magnus Group

16-17 MARCH, 2023

VIRTUAL EVENT

7TH EDITION OF
GLOBAL CONGRESS ON

PLANT BIOLOGY AND BIOTECHNOLOGY

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BOOK OF
ABSTRACTS

7TH EDITION OF
GLOBAL CONGRESS ON

PLANT BIOLOGY AND BIOTECHNOLOGY

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Welcome Message

It gives me great pleasure to share this virtual space with you today, on the occasion of the presentation 7th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2023), Theme: “Ensuring Sustainability and Global Transformation Through Crucial Plant Science Advances”. Today, more than ever, we must work together with nature, instead of against it. Together we will create a fair, just and climate-resilient future for all. Thank you and I wish you all a very successful Congress.

Yours Sincerely

Carlos Ruiz-Garvia, UNFCCC Global Innovation Hub, Germany

Welcome Message

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 reduces the productivity of conventional crops, in environments such as deserts, and 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 industries 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 7th Edition of Global Congress on PLANT BIOLOGY AND BIOTECHNOLOGY will show how biotechnology is an interdisciplinary field of enormous applications that help developers in a very significant way in the present and in the coming years.

Yours Sincerely

Edgar Omar Rueda Puente, University Of Sonora, Mexico

Welcome Message

I am honored to welcome you to the 7th Edition of Global Congress on Plant Biology and Biotechnology. Plant biology is making rapid strides to deepen our understanding of how pathogens, pests, beneficial symbionts, and other microorganisms interact with plant hosts. This continuum of knowledge advancement would help us develop strategies to protect against pests and pathogens, which cause food losses of one-quarter to one-third or even more in some cases. CRISPR gene editing technology has opened up new avenues for modifying or silencing genes, such as those that advance pathogen interests. Notwithstanding the progress in basic and applied research, the challenges of disease management or harmful plant-biotic interactions are unlikely to diminish. There is a need to prepare for unpredictable plant-pathogen interactions as a result of climate change. The phenomenon of antimicrobial resistance is also visible in plants, where the pathogens are developing relative insensitivity to pesticides over time. This, along with the depleting resources of resistant genes, requires inventing new ways of managing diseases. With new opportunities and challenges, I look forward to exciting research in this Congress for the benefit of reducing biotic harms and helping food security.

Yours Sincerely

Ravinder Goyal, Agriculture and Agri-Food Canada, Canada

Welcome Message

Please be welcome to the 7th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2023). This edition is focused on the theme “Ensuring Sustainability and Global Transformation Through Crucial Plant Science Advances”, and will include multiple scientific sessions covering all the relevant topics in Plant Biotechnology and its applications. Outstanding scientists from all over the world will present their recent research. I hope the Congress will serve as a forum that will provide interaction among researchers, exchange of ideas, and help join efforts to further advance the scientific knowledge in this exciting research area, which is so important for global sustainable development. I look forward to seeing you soon!

Yours Sincerely

Jose J. Pueyo, CSIC, Spain

Welcome Message

I am glad to welcome all those who make small contributions to the ability to understand and use natural processes in plants and use them in their work to create conditions for new knowledge! Allow me to wish you success in cooperation and inspiration for every day of your work.

Yours Sincerely

Vashchenko Victor Fedorovich, Rlets State University, Russian Federation

Welcome Message

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.

Yours Sincerely

Vijayan Gurumurthy Iyer, Techno-Economic-Environmental Study and Check Consultancy Services, India

Welcome Message

On behalf of the scientific committee member and chair of the session, I warmly welcome you to 7th Edition of Global Congress on Plant Biology and Biotechnology, theme on ensuring sustainability and global transformation through crucial plant science advances.This is the 7th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2023) which is going to be held as a Virtual Event during March 16-18, 2023. The conference theme, Impact and Vision: Reaching New Heights, has been carefully chosen to mark such a milestone of our society. I am privileged to be scientific committee of this important conference. We are incredibly grateful for the time and effort you have put into making this virtual event a success. And I would also like to thank the organizing committee for their hard work and dedication in bringing this Global Congress together. I hope that you will find this conference to be a valuable experience and that you will leave with new knowledge, inspiration, and connections. Thank you again for being here and I wish you all a productive and enjoyable event.

Yours Sincerely

V Duraipandiyan, Entomology Research Institute, India

Welcome Message

I am delighted to welcome you all to the 7th Edition of Global congress on Plant Biology and Biotechnology! With a rapidly growing world population, deterioration of soil heath and the dramatic effect of climate change on plant growth, we plant biologists have a challenge of feeding the world. The field of plant biology and biotechnology has been advancing expeditiously in recent times. Rapid advancements in 'gene editing' are propelling the fields of plant biology and plant breeding. CRISPR genome editing has a tremendous potential to address the impact of climate change on crop yields and food security. Developing a low-emission method for fertilizing crops is an important area to focus on. Conservation of plant biodiversity is an equally important task in front of us. We have seen the advancements in Artificial Intelligence (AI) and growing applications in plant biology. Rapid detection of pests and pathogens, prediction of plant health and crop yield is now possible using AI. Feeding 10 billion people sustainably by 2050, would require the use of cutting-edge technologies and dedicated efforts from all of us.

Yours Sincerely

Subramanian Sankaranarayanan, Indian Institute of Technology, India

Keynote Speakers

Mohammad Babadoost
University Of Illinois, United States

Ravinder Goyal
Agriculture and Agri-Food Canada, Canada

Jorge Zavala
University of Buenos Aires, Argentina

Edgar Omar Rueda Puente
University Of Sonora, Mexico

Carlos Ruiz Garvia
UN Climate Change Global Innovation Hub (UGIH), Mitigation Division, UNFCCC, Germany

Vashchenko Viktor Fedorovich
Rlets State University, Russian Federation

Jose Pueyo
CSIC, Spain

Vijayan Gurumurthy Iyer
Techno-Economic-Environmental Study and Check Consultancy Services, India

Gautam Mukhopadhyay
Derozio Memorial College, India

Chellapilla Bharadwaj
ICAR-Indian Agricultural Research Institute, India

Subramanian Sankaranarayanan
Indian Institute of Technology, India

V Duraipandiyan
Entomology Research Institute, India

Susmita Shukla
Amity University, India

Hajri Haska
Agricultural University, Albania

Thank You All...

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 120 different countries and 2000 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.

ABOUT
GPB 2023:

After the prodigious success of our annual conference on plant biology, Magnus Group is delighted to announce and invite one and all to its signature event 7th Edition of Global Congress on Plant Biology and Biotechnology (GPB 2023) which is going to be held as a Virtual Event during March 16-18, 2023.

The congress will be centred on the theme *Ensuring Sustainability and Global Transformation Through Crucial Plant Science Advances.*

Plants are sessile, blind, and deaf living entities that may appear solitary like individuals to us. We often forget that these intricate organisms are totally responsible for life on Earth. Plant Biology & Biotechnology is a burgeoning scientific field where state-of-the-art advances, extended new research methodologies, and enabling innovation for agricultural, food, and non-food uses emerge on a regular basis. GPB 2023 strives to focus on delivering the most recent scientific developments in plant biology and biotechnology, using an inclusive approach that includes long-standing research sectors as well as new breakthrough topics, on all aspects of science policy and ethics, and encouraging young students and scientists to participate. We cordially encourage plant biology researchers, scientist, academicians, plant biotechnologists, agriculturists, botanists, soil science experts, farmers, industrialists and individuals having interest in plant science from around the world to present and discuss their work and findings at the congress, contributing to a dynamic, successful, and health-safe Congress.

Through this two-day scientific gathering we hope to encourage collaborations at this symposium in the emerging subject of spatial and temporal dynamics in plant biology. Researchers, students, scholars and postdocs working at various levels of investigation will attend the conference. Our goal is to generate conversations and collaborations at various spatial and temporal scales ranging from atoms and molecules through cells, people, and populations and from Milliseconds through minutes to years. The conference structure was created to encourage fruitful contact and discussion among scientists from various backgrounds, disciplines, and stages of their careers.

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16-17 MARCH

DAY 01

KEYNOTE FORUM

7TH EDITION OF
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PLANT BIOLOGY AND BIOTECHNOLOGY

Strategies to improve heavy metal tolerance in legumes: Metal-tolerance genes and the role of tolerant rhizobia

Legumes play a key role in sustainable agriculture. Mineral nitrogen deficiency is an important limiting factor for plant growth in arid and semi-arid regions, and rhizobia-legume symbioses are the primary source of fixed nitrogen in such areas. The introduction of legumes and their nodulating rhizobia may have an important effect on the reclamation of degraded and polluted marginal soils for sustainable agriculture. Such recovery is becoming an urgent matter due to the increasing extension of affected lands and the ever-rising requirements for food and feed. Heavy metal contamination is increasing worldwide in both wild ecosystems and agricultural soils due to natural processes, but mostly to anthropic activities, and they can enter the food chain by being taken up by plants. It becomes of the greatest interest to obtain legume varieties and bacterial inocula with enhanced tolerance to heavy metals for use in soil reclamation, which can be achieved by traditional trait selection or by biotechnological procedures. We will present our results on the selection of tolerant legume cultivars and rhizobial strains, as well as our biotechnological approaches to obtain legumes and rhizobia with improved tolerance to heavy metals. Understanding the genetic basis of metal accumulation and tolerance in plants is important for reducing the uptake of toxic metals in crops, as well as for removing heavy metals from soils by means of phytoremediation. Following exposure of *Medicago truncatula* seedlings to cadmium (Cd) and mercury (Hg), we conducted a Genome-Wide Association Study study (GWAS) using Relative Root Growth (RRG) and leaf accumulation measurements that allowed us to identify genes involved in heavy metal tolerance and accumulation. It is known that metal-tolerant symbiotic rhizobia have the potential to increase legume metal tolerance. We isolated from Hg-contaminated soils several *Ensifer medicae* strains that nodulate M. *truncatula*. We assembled and annotated the genomes of those rhizobia strains that showed wide variation in tolerance to Hg, and found structural variations in mercury reductase (*mer*A) and alkylmercury lyase (*mer*B), which are involved in Hg detoxification, and entire *mer* operons that were associated with the most Hg-tolerant strains. Genes in the mer operons and duplicated *mer*A copies throughout the genomes showed significantly higher gene expression in the tolerant vs. less tolerant rhizobia strains. In the most tolerant E. *medicae* strain, a whole *mer* operon was located in a large additional 71-kb plasmid, which was not present in any other strain. Plasmid transfer to non-tolerant bacterial strains arises as a possibility to obtain increased Hg tolerance.

Abdelhakim Msaddak[1], Michael Clear[2], Aditi Bhat[2], Brendan Epstein[3], Peter Tiffin[3], Miguel A. Quinones[1], M. Mercedes Lucas [1], Timothy Paape[2] and Jose J. Pueyo[1*]

[1]Department of Soil, Plant and Environmental Quality, Institute of Agricultural Sciences, CSIC, Madrid, Spain

[2]Department o Biology, Brookhaven National Laboratory, Upton, NY, USA

[3]Department of Plant and Microbial Biology, University of Minnesota, St. Paul, USA

Biography

Jose J. Pueyo is a Full Professor and Group Leader at the Institute of Agricultural Sciences, Spanish Research Council (CSIC), Madrid, Spain. He is author of more than ninety scientific publications. After obtaining his PhD, he worked as a Research Assistant at UCD, Dublin, Ireland, as a Fulbright Fellow at UCSD, San Diego, USA and as a Research Associate at TSRI, La Jolla, USA. He then joined the Centre for Environmental Sciences, CSIC, Madrid, Spain, where he was appointed Director. He also was Chair of the COST Committee on Food and Agriculture, and Scientific Advisor for the State Research Agency.

Audience Take Away Notes

- Soil contamination by heavy metal is an increasing problem that poses widespread health risks for humans, animals, plants, microorganisms and ecosystems
- Both the germplasm screening and transgenic approaches are valid ways to obtain metal-tolerant varieties and inoculants, which are important for food and feed security and soil phytoremediation
- Genes and loci which are relevant in plant heavy metal tolerance and accumulation have been identified that can be used both as tolerance markers and to transform crops so that they can be safely cultivated in moderately contaminated lands
- The mechanisms of heavy-metal tolerance and detoxification in rhizobia have been identified
- The identification of a stable plasmid containing the *mer* operon capable of mercury detoxification opens the possibility to tranfer Hg tolerance to non-tolerant bacterial strains, including different rhizobial species and other beneficial bacteria, such as PGPR

Environmental Health Impact Assessment (EHIA) processing investigations during the post covid world for an efficient plant biology and biotechnology towards sustainable development

Many plant biology and biotechnological industries are increasing to fight the pandemic. Sustainable development is a kind of development that meets the needs of the present without compromising the ability and efficiency of future generations to meet their own needs. Environmental Health Impact Assessment (EHIA) can be defined as the systematic identification and evaluation of the potential environment healt impacts or effects of plant biology and biotechnology industrial projects, plans, programs, policies or legislative actions relative to the physical-chemical, biological, cultural and socioeconomic components of the total environment (1). EHIA is proposed for all the plant biology and biotechnology engineering plants for sustainabledevelopment (2). Total Quality Management (TQM) is based on quality and sustainability management from the customer's point of view (3). TQM processes are divided into four sequential categories: plan, do, check, and act. This is also called the PDCA cycle for continuous process improvement. In the *planning* phase, bio- industrialists define the problem to be addressed, collect relevant data, and ascertain the problem's root cause; in the *doing* phase, bios industrialists develop and implement a solution, and decide upon a measurement to gauge its effectiveness and efficiency; in the *checking* phase, bio industrialists confirm the result through before-and-after data comparison; in the *acting* phase, bio industrialists document their results, inform others about process changes, and make recommendations for the problem to be addressed in the next PDCA cycle. The industries must adopt the triple bottom line framework towards the concept of economic, environmental, and social entrepreneurship (4). Environmental impact assessment can be defined as the systematic identification and evaluation of the potential environmental impacts (effects) of the proposed plant biology and biotechnology industrial projects, plans, policies, programs, or legislative actions relative to the physical-chemical, biological, bio-chemical , biophysical, cultural, socio-economic, and anthropological components of the total environment (5). Strategic environmental assessment (sea) process can be broadly defined as a study and check of the potential impacts (effects) of a proposed project, program, plan, policy or legislative action on the environment and sustainability (6). The legislation of EIA process was established in 1970 by the enactment of the National Environment Policy Act (NEPA) in the USA. This was first time that EIA process became an official tool

Vijayan Gurumurthy Iyer

Techno-Economic-Environmental Study and CheckConsultancy Services, Paruthipattu, Avadi, Chennai, Tamil Nadu, India

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering at the Indian School of Mines, Dhanbad, and graduated as M.Tech. In 1998. He has served as Technical Officer in Indian Council of Agricultural Research, wef May 1985 to Feb. 1998. He received his PhD degree in 2003 at the same institution. After three years postdoctoral fellowship duly supervised by Prof. Dr. Nikos E. Mastorakis at the World Scientific Engineering Academy and Society, Athens, Greece, he pursued post-doctoral elaboration. He obtained the position of a Professor in Institute of Technology, Harames University, Harar, \ Ethiopia during 2004-2005. He has published more than 380 research articles in SCI (E) journals and has been cited 4000 to sustain his hinder of 50.

in scientific sector to protect the environment. Three of the significant terms while complying with the requirements of NEPA process are “environment inventory”, “environment impact assessment process”, and “environment impact statement”. EIAs of design research structures were undertaken in order to protect environment during the year 1950 in Japan, Europe and North America (7). The purpose of the EIA process is to encourage the consideration of the environment in organizational planning and decision making process. Historically, the choice of proposed projects, policies, plans, programs, permits, procedures or legislations was primarily based on only one criterion called economic viability. Today, it is necessary to consider three criteria of economic, environment and social viabilities.

The pre covid World has been characterized by the passage of legislation dealing with the environment including legislations of control of water, air and land pollution, solid and hazardous waste management, resource conservation and recovery protection (RCR), and soil and groundwater remediation. It is proposed that Industry 4.0 impacts (effects include source specific, industry-specific, and generic generation or decay) protocol for SEA process for the performance of sustainable environmental plant biology and biotechnology industrial engineering plants is helpful for sustainable development. SEA process is a predictable process that is devised in to two phases (8). The first phase is called Initial Environment And Sustainability Evaluation (IESE) and the second phase is Environment And Sustainability Impact Studies (ESIS). IESE has been carried out for genetically modified Bt Cottons and genetically modified naturally pigmented colour seed-cotton (or *kapas*) varieties during the research year 1992-1993 at Central Institute for Research on Cotton Technology, Bombay to determine whether potentially adverse effects on environment and sustain efficacy with respect to physical, chemical, biological, economical, socio-economic environment and on human health and well-being are significant or whether mitigation measures can be adopted to reduce or eliminate adverse environment and sustainability impacts (9). Detailed SEA procedure can be called as ESIS that was applied to identify and evaluate the environment and sustainability consequences both beneficial and adverse impacts in order to ensure that the environment and sustainability impacts were taken in to consideration in organization’s planning and decision making process (10). SEA process is designed to identify and predict the potential impacts of the physical, biological, ecological, socio-economic, cultural environment and on human health and well-being are adequately protected (11).

