projected through this research, would phenomenally help in evolving climate-smart agricultural systems

Biography

Dr. Vir Singh is Emeritus Professor of Environmental Science at GB Pant University of Agriculture & Technology, India. He has more than three decades experience in teaching, research, and extension. He has been educated and trained in many universities and institutes in India and has also worked with many reputed organizations outside India. He has published more than 50 books, many monographs, and more than 250 research papers, book chapters, and popular articles. In his book Fertilizing the Universe published by Cambridge Scholars in 2019, he proposes a Theory of astro-biological evolution.

Abhishek Kumar Singh[1]*, Punita Kumari[2], Shilpi Kerketta[3], Lamella Ojha[4]

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Phytochemicals as natural feed additives for ruminants

Ruminant nutrition plays a crucial role in ensuring optimal animal health and performance. Traditionally, feed additives such as antibiotics and synthetic growth promoters have been utilized to improve feed efficiency and promote growth in ruminants. However, due to concerns over antibiotic resistance and consumer demands for safer and more sustainable animal production, there is a growing interest in exploring natural alternatives as feed additives. Phytochemicals derived from plant sources, including tannins, saponins, and essential oils, have shown promising potential as natural feed additives for ruminants. Tannins are polyphenolic compounds found in various plant species and are known for their astringent properties. They have been shown to modulate rumen fermentation by inhibiting the activity of certain microorganisms, such as methanogens and protozoa, leading to reduced methane emissions and improved feed efficiency. Additionally, tannins possess antimicrobial properties, which may contribute to enhanced gut health and reduced risk of gastrointestinal infections in ruminants. Saponins are glycosides widely distributed in plants and exhibit diverse biological activities. In ruminants, saponins have been found to increase rumen microbial protein synthesis, enhance nutrient digestibility, and promote rumen fermentation. Furthermore, saponins have shown potential to modulate the rumen protozoal population, leading to decreased methane production and improved nitrogen utilization. Essential oils are volatile compounds extracted from plants and possess various biological properties, including antimicrobial, antioxidant, and anti-inflammatory activities. When used as feed additives for ruminants, essential oils have been reported to improve rumen fermentation, enhance nutrient utilization, and modulate rumen microbial populations. Moreover, certain essential oils have shown promising effects on mitigating enteric methane production in ruminants.

The utilization of tannins, saponins, and essential oils as natural feed additives for ruminants offers several advantages, including their availability in abundant plant sources, potential health benefits, and environmentally friendly nature. However, further research is needed to determine the optimal dosage, mode of action, and potential interactions with other dietary components. This chapter comprehensively overview the application and implications of these phytochemicals as an additive for ruminants and further discussed about their usages in different stage of animal performances along with their long-term effects, safety, and economic viability as natural feed additives.

Audience Take Away Notes

- The audience will the audience will learn that the use of phytochemicals in ruminant production systems holds promise for improving animal health, digestion, and nutrient utilization, while also offering potential alternatives to antibiotics and contributing to a more natural and sustainable approach to animal production
- The use of phytochemicals in ruminant production systems can provide valuable tools for farmers, veterinarians, and nutritionists. The use of phytochemicals aligns with the growing demand for sustainable agricultural practices. By reducing reliance on synthetic additives and promoting a more natural approach, farmers can meet consumer expectations and enhance the sustainability of their

operations. Nutritionists can assess the specific needs of ruminants and select phytochemicals that target certain nutritional requirements or promote specific health benefits. Veterinarians can recommend phytochemical-based supplements or treatments to improve animal health, reduce antibiotic usage, and support a more holistic approach to veterinary medicine. Researchers can plan various experimental design to extract more information about their benefits

