magnus Group

SEPT 01-02

7TH EDITION OF GLOBAL CONFERENCE ON

PLANT SCIENCE AND MOLECULAR BIOLOGY

VIRTUAL EVENT

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BOOK OF ABSTRACTS

7TH EDITION OF GLOBAL CONFERENCE ON

PLANT SCIENCE AND MOLECULAR BIOLOGY

01-02 SEPT

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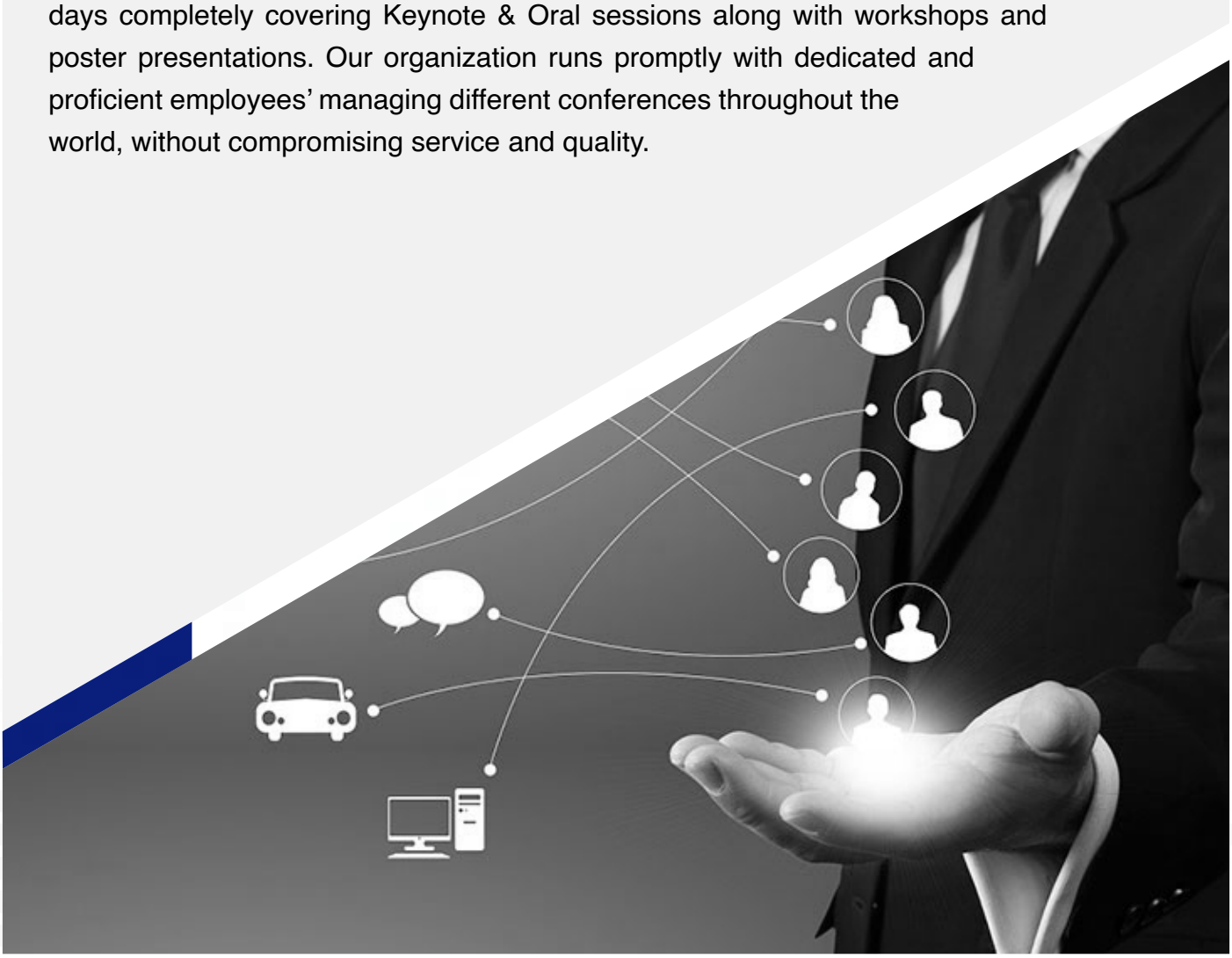
ABOUT MAGNUS GROUP

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 conference and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

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



ABOUT GPMB 2022

Magnus Group welcomes you to our Online Event entitled "7th Edition of Global Conference on Plant Science and Molecular Biology" GPMB 2022 scheduled on September 01-02, 2022 with the theme "Evaluating Plant Science Innovations for A Sustainable Green Future" GPMB 2022 is an international platform that amalgamates world renowned experts of both academics and industries within the discipline of Plant Science and Molecular Biology from all over of the world. This event brings together all the plant science scientists, botanists, and agronomists to exchange and innovates new theories and practices of Plant Science and Molecular Biology.

KEYNOTE FORUM

DAY 01

7TH EDITION OF GLOBAL CONFERENCE ON

PLANT SCIENCE AND MOLECULAR BIOLOGY

01-02 SEPT

Pavlovskaya Ninel[1]*, Rodimtsev Sergey[2]

[1]The Ministry of Agriculture of the Russian Federation, the Federal State Budget Educational Institution of Higher Education "Orlov State Agricultural University. N.V. Parakhina, Department of Biotechnology. G. Eagle, Russian Federation.

[2]Department of Service and Repair of Machines, Oryol State University named after I.S. Turgenev, Oryol, Oryol Region, Russia

Managing the conditions of the processes of vegetation of grain crops using NDVI.

Yield forecasting is an important tool for managing the production process and one of the mandatory elements of the precision farming system. Modeling of the effect of the current conditions on the vegetation of plants is realized by factor analysis of temperature, soil, climatic and other influences. An evaluation indicator should be selected as an independent variable of the mathematical model that most fully reflects the impact of the current conditions on the growth and development of culture, including the possibility of determining it in a remote format. As a criterion for optimizing the predictive mathematical model, the article considers the possibility of using deviations of the current NDVI values from the average long-term indicators. On the example of winter wheat and spring barley, the procedure for the formation of NDVI time series based on archival data from 2016-2020 is given. The approximation of long-term average data by an asymmetric gaussian is performed and the adequacy of mathematical models is checked, allowing

Drawing. Dynamics of NDVI (ΔNDVI) anomalies of the 2021 vegetative season

1. The task of managing the vegetation process can be implemented on the basis of predictive models obtained by factor analysis of the initial data.

2. A comparative analysis of the average long-term and current (vegetative season of 2021) NDVI indices for the studied crops, a diagram of NDVI anomalies (ΔNDVI) of the current vegetative season was obtained. The diagram is recommended for assessing the influence of external factors on the vegetative process.

3. The characteristic of ΔNDVI can be used as an independent variable (optimization criterion) in factor models for predicting the dynamics of the vegetation process.

Biography

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

Iakovoglou V.*, Zaimes, G.N., Koutalakis, P., Pagonis, G., Gkiatas, G.

UNESCO chair Con-E-Ect, Drama, Greece

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

Monitoring and Mitigating pollutants at the Aggitis Basin

Increased sedimentation, mainly due to erosion, plays a substantial role in contributing non-point source pollutants that have as ending point the sea water bodies. Factors such as increased agricultural activities, deforestation and wildfires result to excessive erosion rates. At this study, preliminary results are presented on research that was conducted for the Aggitis Basin, located at the prefecture of Eastern Macedonia in Northern Greece. In order to identify the pollution sources, the study areas were selected based on land use characteristics, such as dominant vegetation, soil type and slope category. Specifically, the studied land uses were, rangeland, agricultural and natural areas of sclerophyllous and riparian vegetation. Based on erosion "pin-measurements", the land use that contributed the least sedimentation were the areas with the riparian vegetation. On contrary, the rangeland, the agricultural as well as the areas with the sclerophyllous type of vegetation contributed the most pollutants. Consequently, specific land uses were more prone to increased levels of erosion (e.g., agricultural). So, those areas require further action, such as introduction of nature-based solutions in order to mitigate non-point source pollutants reaching the sea bodies.