Audience Take Away Notes

- The concept of environmental health impact assessment for plant biology and biotechnology through real time analysis of but cottons and naturally pigmented color cottons. The audience will be able to acquire skill and
- EHIA concepts were elaborated

High, medium and low cover gradient of vallisneria spiralis in association with plant species diversity and phenology of five tropical ponds near Kolkata, India

Vallisneria spiralis, a widespread but least concern aquatic macrophyte as per red list of IUCN (2019). The species is well known oxygenator plant in our aquarium. V. *spiralis* is reported to be more acceptable rosette forming type than canopy forming ones in respect to rampant public uses specially of our rural and peri-urban tropical ponds. To date, risk assessment of this plant invasion in temperate lakes reported no major threats on native biodiversity and ecosystem functional services. Only presence of V. *spiralis* in clear water of Indian ponds had been observed and recorded but abundance, phenology of associated species was poorly studied. Co-existence and phenology of aquatic plant species including their major growth forms were investigated to collect baseline data in five selected eutrophic ponds (total nitrogen: 7 to 9 mgl^{-1}; total phosphorus: 0.1 to 0.2 mgl^{-1}) around Kolkata (India), used for bathing, washing and cleaning of utensils. Ponds were selected on the basis of gradient of Vallisneria spiralis coverage [high (70%): two ponds, medium (45%): one pond and low (6%): two ponds] for fifty-one months, in order to gain an idea about species biology, their diversity strategy and utility. Total of twenty hydrophytic species including dominant (≥50% occurrence) angiosperms, less-dominant (≤50% occurrence) ferns and macro-algae were recorded during the study period. Average number of less-dominant species presence was observed to be greater in high cover ponds. *Nymphaea pubescens*, a locally threatened species, *Rotala rotundifolia*, an uncommon species of the area and *Azolla pinnata*, a useful biofertilizer species were found to be present. More than half of total recorded plant list was noted to be useful/economic from different aspect of utilization by rural communities for their livelihood subsistance. Significant associations (P≤0.05) with invasive (*Alternanthera philoxeroides* in all ponds and *Eichhornia crassipes* in medium as well as low cover ponds) and non-invasive [*Nymphoides hydrophylla* and *Marsilea minuta* (dominant form) in high cover ponds, *Ludwigia adscendens* in medium and low cover ponds] were observed according to Jaccard Similarity Coefficient. Implications of these results have been discussed in light of conservation of local species and management of invasive macrophytes. When growth-form was considered, species in same categories of ponds pooled together for representative samples. Highest monthly occurrence for emergent species, record of reproductive structures in nearly 60% of survival period of floating types and dense pond area infestation for almost half of the presence of submerged form

Gautam Mukhopadhyay

Department of Botany, Derozio Memorial College (under West Bengal State University), Rajarhat, Kolkata, West Bengal, India

Biography

Dr. Gautam Mukhopadhyay awarded Ph.D. (Botany) from University of Calcutta in 2005 with National Junior Research Fellowship from Biological Sciences division, Indian Statistical Institute, Calcutta. He was Ex-Visiting Scientist of Agricultural and Ecological Research Unit of same institute (2011). During his oral presentation in *Symposium on Aquatic Weeds* organized by European Weed Research Society also visited Laboratory of Phytoecology of University of Metz and Institute of Botany of University Louis Pasteur, Strasbourg, France. He is in the position of Senior Faculty (UGC qualified, Govt. Approved), department of Botany of Govt.-Aided College. He has published 7 research articles in SCI (E) journals.

were unique features of high cover ponds. Thus baseline data showed particular mode of phenological trait should be studied for a specific type of growth form in ponds with rich V. spiralis.

Audience Take Away Notes

- This could be a training data for study of plant diversity in Vallisneria dominated tropical ponds
- Check list of useful plants for food/feed, medicinal value, as biofertilizer specially for rural communities for their livelihood subsistence
- Yes very few research/study on tropical ponds, that should be increased
- Since it was a baseline study for anthropogenic uses of ponds and aquatic plants, thus results could be checked and methods may redesigned for large number of ponds
- I have tried to use proper statistical analysis for this time-series data, thus might showed accuracy, but need large number of sample size to come to any firm conclusion
- Discussion in light of conservation of local plant species and management of invasive macrophyte very frequent problem of tropical ponds) in order to maintain ecosystem health and services

Transformative innovation on plant-based solutions to satisfy core-human needs can shift the needle on climate change

At the UN Climate Change Conference COP27 in Sharm el-Sheikh in November 2022, government delegates and a variety of experts highlighted crucial innovative approaches to tackle climate change notably in the areas of energy, food and buildings at Global Innovation Hub (UGIH) dialogues organized by the UN Climate Change secretariat.

Sustainable food production systems and sustainable construction materials are two key areas in which impacts can be made to significantly shift the needle in terms of slashing greenhouse gas emissions and building resilience to climate change, while making progress on the UN's Sustainable Development Goals.

In these sectors, proven technologies such as beans and bamboo exist which have major potential to alleviate the climate crisis. The challenge is to quickly overcome barriers and to scale up transformative solutions to climate change so that the global economy can be decarbonized by 2050 and societies can be made resilient to impacts of climate change including more heatwaves, floods and droughts. One way to do this is through intelligent matchmaking and coalition building between institutions, companies, and governments. At COP27, the UN Climate Change secretariat launched version 1.0 of the Virtual Hub site - a tool for collating government entities' demand for climate and sustainability solutions. Co-designed with the Amazon Web Services Innovation Studio and Open Earth Foundation, version 1.0 of the platform is designed to be a platform of global ambitions to tackle climate change.

This presentation at the 7th Edition of Global Congress on Plant Biology and Biotechnology will elaborate on key results of discussions on two focus areas at the UGIH Dialogues in Sharm el-Sheikh: promoting beans as one of the world's most sustainable foods and betting on bamboo as a highly sustainable building material.

Audience Take Away Notes

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

Carlos Ruiz-Garvia

UN Climate Change Global Innovation Hub (UGIH), Mitigation Division, UNFCCC, Bonn, Germany

Biography

Carlos Ruiz-Garvia joined the UNFCCC secretariat (UN Climate Change) more than 11 years ago, where he is currently appointed as a Project Manager of the Global Innovation Hub (UGIH). Mr. Ruiz-Garvia is a graduate of Forestry Engineering (Universidad de Concepción, Chile), has a PhD in Agricultural Engineering (University of Göttingen, Germany), a M.Sc. in Forestry from the same university, a Project Management Diploma (University of Stetson, USA) and Economics at Harvard. His master thesis on Climate was granted an international award for excellence in forestry sciences. Throughout his career, Carlos provided leadership to multi-stakeholder organizations committed to innovations on sustainability standards.

Challenges on identification and management of bacterial pathogens of plants: A case study of an emerging bacterial disease of cucurbits

Bacterial spot of cucurbits, caused by Xanthomonas cucurbitae, is an emerging disease in cucurbit growing areas throughout the world. The pathogen can infect all cucurbit crops, but its major hosts are pumpkins and winter squash. Leaves and fruits of cucurbits are infected by

X. cucurbitae at all growth stages. Infected fruits by X. cucurbitae are usually colonized by opportunistic fungi and bacteria and rot. Our surveys in the North Central Region of the United States showed that 159 of 180 and 71 of 79 of pumpkin and squash fields, respectively, had fruits infected with X. cucurbitae. The mean incidence of fruits with bacterial spot in pumpkin and squash fields surveyed was 25 and 19%, respectively. We identify the pathogen based on the colony morphology on yeast Dextrose Agar (YDC), Polymerase Chain Reaction (PCR) test using RST2/RST3 primers, and pathogenicity test on susceptible pumpkin 'Howden'. X. cucurbitae survived in infected leaves and fruits in the field for more than 24 months. X. cucurbitae also survived longer than 18 months in the seeds at 4 and 22°C and remained viable. The pathogen was isolated from asymptomatic weeds in pumpkin fields. We eradicated the pathogen in the naturally-infected and artificially-infested seeds by hot-water treatment at 55°C for 15 min, and also HCl treatment at 0.5% concentration for 40 min. In our field trials, copper compounds, acibenzolar-s-methyl (ActiGard 50 WG), fungicides famoxadone + cymoxanil (Tanos 50D WG) and quinoxyfen (Quintec 250SC), and an extract from Reynoutria sachalinensis (Regalia) reduced the incidence and severity of bacterial spot on both leaves and fruits compared to the controls. However, no chemical or biocontrol agent provided satisfactory management of the disease. Crop rotation did not prevent occurrence of the disease. We screened 81 commercial cultivars of gourds, pumpkins, and squashes, as well as 300 Cucurbita spp. accessions, for their resistance to X. cucurbitae under greenhouse and field conditions. None of the commercial cultivars was resistant to the pathogen. Among the accessions tested, 9 and 21 accessions were classified as resistant and less resistant, respectively. Resistant and less resistant accessions belong to the species Cucurbita maxima, C. maxima subsp. *maxima*, C. maxima subsp. andreana, and C. okeechobeensis subsp. martinezii. This was the first report of potential resistance to bacterial spot of cucurbits.

Mohammad Babadoost

Salisu Sulley, Abbasali Ravanlou, Sita Thapa, and Xiaoyue Zhang
Department of Crop Sciences, University of Illinois, Urbana, USA

Biography

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

A new approach that focuses on the basal immunity mechanism to slow down the development of antimicrobial resistance in plants

Antimicrobial Resistance (AMR) has been on the rise in both plants and animals. A continuous use of antimicrobial agents such as pesticides against plant pathogens creates selection pressure for the pathogens to mutate and evade the toxic effect. It prompts more usage of the pesticides to ensure crop productivity, which results in a vicious cycle of higher pesticide doses and microbial survival. The ever- increasing amount and number of pesticides released into the environment has put a question mark on the environmental and health safety of the practice. By using a bioinformatics approach, we developed a pipeline that can identify peptides from a large proteome database potentially displaying properties of innate immunity. The latter is a basal form of defense that provides the first layer of protection. We analyzed pea proteomics data to generate possible fragments with 18 amino acids. For the pipeline, different algorithms or programs were combined. Duplicated fragments were removed by using the CD-Hit algorithm. The sequences were evaluated through five antimicrobial activity predictors: sense the moment, DBAASP, CAMP, ADAM and AxPep. The positively charged residue distribution, α-helix formation, and hydrophobicity of selected peptides were manually evaluated to further reduce the number. The top ten candidates from the curated list were evaluated for their toxicity against fungal, oomycete, and bacterial pathogens, which are the causative agents for many diseases in commercial crops. Depending on the pathogen, the peptides showed IC50 values in the range of 1–20 μM, which could be suitably deployed to manage the diseases through eco-friendly means.

Audience Take Away Notes

- It will educate the audience about the dangers of extensive use of pesticides or antibiotics. The practice is unsustainable, and the consequences of antimicrobial resistance could be catastrophic
- There is an urgent need to reduce our reliance on these chemical agents and manage the disease through environmentally friendly means. It requires constant efforts to discover alternative ways to control the pathogens
- The solutions could be found through an integrated approach involving different disciplines of science, including but not limited to microbiology, plant pathology, immunology, molecular biology, agriculture and bioinformatics
- The present research provides an innovative path for the identification of biomolecules with toxic properties against a wide range of bacterial and fungal pathogens

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[3]Troplia LTDA, Brasilia-DF, Brazil

Biography

Dr. Goyal received his PhD degree in Biochemistry from the Punjab Agricultural University, Ludhiana, India. He taught at a University and served in ICAR, India before accepting a post-doctoral fellowship at the USDA-Henry Wallace Plant Sciences Institute, Beltsville, MD, USA in 2000. He served at the University of Maryland, MD, and University of Victoria, Canada. Dr. Goyal is now an adjunct professor with the University of Lethbridge and a scientist with AAFC Canada, where he is leading a research program on plant biology with a focus on antimicrobial resistance. He has published more than 40 research articles.

Sustainable development via plant cultivation through in vitro system: A change in scenario

Plant tissue culture has emerged in such a way that it finely integrates with biotechnology and agricultural systems and being a key enabler in support of many pharmaceutical and industrial outcomes. Since 1902 there have been tremendous advances in plant culture and their application has spawned great diversity in science. In the last few decades, tissue culture techniques have been developed to meet the increasing thrust for achieving large scale production of enhanced secondary metabolite, plant growth, biological activities, and genetic transformation studies of almost all plant species. Significant advances in techniques to deal with hurdles of recalcitrant tree species, endangered horticultural crops and low concentrations of secondary metabolites have been sought. The increased use of plant culture system has been evident for a superior perception of plant- oriented compounds such as secondary metabolites and tissue culture protocol of economically important plants. Due to the development of modern techniques, several specific protocols have been developed for the commercial scale production of a wide range of several plant species including leguminous, horticultural and tree species. Plant tissue culture has made significant contributions recently and is now an indispensable tool for the advancement of agricultural science and modern agriculture. Agriculture puts food on our plates hence it is a key factor in covering the SDGs of achieving food security, productive employment for all along with supporting the livelihoods of over millions of farmers around the world. These farmers face many challenges from climate change, threats to biodiversity and feeding a growing population. While *in vitro* protocols presented as quite an answers to these challenges, there is need to continue enhancing and exploring in this state of art of culturing plant tissue in vitro followed by commercialization of *in vitro* raised tissue culture plants.

Audience Take Away Notes

- Audience will learn the techniques related to large scale production of tissue culture raised plants and will understand the commercial aspects in varied agriculture sectors
- The presentation revolves around plant sciences, plant biotechnology, horticulture and many other topics. Audience will learn about the importance of plant biotechnology and their everyday use in different related and interrelated industries which will be helpful in attaining SDGs
- Agriculture sector is very broad and comprises various job

Susmita Shukla

Applied Plant Biotechnology Research Lab, Centre for Plant and Environment Biotechnology, Amity Institute of Biotechnology, Amity University, Noida (U.P), India

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. 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.

- opportunities. Research in Applied Plant Biotechnology has potential to double the farmer's income by growing high-value crops raised through plant tissue culture techniques consistently which can be an engine for agricultural and economic diversification
- Yes it will help in developing translational research projects
- Yes the difficult plant species can be grown utilizing this technique moreover large scale production and round the year availability is also possible
- Yes it will also help in understanding the whole mechanism of developing quality planting materials
- **List all other benefits**
    - Generate woman empowermen
    - Develop technological innovation
    - Research and commercial applications
    - Job opportunity

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SPEAKERS

7TH EDITION OF
GLOBAL CONGRESS ON

PLANT BIOLOGY AND BIOTECHNOLOGY

Yifeng Wang[1*], Yuxuan Hou[1], Jiehua Qiu[1], Huimei Wang[1], Shuang Wang[1], Liqun Tang[1], Xiaohong Tong[1] and Jian Zhang

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

Abscisic acid promotes jasmonic acid biosynthesis via a 'sapk10-bzip72-aoc' pathway to synergistically inhibit seed germination in rice (*oryza sativa*)

Seed germination is coordinated by diverse phytohormones. Abscisic Acid (ABA) and Jasmonic Acid (JA) both inhibit seed germination, but their interactions during this process remains elusive. Here, we report the identification of a "SAPK10-bZIP72-AOC" module, through which ABA promotes JA biosynthesis to synergistically inhibit rice seed germination. In reception of ABA signal, SAPK10 exhibits auto-phosphorylation activity on the 177th serine, which enables it to phosphorylate bZIP72 majorly on 71st serine. The SAPK10-dependent phosphorylation enhances bZIP72 protein stability as well as the DNA binding ability to the G-box *cis*-element of AOC promoter, thus to elevate the AOC transcription and endogenous JA level to synergistically inhibit seed germination. Blocking of JA biosynthesis or signaling significantly alleviated the ABA sensitivity on seed germination, suggesting that ABA-imposed inhibition is partially relied on the elevated JA level. Our findings shed deeper insight into the molecular networks of ABA-JA synergistic interaction during rice seed germination.

Audience Take Away Notes

- The current study identified a key ABA signaling pathway 'SAPK10-bZIP72-AOC' in rice seed germination
- The current works uncovered the comprehensive effects of SAPK10-mediated phosphorylation on the ABA signaling elements
- We concluded that the inhibition effect of ABA in seed germination is partially based on the activated JA concentration
- Our findings shed a novel insight into the molecular networks of ABA–JA synergistic interaction during rice seed germination

Biography

Dr. Wang Yifeng is an associate researcher and master tutor at China Rice Research Institute. He graduated from Shangdong University, China, with a bachelor's degree in biotechnology in 2009; In 2014, he graduated from Zhejiang University, China, majoring in botany; He worked at the China Rice Research Institute in 2015. He is mainly engaged in cloning and functional research of genes related to seed dormancy and germination. He presided over projects such as the National Natural Science Foundation of China, the Natural Science Foundation of Zhejiang Province, and the Key R&D project of Zhejiang Province. As the first/co-first/corresponding author, he has published 14 articles in New Phytologist, Journal of Experimental Botany, Plant Physiology and Biochemistry, and other magazines, with a cumulative impact factor of>40. As the principal author, he has published 15 papers in Molecular Plant, Plant Cell, Plant Biotechnology Journal, Plant Physiology, and other magazines and has obtained 6 invention patents.

Kannan Chinnaswami[1*], Vanama Sowmya[2] and Maruti Pesari[1]

[1]Department of Plant Pathology, ICAR-Indian Institute of Rice Research, Hyderabad, India

[2]Department of Plant Pathology, PJTSAU, Hyderabad, India

Role of microbial secondary metabolites in the management of plant diseases

Synthetic chemical pesticides are the first choice for the farmers when it comes to protect their crops against pests. This is mainly because of their efficiency in killing the pests, rapidity in effect and easy availability. However, these chemicals pose serious threat to human health and the environment. Non-judicious use of chemical pesticides leads to pollution of soil and water, health hazards due to residual toxicity and sometimes, development of resistance in pathogens against these chemicals making them useless. These concerns lead to search for alternate sources of chemicals that are natural, easily biodegradable and do not harm the environment. Thus, microbial metabolites emerge as an excellent source of active compounds that are antimicrobial and does not harm the environment as does the synthetic chemical do. Antibiotics are well known such anti-microbial metabolites derived from the microbes such as bacteria and fungi and are widely used in the pharmaceutical industry. Metabolites Koninginin D, 6-pentyl-2H-pyran-2-one and Gliotoxin from the species of fungi *Trichoderma* are effective against the pathogens like *Rhizoctonia solani*, *Sclerotium rolsfii*, *Fusarium spp.* etc. Similarly metabolites Bacillomycin D, Bacillin and Iturin A are derived from the species of the bacteria Bacillus and are effective against several soil borne pathogens. The microbial metabolites depending upon their stability are used as such in their naturally available form or used for synthesizing derivatives with more potent and stability.

Audience Take Away Notes

- The topic explains the negative effects of synthetic pesticides on human and cattle health and the environmental pollution they cause, concept of biological control, microbial secondary metabolites as a source of pesticides and their advantages
- Biological control suing microbial secondary metabolites is a fascinating field of research leading to arrival of novel molecules for plant disease management. This knowledge would help other faculty to expand their research and or teaching
- Novel formulations of microbial secondary metabolites including nano and micro encapsulations offer great scope for environmentally safe management of plant diseases

Biography

Dr. Kannan C. studied Agriculture at the Tamil Nadu Agricultural University, Tamil Nadu, India and obtained his Ph.D in the year 2003. He joined the Indian Agricultural Research Service in the same year and started working on biological management of diseases in arecanut and cocoa. He later worked on the biological management of parasitic weeds especially, Orobanche in vegetables and mustard. He is currently working on finding microbial metabolites for management of pathogens in rice. He has published more than 35 research articles, one patent in consideration and registered about 6 microbial species in the National Repository.