- By exploring these research areas, faculty members can expand their own research or teaching on the use of phytochemicals in ruminant production systems. They can delve into specific phytochemical sources, mechanisms of action, dosage optimization, formulation techniques, and long-term effects on animal health, production, and sustainability. This research can contribute to advancing our understanding of phytochemicals' role in ruminant nutrition and aid in the development of practical applications for the industry
- The use of phytochemicals in ruminant production can simplify a designer's job by enhancing nutrient utilization, providing targeted health management, offering natural alternatives to additives, supporting sustainability and consumer preferences, and fostering innovation. By leveraging the benefits of phytochemicals, designers can streamline feed formulation processes, develop efficient solutions to challenges, and meet evolving market demands
- The use of phytochemicals may not provide new technical information to assist in the specific details of a design problem, it can offer valuable considerations and tools to address challenges related to animal health, performance, sustainability, and consumer preferences. By integrating the potential benefits of phytochemicals into the design process, designers can make more informed decisions and create designs that align with desired outcomes and industry trends
- These bioactive compounds offer potential solutions for optimizing ruminant health, performance, and sustainability, providing valuable tools for farmers, nutritionists, and researchers in the field of ruminant production. The ease of availability can render them a potential and cheap tool for adoption by farmers and may provide a sustainable solution to many challenges faced by farmers and industry

Biography

Dr. Abhishek Kumar Singh is currently working as Assistant Professor in the Animal Nutrition department at Banaras Hindu University, India. Dr. Abhishek Kumar Singh has completed his BVSc & AH degree he has persuaded his MVSc from Indian Veterinary Research Institute, India. He pursued his Ph.D. in Animal Nutrition from Nation Dairy Research Institute, Karnal, India. Dr. Singh has also worked as Scientist at National dairy Development Board, Anand, Gujarat in animal feed quality control laboratory for two years. Dr. Abhishek Kumar Singh has published more than 25 articles in esteemed scientific journals. He has also authored a book and written many book chapters in national and international books series. He has reviewed many research papers in reputed journals.

Mahendra Singh Pal

Department of Agronomy: College of Agriculture, G B Pant University of Agriculture & Technology, Pantnagar-263145 (U S Nagar), (Uttarakhand), India

Effect of cutting and splitting of nitrogen doses on yield, quality and economics of fodder oat in indo-gangetic plains of India

Field study was conducted at Instructional Dairy Farm, Nagla, G. B. Pant University of Agriculture and Technology, Pantnagar from 2019-20 to 2021-22 during Rabi season (October-November to March-April) to assess the 'Effect of cutting and splitting of nitrogen doses on yield, quality and economics of fodder oat in Indo-Gangetic plains of India'. The experimental site was located in the Tarai region of Shivalik range of Himalayas in between latitude of 29° N to longitude of 79.3° E and at an altitude of 243.84 meter above the mean sea level. The soil was slightly silty clay loam in texture with granular structure having soil pH 6.70, EC 0.25 dS/m, organic carbon 0.75%, available nitrogen, phosphorus and potassium, 200.4. 19.0 and 226.3 kg/ha, respectively. The experiments results indicated that oat varieties UPO-06-1 and UPO-212 gave the highest green and dry fodder yield, respectively, however both were significantly similar. The crude protein production was found higher in UPO-212 but remained significantly equal to UPO-06-1. The gross and net returns were recorded significantly higher in UPO-06-1 but the B:C ratio was significantly higher in UPO-212. Similarly the plant height, number of tillers/m row length, green and dry fodder yield and its respective productivity, crude protein content, crude protein production and economics were found higher at two cuts with 50% N application as basal followed by 50% N at 1st cut that was significantly similar with two cuts with 60% N application as basal followed by top dressing of 40% N at 1st cut. It is therefore concluded that oat variety UPO-06-1 or UPO-212 could be harvested twice with application of 50% N as basal followed by top dressing of 50% N at 1st cut for higher fodder and crude protein yield and net return in Indo-Gangetic plains of India.

Key words: Fodder Yield, Crude Protein, Cutting Management, Nitrogen Dose, Tillers.

Audience Take Away Notes

- Oat is one of the important winter season crop grown for not only for grains but also for feed and fodder. It is a highly nutritious food for human being. It is good source of beer too
- The research paper will highlight the significance of production technologies including different high yielding varieties, nitrogen dose, its use and cutting management so that the productivity could be improved
- It will also describe the crude protein production with change of varieties, N dose and cutting management
- The economics of oat production and B:C ratio will support in decision making process of researchers, farmers and other stake holder to grow oat in different agro-climatic regions of the globe.
- The research paper will force to professors and researchers to think out of box about oat and its good agronomic practices for higher productivity