Audience Take Away:

- Be informed on how land use alterations affect the level of erosion.
- Understanding that sustainable land use can be introduced by mitigating lose of soil and maintain clean waters.
- The introduction of nature-based solutions helps mitigate the problem and induce sustainability.
- Understand the importance and impact of the effect of land use alterations.

Biography

Dr. Valasia Iakovoglou has more than 25-yrs of national/international research and teaching experience as an Ecophysiologist/ Silviculture expert in seedling production and Restoration/Conservation of Ecosystems with emphasis on Biodiversity under the challenges of Climate Change. She has received numerous scholarships, awards and recognitions. She is an editor and reviewer in more than twenty peer-reviewed Journals with one of them being the Intergovernmental Panel on Climate Change (**IPCC**). She has more than 100 publications (such as books/book chapters and peer-reviewed scientific papers). She is active in many scientific societies such as the Mediterranean Experts of Climate and environmental Change (**MedECC**) and associations such as the "Association of Inter-Balkan Woman's Cooperation Societies (**AIWCS**)" of UNESCO Center, where she is the Secretary General Board Member. Since 2018 she is the Director of the Ecotourism Sector of the UNESCO chair Con-E-Ect.

V.A. Dragavtsev[1]* ,V.V. Novokhatin[2], V.A. Vorobiev[3]

[1]Federal State Budgetary Scientific Institution "Agrophysical Research Institute". FSBSI AFI, Saint-Petersburg

[2]Federal State Budgetary Institution of Science "Federal Research Center of the Tyumen Scientific Center of the Siberian Branch of the Russian Academy of Sciences. Tyumen

[3]Ural Research Institute of Agriculture - a branch of the Ural Agrarian Research Center of the Ural Branch of the Russian Academy of Sciences, Krasnoufimsk

New phenotyping algorithms for seven genetic-physiological systems that control the characteristics of the maximum yields of future plant varieties.

Global warming and the growing rise in the price of bakery and feed grains make the problem of hereditary increase in the drought resistance of grain crops one of the most important tasks of ensuring the food security of mankind. Based on the dismemberment of the complex structure of the properties of drought resistance of cereals (phenotyping), the limitations of the canonical genecentric approach and approaches of molecular genetics to solving the problem of a radical hereditary increase in drought resistance are shown. A priority epigenetic approach to hereditary increase in drought resistance is proposed, based on the Theory of Ecological-Genetic Organization of Quantitative Traits (TEGOQT), which operates not with components of productivity, but with seven genetic-physiological systems (GPS), whose positive contributions increase yields: 1) attractions; 2) microdistributions of the attracted plastic substances between grains and chaff in the ear; 3) adaptability (drought, cold, frost, heat, salt resistance, etc.); 4) horizontal immunity; 5) "payment" by dry biomass for the limiting factor of soil nutrition (N, P, K...); 6) tolerance to thickening of agrophytocenosis; 7) hereditary variability in the duration of the phases of ontogenesis. This article examines one of the subcomponents of a complex GPS - adaptability, in particular - drought resistance, in the formation of which at least 22 component traits are involved.

Keywords: Cereals, drought tolerance, phenotyping, eco-genetic structure of productivity traits, management of the selection of parental pairs for hybridization.

Jorge A. Zavala

Cátedra de Bioquímica/ Instituto de Investigaciones en Biociencias Agrícolas y Ambientales, School of Agronomy, University of Buenos Aires and CONICET, Argentina.

Soybean response to herbivory: an alternative to insecticide application?

Soybean (*Glycine max L.*) is the world's most widely grown seed legume. One of the most important pests that decrease seeds quality and reduce yield of soybean crops is the southern green stink bug (*Nezara viridula*). However, insect damage triggers accumulation of defensive compounds, such as protease inhibitors (PI), isoflavonoids, and reactive oxygen species to stop stink bug feeding, which are regulated by jasmonic acid (JA). The aim of this study was to identify and characterize the role of LOX isoforms in the modulation of chemical defences in growing seeds of field-grown soybean as response to *N. viridula* attack. Stink bug attack increased LOX 1 and LOX 2 expression, and activities of LOX 1 and LOX 3 isoenzymes in developing soybean seeds. In addition, stink bug damage and MeJA application induced expression and activity of both cysteine PI and trypsin PI in developing soybean seeds, suggesting that herbivory induced JA in soybean seeds. Moreover, the high PI levels in attacked seeds decreased cysteine proteases and α-amylases activities in the gut of stink bugs that fed on field-grown soybean. In this study we demonstrated that LOX isoforms of seeds are concomitantly induced with JA-regulated PIs by stink bug attack, and these PIs inhibit the activity of insect digestive enzymes. To our knowledge no study before has investigated the participation of LOX in modulating JA-regulated defences against stink bugs in seeds of field-grown soybean, and the impact of soybean PIs on α-amylase activity in the gut of N.viridula

Audience Take Away:

- They can induce soybean 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 seeds responses to herbivory can be used a model of plant responses against herbivory and help to study similar responses in other crops.

Biography

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

SPEAKERS

DAY 01

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Maria Batool[1]*, Peer M. Schenk[1], Taylor J. Wass[1], Lilia C. Carvalhais[2],

[1]School of Agriculture and Food Sciences, The University of Queensland, Saint Lucia, Australia

[2]The Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland, Saint Lucia, Australia

Soil microbiome engineering to alleviate high salinity stress in wheat

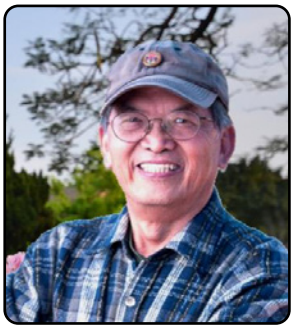
1-Aminocyclopropane-1-carboxylic acid (ACC) is an ethylene precursor, whose concentration elevates in plants when they face biotic or abiotic stress. In crop production, the microbiome plays a very significant role in plant growth promotion (PGP) where some microbes in the natural soil can cleave ACC thus reducing ethylene levels in the plants and alleviating stress. The study aims to identify the role of ACC in microbiome interactions in the rhizosphere under salt stress for two different varieties of wheat i.e., Suntop, a salt tolerant cultivar and Sunmate, a salt sensitive cultivar. We hypothesize that following the approach of "targeted microbiome engineering", recruitment of potential abiotic stress alleviating PGP rhizobacteria (PGPR) in the natural soil could be achieved by applying ACC as a soil amendment. Once ACC metabolizing bacteria have been recruited, these could then cleave ACC into ammonia and α –ketobutyrate. As a result, wheat plants grown in ACC-amended soil with high salinity would have their stress alleviated and growth promoted due to reduced ethylene levels. Qualitative screening of ACC treated soil from wheat rhizosphere was conducted to isolate and characterize the ACC deaminase-producing microbiome and its plant growth promoting activities under elevated salinity conditions. Phenotypic results showed significant growth promotion and stress alleviation potentially by the ACC-deaminase microbiome when salinity levels were elevated from 100 mM NaCl to 140 mM NaCl for the salt sensitive variety Sunmate, whereas no significant effect was shown in the salt tolerant cultivar Suntop. Microbiome analysis of rhizosphere soil samples showed a clear shift of the microbiome in the presence and absence of ACC in the rhizosphere suggesting ACC addition reconditioned the soil microbiome towards ACC metabolizing microbes. ACC deaminase bacteria overall helped plants not only in salinity stress alleviation but also provided growth promotion for wheat. Moreover, the overall performance of ACC deaminase bacteria seemed to be dependent upon the presence of salinity stress, levels of salinity and it was differential towards tolerant and susceptible wheat varieties. The long-term goal of this research is to evaluate commercial feasibility of ACC soil amendments and validate their long-term impacts on the soil microbiome and crop productivity under stress conditions.