K. N. Gupta[1*] and V. K. Baranwal [2]

[1]Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.), India
[2]Plant Virology Unit, Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi, India

Diagnostics tools for detection of *Citrus Yellow Mosaic Virus* (CYMV) & Citrus Greening Bacterium (CGB) in sweet orange by multiplex PCR

Citrus is one of the most economically important fruit crops in India. Commercially grown citrus includes sweet orange, acid lime and mandarin. *Citrus Yellow Mosaic* (CYMV), a viral disease and Citrus Greening Bacterium (CGB), a bacterial disease are the two most important diseases that are impending fruit production through the world. Symptoms include yellow shoots, blotchy mottling leaves, corky veins, twig dieback, smaller or lopsided fruits with aborted seeds, root degradation and tree decline HLB affects all commercial citrus varieties and a source of genetically resistant germplasm remains unknow. Despite these efforts, the most effective way to control HLB would be the replacement of susceptible citrus varieties by HLB-resistant plants. However, no resistant trees or scion-rootstock combinations have been identified so far. Citrus genetic transformation via the introduction of a single trait is an opportunity for improvement of citrus varieties, maintaining their genotypic and phenotypic characteristics. Different genetic strategies have been tested to obtain HLB-resistant citrus varieties. A method of multiplex polymerase chain reaction (PCR) was developed for the simultaneous detection of *Citrus Yellow Mosaic Virus* (CYMV) and citrus greening bacterium, *Candidatus Liberibacter asiaticus* (CLa) from sweet orange trees. Initially total DNA from individual CLa and CMBV infected citrus plants were mixed infected field sample for both pathogens were detected by Multiplex PCR. Using multiplex PCR two different fragments of 1024 bp and 451 bp specific to CYMV and CGB respectively were simultaneously amplified. The consistent result of multiplex PCR was compared with Simplex PCR for detection of each pathogen. The Multiplex PCR method developed in the present investigation proved to be highly sensitive, economic and reliable methods for detection of Citrus Greening Bacterium (CGB) and the *Citrus Yellow Mosaic Virus* (CYMV) in citrus trees from the orchards.

Audience Take Away Notes

- A method of multiplex Polymerase Chain Reaction (PCR) was developed for the simultaneous detection of *Citrus Yellow Mosaic Virus* (CYMV) and citrus greening bacterium, *Candidatus Liberibacter asiaticus* (CLa) from sweet orange trees
- They learn simultaneous detection of Citrus Yellow Mosaic Virus (CYMV) and citrus greening bacterium, *Candidatus Liberibacter asiaticus* (CLa) in one PCR

Biography

Dr. K. N. Gupta studied on Molecular Plant Virology at the Central University, New Delhi as Ph.D. in 2009.And worked on molecular detection and characterization of citrus virus disease with Dr. V. K. Baranwal (National Professor) [2Plant] Virology Unit, Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi 110012, and India. I obtained the position of Scientist, senior scale at the Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)-482004, India. I was published more than 30 research articles in various journals.

K.R. Aneja

Formerly Professor and Chairman, Department of Microbiology, Kurkshetra University Kurkshetra, Haryana, India

Treatment/prevention of dental caries through the herbal plants and commercial mouth washes

Dental caries (derived from the Latin word -"*caries*" which stands for decay) also referred to as tooth decay or cavities, are decayed areas of the teeth that develop into tiny openings or holes. It is a term that refers to both the disease and the resulting lesion. It is caused by a combination of factors, mainly tooth -adherent cariogenic (decay-causing) bacteria, primarily *Streptococcus mutans* that makes acids in your mouth, which attack the tooth 's surface or enamel. It is one of the most common oral health problems in the world. Almost 100% of adults are affected by dental caries.

Bioactivity of different parts of 3 herbal plants (*Amomum subulatum*, *Elettaria cardamomum and Sapindus mukorosi*) was evaluated by agar well diffusion against three bacterial (*Streptococcus mutans*, *Staphylococcus aureus and Lactobacillus acidophilus*) and two fungal (*Candida albicans*, *Saccharomyces cerevisiae*) pathogens causing dental caries. The objective was to search for novel natural extract/s with the potential to cure/prevent dental caries. For extraction, 3 organic solvents (e.g. ethanol, methanol and acetone) and aqueous (hot and cold water) were used for each plant part. The zone of inhibition produced by an extract against a pathogen, both bacteria and yeast) was used as a parameter for the antimicrobial activity. The antimicrobial activity was found to be variable in different solvents as well as different parts against the 5 tested pathogens. Lactobacillus acidophilus was found to be resistant to all the tested extracts.

Antimicrobial activities in 10 mouth washes and 15 tooth pastes tested against dental caries pathogens revealed hexidine as the most effective mouth wash followed by chlohex and triguard. Synergistic bioactivity of purified extracts, tooth pastes, mouth washes and saliva against the tested pathogens suggests that the novel product/tooth paste could be exploited commercially to protect/ treat oneself from the dental caries.

Audience Take Away Notes

- This presentation will not only be useful for the future research workers to pursue research in this area having lot of potential
- It is of interest to you and me to protect from the dental caries by using the best mouth wash and tooth paste
- Has very useful information for the industrial houses dealing with the related products

Biography

Prof K.R. Aneja, is a former Professor and Chairman of Microbiology Department and an Aluminus of Kurkshetra University Kurkshetra, from which he got his B.Sc. M.Sc. and Ph.D. He visited University of Abertay Dundee for his Postdoc under the INSA-ROYAL Society Academic Exchange Fellowship in 1996. He is the past President of the Mycological Society of India, and recently selected for the prestigious Life Time Achievement Award 2022 by the MSI and a Member of the Project Expert Group of the ICFRE, Dehradun. He has published 172 research papers/reviews and authored 12 books in different areas of Microbiology (medical, nursing, food, agriculture, industrial), Mycology, Biochemistry and Biotechnology.

Vijayan Gurumurthy Iyer
M.Tech., Ph.D., (IIT-Dhanbad), Faculty (Climate Change),
Bihar Institute of Public Administration & Rural Development Gaya, Bihar, India

Environmental Health Impact Assessment (EHIA) processing investigations during the post covid world for an efficient plant biology and biotechnology towards sustainable development

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).

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).

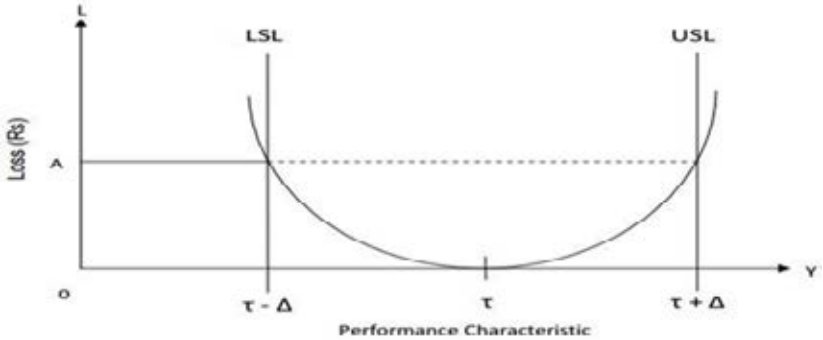
1. Nominal - the - best.
2. Smaller - the - better.

Larger - the – better

NOMINAL – THE – BEST:

The cotton ginning quadratic function which is called the **Nominal – the – best** type. LSL is lower standard level, (-6o included Pioseaich attempted foi Zeio defect)

USL is upper standard level, Six Sigma, (+6□ included Pioseaich attempted foiZeio defect)



Quadratic Loss Function

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 τ.

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 $L = k (y - \tau)^2$,

Where, L = Environmental cost incurred as quality deviates from the target.

y =Environmental Performance characteristic

τ = target

k = Environmental Quality loss coefficient.

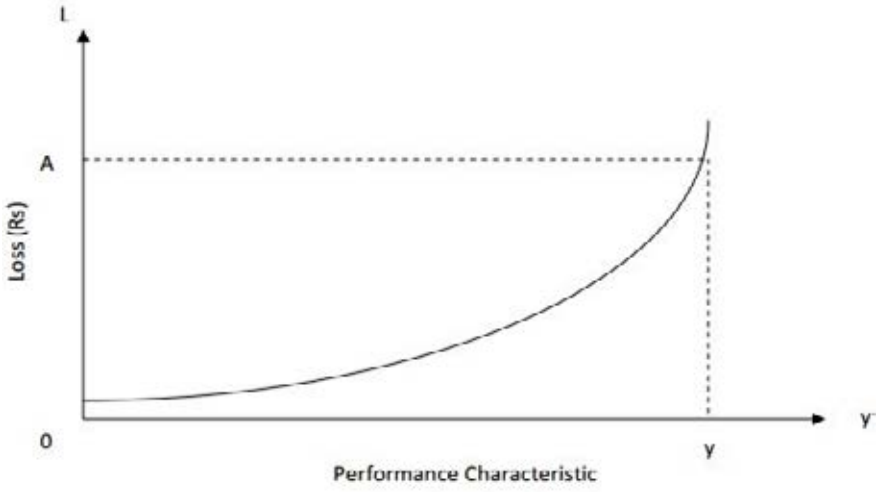
The loss coefficient is determined by setting $\Delta = (y - \tau)$, the deviation from the target. When Δ is the USL (or) LSL, the loss to the customer of repairing (or) discarding the product is Rs. A.

Thus,

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

SMALLER – THE – BETTER:

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



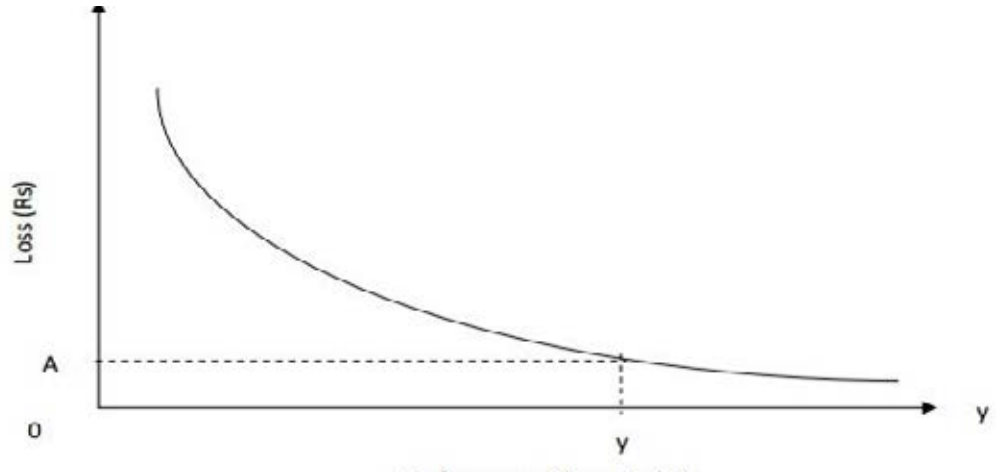
The target value for smaller – the – better is 0. There are no negative values for the seed-cotton performance characteristic.

The radiation leakage from a microwave appliance, the response time for a computer, pollution from an automobile, out of round for a whole etc. are the performance characteristics for this concept.

LARGER – THE – BETTER:

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

$= A / \Delta^2$.



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:

1. System design - involves creating a working laboratory gin model
2. System design - involves creating a working prototype
3. Parameter design - involves experimenting to find which factors influence product performance most.
4. 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, Introduction

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering at the Indian School of Mines, Dhanbad, and graduated as M.Tech. In 1998. He has served as Technical Officer in Indian Council of Agricultural Research, wef May 1985 to Feb. 1998. He received his PhD degree in 2003 at the same institution. After three years postdoctoral fellowship duly supervised by Prof. Dr. Nikos E. Mastorakis at the World Scientific Engineering Academy and Society, Athens, Greece, he pursued post-doctoral elaborations. He obtained the position of a Professor in Institute of Technology, Haramaya University, Harar, Ethiopia during 2004-2005. He has published more than 380 research articles in SCI (E) journals and has been cited 4000 to sustain his h.index of 50.

Mohammad K. Abhary

Biology Department, Faculty of Science, Taibah University, Al-Madinah, KSA. B11, Janadah Bin Umayyah Road, Taibah, Medinah, Saudi Arabia

Variation and diversity within wild moringa peregrina (FORSSK.) fiori Seed size and shape

Background and Aims: The *Moringa peregrina* (Forssk.) Fiori is a neglected superfood plant with tremendous medicinal properties, naturally growing at shorelines of the Red Sea region. Limited information is available about the genetic resources and diversity of this tree, which is under threat due to severe biotic and abiotic factors in the region. The search for genetic diversity within a species usually depends on the geographical distribution studies for such plant species. This study aims to explore the variation and diversity found within the progeny of *Moringa peregrina*, based on the size and shape of its seeds.

Methods: Collected wild-type *Moringa peregrina* seeds were assorted according to its size and shape, analyzed for its moisture, protein, oil, minerals, total phenols, total flavonoids, protein, and germination rates. Germinated plants were evaluated for phenotypic characters and tissues, including leaves, roots, were analyzed for its minerals, protein, total phenols, and total flavonoids content. Tissues were subjected to callus generations, rooting, and shooting micropropagation experiments and DNA RAPD marker analysis.

Key Results: Analyzed plant tissues have shown qualitative and quantitative variations in their minerals, oil, and phytochemical contents, which are statistically significant and correlated with the seed size and shape. Moreover, germination, plant height, leaf morphology and clonal response to growth regulators were also variant according to seed size and shape. The molecular RAPD marker analysis has shown that the genetic material had similarities and distances among the seeds of different sizes and shapes.

Conclusions: Variation and diversity within wild-type *Moringa peregrina* species are found in its progeny, where seed size and shape are considered as indicator traits for genetic variation and diversity.

Audience Take Away Notes

- Using the information of this work in breeding strategies
- Farmers could select the seed size/shape in accordance with their future product characters
- Chemists and Pharmacists could select the best seeds for their extractions
- Plant Biotechnologists can benefit from this research in micropropagation and transformation techniques

Biography

Dr. Abhary studied Cell Molecular Biology/Biotechnology at the University of Missouri St. Louis, USA in 2010. Before that, worked on Gene silencing strategies of begomoviruses in plants at the University of Wisconsin-Madison in 2003. Dr. Abhary is a faculty member of the Biology department at Taibah University, working on different subjects and focused on the biotechnological uses of plants in the environment.

Hemant Sood

Department of Biotechnology &Bioinformatics, Jaypee University of Information Technology (JUIT), Waknaghat, Solan, H.P., India

Production of bioactive compounds from shoot cultures of endangered and commercially important medicinal plants of Himalayas

Plant cell culture technologies have made possible the production of a wide variety of pharmaceuticals such as alkaloids, terpenoids, steroids, saponins, monoterpenes, flavonoids and amino acids. The standardization of technologies for the production of plant metabolites through cell cultures help in understanding the biology of their biosynthesis and accumulation. Various factors such as physical, chemical, nutritional and genetic influence the production of metabolites in plant cell cultures. The controlled production of plant metabolites through cell cultures provides a suitable alternative not only in relieving pressure from natural habitats of plant species but also provides conditions suitable for year round production of metabolites. The production of plant metabolites has been enhanced by exposing the cultured cells to biotic and abiotic elicitors. Off late, the induction of hairy roots has been found suitable in the production of metabolites synthesized in various parts of plants. Though the production of plant metabolites has been tried for the last many years yet the success rate in terms of number of metabolites produced on a commercial scale has been low. The lack of proper understanding about the biology of biosynthesis of plant metabolites has been major stumbling block, in addition to poor amenability of medicinal and aromatic plant species to in *vitro* conditions. Continuous efforts are required to be made in up scaling the production of metabolites on large scale. Least attention has been given towards working out the cost effectiveness of metabolite production through cell cultures. Molecular events regulating the biosynthesis and accumulation of metabolites need be understood by selecting plant-metabolite systems, which are readily amenable to in *vitro* conditions coupled with recent advances in genomics technologies.

Audience Take Away Notes

- Development of cell and tissue cultures for the production of medicinal compounds
- Alternative technologies for the production of secondary metabolites
- Conservation of critically endangered medicinal plants
- In vitro raised plants are the best alternatives for the herbal and pharmaceutical industries

Biography

Dr. Hemant Sood, Ph.D from Jaypee University of Information Technology (JUIT), Waknaghat, Solan, India and workingas Associate Professor in the Department of Biotechnology and Bioinformatics. I was conferred with **Indian Science Congress Young Scientist Award**. She has developed successful micropropagation technology in for 16 different plant species. She was awarded with International Scholarship by the **Israel's Agency for International Development Cooperation (MASHAV) Israel's Ministry of Foreign Affairs which was availed at** The Hebrew University of Jerusalem. She has 03 Granted Patents as lead inventor from Govt. of India. CII nominated her among 125 women luminaries in STEM and showcased my scientific contributions and achievements along with 125 women luminaries.She has more than 100 research publications and supervised 12 PhDs and 35 M Sc/M.Tech students.

O P Shukla*, SKS Chauhan
Plantation Department, JK Paper Ltd, Unit: CPM, Fort Songadh, Tapi, India

Subabul (*leucaena leucocephala*) clonal forestry: A path forward for solution of fibre resource development to paper industries in India

Global Per capita average paper consumption is 57 Kilogram while in India is 13 Kilogram. India is one of the major producers/consumers of paper and pulp products (3 to 4% of global share). Approximately 9.2 million tonnes wood out of total 20 million tonnes is used by Indian paper industries to produce 16.91 million tonnes from agro forestry & farm forestry plantations and 10.8 million ton is used by the Ply, MDF & Particle board and other sector. Development challenges thus faced by the industry, includes development of robust raw material base, from clonal agro and farm forestry on farmers/private lands, following genetic improvement of *Leucaena leucocephala* and realization of its potential as a multiple use species.

JK Paper Ltd has annual production capacity is about 7,60,000 TPA and having three integrated pulp and paper plants located at Songadh (Gujarat), Rayagada (Orissa) and Kagaznagar (Telangana) producing writing & printing paper and packaging board papers. The annual production capacity of Unit- CPM is 300,000 MT paper & paperboards. The annual wood requirement of CPM unit is about 600,000 MT which comprises of primarily *Leucaena*, *Eucalyptus* & *Casuarina* out of which *Leucaena* is major (About 75%). For sustainable raw material supply, JKPL is promoting clonal agro & farm forestry plantations programme in adjoining to mill's catchment area from the year 1996-97.

The total demand for wood, over 90% is sourced from industry-driven agro and farm forestry plantations, with the rest from the government and other sources. India's paper industry is wood-positive that is, it plants more trees outside forest than it harvests. In India, an estimated 500,000 farmers are engaged in growing plantations of *Eucalyptus*, *Subabul*, *Casuarina*, Acacia and Poplar. On average, about 125,000 hectares are being brought under agro and farm forestry on an annual basis, with around 1.2 million hectares on a cumulative basis across the country. During the past 25 years, JK Paper has been a pioneer in developing clonal propagation systems to-regenerate these highly productive plantations. Original clonal selections optimized disease resistance, coppicing ability, and volume growth, while recent priorities have moved to improve volume growth and wood quality. The Indian paper industry also found Leucaena species to be a potential raw material for paper making. Farmers are getting farm income much more from subabul clonal plantation as compare to traditional agricultural crops. The productivity of subabul clone approximately is per ha 85 MT in 18-20 months in irrigated land which produces 60CMT/HA/Year better than Eucalyptus planted in India and more beneficially plantation to improve soil of the land due to nitrogen fixation capability and micro climate of plantation area. Consequently several farmers are showing interest for plantation to replace the agriculture crop which has climatic and minimum support price uncertainties. The JK Paper Ltd is executing bilateral agreement with the farmers with the Minimum support price and free technical guidance with harvesting and logistic support done by JK Paper Ltd.