Biography

Mahendra Singh Pal, G B Pant University of Agriculture & Technology, India

Mahendra Singh Pal

Professor & Head, Department of Agronomy, College of Agriculture, G.B.Pant University of Agriculture & Technology, Pantnagar-263145 (Uttarakhand), India

Bio-fortification of zinc and iron through agronomic manipulation in fodder crops

More than two billion of global population is malnourished particularly in India. Micronutrients deficiency among the people of every age is very common. Agronomic bio-fortification is a feasible and cost-effective means of delivering micronutrients to people who have limited access to diverse diets and other micronutrient interventions. Bio-fortification of crops can increase the levels of micronutrients in final product through application of micronutrients as foliar, soil application, seed priming and seed coating. Hence, the field study was carried out to study the 'Bio-fortification of zinc and iron through agronomic manipulation in fodder crops' during Kharif seasons (July to October) - 2019-20 and 2020-21 at Instructional Dairy Farm, G B Pant University of Agriculture & Tehnology, Pantnagar (Uttarakhand), India. The experimental site was clay loam in soil texture, neutral in reaction, low in available nitrogen, medium in phosphorus and high in potassium content. The experiment consisted of two fodder crops maize (var. African tall) and sorghum (var. SSV-74) in main plot and 7 combinations of zinc and iron application i.e. Control (only rec. NPK dose), 10 kg $ZnSO_4$ /ha as basal + 1% $ZnSO_4$ foliar spray at 45 DAS, 10 kg $FeSO_4$ /ha as basal + 1% $FeSO_4$ foliar spray at 45 DAS, 10 kg $ZnSO_4$ +10 kg $FeSO_4$ /ha as basal + 1% $ZnSO_4$ +1% $FeSO_4$ as foliar spray at 45 DAS, 20 kg $ZnSO_4$ /ha as basal + 1% $ZnSO_4$ foliar spray at 45 DAS , 20 kg $FeSO_4$ /ha as basal + 1% $FeSO_4$ foliar spray at 45 DASa and 20 kg $ZnSO_4$ +20 kg $FeSO_4$ /ha as basal + 1% $ZnSO_4$ + 1% $FeSO_4$ as foliar spray at 45 DAS in sub plot were laid out in split plot design. The recommended dose of fertilizer was 90:40:40::N:P205:K20 kg/ha. The pooled data of two years indicated that fodder maize and sorghum could be fortified with application of 10 kg $ZnSO_4$ + 10 kg $FeSO_4$(Basal/ha) +1% $ZnSO_4$ +1% $FeSO_4$ foliar spray at 45 DAS for higher green and dry fodder yield, net returns and greater Zn and Fe content in foliage in Tarai region of Uttarakhand and also replicated in similar agro-ecological zones of India.

Key Words: Bio-Fortication, Iron, Mazie, Sorghum, Zinc.

Biography

Mahendra Singh Pal, G B Pant University of Agriculture & Technology, India

Sreeni K R

Director, Organic Agriculture (Division) Sarvathobhadram-Organic-Farmers, Peringottukara, Thrissur, Kerala, and Project Manager at PayAgri Innovations Solutions Pvt Ltd., IITM, Chennai, India

Sarvathobhadram-organic initiative: Cooperative model for resilient agriculture by adopting system of rice intensification

The assistance of the Sarvathobhadram-Organic-Farmers' Cooperative helped small and marginal farmers customise, adapt, and customise the system to their unique needs. The Farmers Club, which has 50 members, was established in May 2020 with the goal of assisting farmers in converting to organic agriculture by adopting the System of Rice Intensification (SRI). The club's goal is to promote entrepreneurship, a sustainable means of subsistence, and food security in the Anthikad Block Panchayat. By working with government agencies and utilising convergence, the project addressed climate change and resilience while maximising the programs available to farmers in panchayath. The transformation was sluggish initially, but it accelerated over time, indicating that farmers have variable levels of satisfaction based on a variety of circumstances. Very young rice seedlings are planted singly in a grid pattern in the System of Rice Intensification (SRI), a management strategy for irrigated rice production. The soil is kept moist yet well-drained throughout the whole growing season. Dewatering low-lying fields is the first step in rice farming in a wetland. Fields have typically been surrounded by permanent bunds. The movement of saltwater inward into their fields has been prevented by a network of barrages across the canal and at estuarine mouths. Locally, a system of pumping operations (inflow and outflow) has been designed to pump out excess water and, during times of shortage, to pump water from the river into the canal and ultimately onto the field. If saltwater from estuaries seeps into the field, water is pumped there using contemporary pump sets, which then routes through bunds. Farmers' organisations are working to achieve SDG13 on climate action, which calls for increased resilience and the capacity to adapt local solutions, in order to reduce the risks and tragedies brought on by climate change. This study investigates the adoption of organic farming using the SRI approach, the rise in output, and the effectiveness of the convergence method. The results demonstrate that SRI should be taken into consideration as a potential cultivation method for all farmer's groups as it also tries to identify various obstacles experienced by farmers throughout the paradigm transition from conventional to organic methods (Padasekharam).