Audience Take Away:

- The audience will learn how they could potentially make use of different kinds of soil amendments to assist plants to cope with the abiotic and biotic stresses.
- Salinity and other abiotic stresses are very common problems in crop production, so learning ways to exploit the soil microbiome to increase resilience in crops would help to address food security.
- The long-term goal of this research is to evaluate commercial feasibility of ACC soil amendments and validate their long-term impacts on the soil microbiome and crop productivity under stress conditions.

Biography

Maria Batool completed her Bachelor (Honors) of Science in Plant Pathology from PMAS Arid Agriculture University Rawalpindi, Pakistan in 2012 with a Bronze Medal. After gaining practical experience as internee at National Agriculture Research Center (NARC), Islamabad, Pakistan and PMAS Arid Agriculture University Rawalpindi, she got full Turkish Government Scholarship and went to Turkey for her Master's degree in Molecular Biology and Genetics. She is currently doing her Doctorate after getting offered full Research Training Program (RTP) Scholarship from The University of Queensland in 2020. She has various publications in SCI and ISI index journals.



Ping Lim

Director of Ornamental Plant Research for Altman Plants, California USA

In search for Ecofriendly roses

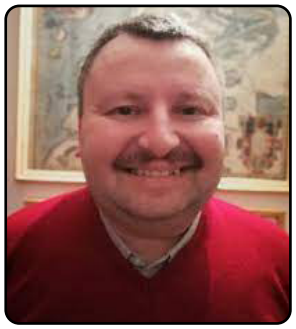
With increasing concerns over global climate change and the impact of synthetic chemicals in our environment, natural beauties on this planet may seem like a fading dream. But modern rose breeders are making strong progress in developing roses that can withstand these stresses and beautify the planet without harm.

In this 20-minute presentation, Ping Lim will be exploring the challenges of his ecofriendly rose breeding program from the past 2 decades. He will discuss how these creations can thrive and perform beautifully under unfavorable conditions to withstand environmental stresses such as diseases without pesticide application and extreme cold or heat. Through this expedition, , many of his roses have been awarded numerous prestigious international honors, including by AARS, ARTS, AGRS, ARC, Rose Hill, Portland Best Roses, Biltmore International trials, Ireland International and Japan Best.

Easy Elegance Roses and True Bloom Roses are both brand names created and commercially available throughout USA, Asia and Europe including Russia and Arctic circle nations.

Biography

Ping Lim graduated from the Horticulture Department at National Taiwan University. So far he has been granted a total of 48 US plant patents related to roses, hibiscus and agapanthus for Bailey Nurseries Inc. and Altman Specialty Plants. In 2022, he was honored to be inducted into the “21st Century Hall of Fame” by the American Rose Society.



Lucian Copolovici*, Andreea Lupitu, Cristian Moisa, Flavia Bortes, Denisa Peteleu, Virgiliu Ciutina, Dana Copolovici

Faculty of Food Engineering, Tourism and Environmental Protection; Institute for Research, Development and Innovation in Technical and Natural Sciences, Aurel Vlaicu University, Arad, Romania.

The effect of high carbon dioxide on plants drought tolerance

43.1 billion tons of CO_2 were released into the atmosphere by human activities in 2019. Thus, in April 2022, the global CO_2 concentration was 421 ppm. Increasing the rate of photosynthetic carbon fixation, which leads to increased biomass production, is beneficial for plants because of the high CO_2 concentrations. At the same time, rising temperatures and periods of drought cause plant stress, and the rise in carbon dioxide concentration is also linked to this. Plant species from the Brassicaceae family (*such as Brassica oleracea variety gongylodes, Brassica oleracea variety capitate, and Raphanus sativa*) grown in high carbon dioxide environments were used to test the drought resistance. Short periods of drought have influenced the leaf's photosynthetic parameters, volatile organic compound emission, chlorophyll content, and flavonoid content. We have demonstrated that plants grown at more than 800 ppm carbon dioxide concentrations are more vulnerable to drought stress than plants grown at 400 ppm CO_2.

Audience Take Away:

- Climate change could influence the plants grown.
- High carbon dioxide influences the plant's tolerance to abiotic stress.

Biography

Prof. Lucian Copolovici Ph.D. Habil.Faculty of Food Engineering, Tourism and Environmental Protection"Aurel Vlaicu" University from Arad. Ph.D. in Chemistry since 2004; Postdoctoral stages at Tartu University (Estonia), Gent University (Belgium), and Estonian University of Life Sciences (Estonia), Ph.D. coordinator in Environmental Sciences (since 2014) and Environmental Engineering (since 2018). Author and co-author for more than 90 Web of Science Papers, seven books and book chapters, and 200 presentations at national and international conferences in the field of environmental protection and plant eco-physiology.

E.U.U. Rathnathunga[1,2]*, W.H.N.Y. Hewage[1], E.P.S. Chanadana[1]

[1]Department of Biosystems Technology, Faculty of Technology, University of Ruhuna, Karagoda-Uyangoda, Kamburupitiya, Sri Lanka

[2]Present Address: Department of Urban Bioresources, Faculty of Urban and Aquatic Bioresources, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka

Phenology of two Carica Papaya L. genotypes with response to tropical climate

Carica papaya L is a gynodioecious plant that has three sex forms: female (F), male (M), and hermaphrodite (H). The nutraceutical and antimicrobial properties of papaya varieties are highly beneficial during pharmaceutical production. The study's objectives were to evaluate the performance of the two papaya varieties in the tropical climate and to establish a relationship between the growth of the two papaya varieties and the ambient conditions. 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 16 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 (R) (a commercial variety) and a local variety (L) were observed for the plant height (PH), stem diameter (SD), leaf number (LN), leaf length (LL), chlorophyll content (SR), flower number (FN) and the fruit number (FR) were measured at 3rd, 6th, 9th, 12th and 15th month of growing (MG). The weather data of the daily min and max temperature, min and max relative humidity (RH), bright sunshine hours, evaporation and rainfall were obtained and averaged on monthly basis. The dates to flowering (FLD), dates to fruiting (FRD) and the total growing degree days (GDD) were calculated. An average of 13 GDD was observed throughout the planting period of 15 months. FLD of H and F of R was significantly lower with compared to the H and F of L variety and the same pattern was observed for the FRD. PH, SD, LL, SR and FR were significantly negatively correlated with GDD for H and F of Local variety.While the LN, LL, SR and FN showed a significantly positive correlation for F of R.All plant types were significantly positively correlated for the PH, SD and FR. All seven morphological characters of F and H of local variety are significantly positively correlated with the 08:30 am RH, 03:30 pm RH and average RH. All plant types of FN were negatively correlated with evaporation while LL and FR were negatively correlated with rainfall. The study summarises the fact of morphological and phenological factors are highly associated with environmental variables such as temperature, relative humidity, bright sunshine hours, and rainfall which would ultimately affect the vegetative development and the development of papaya fruit. The study would provide an understanding of the yield potential of local varieties and associated environmental factors that could be important in developing related industrial products such as papain enzyme.

Audience Take Away:

- The audience will understand the importance of tropical papaya varieties and their relationship to tropical conditions.
- It will be utilized in their research work for predicting phenological sub-periods, staggering production, genetic breeding programming, harvest season planning, and climatic zoning.
- This research can be use byt the other faculty could use to expand their research or teaching through varietal identification, determining the growing degree days, and so on.
- The research is a practical solution to identify suitable cultivars, their phenology, and morphology during the research on nutraceutical and antimicrobial properties of papaya varieties are highly beneficial during pharmaceutical production.