Audience Take Away Notes

- The short rotation pulpwood species will help the growers to grow the fast growing crop and to earn more income in short span of time. This will be beneficiary to the growers and reduce the demand and supply gap
- This pulpwood species will help to improve the soil fertility and alternate source of animal fodder
- This will help the farmers to overcome the labour problem with low investment.
- At present Subabul is not utilized for paper making in any part of the world. This will be a new learning for global industries to understand the alternative new species to make paper
- It will increase new knowledge of audience that *Leucaena leucocephala* can grow in 1.5 years against 3 to 4 year rotation under intensive clonal forestry program and can be utilized for paper making against existing raw material Eucalyptus with rotation 7 years in Asian and European paper industries

Biography

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

Timir baran Jha

Department of Botany, Maulana Azad College,Rafi Ahmed Kidwai Road, Kolkata, India

Unfolding chromosomal diversity in cultivated and wild Indian rice

Rice as major source of calories and proteins are consumed by more than half of the world population. Diverse phenotypic and genotypic analysis including its complete genome sequencing has benefitted mankind. However, in the era of climatic changes and increasing world population, significant increase in yield and better distribution to reduce hunger is a mandate. To increase present gene pool in so called self pollinated crop, traditional cultivars and wild relatives may play an important role in unfolding and conserving valuable traits. In contrast to the advanced molecular analyses of the rice genome, chromosome analysis did not received adequate attention it deserves as a staple food crop. Chromosomes are gene bearing discrete genomic structures and cultivated *Oryza sativa* (indica) is reported to have 2n=24 very small chromosomes. Thick cytoplasm, silicates in cell walls and chromosome size inevitably demands application of molecular cytogenetics method for accurate numerical counts as well as to analyse morphological configuration and position of chromosomal landmarks on individual chromosomes. Keeping in mind the repository status of Indian rice the presentation for the first time has standardized and clearly documented and conserved untapped karyotypic diversity in some traditional members of O. *sativa* as well as some diploid and polyploid wild Oryza species. The presentation will highlight cultivar/species based morphometric analysis and unique karyotypic features based on non-fluorescent Giemsa and fluorescent DAPI (4'-6-diamidino- 2- phenylindole). The unfolded genetic diversity recorded in Indian rice is expected to be utilized by the rice breeders and genome researchers.

Audience Take Away Notes

- To instill student's interest on rejuvenated chromosomal studies in plants
- Chromosomes are condensed gene bearing genomic structures. The presentation will help students and researchers to gain advance knowledge on chromosome preparation. It requires skilled workers and can be implemented in a cost effective manner
- Faculties could use the knowledge of chromosome preparation to expand their teaching and research base in molecular biology
- Molecular cytogenetics uses DNA base specific fluorescent stains like DAPI and CMA for targeting AT and GC rich heterochromatic regions directly on the chromosomes
- Molecular cytogenetics analysis can differentiate between the cultivars

Biography

Prof. Jha studied Plant sciences (Botany) in the University of Calcutta and awarded Ph.D degree in the year 1982. He joined West Bengal Education Service (WBES) and in 1995 selected for West Bengal Senior Educational Service (WB-SES) and served different Govt Colleges to teach Undergraduate and Post Graduate Students and carried out extensive research on Plant Biotechnology. Since 2010 onwards concentrated on plant chromosome research flowing molecular cytogenetics methods on important crop plants like Lentil, Capsicum and now on Rice. He has published more than 90 research articles in national and international journals.

Rajeev Kumar[1*] and Seweta Srivasta[2]

[1]Department of Botany School of Bioengineering and Bioscience Lovely Professional University Phagwara, Punjab, India
[2]Department of Plant Pathology, School of Agriculture, Lovely Professional University Phagwara, Punjab, India

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

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

Keywords: Biofungicides, fungi, solanaceae, poison, extract, weed plant

Audience Take Away Notes

- Effect of biofungicides instead of chemical based formulations, easy to use and preapare free from toxic chemicals and shows very effective results
- Yes, because bioformulations and biofungicides are good source to control the disease
- List all other benefits
    - Easy to use
    - Biofungicides
    - Weeds management
    - Eco-friendly
    - Environment protactor
    - Free from toxicity

Biography

Rajeev kumar currently am pursuing PhD Botany from Lovely Professional University, Punjab. He had done his graduation from Chatarpati Sahu ji Maharaj University, Kanpur and Masters from Maharishi Markandeshwar Deemed to be University Mullana, Ambala. He had a publication in reputed journals. Currently he is doing his PhD research in Preparation of Biofungicides using Micro-organisms and Weed Plants leaves extracts.

Tripta Jain
Department of Botany, Mohanlal Sukhadia University Udaipur, Rajasthan, India

Microbes for sustainable future

Our planet Earth and human life are increasingly becoming unsustainable due to modernization that results into harsh environmental changes like loss of biodiversity, climate change, desertification, unbalanced N and P cycles, water, air, soil pollution and the poor quality of the human life such as hunger, poverty, regional conflicts, refugees, rising health ailments etc. In order to find solutions for these problems and attain sustainability, United Nations formulated seventeen internationally accepted Sustainable Development Goals (SDGs). The United Nations Sustainable Development Goals (SDGs) are the roadmap to achieve a better and more sustainable future for all by 2030. Microbiology mainly deals with the study of microorganisms, their effect and application. Microorganisms have a direct role in accomplishing these SDGs like food security, health and wellbeing, clean energy, environmental degradation and climate change. Microbial diversity and microbial technology are imperative to achieve a majority of Sustainable Development Goals (SDGs), Since microbes have crucial role in regulation of ecosystem, as microbial communities play a vital role in nutrient recycling and hence directly affecting primary productivity or farm productivity and food security. Soil microbial community's especially rhizospheric microorganisms promote crop growth and thus indirectly contributed to food supply for humans (SDG 2). Similarly, microorganisms and their enzyme are responsible for the degradation of various organic wastes and recycling of industrial waste thus play a critical role to attain environmental sustainability. Microbes can be also used for bioconversion of wastes into renewable bioenergy like methane, biobutanol, bioethanol, biohydrogen and biodegradable plastic. Large numbers of drug including antibiotics are produced by tiny microbial factories. Furthermore gut microflora are important for digestion of food and wellbeing of human health to accomplish SDG 3. Microbes have been used by humans since ancient times for brewing and fermenting purposes. Microbes are source of various industrial products like enzymes, polysaccharides, vitamins, amino acids, organic acids, alcohols, single cell proteins etc. and currently are main drivers of the bioeconomy and industry of several trillion dollars, thereby contributing directly to SDGs 8 and 9. Various aspects related to application of microorganisms for achievement of SDGs will be discussed in this presentation.

Audience Take Away Notes

- Sustainable Development Goals (SDGs) proposed by UN
- Why we need to shift towards sustainability
- Importance of microorganism to attain different SDGs

Biography

Dr. Tripta Jain is currently working as Assistant Professor at Department of Botany, Mohanlal Sukhadia University, and Udaipur. She got her Ph.D. degree from Mohanlal Sukhadia University and her field of specialization is plant pathology and microbiology. She also holds a Diploma Certificate in Pharmacy. She is actively involved in conducting research since last 10 years. Her specialization for research involves plant pathology, plant microbe interaction and microbial technology. She has been associated with the teaching profession for the past 12 years. She has been associated with prestigious research projects in the past, and has also published about 30 research papers and 11 book chapters in her areas of proficiency and interest. She has supervised more than 25 short term research projects/minor reaearch project in the field of botany and microbiology. She is recipient of Women scientist (WOS-B) fellowship from DST, New Delhi in the year 2009. She also receives Smt. Guman Verma Memorial Best Women Scientist Award for her research paper.

Tiziana M. Sirangelo
CREA—Council for Agricultural Research and Economy Analysis, Genomics and Bioinformatics Department, Montanaso Lombardo, Italy

Cannabis sativa: Studies and trends based on integrated OMICS approaches

Cannabis (*Cannabis sativa L.*) originated from Central Asia and is distributed to a lesser extent in other areas of the world, thriving in a wide variety of habitats and climates. Two main classifications for this plant have been established: fibre crop (hemp), whose woody fibers are employed for rope and textile making, and drug crop (medicinal cannabis), cultivated for therapeutic purposes. It is one of the oldest cultivated commercially relevant species. However, due to the existing cannabis cultivation legislation, many aspects of the crops haven't been completely elucidated, especially molecular and genetic pathways. Conversely, the majority of the economically relevant crop species have already been extensively studied, especially after the development of the novel Next Generation Sequencing (NGS) approaches. Only in recent times regulations have become less strict, making it possible a further and more detailed cannabis characterization, getting the attention of the scientific community, as well as the availability of assembled cannabis genomes. In this context, we provide an overview of the cannabis molecular resources available to date, especially about the most promising metabolomics, transcriptomics, genomics approaches. Multi- omics methods are detailed as well, being an impactful strategy to highlight relationships between metabolic pathways and biological processes across several omics layers, and to further investigate the relationships between cannabis sub-species. Particularly, the correlations between genotypes and phenotypes are investigated, as well as novel metabolites with potential therapeutic use in cannabis breeding programs. However, we aware that more studies are still necessary to completely understand the complex cannabis metabolomic pathways. Therefore, relevant emerging techniques are also discussed including pangenomics and genome editing methods, which, when properly combined with multi-omics datasets can impact the genetic improvement of cannabis.

Audience Take Away Notes

- The presentation of the work provides useful inputs in the field and great starting points to further innovative investigations about cannabis, opening new perspectives to future research
- The oral communication also includes in the audience cannabis breeding designers, providing them great suggestions to improve the quality of their plans through the newly available cannabis molecular knowledge

Biography

Tiziana M. Sirangelo is a Researcher in Genomics and Bioinformatics at CREA - Council for Agricultural Research and Economy Analysis - Dep. of Genomics and Bioinformatics. Her main research aim is the application of recent NGS technologies and bioinformatics approaches to investigate molecular mechanisms in plants. She graduated from University of Calabria in Biology (2015) and her PhD in Agri- food Sciences, Technologies e Biotechnologies, at University of Modena and Reggio Emilia (2019). She was involved in projects focused on the analysis of olive genome and transcriptome, on gene expression in peach cultivars in post harvesting conditions and in eggplants.

Dumitru Manole[1*], Ana Maria Giumba[1], Laurentiu Luca Ganea[2], Viorel Ion[2]

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[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Agriculture, Romania

The effect of climatic changes – hail and storm on sunflower hybrids – Constanta County, Dobrogea area, Romania

Constanta County had the largest area cultivated with sunflower crop in Dobrogea region in South-Eat Romania in 2019 (23%), 2020 (20.8%), and 2021 (23.4%). Dobrogea is the most drought area in Romania (average rainfall of 464 mm in the period 1961-1990) and the year 2020 was one of the driest year, with rainfall of 348.5 mm. Sometimes, in this region is possible to have extremely climatic dangerous factors, such as hail and storm. This was happening in the year 2021, when twenty-three sunflower hybrids in a field experiment of S.C. SPORT AGRA S.RL. in Amzacea Village, Constanta County from Dobrogea region (South-East of Romania) were damaged in 2021, June 12th, by a rainfall with hail and storm, this registering in 35 minutes 71 mm rainfall, the sunflower plants having 12-14 leaves. Thus, the aim of this study is i) to see the behavior of the sunflower hybrids in the unbelievable hail and storm conditions, ii) to find out the yield and the tolerance to hail storm the hybrids have, iii) and to know how the sunflower hybrids behavior to the main pathogens under such severe conditions. The results of the performed research are showing that there are sunflower hybrids that tolerate the hail storm, this being able to realize good yields even under such severe conditions.

Keywords: sunflower, hybrids, hail and storm, tolerance, grain yield

Biography

Dr. Eng. Dumitru Manole, graduated National Institute for Agriculture "Nicolae Balcescu" Bucharest Romania 1963. 1963-1992 State Farm Manager. 1971 specialized USA in alfalfa seed production, meeting Prof. Dr. William R.Kerr Lincoln University – Nebraska State. Honorary Citizen of Nebraska State. 1992 – 1994 senior representative ICI Seeds. 2002 founder and president Romanian Farmers Constanta County – Romania. 2003 Doctor Degree. 2-4 decembre 2003 speaker Europe Bio Convention, Austria, Vienne. Octomber 2019 founder and president of Romanian Sunflower Association. 2019 member of International Sunflower Association. April 2020 member of Romanian Scintists Academy. August 2018 organizer and speaker 3th International Conference of sunflower broomrape Romania. November 2018 speaker International Conference of Sorghum, Milan – Italy.

Aviv Asher[1], Reut Dagan[1], Yaron Lugasi[1], Shmuel Galili[2] and Lior Rubinovich[1*]

[1]Northern Agriculture R&D, MIGAL – Galilee Research Institute, Kiryat Shmona, Israel

[2]Institute of Plant Sciences, Agricultural Research Organization, the Volcani Center, Rishon LeZion, Israel

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. This showed that 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 may be optimal, as this produced the greatest yields with no effect on 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 the development of 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 Ph.D. 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.

Bonnin Marie[1*], Benedicte Favreau[2], Alexandre Soriano[3], Patrick Ollitrault Amelioration des[4], Santini Jeremie[5], Morillon Raphael[6], Liliane Berti[7],

[1]CNRS, Equipe de Biochimie et Biologie Moleculaire du Vegetal, Universite de Corse, Corsica, France
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[7]CNRS, Equipe de Biochimie et Biologie Moleculaire du Vegetal, Universite de Corse, Corsica, France

Physiological and biochemical determinant of salt stress tolerance in diploid and tetraploid citrus

Polyploid species are generally considered to have better adaptative abilities than diploids. Previous work has shown that phenotypic variations are induced in the aerial citrus plant part related to stress resistance and polyploidy. However, information regarding the impact of polyploidy on the functioning of the root system is still scarce. Our objectives were to study the physiological, biochemical and genetic determinants regarding salt stress tolerance in diploid and tetraploid rootstock in an intra- or inter-specific genetic context (diploids lined with relatively fixed genotypes that could be similar to autotetraploids and diploids lined with a hybrid between two genotypes belonging to the genera citrus and poncirus that could be similar to an allotetraploid) in control and salt stress conditions. Salt stress adversely affects physiological and biochemical processes associated with plant growth, development and yield. A set of responses at cellular, molecular, metabolic, physiological allows plants to overcome the negative effect of salinity. Under salinity condition, all the tested genotypes showed a different response to salinity. Diploid Poncirus was shown to be the most sensitive genotype. The most salt stress tolerant rootstocks, especially the tetraploids, presented (1) a maintaining for a longer time of their photosynthetic activities, (2) stronger antioxidant defence mechanisms, (3) a better capacity for storage, transport and absorption of minerals and nutrients. Moreover, statistical analysis of the data revealed the interaction of ploidy and stress is the main factor that explains the response of the plants.

Audience Take Away Notes

- Salt stress is an emerging problem of great importance for world agriculture. This research project gives a way of working on how to anticipate the problems related to climate change on crops, because the problem of salinity in arid and semi-arid regions is even more worrying as it is increased by the phenomenon of climate change
- The strength of this project is to propose an integrative approach that uses different techniques and different skills (bioinformatics, physiology, biochemistry, molecular biology, and genetics). The audience will appreciate the integrative approach of this work
- This research project addresses various approaches in several disciplines of biology, such as bioinformatics, physiology, biochemistry and genetics. It is of great interest to academics to demonstrate how to link these disciplines to understand the mechanisms of salt stress response in its entirety. Our integrative approach uses different techniques, and we propose different experimental setups that could inspire other teams willing to study like us the tolerance of higher plants, in particular perennial

plants, to abiotic stress

- To cope with biotic and abiotic constraints, citrus fruits are grafted on rootstocks selected for their adaptation properties. The increase in salinity in the Mediterranean area associated with climate change requires the development of new rootstocks with better adaptation capacities to salt stress. It is therefore very important to propose an integrative approach that allows the study of physiological, biochemical and genetic determinants of stress tolerance, particularly salt stress in the Mediterranean area
- **List all other benefits**
  - Management of large data set
  - Bio-informatics software and computational approaches
  - Pan-genomic
  - Transcriptomics
  - Study of metabolism (photosynthesis)
  - Transmission and scanning electron microscopy
  - Antioxidant molecule assay
  - Determination of the activity of enzymes involved in antioxidant metabolism

Biography

Currently enrolled in the Ph.D program at the University of Corsica on the project "polyploidy and adaptation to environmental constraints determining physiological, biochemical genetic tolerance of tetraploid rootstocks of citrus". I have a master's degree in biology and Plant Valorization "f the University of Strasbourg speculation "Molecular Biology and Biotechnology of Plants". In 2018, I joined the team "RNA degradation" at the Institute of Plant Molecular Biology (IBMP). This allowed me to participate in the project "Identification of TUTases involved in viral RNA uridylation of Turnip Mosaic Virus" where I performed a transcriptomic study by RNAseq, using Illumina high-throughput sequencing. In January 2019, my research in Strasbourg focused on the functional study of the UCN endonuclease, a component of Processing Bodies (PB) in Arabidopsis thaliana.

Marouane Ben Massoud [1, 2, 3*], David Sheehan[2] Abdelilah Chaoui[1]

[1]University of Carthage, Faculty of Sciences of Bizerte, LR18ES38 Plant Toxicology and Environmental Microbiology, Bizerte, Tunisia
[2]Proteomics Research Group, School of Biochemistry and Cell Biology & Environmental Research Institute, University College Cork, Lee Maltings, Prospect Row, Mardyke, Cork, Ireland
[3]School of Biological, Earth & Environmental Sciences, University College Cork, Distillery Fields, North Mall, Cork, Ireland

Mitigation of copper toxicity by calcium and citrate involves the modulation of ascorbate-glutathione cycle and redox status in *pisum sativum* L. seedlings

The aim of this study was to investigate the impacts of exogenous calcium (Ca) and citrate treatments in the shoots of copper (Cu)-treated pea seedlings. Seeds were germinated in distilled water or aqueous solutions of CuCl2 (200 µM) for 3 days then in water or Cu or Cu+effectors (CaCl2 or citrate-Na) for another 3 days. The oxidative damages caused by exposure to Cu were reduced by simultaneous application of the metal and Ca or citrate, which were associated with increased Cu accumulation, elevated levels of hydroxyl radicals and superoxide anions and the increased superoxide dismutase and glutathione S-transferase activities. Concomitantly, exposure to Cu decreased the levels of the non-enzymatic antioxidant compounds, glutathione, ascorbate, and cysteine. However, Cu treatment induced a strong increase in enzyme activities associated with the glutathione-ascorbate cycle, namely ascorbate peroxidase (APX), monodehydroascorbate (MDHAR) reductase, and glutathione reductase (GR). Contrariwise, co-treatment of Cu with Ca or citrate eliminated the Cu-imposed increase in antioxidant enzyme activities. The profiles of 1-D and 2-D proteomics revealed that Cu-induced modifications of protein thiols and carbonyl groups. The present investigation demonstrated that Ca and citrate are efficient in minimizing oxidative damages under Cu stress, by regulating the antioxidant defense system, and maintaining a high status of the glutathione-ascorbate cycle.