Audience Take Away Notes

- Together, farmers in the Kole wetlands work to stop reclamation and the degradation of the unique environment. This process of alternate dewatering and storage necessitates a great deal of forethought. The best method to accomplish this is to keep the wetlands under cultivation. Farmers in the area have created a rice-growing ecology that ensures food security. The Kole wetlands are also a seasonal home for a variety of migrating species. Each contributes to the ecosystem's protection and rejuvenation
- The group together owns approximately sixty-two acres of fertile land with good rainfall and irrigation infrastructure which was not utilized from last 17 years. Internal management rules were developed by the members themselves, who specified their roles and responsibilities. They began with activities such as crop selection, soil testing, seed testing, crop planning, and water budgeting and conservation measures, with instruction from Sarvathobhadram Organic and help from Krishi Bhavan (Agriculture office). The group addressed each stage in order to develop local solutions for farming

- Farmers' cooperative societies have the advantage of collective action, which allows them to benefit from economies of scale by cutting their costs of obtaining inputs or renting services such as storage and transportation. They may also assist their members to become more resilient to economic and environmental shocks by involving them in decision-making processes that create more rural employment prospects or enable them to become more economically and socially empowered. Krishi officers play a critical role in technology transfer and the better use of convergence methods to get the program to the end users, the farmers. Location-specific need-based training stressing local challenges and issues is critical for bringing reasonable improvements to rural communities. Poor resource base and lack of finance, particularly for small and marginal farmers, offer a significant barrier to greater adoption
- Yes. Research can learn the importance of Farmers Cooperative Model and importance of System of Rice Intensification
- Organic farming was a success in Thanniyam panchayath. Farms' confidence in the local agriculture department has improved as well, and most farmers now benefit from government initiatives that use convergence. During covid, farmers regained their confidence, established hundreds of direct and indirect jobs, and regained their self-respect. After 17 years when farming restarted at Kole Wetland, a lot of preparation went into this system of alternate dewatering and storing. Re-using stored water boosts the productivity of the water that has been abstracted, usually in agriculture, allowing for the growth of more crops per drop while maintaining environmental preservation and conservation. Water is at the centre of the Circular Economy. Brown rice flakes and Puttu Podi are value-added products having high demand
- Organic farming contributes to the preservation and improvement of fertility, soil structure, and biodiversity, as well as being fine-tuned to meet local production conditions and market demands. They plan to build a warehouse and begin the process of obtaining organic certification next year, as well as a self-sufficient hamlet that provides healthy food to all. The satisfaction was reported using System of Rice Intensification (SRI) with regard to increasing
- cropping intensity, increase the number of soil beneficial microbes, reducing cost of cultivation, ease in marketing of farm produce, selection of quality seeds, as well as insect biodiversity and preparation of Organic manures and pesticides
- **List all other benefits**
    - It involves decreased soil erosion and better water quality downstream as well as in the wetland
    - Compared to conventionally grown farm products, Organic Matta Rice cultivated at kole wetland offers a more nutrient-dense and morally-sound eating option
    - Farmers in the area have created a rice-growing ecology that ensures food security
    - Rice seedlings were transplanted onto puddled soil with a transplanting machine after 8-10 days. 2–3 seedlings per hill, shallow depth, optimal spacing (14 cm). It aids in increased yields and reduced weeding
    - The roots would absorb more nutrients and develop robustly and widely
    - Jeevamrutham is a less expensive organic fertiliser made from cow dung and urine that helps to protect plants from bacterial and fungal infections
    - Supporting small and marginal farmers in Thanniyam panchayath, Thrissur, Kerala, to modify, adapt, and adjust the system to their unique needs
    - A strategy was created to rebuild the community's agriculture from the ground up, bring in more money, and entice farmers to switch to organic farming after realising the dire circumstances of the paddy farmers
    - After 17 years, the majority of farmers renewed their operations after leaving behind hundreds of hectares of cultivable wasteland