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 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.

Sweta Binod Kumar*, Maria Swiontek Brzezinska, Agnieszka Kalwasinska

Department of Environmental Microbiology and Biotechnology, Faculty of Biology and Environmental Protection, Nicolaus Copernicus University in Torun, Poland

Isolation and identification of salt-tolerant plant growth-promoting rhizobacteria from technosoils affected by saline effluents from the lime repository

Technosoils are anthropogenically disturbed soils. Microorganisms retrieved from such habitats, due to their natural adaptations to harsh environmental conditions, can be useful and find applications in agriculture, bioremediation, industry, and medicine. Nitrogen fixing bacteria were isolated from the rhizosphere of *Salicornia europaea* (L.), *Tripolium pannonicum subsp. tripolium* (L.) Greuter, wheat (*Triticum aestivum* L.) and maize (*Zea mays* L.) grown in the technosoils in Janikowo, central Poland, affected by saline effluents from the soda lime repository. Nitrogen-free semisolid JNFb, JMV and Azotobacter medium were used for enrichment and isolation of diazotrophic bacteria. A total of 12 bacteria were selected which showed the presence of the *nif*H gene which were subsequently identified using the 16S rRNA. The isolates were tested for other growth promoting traits such as ammonia production, phosphate solubilisation, 1- aminocyclopropane-1-carboxylic acid (ACC) deaminase activity, and production of indole acetic acid (IAA), siderophore, HCN, EPS, and gibberellic acid. Salt (0% - 4%) and pH (6-9) tolerance were also tested which showed that they are tolerant to a range of pH and salt concentration. The selected strains were also checked for their resistance to fungal plant pathogens and antibiotics. Finally, a germination test was performed on wheat seeds with NaCl stress of 150 mM. Three strains *Azotobacter chrococcum, Agrobacterium pusense,* and *Agrobacterium arsenijevicii* significantly promoted the growth of seedlings' roots and hypocotyls in the salt stress compared to seedlings without bacteria ($P < 0.001$). Sphingobium fuliginis significantly promoted seedling growth without any stress compared to control seedlings ($P < 0.05$). A detailed study was performed on diversified PGPR isolated from the technosoils. The rhizosphere of the plants grown in technosoils is a valuable source of halotolerant diazotrophic bacteria with various plant growth-promoting potential and fertilization by the potential PGPR will be further tested at the field level for exploitation as bioinoculant. The present work is a part of project NitroFixSal (N fixing bacteria from extreme environments as a remedy for nitrogen deficiency in saline soils), Project code: 101038072, funded under H2020 | MSCA-IF-EF-ST.

Audience Take Away:

- Audience will learn about the PGPR from technosoils and how they can be useful for plants in the farmlands facing salinity stress.
- The results from the present work will also help the researchers from the field to plan their research studies to exploit the PGPR potential for sustainable agriculture to minimize the overuse of mineral fertilizers.

Biography

Dr. Sweta Binod Kumar is a Biotechnology graduate from Visva-Bharati University in Santiniketan (India). She performed her doctoral thesis at Central Salt & Marine Chemicals Research Institute in Bhavnagar (2016- 2019). She specializes in studying the phenomenon of adherence of bacteria to polymeric membranes. Her innovation "*Bacterial Detection kit for Water*" owns a prestigious Biotech product, process development, and commercialization award by the Department of Biotechnology, Govt. of India on 11th May, 2018, Technology Day. She has a total of 7 publications and 3 patents (1 international). She is now working on the *NitroFixSal* project funded by the EU under Widening Fellowship (Horizon 2020) coordinated by Dr. Agnieszka Kalwasińska, NCU prof.

Marcin Michalak[1]*, Magdalena Szmurlo[1], Beata Plitt-Michalak[1,2]

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[2]Department of Chemistry, University of Warmia and Mazury in Olsztyn, Plac Łódzki 4, 10-719 Olsztyn, Poland

DNA Methylation as an Early Indicator of Aging in Stored Seeds

Ex-situ preservation of genetic resources is an essential strategy for the conservation of plant biodiversity. In this regard, seed storage is the most convenient and efficient way of preserving germplasm for future plant breeding efforts. A better understanding of the molecular changes that occur during seed desiccation and aging is necessary to improve conservation protocols and real-time methods for monitoring seed quality. Epigenetic regulation plays an important role in the management of plant growth, development, and response to stress factors. Several reports have indicated that DNA methylation plays a critical role in seed development and viability. This study examines changes in 5-methylcytosine (5mC) levels in the DNA of seeds during aging, a process that has important implications for plant conservation and agriculture. The changes in the level of genomic 5-methylcytosine (5mC) in seeds of *Populus nigra* L. by 2D-TLC were assessed. *P. nigra* is a riparian forest species. The riparian forest species are a key priority in biodiversity conservation and climate change strategies. Therefore, there is an interest in protecting and preserving *P. nigra* germplasm as it is a pioneer species and a key component of softwood forests in Europe.

In our study, we demonstrate for the first time that 5mC levels decrease during storage and that the decline can be detected before any changes in seed germination are evident. Once *P. nigra* seeds reached an 8-10% reduction in the level of 5mC, a substantial decrease in germination occurred. The decline in the level of 5mC appears to be a critical parameter underlying the rapid deterioration of intermediate seeds. Thus, the measurement of 5mC can be a fast, real-time method for assessing asymptomatic aging in stored seeds.

Audience Take Away:

- A better understanding of the seed aging process.
- Role of DNA methylation during aging of seed.
- Epigenetic as a useful tool in predicting seed viability.

Biography

Dr. Marcin Michalak studied Biology at the Adam Mickiewicz University, Poznan, Poland, and graduated in 2006. After, he joined the research group of Prof. Pawel Chmielarz at the Institute of Dendrology, the Polish Academy of Sciences (ID-PAS). He received his PhD degree in 2012. He completed three postdoctoral fellowships, two of them at the USDA National Center for Genetic Resources Preservation, CO, US, and the third at the Millennium Seed Bank, UK. He obtained the position of Associate Professor at the University of Warmia and Mazury, Poland in 2019. Until now he has published more than 30 research articles indexed in SCI(E) journals and cited more than 300 times.

Ewa Szwajczak*, Michal Ludynia, Edyta Sierka

Institute of Biology, Biotechnology and Environmental Protection, Faculty of Natural Sciences,University of Silesia, Katowice, Poland

In search of new adjuvants: Assessing the physiological response of white quinoa (*Chenopodium album L.*) to dioxolane-assisted herbicide via efficiency of the photosynthetic apparatus

Global pesticide use has increased to unprecedented levels since the middle of the last century. Many papers reported that over-reliance on herbicides, especially glyphosate, is detrimental to the environment. It is also recognized that inert ingredients in pesticides can can pose phytotoxic effects or harm non-target organisms. In this frame, more attention is being paid to solutions improving the efficacy of herbicides and thereby mitigate their environmental impact.