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, Physiology, Molecular Biology and Proteomics. Their current project is 'Alleviation of Heavy Metals Toxicity in Germinating Seeds by Exogenous Chemical Effectors'.

Benoit Van Aken*, Aaron Newborn, Fanella Zamcho

Department Chemistry & Biochemistry, George Mason University, Fairfax, Virginia, USA

Effects of environmental contaminants on lignin biosynthesis in *arabidopsis thaliana:* Implication for biofuel production

Marginal lands contaminated by anthropogenic pollutants can be turned into fields for biofuel production bringing the combined benefits of reducing dependency on fossil fuel, mitigation of carbon dioxide emissions, and land bioremediation (phytoremediation). However, prior research has shown that plant exposure to stress, including toxic chemicals (e.g., heavy metals), may lead to increased lignification of the plant biomass, therefore potentially impairing biomass digestibly and its conversion into bioethanol. The objective of the present study was to determine whether exposure to toxic organic contaminants may affect lignin biosynthesis in the model plant, *Arabidopsis thaliana*. Hydroponic plantlets were exposed to the antibiotic, chlortetracycline (CT), and the forever pollutants, polychlorinated biphenyls (PCBs). Toxicity testing indicated that exposure to CT and the PCB hydroxylated derivative, 4-hydroxy-2, 5-dichlorobiphenyl (4'-OH-2,5-DCB) caused a dose-dependent reduction of the biomass, with an effect concentration 50% (EC50) of 8.1 ± 2.3 mg L^{-1} and 2.5 ± 1.9 mg L^{-1} for CT and 4-OH-2,5-DCB, respectively. The parent PCB, 2, 5-DCB, did not show significant toxic effects at the highest concentration tested (25 mg L^{-1}). The lignin content of the biomass was then compared in exposed plants and control, non-exposed plants using Fourier-Transformed Infrared Spectroscopy (FTIR). Several spectral second-derivative absorbance peaks correlated with lignin were identified in the fingerprint region (~800 – 1800 cm^{-1}), indicating a lignin increase of 16 to 40% in plants exposed to CT, and 22 to 102% in plants exposed to 2,5-DCB and 4'-OH-2,5-DCB. Whole genome expression analysis using RNA sequencing was conducted to determine the molecular bases of Arabidopsis exposure to the three pollutants. Each compound resulted in significant differential expression of more than 1,000 genes in exposed plants versus control plants (FDR adjusted p-value < 0.05, fold change > 2.0 or < 0.5). Exposure to 2,5-DCB and 4'-OH-2,5-DCB resulted in 5.1- and 4.9-fold enrichment of genes involved in the phenylpropanoid pathway (major lignin biosynthetic pathway), respectively. Exposure to CT also resulted in overexpression of genes involved in lignin biosynthesis, including cinnamyl alcohol dehydrogenases, beta-glucosidases, glycosyl hydrolases, and peroxidases. Exposure to the three compounds also induced genes involved in the metabolism of xenobiotic compounds and detoxification reactions, including glutathione S-transferases and cytochrome P-450s, which was consistent with their observed phytotoxic effects. Our results may have important implications for the production of bioethanol from lignocellulosic biomass generated through phytoremediation applications.

Audience Take Away Notes

- Results from this research indicate that the biomass of plants growing on contaminated land may be less susceptible to conversion to bioethanol
- This research shows that the combined use of transcriptomic and chemometric analysis is a powerful approach for the characterization of the plant response to stress
- The proposed approach is applicable to any type of stress that can be imposed on plants

Biography

Benoit Van Aken is an Associate Professor at the Department of Chemistry & Biochemistry at George Mason University (GMU). He earned a Ph.D. in Biochemical Engineering (2000) from the Catholic University of Louvain, Belgium. Prior to join GMU, he held faculty positions in Civil & Environmental Engineering at West Virginia University and Temple University. Van Aken's research interest focuses on the molecular response of plants exposed to organic pollutants. Van Aken has been awarded research grants from NSF, NIH, USDA, NASA, DOD, and SERDP. He is the author of 50+ peer-reviewed journal articles and book chapters totaling over 3,000 citations.

Ilaria Chiocchio

Department of Pharmacy and Biotechnology, University of Bologna, Bologna, Italy

^{1}H NMR-based metabolomic approach to study *sorghum bicolor* crops in view of smart agriculture applications

Global population growth, climate changes and resources exploitation make it urgent to develop sustainable and smart agricultural practices. In this framework, an upgraded knowledge of plant-environment interactions is required, and a suitable approach is represented by untargeted metabolomics coupled with agro-climatic studies. This work is focused on *Sorghum bicolor* (L.) Moench, the fifth most important cereal cultivated for food, feed, fiber and fuel. Agricultural assessments and ^{1}H NMR based-metabolomics analysis were carried out on grain sorghum cultivated on 12 different fields of Emilia-Romagna (Northern Italy). Plant samples were collected at three different stages: seedlings, vegetative and ripeness. Thus, the relationships between agro-climatic parameters and metabolome variations of leaves, stems, and grains were investigated through multivariate data treatment. Moreover, antioxidant activity of grain was also measured by BCB *in vitro* test.

The results of PCA highlighted qualitative and quantitative differences among the metabolomes of the twelve sorghum crops. Dhurrin, 4-OH-benzhaldeyde, rutin, sugars, organic acids and amino acids were the most varying metabolites. The content of these metabolites resulted (by OPLS model) affected by water supply and soil features such as clay and organic carbon content. The PLS-DA model provided information on the degree of sorghum development on the basis of leaf metabolome. Moreover, the analysis of seedling metabolome resulted a valuable tool to predict, and eventually prevent, the low grain yield. Metabolomic profiling resulted also useful to detect the potential occurrence of dhurrin in grain, which must be kept at very low content for good quality grain.

In conclusion, the results obtained in this work encourage the use of 'omic' approach to support and extend agronomic studies. A first data set is also provided, which might be shared and implemented, tackling the need to develop smart agriculture practices.

Biography

Ilaria Chiocchio is a Postdoc at the department of Pharmacy and Biotechnology of University of Bologna (Italy). Her background is in natural product chemistry and her work includes NMR and MS based metabolomics analysis and classic phytochemical techniques which she carried on both on her home University and abroad. After her MSc in Biology (Vanvitelli University, Caserta, IT), she got a fellowship to work as guest researcher at University of Leiden (NL), and during her PhD in Health Safety and Green Systems (University of Bologna, IT) she obtained a grant to carry on a research project at iDiv (DE).

Van Giap Do*, Youngsuk Lee, Seonae Kim, Sang-Jin Yang, Juhyeon Park

Apple Research Institute, National Institute of Horticultural and Herbal Science, Rural Development Administration, Gunwi, Republic of Korea

Introducing apple MdTFL1 gene promotes heading date and causes high-throughput phenotyping in rice

The heading date along with plant height, grain number, and branching are agronomic traits crucial for rice productivity. The heading date is controlled by floral genes such as the TERMINAL FLOWER 1 (*TFL1*) and FLOWERING LOCUS T (*FT*) gene. Herein, we isolated and cloned the apple *TFL1*-like *gene* (*MdFT1*) to clarify its function in rice. Introducing the *MdTFL1* gene promotes heading date via upregulated multiple flower meristem identity genes, such as (early) heading date gene family (*OsHd1*, *OsEHD1*, *OsHD3B*, *OsGhd7*), *FLOWERING LOCUS T* (*OsFT*, *RFT*), and MADS-box transcription factor, resulting in reducing the duration of the vegetable phase. Interestingly, the introduction of *MdTFL1* has major effects on an array of traits in rice. The transgenic rice exhibited a semi-draft phenotype with shorter plant height, more branching, modulated leaf angle, and less number of grains per panicle. Results indicated that the *MdTFL1* gene not only plays a central role in the transition from the vegetative to the reproductive phase but also mainly controls various physiological aspects. These findings further extend the knowledge of shortened breeding programs and reinforce our understanding of the interaction of genotype–phenotype and indicate the importance of genetic effects on morphology. (This study was supported by the Rural Development Administration research program (PJ01660701) Apple Research Institute, National Institute of Horticultural and Herbal Sciences, Rural Development Administration, Korea)

Audience Take Away Notes

- Establishment of transgenic plant via plant transformation and *in vitro* tissue culture technique.
- Identification of genes involved in control flowering and how it effect to agronomic traits
- Approached modern technique of recombinant DNA technology in plants
- Our findings further extend the knowledge of how to shorten breeding programs

Biography

Dr. Van Giap Do is a postdoctoral researcher at the Apple Research Institute, National Institute of Horticultural and Herbal Science, Rural Development Administration, Republic of Korea. He obtained a Ph.D. in Plant Molecular Biology at the Department of Molecular Biology, College of Natural Science, Jeonbuk National Univ. (2017). After obtaining his Ph.D., he then did research at the same university as a postdoctoral fellow at the Department of Biotechnology, College of Environmental and Bioresource Sciences. His main research interests include plant molecular biology in horticultural science with particular reference to the exploitation of molecular cloning and gene expression analysis for the deep study of plant physiology based on novel mechanisms of genetic regulation.

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KEYNOTE FORUM

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The most productive potential as a result of adaptation by the balance of hormones of the initial cell of the apex, secondary initial meristems

The mechanism of initiation of organogenesis and the sequence of growth of branches, leaves, stems still does not have an unambiguous explanation in botany. In crop production, the potential for harvesting is taken into account the high yield obtained in the variety plot with the recommended excellent agricultural practices. However, explanations are not always realized and poorly executed agricultural techniques; in practice, they are always explained by the weather. Less favorable yield factors for potential yield under given conditions can cause aggression, terrain and years of cultivation of high yields. Thus, the potential for productivity is contained in the biological basis.

Methodology: In a model experiment, determine the stimulation of the initial cells of the apex as dominance in the balance of hormones of stimulants and inhibitors of cultures with the next dominance of stems (barley), simultaneous (rapeseed) and a single apex (pine), secondary meristems. All intact plants were treated with the hormone- inhibitor ethylene, and liquid complex fertilizer with nitrogen in all forms as a trophic stimulant manually to determine the effect on the whole plant, since individual physiological reactions and chemical formulas do not allow us to determine the effect on the yield and its structure.

Hypothesis of experience: The influence of the hormonal status of the apex as the dominance of growth stimulants on organogenesis in ontogenesis and its analogue in crop production - the structure of yield, the phenotype as the transition of phases and the growth of quantitative elements of seed productivity, the impact on the main physiological processes in the plant.

Purpose: To prove the homology of the reactions of initiation of growth and development of apexes in different zones in a geographical experiment, the influence of orthotropic and lodging on apical dominance and decapitation on seed productivity and yield structure.

Results: The capacity of the productive potential consists of a spectrum of favorable conditions during the entire period of ontogenesis for the organogenesis of productivity elements and the genetic ability to perceive a signal for growth and development. The organogenesis of the transition to the next stage of plant development is perceived as the sum of adaptive temperatures in turn: the number of stems, then the number of grains, and the most stable and less variable weight in grain crops. Impulses with the dominance of growth stimulants are added in germination at favorable soil moisture and temperature, the number of stems - at moderate temperatures can continue almost "infinitely" in cereals. In alfalfa at the optimum temperature in the temperate forest-

Vashchenko Viktor Fedorovich

Rlets State University, Russian Federation

Biography

Vashchenko Viktor Fedorovich, studied 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.

steppe zone, a downy stem and few seeds grow, while in the steppe zone the stem is vertical and the seeds ripen. The level of high temperature for leguminous herbs means the dominance of development at the next stage of organogenesis, the exit into the tube, the growth of the main stem and, most likely, its lodging or twisting with a relatively low number of grains and early maturation. Thus, nutrition and water resources can influence the duration of the development phase, when the growth inhibitor ethylene dominates in cereals, the tillering period at a moderate temperature can be considered as a sign of the adaptive potential of the crop and variety. The transition to the next phase, stem elongation, the dominance of the stimulant auxin leads to its regulator - high temperature. This is a stable sign of culture and variety, provided by the mechanism of regulation and perception of environmental impulses. Thus, the productive potential can be defined as natural conditions for the transition or continuation of the formation of the necessary elements of productivity during the entire organogenesis. Anthropogenic influence to create conditions for the formation of a given crop in crop production is decided by the placement of crops or the sowing time. The structure and size is well controlled during the growing season, and taking into account the influence of influence on stimulants and inhibitors is biological crop production.

Conclusions: Thus, the initiation of cells by primary and secondary meristem stimulating hormones determines the usefulness of the number of cells, as the number of stems, mass grains, the number of grains with plants and per square meter. The thermal factor initiates the phases, and the water initiates the number of features. The trophic factor is important for the intensification of the maximum productive area. With insufficient temperature, as in a cereal plant, there may be an almost infinite number of stems or the discovery of a stalk of alfalfa without proceeding to flowering and development. Adaptive capacity as the ability to respond to external factors and increase productivity. Manufacturing recommendations. The genetic ability of the regulatory hormonal system corresponds to the agricultural industry. This is well confirmed in practice by a short period of effective nitrogen supplements, which are direct stimulants and ensure the dominance of meristems in the apex, which is the basis of real yield increases. Each agricultural method is combined with the phase of the beginning of organogenesis of the corresponding element of productivity. The soil factor, when the plant is undemanding to the soil, has a smaller quantitative significance than the weather factor of the year of cultivation for a rapeseed plant with many apexes, as capable of exponential expansion of the yield potential.

Morphological and molecular insights into drought tolerance in chickpea

Chickpea (cicer arietinum L.) is an economically important food legume grown in arid and semi-arid regions of the world. Chickpea is cultivated mainly in the rainfed, residual moisture, and restricted irrigation condition. Chickpea like several other legumes is highly susceptible to terminal drought stress. Multiple genes control drought tolerance. Studies elucidate the association between candidate gene and morpho-physiological traits for the screening of drought tolerance in chickpea. Several genes particularly the ASR gene, DHN and ERF family play a key role in regulating different plant stresses. Analysis revealed a significant effect of drought on relative water content, membrane stability index, plant height, and yield traits. The genotypes Pusa1103, Pusa362, and ICC4958 were found most promising genotypes for drought tolerance as they maintained the higher value of osmotic regulations and yield characters. The results were further supported by a sequence similarity approach for the dehydrin gene and ASR gene when analysed for the presence of Single Nucleotide Polymorphisms (SNPs) and indels. Homozygous indels and single nucleotide polymorphisms were found after the sequencing in some of the selected genotypes. In addition, large-scale genomic resources including several thousand simple sequence repeats and several million single nucleotide polymorphisms, high-density diversity array technology (15360 clones) and Illumina Golden Gate assay genotyping platforms, high-density genetic maps and transcriptome assemblies have been developed. In parallel, by using linkage mapping approach, one genomic region harboring quantitative trait loci for several drought tolerance traits has been identified in ICC 4958 and successfully introgressed in three elite Indian chickpea (Cicer arietinum L.) cultivars: Pusa 372, Pusa 362, and DCP 92-3. Of eight Simple Sequence Repeat (SSR) markers in the QTL-hotspot region, two to three polymorphic markers were used for foreground selection with respective cross-combinations. BGM 10216, with 16% yield gain over Pusa 372, has been released as Pusa Chickpea 10216 and in 2022 Pusa JG 16 was released where the mega variety JG 16 was further improved for drought tolerance by introgression of this QTL from ICC 4958 by the Central Sub-Committees on Crop Standards, Notification and Release of Varieties of Agricultural Crops, Ministry of Agriculture and Farmers Welfare, Government of India, for commercial cultivation in India.

Audience Take Away Notes

- The audience will learn the success story of application of genomic assisted breeding for crop improvement
- It will introduce the audience to cutting edge technology

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- It can be used as a research
- It provides practical solution to a problem that could simplify developing varieties with climate resilience

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Biography

Dr. C. Bharadwaj Principal Scientist, Division of Genetics, ICAR-IARI & Hon Adjunct Assoc. Prof, The UWA IoA, The UWA, Australia after completing his doctoral has joined as the prestigious ICAR as an Agricultural Research Scientist in 1197 at Indian Institute of Soybean Research Institute India. He joined the Chickpea Breeding and Molecular Breeding programmes in 2007. He has 16 chickpea varieties and 150 papers in reputed journals to his credit. Specializing in chickpea pre-breeding, germplasm improvement and resilience breeding and yield improvement using genomic and conventional tools, he has guided seven doctoral and five postgraduate students as Chairman.

Antimycobacterial activity of plant molecules from traditional medicinal plants

Tuberculosis (TB) is one of the deadliest infectious diseases in the world. TB is major challenges for medical filed to management disease. Such as, currently occurrence of Multi Drug-Resistant (MDR) and Extensively Drug-Resistant Tuberculosis (XDR) are creating problems. Also, currently using TB drugs are getting less effective and giving side effects limiting their use. Many people currently using herbal medicine, safety issues are also becoming an important Concern in the management of human diseases. Many medicinal plants are used against various diseases including bacterial infections. Moreover, many plant extracts have been reported as potential sources of antituberculosis agents. Numerous plants are utilized for the treatment of bacterial diseases including mycobacterial infections by traditional practitioners. Therefore, the present study aimed at studying the isolation of antimycobacterial compounds and tested against Mycobacterium tuberculosis. Isolated compounds inhibited the growth of tested organism. We report here some of the compounds are significantly inhibited the growth of M. tuberculosis.

Key words: Medicinal plants, Antimycobacterial, Mycobacterium sp.

V. Duraipandiyan

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Biography

Dr. V. Duraipandiyan, at present he is working as senior scientist at the Division of Phytochemistry and Ethnopharmacology, Entomology Research institute, Loyola college, University of Madras, Chennai and guiding a Ph.D research scholar in multidisciplinary research fields such as Anticancer, antidiabetic, microbiology, biotechnology, biochemistry and biopesticides. He has produced 12 Ph.D candidates. Also, he worked as a visiting Associate professor in King Saud University, Saudi Arabia. He has visited many countries as a researcher and participated in international conferences. He is also editorial member in a few journals, and as reviewer in a number of journals. He has published more than 200 research articles. His research is health and society benefit oriented.