- It's the most difficult task. The wetlands are low-lying areas that are flooded for around six months out of the year, 0.5 to 1 m below mean sea level. Dewatering low-lying fields is the first step in rice farming in a wetland. It is connected to the sea by ponds and canals that are a component of the natural drainage system
- At the Krishi Unnati Mela, an agricultural exhibition organised to inform farmers about the most recent technology advancements in agriculture, Rishaba Yagam, a flagship initiative, was introduced
- The farmers' produce was very valuable as it came during the COVID-19 pandemic
- By providing SHG groups with 50,000 saplings, seeds, and organic fertilisers to begin their kitchen gardens, the effective model was reproduced in several wards of the block
- Sarvathobhadram-Organic helped by identifying direct bulk buyers at the big markets thus eliminating the need for middlemen
- Through kitchen gardening in the block, the project helped 6,500 households by securing food supply and nutrition. The effort was scaled out to cover 25 hectares of wetlands and transform 13 hectares of fallow land into organic vegetable and paddy fields
- Farmers sell their paddy to Supplyco [The Kerala State Civil Supplies Corporation] at a rate of 28 per kilogram, which was set as an MSP [minimum support price] by the Kerala government, but is currently sold at Rs 70 per kilogram due to organic practice
- Branded the Product under Palakkadan Matta (Joythi Rice with 30% bran and 70% bran and Flake) under Sarvathobhadram-Organic
- Therefore, by pumping water inside, dewatering it, and storing it in a cannel, and reusing it an farmers can save 22,00 000 litres or 5,81 179 gallons of water per acres
- After Success of project, it became clear that organic farming using SRI is a more sustainable future for the group

Biography

Dr. Sreeni K R is the Director at Organic Agriculture (Division) Sarvathobhadram-Organic-Farmers', Peringottukara,Thrissur, Kerala, and working as Project Manager at PayAgri Innovations Solutions Pvt Ltd., IITM, Chennai, India which provide farmers with comprehensive support through market, finance, input and technological linkages. He is closely working with farmers to translate cutting edge technologies into farmers solutions, market the farmers produce and promote stainable farming while also improving the quality of life. He is monitoring and analysing farmers producer companies in India. In his previous employment, he served as a program manager for an Amrita Deemed University initiative at Amrita SeRVe. 101 Indian villages have been chosen by the Mata Amritanandamayi Math (MAM) for the Amrita SeRVe program in an effort to assist them become self-sufficient role models for the nation. He is in-charge of the initiative and has transformed numerous villages. He has published 25 academic papers and participated in over 15 international conferences. He is recipient of many awards including TERI-IWA-UNDP (The Energy and Resources Institute -International Water Association - United Nations Development Program) water sustainability award in 2022 and 2023. Additionally, he member in numerous committees and is a member of the Policy making for Doubling Farmer Income initiated by Government of India.

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Plant biostimulant effect of eukaryotic green microalgae on Solanum lycopersicum

Microalgae have been identified as producers of a plethora of bioactive compounds which could have growth stimulating effects on plants. The objective of this study was to investigate if two selected strains of eukaryotic green microalgae belonging to Chlamydomonas and Chlorella genus, designated as cc124 and MACC-360 respectively, have growth promoting effects on tomato plants grown under controlled greenhouse conditions. We investigated the physiological responses of a determinate tomato draft tomato variety cultivated in pots containing a mixture of vermiculate and soil and layered with clay at the bottom. The application of alga whole cell suspensions did not affect the plant height but increased the fruit number, fruit diameter, average fruit weight and total yield. Chlamydomonas strain delayed flowering while Chlorella strain enhanced flowering. For almost all the traits analyzed, the effect of algae treatment depended on the algae strain. Transcription analysis of unopened flower buds revealed the role of microalgae in inducing systemic resistance in plants. These results indicate microalgae not only promotes plant growth but also primes plants for tolerance to both abiotic and biotic stresses.