Herein, we tested a novel application of low molecular weight 1,3-dioxolanes as adjuvants dedicated to herbicides. The data suggest that these compounds diminish barriers posed by the surface tension of the formulation and cuticular wax and cell walls of the plant. By their properties, they can increase the absorption of xenobiotic active ingredients, i.e. herbicides, by the foliage. Described compounds were characterized as harmless to plants and favorably modifying the physicochemical properties of the spray solution. Thus, this study aimed to quantify the efficacy of a commercial formulation of the potassium salt of glyphosate (Roundup 360 Plus) supported by 1,3-dioxolanes on a common weed species, white quinoa (*Chenopodium album* L.), grown under greenhouse conditions. In order to show the differences among different adjuvant treatments significantly, the glyphosate rates applied were under the recommended doses. Three formulations were made with reduced concentrations of glyphosate (0.04, 0.12 and 0.2 L ha^{-1}) and one of three dioxolanes at 1%(v/v)—TMD (2,2,4-trimethyl-1,3-dioxolane), DMD (2,2-dimethyl-1,3-dioxolane) and DDM ((2,2-dimethyl-1,3-dioxan-4-yl)methanol).They were compared with a pure commercial product. Chlorophyll a fluorescence parameters and OJIP test analysis, which explores changes in photosystem II (PSII) photochemical performance, has been used as a measure of plant susceptibility to glyphosate stress and verified the effectiveness achieved by different formulations.As a result, we observed a negative effect on Chl a fluorescence parameters as well as on the shape of OJIP ChlF transients. Changes were observed for all 1,3-dioxolanes-at the lowest dose and especially at the middle dose of glyphosate. It was also partly the case for the highest dose, at which the variation was less noticeable due to the excessive herbicidal activity of glyphosate. Adding 1,3-dioxolanes to glyphosate increased herbicidal activity and had comparable effects for lower herbicide doses. Results derived from the assay based on the efficiency of the photosynthetic apparatus correlate well with increased mortality. Furthermore, this physiological response of white quinoa occurred seven days after treatment before the visible damage caused by glyphosate.In conclusion, experimental results suggest that introducing 1,3-dioxolanes to agriculture may be an opportunity to reduce herbicide load and minimize herbicide runoff pollution. The early response of photosynthetic apparatus efficiency decrease can be considered a measure of the amount of glyphosate acting after entering the plant, thus determining the effectiveness of the adjuvant. These findings suggest that the following directions for research should be conducted under field conditions. On a larger scale, other applications of these compounds would also be worth exploring.

Audience Take Away:

- Abandoning agrochemicals seems to be a pious hope in times of intensive agriculture covering the global food demand. For this reason, recent studies seek alternative approaches toward such products by shifting to bio-based and environmentally friendly substances. The large field of novel adjuvant research is also following a similar trend.
- The objectives of this study were to present a rapid and non-destructive method to measure the effect of adjuvants on herbicide efficacy in the early stage after treatment and to analyze novel application of 1,3-dioxolanes.
- The main interest was in chlorophyll a fluorescence analysis, which can be used to search for new agrochemicals.

Biography

Ewa Szwajczak obtained her first degree (B.Sc.) and Master's degree (M.Sc.) from the University of Silesia in Katowice (Poland), Faculty of Natural Sciences in Biotechnology (2019) and Plant Biotechnology (2021). Working in Department of Plant Physiology, she studied growth, physiological and stress responses of tomato plants after exposure to non-steroidal anti-inflammatory drugs. Following on, continued research in the Department, collaborating with the Institute of Chemistry concerning applying 1,3-dioxolanes in plant sciences. Currently expanding application of these compounds in a PhD program at the University of Silesia, aiming to support plant functional diversity in agroecosystems.

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Polyploidy and adaptations to environmental stress: physiological, biochemical and genomic determinants of tolerance in citrus polyploid rootstocks

The Mediterranean basin is one of the main citrus production areas in the world. It ranks third behind China and Brazil. In the heart of the Mediterranean, Corsica is located at the northern limit of the citrus production area (40° North). It benefits from pedoclimatic conditions favorable to the cultivation of citrus fruits. However, this citrus cultivation can be endangered by the emergence of strong abiotic constraints. Indeed, the current climate changes result in an increase in the frequency and intensity of stress episodes in plants. In Corsica, these climatic changes can be characterized by episodes of intense drought that force producers to irrigate their crops more intensively. This results in an increase in soil salinity. The increase in salinity leads to a decrease in growth, tree productivity and citrus quality. The selection of rootstocks adapted to these emerging abiotic constraints seems to be a key criterion to facilitate the adaptation of citrus crops. Work carried out by the University of Corsica, CIRAD and INRAE for about ten years now, has shown that tetraploid citrus rootstocks (4x) would be more resistant to nutritional stress, cold and water deficit compared to diploid rootstocks (2x) which are the most commonly used. However, the molecular and genetic basis of this adaptation is not well known, so this thesis aims to study the mechanisms promoting the response to environmental stresses of 2x and 4x citrus rootstocks. It is highly probable that 4x rootstocks show a better tolerance to salt stress but the reasons for this better adaptation remains to be elucidated. To understand and identify the mechanisms involved, we will develop an integrative approach including the study of physiological (photosynthetic capacity, stomatal conductance, chlorophyll fluorescence), biochemical (oxidation markers, specific activity of enzymes involved in the management of oxidative stress), genetic (transcriptome analysis by RNA-seq) and epigenetic (methylome analysis by Bs-seq and Me-Dip-seq) mechanisms. At the end of this work, we will be able to provide new evidence to explain the advantages of tetraploidy over diploidy. We will be able to determine if there is a constitutive preadaptation linked to tetraploidy or if tetraploidy improves the response to stress through phenotypic plasticity.

Audience Take Away:

- 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, 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.
- 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 in Ph.D 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 degree in Biology and Plant Valorization “of 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

Mathias Twizeyimana*

AgBiome, Inc., P.O. Box 14069, Research Triangle Park, NC, United States

Microbial-based pesticides, an alternative approach in crop disease management

Every year an estimated 10-16% of global food production is lost to agricultural pests despite tremendous improvement in management practices over the years. The intensive use of synthetic pesticides and its dependency in controlling crop pests pose a risk of pesticide resistance; moreover, it has been very challenging to produce resistant cultivars for different crops and to discover new mode of action (MOA) active ingredients. The discovery of microbial-based pesticides that can effectively control major agricultural pests including plant diseases, insects, weeds, and nematodes will result not only in alternative management strategies, but also reduction of the high risk of pesticide resistance. At AgBiome, our mission is to partner with the microbial world for human benefit, and discover unique microbes with activity against major agricultural pests. We have built a core collection of fully sequenced microbes from diverse environments and employ both the microbes and their sequences in the discovery of new biological products for the control of diseases, insects, weeds, and nematodes. The identification of biological products with high efficacy against crop pests will provide a valuable alternative to synthetic pesticides and play a useful role in Integrated Pest Management programs.

Audience Take Away:

- Microbial-based pesticides have an important role in agriculture.
- The discovery process and genomics- and machine learning-accelerated discovery of biocontrol microorganisms .
- Role of Microbial-based pesticides in pesticide resistance management, reduction of synthetic pesticide dependency, and Integrated Pest Management.

Biography

Mathias Twizeyimana is a Plant Pathologist at AgBiome, Inc. He was a Postdoctoral Researcher at the University of Illinois, Urbana-Champaign, and the University of California, Riverside, working on different crop pathogens. He has authored many scientific publications in leading plant pathology journals. Mathias did his postgraduate (Plant Pathology) training at the International Institute of Tropical Agriculture and his PhD in Plant Pathology under a joint program in these three institutions: University of Ibadan; International Institute of Tropical Agriculture; and University of Illinois, Urbana-Champaign.

Pimentel Carlos

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Plant responses to water deficit.