The molecular odyssey during pollination

Flowering plants have evolved complex molecular mechanisms that ensure successful pollination and seed set. Continuous cell-cell communication between the pollen (male) and cells of the pistil (female part of the flower) is a critical determinant of reproductive success. The stigma, a specialized female tissue of the pistil receives and facilitates the growth of desirable pollen and blocks less desirable pollen for fertilization. Stigma development and receptivity (ability to accept compatible pollen) is likely regulated through Reactive Oxygen Species (ROS). A functionally redundant Mitogen-Activated Protein Kinase (MAPK) signaling cascade ensures stigma receptivity in Arabidopsis (Jamshed et al., 2020). Self-recognition and Self-Incompatibility (SI) are mechanisms that prevent self-fertilization and consequent inbreeding in flowering plants. The molecular basis and genetic analysis of SI system have uncovered a complex, receptor-ligand mediated, phosphorylation-dependent signaling pathway that coordinates the rejection of self-pollen. The members of mustard family utilize methylglyoxal, a metabolic by-product of glycolysis to bring about SI response (Sankaranarayanan et al., 2015; Kenney et al., 2020). Compatible pollination results in a rapid stigma senescence response (Sankaranarayanan et al., 2013). Following which, the pollen forms a pollen tube to transport the non-motile sperm cells to the ovules for double fertilization. Defensin- like peptide LUREs function as pollen tube attractants secreted by the synergid cells of the ovules (Okuta et al., 2009). In Torenia fournieri, an ovular competency factor AMOR glycan is required to perceive LUREs (Mizukami et al., 2016). 4-O-methyl-glucuronosyl galactose, the terminal sugar of AMOR glycan is essential and sufficient for the competency induction of pollen tubes (Jiao et al., 2017). Given that pollination is an important event in plant reproduction, understanding the molecular mechanisms contributing to successful pollination could result in strategies to improve crop yield.

Audience Take Away Notes

- The audience will learn about the different molecular mechanisms that mediate pollination in plants. Latest research in the field of plant reproductive biology will be presented
- This knowledge is critical for generating hybrid crops and making new plant species
- The knowledge gained from this presentation will also be useful in teaching plant reproductive biology and developmental biology courses

Subramanian Sankaranarayanan

Biological Engineering, Indian Institute of Technology, Gandhinagar, Gujarat, India

Biography

Dr. Subramanian Sankaranarayanan did his bachelor degree in Agriculture and a got a Masters in Biotechnology from Tamil Nadu Agriculture University, India in 2009. He obtained his PhD in plant developmental biology from the University of Calgary in Canada in the year 2015. Following which he worked as a post-doctoral scientist in several leading institutes like ITbM, Nagoya University, Japan; Cold Spring Harbor Laboratory and Purdue University for over 6 years. He took up a position as a faculty in Bio-engineering at the Indian Institute of Technology, Gandhinagar in 2022. He has published more than 20 research papers in reputed international journals.

New 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

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Department of Agriculture and Ganaderia, University of Sonora Sonora, Mexico

Biography

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: 2018 Management 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 responses to the stink bug diceraeus furcatus attack: A new pest of corn

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 unfavourable 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 I will summarize the current knowledge about plant responses to D. furcatus attack that can increase the resistance to this pest and also could make corn more susceptible.

Audiences 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 soybean and corn 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 Bioquímica, School of Agronomy, INBA-CONICET, University of Buenos Aires, Argentina

Biography

Dr. Zavala studied Agronomy at the University of Buenos Aires, Argentina and graduated as MS in 2000. He received his PhD degree in 2004 and a two-year postdoc at the Max Planck Institute for Chemical Ecology, Jena, Germany. After a 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 Associate Professor at the University of Buenos Aires, School of Agronomy. He has published more than 70 research articles in SCI (E) journals. He is interested in plant defenses against insect attack, and how insects respond to plant defenses, using chemical, biochemical and ecological tools.

Climatic changes and forest trees and shrubs adaptation in the future time

The earth planet, the environment and the different forms of life have had a close relationship at every stage of human development, they have such correlations so significant that in these last decades there is talk of very real mutual influences between the binomial planet/ environment - and life forms, life communities.

Many living organisms have such strong connections with the environmentthat their existence cannot be understood without specific conditions for certain species or populations. And depending on these individual conditions, populations, living organisms, have sometimes increased and decreased throughout the globe. But, it is the human species, which has only had increases in frightening progression from decade to decade, from century to century, regardless of the fact that there have been natural or human disasters such as diseases and wars. So, when the world was at the acceptable limits of some unpleasant environmental phenomena, the human population had a greater need for the use of resources and began to use the techniques of various technologies for the use of resources, which were bringing more and more significant negative impacts on the environment. Thus began phenomena such as soil, air, water pollution, such phenomena in the atmosphere that have to do with the ozone layer, up to heavy pollution in the form of smog or acid rain, threat of rare species or ecosystems, finally to global warming, are mostly attributed to human activities.

There are many factors that have been influential in the appearance of these phenomena, but the increase in population, the use of natural resources and the technology used are considered to be the main factors in the appearance of these phenomena. A worldwide overpopulation is still observed in extremes, from a few thousand individuals about 200,000 years ago, in 1880 we passed 1 billion, and in 1999 we reached 6 billion. One estimate puts the world's population at 7.7 billion in 2019, and projections predict it will reach 8.5 billion in 2030, 9.7 billion in 2050, and 10.9 billion in 2100. But, apart from the fact that we have an increase in the number of people from year to year, at the same time more and more, the world is getting more and more urbanized, and this especially at the end of the century we passed and continues with high intensity towards the century we are in. Around the 1980s worldwide, almost 50% of the population lived in urban areas in cities/towns, and this urban population figure is projected to reach about 70% by the 2050s.

On the other hand, the natural resources that populations use are limited, they are not inexhaustible, except for a part that is renewable, and these resources are reduced by the growing demands for their use.

Hajri Haska

Department of Forestry, Faculty of Forest Sciences, Agricultural University of Tirana, Albania

Biography

Prof. Haska, PhD studies in 1992-1999 for forestry and environment, since 2013 title “Professor”. Engaged in both: research and teaching; 1997-2002 Research Fellow, 2002-2007 Director FPRI, 2007-2011 Director of AEF, external/guest lecturer since 2001 at the FFS, Tirana, Albania and others universities. From October 2011 ongoing: permanent Academic staff, Professor, University of Agriculture, FFS, Tirana, Albania (Full Time), Part Time in national and international universities Designed, participated, directed studies, research project, national and international level, about 52, 19 internationally; participants in working groups for preparation of legislation, strategies, field of forestry and environment. Participated many meetings, seminars, conferences etc., at national and international level, 92 of them, has made 74 presentations, publications in various journals and magazines, about 95, including 13 in journals with Editorial Board and 3 in journals Thomson Routers, 10 texts/ monographs, Awards and Acknowledgments. External collaborator with CFRI, Croatia, from 2005, External collaborator IF, Belgrade, Serbia, from 2006. Member national/ international associations, member Editorial Board 4 journals.

Such natural resources as land, minerals, waters, forests, etc., are assets that are being impacted by their human uses. The increase in population, the use of resources and technology are some of the main aspects that are strongly influencing climate change in recent decades around the globe.

On climate change and vegetation, there are many discussions in scientific circles. Impacts on the environmental components of the climate such as temperature increase, sea level rise, decrease/seasonality of precipitation, increase and concentration of Co2 and other greenhouse gases in the atmosphere, bring consequences and stress on the vegetation world, including even forest ecosystems, up to the extinction of specific species.

The world has a forest area of 4.06 billion ha, about 31% of the earth's surface, 0.52 ha per person, and why forests are not distributed equally to people geographically. Albania has about 1 860 000 ha of forests + pastures, 65% of the territory, forests 1,310,000 ha or 46%, pastures 550,000 ha or 19%.

Thus, for example, the average global air temperature has increased by 0.7-0.8 °C in 2009, compared to the pre- industrial time period. The IPPC points out that global warming turns out to be more the result of human influences. For the future, there are different scenarios, where it is predicted, for example, that the temperature will increase significantly, up to 3 degrees in a few decades, the sea level will rise a few cm, we will have a decrease in the amount of precipitation, precipitation will fall at a higher intensity in a shorter time unit. We will have an extension of the vegetation period of the vegetation as well as vertical climbing of plant and wood species, so even in forests these differences will be reflected with visible significance in the vegetation distribution.

Albania, as a Mediterranean country, will undoubtedly be significantly affected by these changes, especially by the increase in temperature, where in the horizons of 2025 it will be from 0.8-1.1 C0, in 2050 around 1.7-2.3 and in 2100 around 2.9-5.5 C0, while the lack of precipitation (%) will vary from -3.4 to -2.6 in 2025, -6.9 to -5.3 in 2050 and about -16.2 to -8.8 in 2100, and we will also have a rise in sea level waters also in Albania and in other countries of the Mediterranean region. Evergreen species, oak forests are expected to expand, while the area of beech forests may decrease. The rise of the sea level brings problems in the forest ecosystems Kune-Vain, Velipojë, with a little Divjakë-Karavasta. The lagoons expand the fauna and flora of the water changes in favor of the species that like more warmth, a re-composition of the respective habitats.

But among the scientists there is also a rather optimistic point of view, which also derives from the long evolution of the plant world. A question arises: this plant world will be subjected to the harsh conditions of climate change and different types and species, including woody ones, may go towards extinction, or will they try to adapt and adapt to them and survive..? ??. The long evolution has shown that the vegetative world itself tries to adapt to these climate changes, in the constant struggle to survive, plants have many organisms inside them that realize this adaptation. Evolution has shown that vegetation is adaptive to the factors of drought, lack of water, in the desert we have plants with spikes, thorns, like cactus (Cactus), not leaves, so that they don't waste too much water during transpiration, or in dry places we have the development of broom (Spartium), with long threads that transpire less water than leaves.

In order to minimize as much as possible the negative significance of the impacts that climate change brings on the environment, and especially on forest ecosystems, we need to study and understand the way in which population, consumption and technology create their impact on this environment, and at the same time we must also apply methods, tools and ways of adapting the vegetation world, including forests and trees, to these climate changes, because forests are in fact the main element that affects the establishment and preservation of environmental balances in planet.

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SPEAKERS

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Gun Mardiatmoko

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

Sago forest conservation for food security and tackling climate change

One of the causes of climate change is due to deforestation and forest degradation, including damage to sago forests. In terms of the existence of this sago forest, it plays an important role in food security and handling climate change in a country. The aims of this research are (1) to find out the production of sago flour and the yield of processed sago products and (2) to calculate the amount of carbon absorption by sago forests. Measurement of sago biomass was carried out by destructive sampling in which sago at the sapling level up to the trees was felled and the wet weight and dry weight per segment were measured, i.e. stems, leaves and roots. Production of sago starch ranges between 513 kg and 577 kg with yield of 41.9% and 50.4% per tree. Sago's top-root ratio at the sapling level to trees ranges from 48% to 562% and the water content ranges from 72.9% to 99.9% per tree. Biomass content ranges from 48.1 kg to 761.6 kg or CO_2 absorption ranges from 83 kg to 1.314 kg per tree. This research is still very simple because there are only a few samples of sago trees studied and to get the results of calculating sago biomass for a wider area, it is necessary to multiply the samples studied.

Keywords: sago forest, biomass, CO_2 absorption, climate change

Audience Take Away Notes

- This research will help the audience to be able to do sago forest conservation for food security and tackling climate change
- This research can be developed more broadly in other faculties, especially those that focus on natural resource conservation for achieving Sustainable Development Goals (SDG)
- This research will be of great use, especially for the younger generation, because it can increase their concern for natural resources that are dwindling if they do not apply sustainable natural resources

Biography

Dr. Ir. 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.

Subbalakshmi Lokanadhan
Professor (Agronomy), Tamil Nadu Agricultural University, Coimbatore, India

Cultivation of traditional rice landraces for human health and food security

In Asia, more than two billion people are getting sixty to seventy per cent of their energy requirement from rice and its derived products. Many rice varieties with medicinal value are cultivated and used in certain pockets in states of Karnataka, Madhya Pradesh, Kerala, Tamil Nadu, Uttar Pradesh, Himachal Pradesh and Western Ghats in India. These rice types, being the local land races is exploited by the rural folks to treat skin disease, blood pressure, fever, rheumatism, lactation and used also as a health tonic. Some of the rice landrace types are used in sidda and ayurvedic for exploiting the curative value and is used in many medicinal preparations. The trend towards health consciousness, has made to re look the traditional varieties recently experiencing an increasing trend among consumers and the profitable market is reversing and focussing towards traditional varieties, due to their incredible health benefits. India is rich in rice land race bio-diversity. The traditional rice landrace cultivation are confined to certain pockets depending on the suitability of local climate and soil type, under varied level and quantity of water requirement, also having high degree of resistance to pests and diseases, known to have specific nutritional and therapeutic properties. Cultivation of rice landraces have survived in many disasters in comparison to HYV and popular rice varieties. The traditional varieties are exploited in sidda medicine, due to medicinal properties and health benefits. Hence there is a need for us to revisit and reassess the value that has been attributed to traditional rice by exploiting cultivation of Rice landraces for human health and food security in future.

Key words: Rice landrace, cultivation, human health

Biography

Dr. (Mrs) Subbalakshmi Lokanadhan, presently working as Professor of Agronomy at Water Technology Centre, TNAU, Coimbatore. Worked as agronomist at Department of Rice and Cotton crop wise and Department of Agronomy. Coimbatore and other constituent colleges in TNAU. Has experience at Directorate of Crop Management/Plant Breeding and Genetics/Planning and Monitoring at TNAU at different time periods of service. Involved in monitoring of state funded projects in TNAU. Published nearly 170 papers comprising of research, conference, symposium and seminar contributory papers in relation to Agronomy, field/cultural activities, environment protection, reduction in cultivation cost of crops and enhancing crop productivity per unit area. Chaired and guided fifteen post graduate students in Agronomy. Received awards for oral and poster presentation at national and international conferences Obtained award and appreciation for achieving 10 t/ha yield in irrigated Rice crop. Technical committee member for SRI component under IAMWARM (World Bank) Project and monitoring committee member for evaluation of BT rice at TNAU. Co-ordinated in Agronomy research and teaching both at undergraduate and post graduate level in Department of Agronomy and instrumental in syllabus revision for Agronomy subjects. Visited all rice growing south eastern countries to participate in International trainings and conferences.

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Jackfruit (*artocarpus heterophyllus lam.*) – A multipurpose tree for sustainable development in tropical regions of India and the globe

Jackfruit is native to India, with its origin from Western Ghats and spread across several states of South, East, West and North Eastern parts of India and many tropical countries. It grows as wild tree in its habitat. Now with selection of elite varieties and vegetative propagation methods, it is possible to get clonal plants for area expansion, early bearing and varieties suitable for various purposes. The jackfruit is widely used by people as food source, the tender fruits as vegetable, mature fruits for preparation of value-added products as such chips, papad, flake and seed flour, which are having good amount of minerals as well as vitamins and fiber, thus providing low glycemic food for diabetic people. The ripe fruits are mainly used for direct consumption by all category of people, has many medicinal properties, used in preparation of jam, juice, squash, pulp for ice cream and sweets. The outer skin of the fruit as the delicious feed for animals. The tree gives very good quality timber and is extensively used in wooden carvings and preparation of musical instruments. The wood has termite resistant quality and long lasting, considered as auspicious, used in several south Indian temples as main door frame. The jackfruit tree is considered as evergreen tree and contributes for cool environment. Leaves serve as fodder for animals and fallen leaves as good source of organic manure. One acre of Jackfruit can serve many needs of a farmer with good economic returns. The trees has rare quality of adaptability to sustain both in extreme drought and floods conditions besides the minimum care and low investments makes it a farmer friendly crop, can take care many generations since it lives for many centuries. Thus, it can be aptly called as second "*Kalpa Vruksha*" next to Coconut and contribute for food security and sustainability.

Biography of K. Narayana Gowda

Prof. K. Narayana Gowda obtained his B.Sc. (Agri)–1973, M.Sc. (Agri)–1979 and Ph.D. during 1992 with distinction and gold medal from the University of Agricultural Sciences, Bangalore, Karnataka, India. Prof. Gowda had the rare opportunity of serving for 41 years in fourteen different distinct positions as a teacher, researcher, extension personnel and an able administrator both in India and abroad. Prof. Gowda guided 11 Masters and 11 Doctoral degree scholars in Agricultural Extension and Development Communication. Implemented successfully many research and development projects. Most important ones are; Identification of appropriate cropping patterns for the Tank Achkat areas of South Karnataka (1992), Development of Model for Doubling Farmers Income (2010), Developing and Standardising Farmers based organisations for sustainable development of Farmers (2010),Identification and Standardisation of varieties in Jackfruit besides value addition and Processing (2014), Developing model for Attracting Farm Youth in farming popularly called "Attracting and Retaining of Youth in Agriculture" (ARYA) (2014) and Rural Agricultural Work Experience Program model Popularly called "RAWEP"(2014). These models are replicated and implemented across the country. Prof. Gowda travelled widely across 18 countries both for participation and presentation of invited papers in the International Conferences. Many recognitions and awards are bestowed to him both individually and the institution that he served considering his vast contributions. Important ones are; Swamy Sahajananda Best Extension Scientist Award by ICAR during 2009, Life time achievement Award by the International Society of Extension Education presented by the President of India during 2013, UAS, Bangalore received most Prestigious Sardar Patel Best Institution Award of ICAR, 2014 from among 75 Farm Universities in the Country during my tenure as Vice Chancellor of UAS, Bangalore.

Biography of S. Shyamalamma

She has obtained her M.Sc. degree in Horticulture during 1994 with UAS, Bangalore merit gold medal and Ph.D. Horticulture during 2008 with National award for best research on Jackfruit Genetic Diversity using morphological and molecular markers viz., Jawaharlal Nehru Award for Best Post graduate award during 2099-10 from ICAR, New Delhi. Currently serving as Prof. and Head, Dept. of Plant Biotechnology, University of Agricultural Sciences, Bangalore. She has guided 16 M.Sc. and 4 Ph.D. students and is specialized in fruit crops. Started work on Jackfruit genetic diversity in a collaborative mode with CAU, Imphal and AAU, Assam under DBT New Delhi sponsored project "A value chain on jackfruit and its value added products" from 2013 onwards. The project worth 4.65 Cr. helped in getting best varieties in Jackfruit (Swarna, Lalbagh Madhura, Byrachandra and GKVK Red Jack), which can bear early (3.50 years) and suitable for table and value addition purpose. With the support of AICRP on Post Harvest Technology staff, developed Jackfruit value added products viz., chips, papad, squash, jam, juice, flake powder, seed powder and technologies are commercialized. She has been recently awarded with state award "Nagamma Dattatreya Rao Desai Prize Award -2022", for need based research on Jackfruit. She is actively involved in implementation of Jackfruit projects on DUS characterization at all India level and also production of elite planting materials in Jackfruit for area expansion. Further she is involved in teaching and guiding master's and doctoral students in Plant Biotechnology, at UAS, GKVK, Bengaluru. She is serving as Coordinator, DBT HRD programme at the Dept. of Biotechnology.