Audience Take Away Notes

- Microalgae are plant growth promoting microorganisms
- Extraction of bioactive compounds for application to plants is not necessary
- Microalgae based biostimulants can be cost effective in terms of labor, space, energy and time when compared other types of biostimulants
- The strain-specific effects of microalgae on plants is crucial and different algae strains should be investigated and characterized

Biography

Gitau Margaret Mukami studied Natural Sciences, Botany, at the University of Chinese Academy of Science and graduated as MS in July 2017. She joined the Institute of Genetics in Biological Research Centre, Szeged Hungary for a 1-year International Training Course. In September 2018, she joined the research group of Gergely Maróti at the Institute of Plant Biology at the same institution and enrolled for her PhD. in Plant Molecular Biology at the University of Szeged. She graduated with PhD. in July 2023. Her work involves discovering the plant biostimulant potential of microalgae. She has published 3 articles in SCI(E) journals about this work.

Laura Martins de Carvalho
Faculty of Civil Engineering, Architecture and Urbanism of the State University of Campinas (UNICAMP), Brazil

Urban community gardens as a means of female empowerment and urban sustainability: Tackling gender inequality and illegal waste disposal

More sustainable cities require discussing the use of land turned into illegal waste disposal turned into community gardens, recovery of degraded areas, regulation of resource use and issues involving disputes over urban development models. These conceptions are anchored in the paths agreed in global pacts and in the Sustainable Development Goals, which propose more resilient cities, capable of reacting and reinventing themselves. This presentation aims to bring us closer to experiences that show the potential of collective action and solutions led by women who produce not only food, but also new horizons of livelihoods, income generation, and overcoming of structural violence. These community gardens bring us to diverse agricultural practices that take place in Sao Paulo and its surroundings, for food production, against waste and in the search for full use of these, environmental education and other solutions to the problems and challenges that women face and that require institutional actions with intersectoral public policies. The phenomenon of urban and peri-urban agriculture needs to be treated as part of urban planning and, as the different histories and contexts of neighborhoods and regions show, it needs to be considered as plural and diverse. It is not just one way of doing things, but several and with perspectives as different as what is experienced and translated by women collaboratively in the creation of the common.

Audience Take Away Notes

- The audience will be able to see the insights regarding the different types of urban agriculture practices led by women in socially vulnerable areas; the potential for mobilization and popular participation of female urban farmers in social districts; and the transformation of land that was a former waste disposal spot into a community garden
- Scholars, civil society organizations, public servants, practitioners, and policy makers will benefit from the presentation, as multiple stakeholders produce urban agriculture in socially vulnerable areas and engender a process of liberation of oppressive structures for women
- Grassroots urban female farmers networks offer local solutions to complex social problems in socially vulnerable areas such as income generation; access to healthy food in areas of food apartheid; environmental conservation; environmental education; and women emancipation from structural inequalities and violence

Biography

Laura Martins de Carvalho is currently a post-doctoral researcher at the Faculty of Civil Engineering, Architecture and Urbanism of the State University of Campinas (UNICAMP). She is a PhD. in Global Health and Sustainability (Faculty of Public Health – University of São Paulo, 2021); Master of Science in Environment and Development (Trinity College Dublin, 2012); BA in Social Sciences (PUC-SP, 2007). Research topics: urban agriculture in socially vulnerable areas; popular entrepreneurship; urban agroecology; women empowerment in urban agriculture; urban sustainability and urban collectives for sustainability action. She is experienced in conducting and coordinating research in disadvantaged urban communities of São Paulo and Campinas, Brazil; Dublin, Ireland; Lisbon, Portugal; and in rural communities in Rwanda, Africa. She is open for potential collaborations.