Light and oxygen are essential to life but can also damage plant photosynthesis and yield, especially the excess of light above 600 to 800 µmol m-2 s-1 in the presence of O_2 (a strong oxidant). This metabolic phenomenon, i.e., photoinhibition, is the light-induced decrease in photosystems activity. Mainly associated with other environmental stresses, such as drought, which reduces the CO_2 assimilation rate (A). Under high photosynthetic photon flux density (PPFD), the photosynthetic apparatus's ability to utilize the absorbed energy thoroughly is exceeded, but water photolysis continues. In this case, the electrons of water photolysis cannot be assimilated by the photosystem and react with O_2 forming reactive oxygen species (ROS), causing damage to membrane integrity. Since, in the field, drought is generally associated with a high PPFD due to a clear sky, photoinhibition an oxidative stress will occur even under moderate water stress. Water deficit induces several physiological responses, varying for the specie studied in its growth stage and cultivation conditions. There is a reduction in A in mild water deficiency, but it is still under debate about the causes of this reduction. Some authors state that there is only a limitation of CO_2 substrate (diffusional limitation) due to stomatal closure under mild stress. However, studies conducted from the 1970' showed a diffusional and a metabolic effect on A under mild stress, probably caused by photoinhibition. Moreover, RuBP regeneration is reduced in the Calvin cycle, probably due to a lower chloroplastic ATPase activity or lower inorganic phosphorus (Pi) availability for ATP synthesis. In addition, Pi is exchanged by triose-P from the chloroplast through the phosphate antiporter translocators. Hence, a foliar spray of mono ammonium phosphate (MAP) can improve this cytoplasmatic Pi content and reduce drought's photoinibitory effect. In an experiment with common bean, two days after the foliar Pi spray (MAP), a mild water deficit was imposed, and A was evaluated during water stress and recovery. After rehydration, A and gs of genotypes supplied with Pi were higher than those of non-Pi-supplied plants. These results revealed an up-regulation of A's recovery after water deficit with a foliar spray of Pi. Recently, another study with water deficit imposition in *Phaseolus vulgaris* L. genotypes was conducted with two experiments, one under a PPFD of 500 µmol m-2 s-1 and the other under 850 µmol m^{-2} s^{-1}, which showed a more significant decrease in A under mild water stress than under low PPFD. The chlorophyll a fluorescence parameter maximum quantum yield of photosystem II (Fv/Fm), under lower PPFD, was reduced only under severe water deficit. However, Fv/Fm and other parameters were reduced from the beginning of the drought in the second experiment under the higher PPFD. Besides, the non-photochemical quenching (NPQ) values were almost double in the second experiment compared with the first one indicating a higher energy dissipation, primarily by heat, to avoid more intense photoinhibition in the second experiment.

Audience Take Away:

- Mild drought effects on plants are due to diffusional and metabolic limitations.
- Mild drought is associated with photoinhibition and oxidative stress caused by ROS production.
- In an experiment to evaluate drought effects, especially in controlled conditions, a PPFD above 800 µmol m-2 s-1 is required to represent genotype responses accurately.
- A foliar spray with Pi, like MAP, can reduce the negative effect of drought at the reproductive stage, especially at the pollination stage.

Biography

Prof. Pimentel graduated in Agronomy from the Federal Rural University of Rio de Janeiro (UFRRJ), Brazil, in 1977. He did his MSc at the University of Paris 7 (Jussieu), Paris, France, and he received his Ph.D. degree in 1985 at the same institution. In 1988, he had the degree of Associate Professor at the UFRRJ. In 1994, he obtained the Full Professor position at the same University. He did one year of sabbatical leave (1999-2000) supervised by Dr. Long at the University of Illinois, the U.S., working on the FACE programs with the GHG effects on soybean and corn.

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POSTERS

DAY 01

7TH EDITION OF GLOBAL CONFERENCE ON

PLANT SCIENCE AND MOLECULAR BIOLOGY

01-02 SEPT

Hyun-Sook Lee[1]*, Su-Kyung Ha[2], Hyun-Su Park[2], Chang-Hyun Lee[4], Ji-Ung Jeung[5]

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Rice blast resistance of Korean rice cultivars associated with the allele type of R-gene linked DNA marker

Rice blast is one of the most serious diseases in the world that cause considerable yield losses. In South Korea, the breakdown of blast resistance frequently occurs due to increase rice cultivars with similar genetic backgrounds or rapid changes in the blast pathogenic races. This disease can be managed by using the recommended dose of nitrogen fertilizer, treatment of chemical fungicides, and resistant varieties. Cultivation of disease-resistant rice cultivars is the most effective and economical way to control rice blast disease. In the present study, the genetic diversity of blast resistance genes using gene functional/linked markers, and rice blast resistance for 3 years were investigated in 300 Korean rice varieties. Blast resistance was determined using the 0–9 scoring system (a scale 0=no lesions to 9=dead leaves) from IRRI in the nursery test of the experimental field at Wanju in Korea. The genetic diversity at 12 blast resistance gene loci was evaluated using 18 functional/linked markers. The blast score of 300 rice varieties showed a significant correlation between years ($r > 0.64$, $p < 0.001$). Among the 300 varieties, the blast score average of the 263 Japonica varieties was significantly higher in all test years than that of the 37 Tongil-type varieties. The 88 early maturing varieties showed blast resistance than the 114 mid-late maturing varieties or 98 medium maturing varieties. Analysis of variance showed that the '9871.T7E' marker linked with *Pi40* was strongly associated with blast disease with the phenotypic variance of 16% to 29% for 3 years ($p < 0.001$). Among varieties harboring the *Pi40* allele, the early maturing verities accounted for 87%. These results implied that the blast resistance of early maturing varieties in Korea is associated with *Pi40* gene. These results will be beneficial for breeding of blast resistance rice in Korea. The research was funded by the Rural Development Administration(RDA) of South Korea, grant number PJ0168302022.

Audience Take Away:

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

Biography

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

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Identification of genetic model related to spikelet sterility using QTLs combination

Interspecific crosses are steadily used in breeding projects because it can improve the genetic diversity of rice and develop a new variety with useful genes. However, it is difficult to develop varieties due to the linkage drag such as spikelet sterility during interspecific crosses. This study conducted to confirm the spikelet sterility of rice generated when the resistance genes was introduced. QTL analysis to search for spikelet sterility revealed that five loci (*qSS8, qSS11, qSS12, ePS6-1,* and *ePS6-2*) were searched, and that of these, QTL *qSS8* and *qSS12* had a significant effect on sterility. The lines with allele type of *qSS12_Jinbu* derived from Jinbubyeo exhibited high spikelet fertility, regardless of the presence of the other QTL allele type. But other lines with the allele type of *qSS12_GPL+qSS8_Jinbu* showed severe spikelet sterility. The major *QTLs, qSS8* and *qSS12* were narrow down to 200- and 82-kb regions on chromosomes 8 and 12, respectively. Of the 7 and 6 ORFs present in the target region of *qSS8* and *qSS12*, respectively, OS8g0298700 of *qSS8* and Os12g0589400 and Os12g0589898 of *qSS12* induced significantly different expression levels of the candidate genes in rice at the young panicle stages. The research was funded by the Rural Development Administration(RDA) of South Korea, grant number PJ01480402.

Audience Take Away:

- This study will be useful in understanding the mechanism related to the spikelet fertility caused by the hybrid breakdown and help develop a rice variety with improved spikelet fertility.

Biography

Mr. Lee studied agronomy at the Jeonbuk national university, Republic of Korea and graduated as MS in 2017. He then entered the Ph.D. course at the same department in 2018. He has been working on crop breeding division of the RDA in Korea since 2017.

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Genetic diversity and population structure of cowpea [*Vigna unguiculata* (L.) Walp.] from Europe and Africa using DArT and SNP markers

Cowpea (*Vigna unguiculata*) is an important grain legume well adapted to the dry regions with the added benefit of enhancing soil fertility. Cowpea makes an important contribution to the nutritional security of small farmers in tropic and sub-tropic regions mainly in Africa. International and national research institutions have been making progress concerning cowpea conventional breeding. However, modern breeding, based on molecular tools with a genotyping capability that quickly generates results, will allow faster breeding decisions than conventional procedures. This study reports the genotyping of 97 cowpea landraces from Europe and Africa using high throughput DArTseq and next-generation sequencing technologies. A total of 61,221 silicoDArT and 38,889 SNP markers were found. After screening with quality control parameters that include 95% reproducibility, 31,420 silicoDArT and 11,050 SNP markers were used for subsequent analysis. These markers had a mean Polymorphic Information Content (PIC) value of 0.14 and 0.17, respectively for silicoDArT and SNP. The model-based Bayesian cluster analysis in STRUCTURE visualized the genetic structure of the populations under examination. SilicoDArT and SNP analysis clearly separated genotypes of distinct origins, such as those from Portugal and from Mozambique. Similar to silicoDArT markers, SNP markers also produced two major clusters. There is more genetic diversity in the accessions from Mozambique than in the accessions from Portugal. Our study highlights silicoDArT and SNP markers as valuable tools for cowpea genetic variation assessment. The presented results will help researchers and breeders to select and introduce new cowpea germplasm resources for future exploitation in breeding programs.