B N Hazarika
Central Agricultural University, College of Horticulture and Forestry, Pasighat, Arunachal Pradesh, India

Genetic diversity of horticultural crops of North East India and their exploitation potential

The North-East India is a part of both Himalaya as well as Indo-Burma biodiversity hotspots in the world. It has the richest reservoir of plant diversity in India and is one of the 'biodiversity hotspots' of the world supporting about 50 % of India's biodiversity. Northeastern region occupy 7.7 % of total geographical area of country and harbor's 50 % of Indian flora (8,000 species) of which about 4 % is endemic (2,526 species). The distinct tribes in the region have rich indigenous knowledge system on the use of components of biodiversity for their daily sustenance like food, fodder, shelter and healthcare. The region has several unique features such as fertile land, abundant water resources, evergreen dense forests of about 66%, high rainfall, and agriculture-friendly climate. Its unique phyto-geographical positions, topography and high degree of precipitation are some of the important factors which are mainly responsible for its enormous biological diversity. As a result, an array of wonder plants is grown across the region ranging from tropical to alpine. A large number of diversity in fruits belonging to the genera Artocarpus, Annona, Averrhoa, Garcinia, Musa, Passiflora, Phyllanthus, etc. are reported from the region. Besides diverse vegetables particularly wild leafy vegetables, rare genotypes of cucurbits, solanaceous vegetables, chilli, ginger, turmeric, etc. are there with some unique quality because of their locational advantage. The region has a great ethno-cultural diversity with major and sub-tribes, which explains the wealth of traditional ecological knowledge among farmers. People of region have their own culture, tradition and medicinal system of treatment and knowledge acquired through close observation of nature. Its ethnic people living in the remote forest areas still depend to a greater extent on the forest ecosystems for their livelihood they collect different medicinal plants and use them in traditional ways to cure their health related forms. The minor and wild fruits are mostly used to cure various gastrointestinal disorders, respiratory problems, cardiovascular compliance, muscular illness, bone diseases, gynaecological problem, cancers, snake bite, allergy and malaria etc. by local people of the region. This indigenous system of treatment based on such fruits is still an important part in social life and culture of the tribal people. However, this traditional knowledge of the local people has been transferred from generation to generation without proper technological interventions. This paper provides the information on genetic diversity of horticultural crops of North East India and their exploitation potential.

Audience Take Away Notes

- Audience will be excited to know the genetic diversity of horticultural crops of North East India. Audience will be able to know some endangered plants like Phoebe Cooperman: An Economically Important Wild Edible Fruit of Arunachal Pradesh
- This deliberation will help audience by giving the information on unique plants which are yet to explore and thus give them job of utilizing them. This information can be taken as base for further advanced

research. By the deliberation a new direction on wisdom of tribal people with plants can be known which may provide practical solution of some problem relating to nutrition or health

Biography

Prof. B N Hazarika, PhD presently working as Dean, College of Horticulture and Forestry, CAU, Pasighat, Arunachal Pradesh. Prof. B N Hazarika guided a number of PG & Ph D students, handled several externally funded research projects and organized 90 trainings. He has published 150 research papers, published 20 books, 25 conference papers and book chapter, 11 practical manual, 25 Bulletins, edited 13 souvenir and 245 popular articles. He contributed significantly in collection, morphological and molecular characterization of diverse genotype of various fruit crops, standardized good agricultural practices for some major fruit crops; introduced new fruit crops in the region.

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Department of Nematology, Anand Agricultural University, India

Management of phytonematodes in potato in India

Global production of potato is about 320 MT of which China (72 MT), Russia (35 MT) and India (26 MT) are the major producers. Plant-parasitic nematodes are a significant factor limiting potato production and tuber quality in several regions where potato is produced. Overall, parasitic nematodes alone cause an estimated annual crop loss of $ 78 billion worldwide and an average crop yield loss of 10–15%. In India, Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh, Punjab, Assam, Haryana, Jharkhand and Chhattisgarh are the major potato producing states. IIn India among, Potato Golden Nematodes (PGN) (Globodera rostochiensis & G. pallida), Root - Knot Nematodes (RKN) (Meloidogyne incognita & M. javanica) both on roots and tubers Reniform (Rotylenchulus reniformis),Stunt (Tylenchorhynchus spp.), Spiral (Helicotylenchus spp.) & Lesion (Pratylenchus spp.) parasitizing potato, PGN and RKN are major crop damaging enemies. Feeding of both these nematodes reduces vigor of plants and causes blemishes on tubers. The latter can lead to a severe reduction in tuber quality. Symptoms of damage include stunting, yellowing of plant leaves and loss of plant vitality.Nematode infection can be checked by using certified planting materials from nematode infection, strictly observing sanitation of farm, implements used, adding adequate good quality organic manures such as FYM, deoiled cakes as fertilizers. Even soil solarization with LLDPE 40 microns clear film and growing nematode free rotation crops like rapeseed. Mustard, sudan grass, etc. can help to manage nematodes. Bio agents viz. Pochonia chlamydosporium, Purpuriocillium lilacinum , Pasteuria spp. Trichoderma spp., Pseudomonas fluorescens, etc. can be used for nematode management Based on two years pooled data,application of Denicotinized Tobacco Dist (DTD) containing (12-13% Ca, 0.2-.0.6 % nicotine,2.2 % N,0.50% P & o.40% K) indicated no toxic effects of DTD on seed germination even in higher dose of DTD 16 t/ha Both common scab and RKN diseases were decreased significantly with corresponding increase in DTD doses from 4-16 t/ha indicating 61.72% and 53.47 % decrease in common scab and RKN diseases respectively over control. Similarly in another field trial based on two years pooled data, potato seed treatment with Boric acid andTrichoderm viride+Pseudomonasfluorescenseach@3%(w/w) coupled with soil application of Trichodermavirid + Purpuriocillium lilacinum+Pseudomonasfluorescenseach@4kg/ha under crop row proved cost effective practice for management of Common scab and root- knot nematodes in potato field. Even soil fumigation with Metham- Sodium and shell DD has also proved effective for suppressing cysts nematodes in potato fields. However,there is an urgent need to take up massive efforts by nematologists for management of potato nematodes to help farmers in India.

Biography

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 June 28, 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, and 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. Presented148 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 institutions, 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.

Vashchenko Viktor Fedorovich Lipetsk
Rlets State University, Russian Federation

Paradigm of adaptation and agro-climatic potential, growth and development of an intact plant by secondary metabolism

Growth and development are controlled by the initial cell of the apex by a complex hierarchy, a stepped network of integral signals from the balance of hormones of stimulants and inhibitors, their level in ontogenesis, which control the appearance of initial cells of secondary meristems, organogenesis, and morphogenesis. The secondary metabolism of the year creates a phenotype, ranging from environmental signal perception, transport and repression, degradation, the inclusion of genes to create molecules and their secondary metabolism. They constitute the agro-climatic potential, the process of adaptation.

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 growthresumes. 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.

Key words: Apex, balance, Hormone, metabolism, heredity, adaptability, regulation, phenotype.

Biography

Vashchenko Viktor Fedorovich, studied 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.

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The dependency of latex production on sex expression of *carica papaya L*

Papaya (*carica papaya L.*) produces fruits throughout the year which are highly beneficial during pharmaceutical production for their nutraceutical and antimicrobial properties. It is a gynodioecious plant that has three sex forms: female, male, and hermaphrodite. Papain is one of the main products derived from the dried latex of immature fruits used in meat tenderization, cosmetic production, and related drug productions. The study's objectives were to evaluate the performance of female and hermaphrodite plants of papaya Red lady variety during 3 months of planting and 6 months of planting for latex production and to establish a relationship between the growth of papaya plants and latex production. The experiment was conducted at the Faculty of Technology, University of Ruhuna, Karagoda-Uyangoda, Kamburupitiya (6.0635° N, 80.5420° E; 14 m a.s.l.) of IL1A agroecological region. The experiment design was Randomized Complete Block Design (RCBD) of 10 replicates in two varieties with 1.8 m X 1.8 m spacing. The morphological characteristics of the H and the F plants of the papaya Red lady were observed for the Plant Height (PH), Stem Diameter (SD), Leaf Number (LN), Leaf Length (LL), chlorophyll content (SR), Flower Number (FN), Fruit Number (FR) and the total individual latex production per plant (LP) were measured at 3rd and 6th month of growing. Fully matured papaya fruits of individual plants were selected for tapping during morning hours between 6.00 – 7.00 am. Longitudinal incisions of about 02 mm from four side of each papaya fruit were directed from the stalk end to the tip and collected the latex in suitable containers. The latex yields were significantly higher in female trees during both growing periods which are contradicted to previous literature and the highest yields were observed during 3rd month of growing. FR for female plants was also higher in female trees hence the highest FN was observed during 6th month of growing. However, with contrast to the latex yields, higher SR, SD, LN and FN were observed for the hermaphrodite plants for both months of growing. According to the correlations observed for the latex production with the other morphological factors; significantly negative correlations were observed with the PH for both female and hermaphrodite plants of both 3rd and 6th months of growing while significantly positive correlation was observed for the FR for hermaphrodite plants of both 3rd and 6th months of growing and female plants of 6th month of growing; FR was significantly negatively correlated for female plants of 3rd month of growing; FL was significantly negatively correlated for the hermaphrodite plants of both 3rd and 6th months of growing; LN and SP was negatively correlated for hermaphrodite plants of 3rd month of growing and female plants of 6th months of growing. The study summarises the considerable association of morphological factors, sex expression and the development stages with the latex production of papaya fruit.

Audience Take Away Notes

- The audience will understand the importance of sex expression of tropical papaya and their relationship with morphological characters
- It will be utilized in their research work for predicting phenological sub-periods, staggering production, genetic breeding programming, harvest season planning, and climatic zoning

- The research is a practical solution to identify the latex production during different growth stages of plants for the studies on nutraceutical and antimicrobial properties of papaya

Biography

Dr. Udari Rathnathunga studied Agriculture at the Faculty of Agriculture, University of Ruhuna, Sri Lanka, specializing in Agricultural Biology. She received her PhD degree in 2016 at the same institution for Plant Genetics and Breeding. After two years of experience as the Senior Lecturer Department of Biosystems Technology, Faculty of Technology, University of Ruhuna, Sri Lanka she later joined the position as a Senior Lecturer at the Department of Urban Bioresources, Faculty of Urban and Aquatic Bioresources, University of Sri Jayewardenepura, Sri Lanka. She published more than 40 publications including 06 research articles in SCI journals.

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Soil salinity problem in Bangladesh and its alleviation by morphometric and SSR marker-based screening for salinity tolerance in local and exotic wheat genotypes

Bangladesh is an agrarian country. Agriculture here is vulnerable to various climatic and edaphic factors. Soil salinity is one of the major abiotic stresses affecting crop yield. The intensity and extent of soil salinity are increasing day by day in Bangladesh. As a result food and nutrition security is under threat. Problems related to salinity can be alleviated by identifying saline tolerant genotypes. Salt affected soils can be better utilized by developing and growing salt tolerant wheat varieties. In this study, screening was conducted to evaluate the salt tolerance capacity of wheat genotypes by hydroponic culture and microsatellite markers. Screening at seedling stage of 46 (21 Bangladeshi and 25 exotic) wheat genotypes was carried out by culturing in hydroponic solution (0, 9, 12 and 15 dS/m) on the basis of Salt Tolerant Index (STI) and microsatellite markers. DNA was isolated, quantified and characterized by 30 salinity-linked primers to identify salt-tolerant genotypes. Seedlings under salinized conditions showed salt injury symptoms like yellowing of leaves, drying leaves, reduced shoot and root growth, stunted growth and death of seedlings. BINA Gom-1 (check variety) showed moderate tolerance (12 dS/m) to salinity. Significant positive correlations at both genotypic and phenotypic levels were recorded for root length with shoot length, fresh and dry weight of shoot, and root dry weight. ESWYT P-2, Borkot, ESWYT P-5, Agroni, ESWYT P-8, BARI Gom-23, ESWYT P-30, ESWYT P-19, ESWYT P-12 exhibited the highest salt-tolerant indices. The highest PIC and gene diversity, 0.711 and 0.750 were produced by the marker Xgwm-493 suggesting it as most suitable to evaluate salt tolerance. The UPGMA cluster analysis discriminated the 46 germplasm into seven major clusters. BARI Gom-23, BAW-1263, BAW-1272, BAW-1280 and BARI Gom-19, which showed high to moderate tolerance level of salinity, were located along with control variety BINA Gom-1 in the same cluster 1. Studying both morpho-molecular parameters, it is strongly suggested that these varieties and accessions may be the best candidates for breeding program to incorporate salinity tolerant genes.

Keywords: Genetic diversity, Salt tolerance, Wheat, SSRs, STI

Audience Take Away Notes

- The participants will be able to learn a combined approach for screening for salinity tolerance
- The audience will be able to use this information in future breeding program
- This research methodology could certainly be used by other faculty to expand their research or teaching

Biography

Dr. Muhammad Shahidul Haque obtained B.Sc. Ag (Hons) and M.Sc degrees from BAU. Then he did MS and Ph.D from Nagoya University, Japan. Later he joined as a JSPS Postdoctoral Fellow in Nagoya University. He pursued research on molecular breeding as visiting professor in Nagoya University. He has published 140 articles in national and international journals. He has operated ten research projects funded by national and international (USDA, BAS-USDA, MoE, NST) funding agencies. He is interested in biotic and abiotic stress tolerance in crops He supervised 12 PhD scholars and 110 MS students. He has attended, organized, chaired given lectures in at least 70 Workshops, Seminars, Trainings and International Conferences in home and abroad.

Iqtidar Hussain

Department of Agronomy, Faculty of Agriculture, Gomal University, Dera Ismail Khan, KP, Pakistan

A proof of parthethenium hysterophorus is an invasive and allelopathic weed in our sustainable agriculture under climatic condition of Pakistan

Parthenium (*Parthethenium hysterophorus L.*) is one of the most aggressive herbaceous weeds of the Asteraceae family. It is widely distributed, almost across the world and has become the most important invasive weed. Thee infestations parthenium have been reported to reduce grain and forage yields by 40-90%. The spread of parthenium has been attributed to its alllelopathic activity. Allelochemicals released from parthenium has been reported to decrease germination and growth of agronomic crops, vegetables, trees and many other weed species. Growth promoting effects of parthenium extracts at low concentrations have also been reported in certain crops. A laboratory experiment was carried out to evaluate the germination and germination indices of maize with estimation of maize growth infested with parthenium allelopathy. This trail was conducted in CRD designs with 3 replications. Parthenium dry powder % mixed with soil produced variable responses regarding seed germination and seedling growth. Emergence index, mean germination time, vigor index was significantly affected by various parthenium dry powder percentages. The smaller amount of parthenium powder (5, 10 and 15%) promoted the maize germination and seedling growth.The highest parthenium dry powder (20%) negatively affects the maize germination and seedling growth. Germination %, time to start germination, time taken to 50% could not be affected by parthenium dry powder. In light of this study it is recommended that smaller amount of parthenium dry powder percentage (5, 10 and 15%) promoted the maize germination and seedling growth positively. Therefore the maize can be planted in the field infested with parthenium weed to some extent and its planting should be avoided where the higher population of parthenium precedes the maize planting.

Key words: Allelopathy, *Parthethenium hysterophorus*, Germination, Growth, Development

Audience Take Away Notes

- To determine the allelopathic potential of *Parthethenium hysterophorus*
- Estimate the amount of phyto-toxin release from *Parthethenium hysterophorus*
- We will be able to introduce herbal weedicide from *Parthethenium hysterophorus*
- Reduce the amount of inorganic and chemical herbicide by using *Parthethenium hysterophorus*, water, oil and ethanol extract
- It is eco-friendly method of weeds management and pest management
- In lower concentration upto 5% *Parthethenium hysterophorus* extract maybe utilized as plant growth regulator
- Research can be repeated and replicated in any climate and in any crops to reduce weeds

Biography

Dr. Iqtidar Hussain is serving Department of Agronomy as Assistant Professor in the Faculty of Agriculture Gomal University since 2014. He did PhD in 37 years from Gomal University in Agronomy (plant sciences). He succeeded in publishing 98 research articles in national as well as International repute research journal across the country and around the globe. He served Education Department as Teacher and Subject Specialist for 17 years and Gomal University as Assistant Professor for 8 years.

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Introducing new promising varieties of Zamin and Duru-Gavkhar-4 into the textile industry and achieving high-quality textile industry products from those varieties

During our presentation, a new medium fiber cotton variety Zamin (*G.barbadense L.*) and thin fiber high-yielding, disease and pest-resistant Duru-Gavkhar-4, created in the laboratory "Cotton Genetics, Selection, and Seed Breeding" of the Institute of Genetics and Plants of the Academy of Sciences of the Republic of Uzbekistan, created by the traditional (traditional) method of selection. - The creation of Gavhar-4 varieties and their superiority over other varieties are discussed.

After the independence of the Republic of Uzbekistan (1991), the cotton planting area was reduced to 1 million 300 thousand hectares. Currently, the Republic of Uzbekistan occupies the 5th place in the world in terms of cotton cultivation, and the 10th place in terms of productivity. Before independence, the Republic of Uzbekistan exported 90% of its fiber. For fiber processing, the finished product output was only up to 10%. Currently, the export of fiber is stopped, and the production of finished products is started. Cotton-textile clusters are being established and the export of finished products is being launched For this reason, breeders are faced with the task of creating new, fruitful, disease and pest-resistant varieties of cotton whose fiber quality meets world textile requirements.Therefore, the new Zamin and Duru-Gavhar-4 varieties of cotton created in our laboratory are superior to the standard varieties for textile requirements of cotton-textile clusters.

In this work, the quality indicators of standard cotton varieties Namangan-77, C-6524, C-8295 and a new perspective variety Zamin have been characterized. Zamin cotton variety with the best fiber indicators was selected for sowing and further propagation of sown areas in the cotton-textile cluster Fergana Oseana textile LTD. From 2020, in the system of cotton-textile cluster Fergana Oseana textile LTD an elite seed farm will be organized to propagate the perspective variety Zamin in the Fergana district of the Fergana region. There is a great need for thin-fiber (G. barbadense L.) cotton varieties for the production of high-quality products in the republic.