11-13 SEPT

DAY 03-VIRTUAL ROOM 02

POSTERS

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PLANT SCIENCE AND AGRICULTURE

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Color characteristic, active compounds and antioxidant activity of java tea

Java tea or cat's whiskers (Orthosiphon aristatus (Blume) Miq.) is herbaceous shrubs with whitish flower resembling a cat's whiskers. Its dried aerial part has been wildly used as traditional herb for the treatment of fever, epilepsy, gallstones, hepatitis, rheumatism, hypertension, syphilis and renal calculus. This plant also shows antioxidant, antibacterial, hepatoprotective, anti-inflammatory, cytotoxic, antihypertensive, and vasodilatation properties. However, apparent color of commercial Java tea is various. Therefore, this work was aimed to study color characteristic, active compounds and antioxidant activity of Java tea. The work was performed by analyzing fifty Java tea commercial products. Apparent color of Java tea samples was range from light yellowish brown to dark brown. CIELab (L*, a* and b*) and CIELCh (L*, C* and h) which numerical system proposed by Commission Internationale de l'Eclairage and the Munsell Color system in numerical scale were determined. DPPH radical scavenging activity and Ferric Reducing Antioxidant Power (FRAP) were assay for antioxidant activities. Active compounds, including caffeic, rosmarinic, sinensetin, eupatorin and betulinic were analyzed by using UHPLC. The results showed that L*, a*, b*, C* and h of Java tea were 44.42±3.48, 3.86±1.42, 21.30±2.36, 21.69±2.43 and 79.85±3.53, respectively. The most common Munsell color code of Java tea samples was 5Y 5/6. Among 5 active compounds, rosmarinic was major compound with 3.96±1.97%. While the others compound contents were less than 0.5%. DPPH radical scavenging activity and FRAP value were 2.79±1.10 and 2.85±1.72 g GAE/kg, respectively. Though, almost all CIE color parameters were significant correlated with active compounds and antioxidant activities, the correlation values were low to negligible. It could be concluded that color is not appropriate quality indicator for Java tea product.

Audience Take Away Notes

- Information of color, active compounds and antioxidant properties of Java tea commercial products
- Java tea active compounds and antioxidant activity were barely correlated with colors
- Color is not appropriate quality indicator for Java tea product

Biography

Dr. Krittaya Petchpoung studied Agriculture at Kasetsart University, Thailand and graduated as BS in 1995. She then studied Biochemistry at Mahidol University, Thailand in 1998. She received her PhD in Toxicology in 2009 at the same institution. She has worked as researcher at the Scientific Equipment and Research Division, Kasetsart University since 1999. She has published 10 research articled focus on color, active compound and antioxidant in Scopus journals.

Larisa Caisrin

Department of Management of livestock products and agri-food safety, Technical University of Moldova, Chisinau, R. of Moldova

Effect of broilers chicken diet supplementation with peat additive on growth performance and quality of produced breast meat

The current trends in the production of broiler chickens indicate the need to look for natural solutions that affect the efficiency of production and the quality of meat. The aim of the study was to evaluate the growth performance and quality of broiler chicken meat with the addition of a Peat Feed Additive (PFA) in feed. In this experiment, 1000 pieces of one-day-old Ross 308 broiler chickens were used. Broilers were divided into five groups, each containing 200 birds. The first experimental diet was supplemented with 0, 50% of PFA, the second - 0, 75%, the third - 1,00%, and the fourth was supplemented by 1, 25% PFA. The Control Group of broilers (CG) was fed a basal diet without the addition PFA supplement. The slaughter yield and the percentage of carcass elements were calculated. Breast muscles were analyzed qualitatively (pH, colour, water-holding capacity, chemical composition). No significant differences were found in growth performance carcass or water-holding capacity features. Addition of peat to feed had a positive effect on higher protein content and lower intramuscular fat in the breast muscles. This demonstrates the potential for the practical use of peat in the production of broiler chickens as a feed additive.

Audience Take Away Notes

- Feed peat additives are of great interest for animal husbandry because they contain organic acids, including humic acids, which, when used in poultry farming, can make a great contribution to the profitability of poultry farming and provide people with healthy and organic poultry products
- The addition of peat additives represents a good potential for a significant increase in the quality of the organic meat produced, as well as for a potential improvement in the growth parameters of the poultry

Biography

Prof. Caisin Larisa studied Animal Husbandry at the State Agrarian University of Moldova. She received her PhD degree in 1987 at the same institution. After postdoctoral fellowship she taught at the Agricultural University of Moldova at the position of an Associate Professor and then as Head of Animal Husbandry Department and after as Head of Department of Management of livestock products and agri-food safety. She has published more than 170 research articles.

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We wish to meet you again at our upcoming events next year...

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