Biography

Dr. Joana studied Food Chemistry at Catholic University, Portugal. She then joined Instituto Nacional de Engenharia e Tecnologia Industrial (INETI), Portugal. She graduated as MSc in 1997. While working at INETI, she joined the research group of Prof. Rogério Tenreiro at the Science Faculty, Lisbon University, Portugal. She received her PhD degree in 2007 at the same institution. In 2010 she obtained a Research position at INIAV. She focus on plant molecular biology.

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Structure of cowpea [*Vigna unguiculata* (L.) Walp.] populations from Europe and Africa using SSRs markers

Cowpea (*V. unguiculata* L. Walp. ssp. *unguiculata*) is a self pollinating diploid (2n=2x=22) species with an estimated genome size of 620 Mb. It is an important crop for people in sub-Saharan Africa where it was domesticated. Many landraces are still cultivated and its grain is the main crop product used for human consumption. In Southern Europe, cowpea is restricted to a limited acreage and usually cultivated in drought-prone and marginal soils. Cultivation depends on a small number of locally adapted populations selected by farmers over time rather than on the use of modern varieties. These local populations survive on farm and there is a real risk of genetic erosion. In this work, using 12 Simple Sequence Repeats (SSR) markers, we present new insights into the genetic diversity, differentiation and structure of 97 common cowpea landraces from Europe and Africa. A total of 183 different alleles were identified with average Polymorphic Information Content (PIC) value of 0.67, indicating that the used *loci* are useful diversity indicators. The observed heterozygosity (Ho, mean of 0.31) and the expected heterozygosity (He, mean of 0.46) were both low, as expected for a self pollinating species. The model-based Bayesian cluster analysis in STRUCTURE visualized the genetic structure of the populations under examination. The SSR analysis clearly separated genotypes of distinct origins, such as those from Portugal and from Mozambique. In both regions, intermediate accessions were identified, with admixed genetic origin. The principal co-ordinate analysis (PCoA) was in accordance with the STRUCTURE results. SSRs were useful tools for studying genetic diversity and allowed the discrimination of cowpea local populations. The importance of some of these populations justifies the concern about their conservation.

Biography

Dr. Cátia studied Plant Biology at the Lisbon University, Portugal and graduated as MS in 2007. She then joined the research group of Dr. Matthew Paul at Rothamsted Research, UK, for 3 years, followed by Prof. Pedro Fevereiro supervision at ITQB Nova, Lisbon, where she obtained her PhD degree in 2015. After one year as a postdoctoral fellow, she is now a Researcher at INIAV, Portugal. She focuses on legume and cereal abiotic stress responses.

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Cichorium intybus local populations biodiversity screening and their importance in ruminant diet

This is a preliminary characterization screening study of a several spontaneous flora populations belonging to the species Cichorium intybus / common chicory and cultivated varieties Spadona and Puna (varieties, already used in the diet of dairy cows due to the high percentage of protein). The samples, individuals belongings to local populations of the species Cichorium intybus / common chicory were collected from the main romanian regions: Maramureș, Moldova, Dobrogea, Muntenia, Banat, Crișana, Transylvania and individuals belongings to the Spadona, Puna variants, respectively. It was performed a genetic analysis of nuclear, chloroplastidial, mitochondrial and intergenic genetic markers: ITSs [(ITS-u1 / ITS-u4), ITS1 (transcribed spacer), ITS2 (transcribed spacer), ITS3, ITS4], nad1 / 2–3, cox1, matK, rbcLa, rpoB, rpoC1, psbA-trnH (intergenic spacer-chloroplast), rbcL-accD (intergenic spacer-chloroplast) trnL-trn (intergenic spacer-chloroplast). Biochemical analysis was performed for P, K and N total protein respectively (%). In genetic analysis, the similarity matrices for analyzed molecular markers correlated with the sampling locations and the cultivated varieties Spadona / Puna indicate the Constanța county population as the closest to the cultivated variety – Spadona and the local populations from Arad/AR Hunedoara/HD, Caras- Sebeș/CS and Bihor/BH counties exhibits the highest genetic interpopulational similarities. In biochemical analysis, the highest values of nitrogen correlated with protein (%) was presented in Constanța/CT (2.74 N2

/ 17.13% protein) and Sibiu/SB (2.72 N2 / 17.00% protein)populations, even higher than in the cultivated variety (Spadona - 2.13 N2 / 13.31% protein). Concluding, the common chicory from Constanța and Sibiu counties populations are the closest to the cultivated variety - Spadona, these populations are the best suitable candidates in a possible plant ameliorating program.

Audience Take Away:

- This study characterizes several populations of the spontaneous flora of the Cichorium intybus species from a genetic and biochemical point of view, a resilient species to climate factors changes.
- could be considered a suitable candidate species in a plant breeding program by its high protein intake and further to be introduce into the diet of ruminants.
- represents a research direction that aims to improve and diversify the plant species that are introduced in the diet of ruminants in the research and development station of bovine in Arad.

Biography

Graduated Emil Racovita Lycee Baia Mare (1993), then Faculty of Biology and Geology "Babeș-Bolyai" University (UBB) Cluj-Napoca(2002); M.Sc.2005(Cell Biotransformation); Ph.D. work (2005-2010) with Prof. Emeritus Constantin Crăciun(Electron Microscopy Center) and Prof. Rakosy Laszlo, UBB; Ph.D. in Biology (2010); Postdoctoral specialization in ultrastructural characters of dermatophytes (at Romanian Academy, Center for Studies and Research for Agro-Biological Diversity "Acad. David Davidescu"), 2012; Specialization in Electron microscopy-Tecnai at FEI Academy, FEI Nano-Port, Eindhoven, The Netherlands, 2011; Joint Advanced School, "Receptors and Signaling", 2016, Spetses Island, Greece under the auspices of the International Union of Biochemistry and Molecular Biology.

Imre Cseresnyes[1]*, Klara Pokovai[1], Zoltan Barcza[2], Nandor Fodor[3]

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Root electrical capacitance: a novel approach to monitor crop response to climate change

A vigorous, adaptive root system is critical for improved water and nutrient uptake, which in turn increases crop grain yield, especially under stress conditions. High-throughput, *in situ* root phenotyping techniques are increasingly important in breeding plants for sustainable agriculture. This is the first study that documents the efficiency of monitoring root electrical capacitance (C_R*) non-destructively in the field to evaluate crop development under different environmental conditions.

A free-air CO_2 enrichment (FACE) experiment was performed with two winter wheat cultivars, two levels (low and high) of nitrogen supply and two (ambient and elevated to 600 ppm) of [CO_2] in three replicate plots over two years. The validity of C_R* as a proxy for root uptake activity was confirmed by tracking the ceptometer-based leaf area index from the early vegetative to the flowering stage of wheat.