The currently sown fine-staple cotton varieties are characterized by low yield, late ripening, and resistance to various Fusarium races wilt and other cotton pests. Breeders are faced with the task of providing cotton-textile clusters with raw materials from high-quality cotton fiber. This requires the creation of new fine-fiber varieties of cotton, combining early maturing, high yields with an increased number of fruit branches, quantity, and weight of raw cotton in one box. These important elements ensure the yield of fine staple cotton. This article deals with the creation of the cotton variety Duru-Gavkhar-4 belonging to the genus Gossypium barbadense L. using a traditional synthetic breeding method. During many years of individual selection, a new promising fine-staple cotton variety Duru-Gavkhar-4 was created, which was obtained by crossing the Duru-Gavkhar variety with the 9647I variety. The new variety successfully passed the State

Variety Test in 2020 with a result of 98 % in terms of varietal purity and uniformity. The fiber of the new cotton variety Duru-Gavkhar-4 belongs to type I. The vegetation period of the variety is 125–128 days, the yield is 33–38 centner/ha, the fiber yield is 33–35 %, the draw weight of one box is 4.0–4.2 g, the fiber length is 39–41 mm, the weight of 1000 seeds is 118.2 g. In terms of quantitative and qualitative indicators, this variety dominates the control varies which that was Termez-31 (G. barbadense L.). The micronaire index is 3.8–4.1, which fully meets the requirements of the textile industry. The promising cotton variety Duru-Gavkhar-4 is currently being tested in the cotton-textile cluster of “KOVOTECH” in the Bagat district of the Khorezm region.

Audience Take Away Notes

- From our presentation, you can get information about the development of cotton growing in the Republic of Uzbekistan in recent years
- The listeners in the auditorium can get information about new varieties of medium and fine fiber cotton, Zamin and Duru-Gavhar-4, created in our laboratory
- The teachers of agriculture can provide information to students in their lectures
- The newly created varieties of Zamin and Duru-Gavhar-4 can be widely used in production as they meet the requirements of cotton-textile clusters

Biography

Mamaruziev Abdukayum Abdumavlon Ugli was born on June 28, 1960, in the family of an agricultural farmer in the Fergana district of the Fergana region. He graduated from high school in 1967-1977. In 1978-1983, he graduated from the Tashkent Agricultural Institute with the Badge of Friendship of Peoples with a red diploma. In 1984-1986, He worked as an intern-researcher at the Institute of Genetics and Plant Experimental Biology of the Academy of Sciences of Uzbekistan. Since 1988, he has been working as a junior researcher, researcher, and since 1992 as a senior researcher in the "Genetics of Wilt Resistance" laboratory. In 1992, he defended my candidate's thesis on the topic "Effect of exogenous drugs on some properties of cotton". From 1998 to 2012, he worked as a consultant on cotton pest control and fiber quality at Steinert Industries (Germany), International Cotton Group. Since 2006, he has been working as a leading researcher in the "Cotton genetics, selection and seed breeding" laboratory of this institute. During my academic career at the National Academy of Sciences of the Republic of Uzbekistan, he published more than 50 scientific articles and 1 monograph. He is the author and co-author of 8 new cotton varieties.

Patents on cotton varieties

1. Zafar cotton variety patent No. NAP 00219 07.12. 2018
2. Patent No. NAP 00220 07.12 for AN-519 cotton variety. 2018
3. Zangi-Ota-2 cotton variety patent No. NAP 00217 07.12.2018
4. AN-521 cotton variety patent No. NAP 00257 05.12.2019
5. Period cotton variety patent No. NAP 00221 07.12.2018
6. Ground cotton variety patent No. 00364 09.11.2021
7. Yield cotton variety patent No. 00391 04/06/2022
8. Patent order for AN-520 cotton variety No. 20220024. 01.03.2022

Currently, the Zafar variety of cotton is included in the commercialization program, and the cultivated areas are being expanded. The quality indicators of the fiber of the remaining varieties are being studied in the laboratories of state variety testing, production testing and cotton-textile clusters.

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The role of chitosan priming in induction of GABA shunt pathway during wheat (*triticum durum l.*) seed germination under salt stress

Soil salinity leads to a reduction in plant growth, germination, relative water content, and reduces production of wheat plants worldwide. Chitosan showed a positive effect on plant growth, development and improve plant stress tolerance. The current study aimed to examine the effect of different chitosan concentrations on Gamma-Aminobutyric Acid (GABA) shunt pathway in germinating seeds of wheat (*Triticum durum* L.) under salt stress through the characterization of seed germination pattern, seed moisture content, GABA shunt metabolite level (GABA, glutamate and alanine), the level of oxidative damage in term of measuring malondialdehyde (MDA) accumulation level and the GAD mRNA transcription level in response NaCl treatments. Pre-treatment of wheat seeds with chitosan improved germination by enhancing germination percentage, seedling length, seedling fresh and dry weights, especially under salt stress. Data showed an increase in GABA shunt and their metabolites (alanine and glutamate), MDA content and GAD mRNA transcription level, and a decrease in germination percentage, seedling length, seedling fresh and dry weights for both untreated and chitosan treated seeds under salt stress. Our results suggest that the elevation of GABA level in chitosan-treated seeds was to maintain the metabolic stability under salt stress. In addition, MDA content increased in chitosan-treated seeds as NaCl concentration increased. However, the increase was slightly lower than the MDA level in untreated seeds which confirmed that chitosan activates GAD mRNA expression that leads to activate GABA shunt which is involved in the reduction of membrane damage and activation of reactive oxygen species scavenging systems under salt stress. Consequently, this study demonstrated that chitosan significantly enhanced the accumulation of GABA and amino acids metabolism to maintain the C:N metabolic balance and improved salt tolerance in wheat seeds during seed germination.

Audience Take Away Notes

- Pre-treatment of wheat seeds with chitosan improved germination percentage, seedling length, seedling fresh and dry weights especially under salt stress
- Chitosan priming activated GABA shunt pathway through enhanced organic acids metabolism and increased the capability of seeds to germinate under salt stress
- Elevation of GABA level in chitosan treated seeds was to maintain the metabolic stability and ROS scavenging under salt stress
- Remarkable association between GAD mRNA transcription and the response of germinating wheat seeds to salt stress in chitosan primed seeds
- Chitosan significantly enhanced C:N metabolic balance and improve salt tolerance in wheat (*Triticum durum* L.) seeds during seed germination

Biography

Nisreen AL-Quraan graduated in 1998 with Bachelor of Science degree from the Department of Biological Sciences, Yarmouk University, Jordan. She joined the graduate program in the Department of Biological sciences, Yarmouk University and received her Master of Science degree in Plant Biochemistry and Molecular biology in 2001. After completion of her MS, she worked as research and teaching assistant for two years in the Department of Biological Sciences, Yarmouk University, Jordan. On May, 2004 she joined the Department of Biological Sciences, Auburn University, Alabama, USA to pursue her PhD degree in Plant Biochemistry and Molecular Biology working on the plant abiotic stress interaction and the role of GABA shunt pathway in plant stress tolerance. She obtained her PhD Degree in August, 2008 from Auburn University, Alabama, USA. Since September 2008, Nisreen AL-Quraan has been working as a professor in plant biochemistry and molecular biology at Jordan University of Science and Technology, Jordan. Her research is focusing on investigating the pathways that enable plants to adapt and tolerate harsh biotic and Abiotic stress conditions. She is interested in understanding the role of GABA shunt metabolic pathway that is activated in response to the interactions between plants and its environments.

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STRP, a novel arabidopsis protein with a protective role against abiotic stresses

Plants, as sessile organisms, are constantly exposed to critical environmental conditions such as drought, extreme temperatures, and salinity that negatively affect their growth and development, reducing crop productivity. To cope with these abiotic stressors, plants have evolved a repertoire of physiological and biochemical responses that involve multiple processes, including hormone signaling, metabolism alteration, and activation of gene expression.

Understanding the complex mechanisms underlying the plant responses to abiotic stresses represents a major goal for developing crop varieties that can adapt well to adverse environmental conditions.

STRP (Salt-Tolerance Related Protein) is an *Arabidopsis thaliana* poorly characterized protein initially proposed to be involved in the plant response to salt stress based on the hypersensitivity to salt stress displayed by the loss-of-function Arabidopsis mutant. In a proteomic study aimed to identify temperature stress-responsive proteins, STRP was found rapidly accumulate during short-term cold exposure, suggesting its involvement in the plant response to cold stress.

In this study, we characterized STRP protein and investigated its role in the plant response to cold and salt stresses.

Our experiments demonstrated that low-temperature exposure and salt stress caused STRP accumulation and that this was due to the inhibition of its proteasome-mediated degradation.

The *strp* knockout mutant was more susceptible to oxidative damages induced by cold and salt stresses compared to wild-type plants. Furthermore, the analysis of the abscisic acid effects on growth and development evidenced that *strp* plants displayed a reduced sensitivity towards the hormone.

STRP shares common features with the Late Embryogenesis Abundant (LEA) proteins (a family of highly hydrophilic and intrinsically disordered proteins identified in a wide range of organisms) which in plants accumulate at high levels in embryos before seed desiccation and in vegetative tissues under various stress conditions. LEA proteins were proposed to play a protective role by stabilizing cellular structures. STRP is a hydrophilic and largely unstructured protein that remains highly soluble after boiling and can prevent enzyme inactivation after freezing, similar to LEA proteins.

Localization studies performed with protoplast transiently transformed with the 35S: STRP-YFP construct showed that STRP is localized in the cytosol and nucleus and associated with the plasma membrane. Interestingly, cold stress increased the STRP nuclear content, promoting its association with chromatin, thus suggesting that STRP may exert a protective role under stressed conditions.

Results obtained suggest a role for STRP in plant protection against cold and salt stress, proposing this

protein as a multitasking regulator acting at different levels in the response mechanisms to abiotic stresses in Arabidopsis.

Audience Take Away Notes

- The audience will have the possibility of improving their knowledge about the molecular mechanisms underlying the plant response to abiotic stresses
- This could be used to expand the knowledge of plant physiology
- This will provide new information to improve plant tolerance against abiotic stresses

Biography

Dr. Sabina Visconti graduated in Chemistry from the Sapienza University of Rome. She achieved a PhD in Cellular and Molecular Biology, at the University of Rome Tor Vergata in 1999 and from 2000 to 2005 had postdoctoral fellowships in the laboratory of plant physiology at the same university. Since 2005 she is an assistant professor in Plant Physiology and Biotechnology at the University of Rome Tor Vergata. Sabina Visconti's research activity focused on the study of signal transduction pathways and the molecular mechanisms of plant response to abiotic and biotic stresses. She is author of more than 50 oral and poster presentations at national and international congresses, and of 28 articles published in international peer-reviewed journals.

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Use of phosphate-solubilizing bacteria to foster P availability and promote maize growth in P-deficient soils

The agricultural sector is facing several challenges related to climate change and decrease of soil fertility, which is impacting the production of staple food crops. To meet the global food demand and overcome the nutrient deficiency in soils, farmers usually apply high doses of chemical fertilizers. However, this practice brings several environmental and human health concerns, while do not solve the low bioavailability of some nutrients, namely phosphorous (P). Moreover, P resources in nature are finite being of utmost importance to turn available P from all possible sources. Soil microorganisms, namely the Phosphate Solubilizing Bacteria (PSB) can solubilize and/or mineralize insoluble P forms turning them available to plants, increasing their growth under P-deficient conditions.

This presentation comprises the results obtained in two different works aiming: (i) to evaluate the ability of PSB to solubilize hydroxyapatite (a naturally occurring calcium phosphate) extracted from the scales of tilapia (Coptodon rendalli) and (ii) to assess the effects of PSB inoculation on *Zea mays* growth in an agricultural P-deficient soil.

In the first work, several different PSB strains were tested for their ability to solubilize tricalcium phosphate (TCP) and hydroxyapatite from fish scale (FSHA). The strain *Acidovorax oryzae* ZS 1–7 was the best performing bacterial strain, by solubilizing 325 mg/L of P after 10 days, >60 times higher than the negative control. Such solubilisation was related to a decrease of the pH to more acidic values of about 4. This strain also showed higher P solubilisation efficiency with FSHA than with commercial TCP.

In the second work, three P-solubilizing strains, *Rhodococcus* sp. EC35 (B1), *Pseudomonas* sp. EAV (B2) and Arthrobacter nicotinovorans EAPAA (B3), were singly and mixed (BM) inoculated in maize plants growing in P-deficient soils. Three P-treatments were applied to the soils: control – without P fertilization, soluble P (KH_2PO_4) and TCP (sparingly soluble P). Overall, PSB inoculation fostered maize growth in all treatments. In soils without P fertilization, bacterial inoculation enhanced P accumulation in roots and shoots, as well as plant dry biomass (ca. 20%). Strain B2 was the bacteria that best performed in soils amended with soluble P, improving root and shoot biomass by 102% and 63%, respectively. In soils amended with TCP, maize biomass and P accumulation were also enhanced by PSB inoculation (strain B3 and BM).

The results obtained clearly indicate that the use of residues from the fishing industry, namely tilapia scales, can constitute an alternative source of P when associated with PSB. In addition, PSB inoculation proved to be effective in promoting maize biomass, being an attractive alternative to reduce the rate of application of chemical P-fertilizers.

Audience Take Away Notes

- How by-products can be turned in sources of P for agriculture

- The contribution of biotechnology tools such as microbial inoculants to decrease the application of chemical fertilizers, while improving crop production

Biography

Dr. Sofia Pereira is Senior Researcher and Invited Assistant Professor at Centro Biotecnologia e Química Fina, Universidade Católica Portuguesa. She obtained a PhD in Biology in 2010 at Aveiro University, Portugal. Her scientific activity has been focused on fostering biotechnological approaches towards a more sustainable and resilient agriculture and on the use of phytoremediation and phytomanagement strategies for the recovery of environmentally degraded areas, being her domain of activity the environmental and agricultural biotechnology. Dr. Pereira has published more than 50 peer-review papers and book chapters. She has been involved in several national and international projects, as well as, in the supervision of students from different academic levels. Currently, Dr. Pereira is associate editor of Frontiers in Plant Science (Plant Symbiotic Interactions section) and guest editor of several special issues.

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Induction of systemic resistance to tobacco mosaic virus in tomato through foliar application of bacillus amyloliquefaciens strain tborg1 culture filtrate

The application of microbe-derived products as natural biocontrol agents to boost systemic disease resistance to virus infections in plants is a prospective strategy to make agriculture more sustainable and environmentally friendly. In the current study, the rhizobacterium Bacillus amyloliquefaciens strain TBorg1 was identified based on 16S rRNA, rpoB, and gyrA gene sequences, and evaluated for its efficiency in conferring protection of tomato from infection by Tobacco Mosaic Virus (TMV). Under greenhouse circumstances, foliar sprays of TBorg1 culture filtrate (TBorg1-CF) promoted tomato growth, lowered disease severity, and significantly decreased TMV accumulation in systemically infected leaves of treated plants relative to untreated controls. TMV accumulation was reduced by 90% following the dual treatment, applied 24 h before and after TMV infection. Significant increases in levels of total soluble carbohydrates, proteins, and ascorbic acid were also found. In addition, a significant rise in activities of enzymes capable of scavenging reactive oxygen species (PPO and POX), as well as decreased levels of non-enzymatic oxidative stress markers (H_2O_2 and MDA) were observed, compared to untreated plants. Enhanced systemic resistance to TMV was indicated by significantly increased transcript accumulation of polyphenolic pathway (C4H, HCT, and CHI) and pathogenesis-related (PR-1 and PR-5) genes. Out of the 15 compounds identified in the GC-MS analysis, 1,2-benzenedicarboxylic acid mono(2- ethylhexyl) ester and phenol, 2,4-bis(1,1-dimethylethyl), as well as L-proline, N-valeryl-, and heptadecyl ester were present in the highest concentrations in the ethyl acetate extract of TBorg1-CF. In addition, significant amounts of n-hexadecanoic acid, pyrrolo [1,2-a] pyrazine-1,4-dione hexahydro-3-(2- methylpropyl)-, nonane, 5-butyl-, and eicosane were also detected. These compounds may act as inducers of systemic resistance to viral infection. Our findings indicate that the newly isolated B. amyloliquefaciens strain TBorg1 could be a potentially useful rhizobacterium for promoting plant growth and a possible source of biocontrol agents for combating plant virus infections.

Audience Take Away Notes

- Biological control of plant viruses
- Those who are interested in this field will use beneficial bacteria in the soil to control viral diseases
- Yes, because it is applied research

- Yes, the rhizobacterium is a possible source of biocontrol agents for combating plant virus infections

Biography

Dr. Aseel studied Genetics at the Alexandria University, Scholarship of MSc advent from Academy of Scientific Research and Technology (ASRT) in 2010. She received her PhD degree in 2015 at Arid Lands Cultivation Research Institute (ALCRI), City of Scientific Research and Technological Applications (SRTA, City). Dr. Aseel is an Associate Professor at the same institution. Preface: Patent (No. 1261) of the Potato Leafroll Virus Diagnostic Group Kit. She is a member of scientific societies like the Egyptian Society for the Biological Control of pests, American Microbiology society. She has a reviewer in international journals like; frontiers in plant science, and Archives of Phytopathology and Plant Protection. She has published more than 40 research articles in SCI (E) journals.

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Phosphate regulation of arbuscular mycorrhiza symbiosis in rice

Arbuscular Mycorrhiza (AM) is a mutualistic symbiosis between plant roots and *Glomeromycotina* fungi, which is activated under low but inhibited by high phosphate. The effect of phosphate on AM development has been observed for many years but mechanisms regulating it under contrasting phosphate levels remain unknown. Based on previous observations that promoters of several AM functional genes contain PHR binding motifs, we hypothesized that PHR2, a master regulator of phosphate starvation response in rice, was recruited to regulate AM symbiosis development. We observed a drastic reduction in root colonization and significant AM transcriptome modulation in *phr2*. PHR2 targets genes required for root colonization and AM signaling. The role of PHR2 in improving root colonization, mycorrhizal phosphate uptake, and growth response was confirmed in field soil. In conclusion, rice PHR2 which is considered a master regulator of phosphate starvation responses acts as a positive regulator of AM symbiosis between Glomeromycotina fungi and rice roots. PHR2 directly targets the transcription of plant strigolactone and AM genes involved in establishment of this symbiosis. Our work facilitates understanding of ways to enhance AMF propagule populations introduced in field soils (as a biofertilizer) in order to restore the natural plant-AMF networks disrupted by modern agricultural practices. We show that PHR2 is required for AM-mediated improvement of rice yield in low phosphate paddy field soil. Thus, our work contributes knowledge for rational application of AM in sustainable agriculture. Our data provide important insights into the regulation of AM by the plant phosphate status, which has a broad significance in agriculture and terrestrial ecosystems.

Biography

He has studied Physiology, functional Genomics, and Genetics of Plant-environment interactions at prestigious Universities in Asia (India, China), Europe (Netherlands, Germany), and North America (USA) over the course of his ten years of research experience, and has published 25 manuscripts in international peer-reviewed journals. In the last five years, he has conducted genetic studies on root symbiosis in legumes including Lotus japonicus and Medicago truncatula, and cereal crops such as rice utilizing molecular and cell biology analyses.

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https://agri-conferences.com/

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March 21-23, 2024 | Singapore | Hybrid Event

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