Repeated C_R* measurements revealed the seasonal dynamics of root development with a peak at flowering, and indicated a delayed growth in the second year caused by the unfavorable meteorological conditions. From the vegetative to flowering stages, C_R* was strongly correlated with the leaf area index (R^2: 0.897–0.962). The positive effect of elevated nitrogen supply and [CO_2] on crop growth was reflected in higher C_R* values, associated with increases in leaf area index, shoot dry mass at flowering and grain yield. The maximum C_R* was closely related to grain yield (R^2: 0.805 and 0.867) when the data were pooled across the nitrogen and CO_2 treatments and the years. Unlike C_R* and grain yield, shoot dry mass and leaf area index were significantly lower in the second year, presumably due to the enhanced root/shoot ratio induced by a severe spring drought. The increased biomass allocation to the roots was later able to compensate for the yield loss under the more favorable growing conditions that prevailed around flowering. Considering the individual wheat plants, C_R* measured at the anthesis stage was highly significantly correlated with the total aboveground biomass (R^2: 0.715 and 0.727) and grain yield (R^2: 0.648 and 0.661) for each cultivar.

The present results convincingly demonstrated the potential of the non-destructive root capacitance method to assess root responses dynamically, and to predict crop grain yield. One current challenge facing breeding programs is the selection of crop genotypes having higher physiological plasticity and responsiveness to changing climatic events, such as rising [CO_2], extreme temperatures and drought. Capacitance measurement, as a simple, in situ, high-throughput root phenotyping tool could partially replace invasive routine field techniques, and may thus be of interest for future application.

The project was funded by the National Research, Development and Innovation Fund of Hungary (Project No. 137617, financed under the FK-21 funding scheme), and by the Hungarian Government (GINOP-2.3.2-15-2016-00028).

Audience Take Away:

- We demonstrated how root growth dynamics and crop responses to various growing conditions can be efficiently evaluated without using destructive root investigations.
- Our findings help researchers to simply monitor root traits in experiments where destructive sampling and area disturbance are not allowed (*e.g.* in FACE systems with small plot sizes and high maintaining costs).
- The present experimental results can contribute to an improved understanding of the plant–soil relationship, revealing *in situ* the responses of roots to a changing environment.
- We provided a novel method which has a potential to supplement or to (partially) replace the invasive and labor intensive routine field techniques. Hence, it may useful for researchers working *e.g.* in breeding programs aimed to select crops with improved physiological plasticity and responsiveness to future climate.
- As the present findings are universal, the study will arouse the interest of scientists carrying on root investigations, and could simplify their work in many cases.

Biography:

Dr. Imre Cseresnyes graduated as a biologist at Eötvös Loránd University, Budapest, Hungary in 2004, and earned his PhD in environmental sciences at Szent István University, Gödöllő, Hungary in 2013. He joined the research group of Prof. Kálmán Rajkai at the Institute for Soil Sciences, Centre for Agricultural Research, ELKH in 2009. At present, he works at the institute as an associate professor. His main field of research is the application and development of non-destructive root investigation methods, principally dielectric measurement techniques under pot and field conditions. He has published 24 research articles in SCI(E) journals.

Fatima A. Fulgencio[1]*, Edwin R. Tadiosa[2]

[1]College of Science and Computer Studies - Graduate Studies Department, De La Salle University - Dasmarinas, Cavite, Philippines

[2]College of Science, Bulacan State University, Bulacan, Philippines

Inventory, Assessment, and Habitat Association of Ferns and Lycophytes in Forest Fragments of Cavite, Philippines

The rampant land conversions which directly impact a habitat adds up to the anthropogenic pressure that makes the ferns and lycophytes species vulnerable. This study aims to document, assess both ecological and conservation status, and determine the habitat association of ferns and lycophytes that thrive in the forest fragments of the upland Cavite to contribute to the present data on the Philippine pteridophytes. A transect walk was executed in a total of twenty-five quadrats established from July to October 2021. Statistical tests such as Shannon-Wiener diversity, Kruskal Wallis, Canonical Correspondence Analysis, and Spearman's rank correlation were carried out to analyze the collected data. The inventory has a total of 10 species representing 1 class, 2 orders, and 4 families. Pteridaceae family (88.82 %) was encountered across all the forest fragments with *Adiantum philippense* L. as the dominating species. The ferns and lycophytes species diversity are high in Sadati forest (H'=0.97) and Evercrest forest (H'=0.83). Most fern species are associated with low levels of wind, water pH, phosphorous, high elevation, and an average temperature of 23°C. Significantly, all documented species are categorized as least concerned and are still widely distributed in the wild.

Keywords: species richness, *Adiantum philippense* L., canonical correspondence analysis

Audience Take Away:

- The results of the habitat association of pteridophytes in the province may contribute to the present data of ferns and lycophytes. Due to the plant economy, some ferns and lycophytes are bound to become threatened so conserving them is a must. Creating a conservation policy and propagating them in their preferred habitat is helpful not only to the pteridophytes but also to the locals especially if they are planning to build/ create agri-tourist spot in their area.
- Yes, the methods used in this research is an application of ecological data gathering that is fundamental for the study of plant conservation and ecology. Also, the usage of technology in calculating indices using biological statistical software may be applied in other research.
- Yes, as mentioned the usage of HA model is a beneficial way to determine the preferred habitat of vascular plants. Since pteridophytes mostly depends on the environment to survive, the necessary environmental parameters must be present for their existence.

Biography

Miss Fatima Fulgencio studied BS Biology for Teachers at the Philippine Normal University -Manila in 2015 and currently finishing her MS Biology at DLSU-D. She is currently an IBDP and IGCSE Biology teacher at Mentari Intercultural School Bintaro, Indonesia.

Magdalena Korek*, Agata Daszkowska-Golec, Marek Marzec

Institute of Biology, Biotechnology and Environmental Protection - University of Silesia, Katowice, Poland.

Identification of SL-responsive transcription factors in barley

Strigolactones (SLs) are the youngest class of phytohormones primarily involved in shaping the architecture of plants. Barley plants harbouring the mutation in the *HvD14* gene, which encodes the SL-specific receptor, produce almost twice as many tillers as wild-type (WT) plants Sebastian. Moreover, the mutant *hvd14.d* possesses shorter but more branched roots when compared to the WT. So far, no transcription factor (TF) that could control the response of barley to the presence of SLs has been identified. Here, by comparing the transcriptomic response of WT and *hvd14.d* to SLs, we typed TFs that may be involved in SL signaling transduction pathway. The RNAseq analyses were performed for both genotypes, WT and *hvd14.d* treated with two concentrations (1 and 10 μM) of synthetic analogue $GR24^{5DS}$. Overall, the analysis revealed 101 SL-responsive genes that were differentially expressed in WT but not in *hvd14.d*. Analyses of the promoter sequence (1500bp before the codon START) of selected SL-responsive genes allowed us identify 47 TFs that may be involved in the regulation of barley response to SLs. Six of the identified TFs may bind the promoter of more than / almost half of the genes whose expression was altered by treating plants with SLs. The obtained results revealed for the first time the set of TFs that may be involved in SL signaling pathway in barley and, on the other hand, confirm the SL-insensitivity of *hvd14.d* plants.

Audience Take Away:

- The role of strigolactones in plant growth and development.
- The bioinformatic approach of analyzing genes with the open access tools.
- The set of TFs that may regulate SL-specific genes.

Biography

From the very beginning, my education has been strongly associated with plant genetics, with a particular emphasis on epigenetic mechanisms involved in the regulation of gene expression during somatic embryogenesis process in Arabidopsis thaliana, which I touched on both in my bachelor's and in my master's thesis. In the meantime, I participated in a student internship, where I was responsible for describing potentially pathogenic genetic variants obtained after human DNA next-generation sequencing. As a Ph.D. student, I am working with Hordeum vulgare - model plant among crop plants, focusing on the newest class of phytohormones, strigolactones. My doctoral dissertation is related to crosstalk in strigolactones and abscisic acid signaling pathways.

Aaiz Hussain[1]*, Yin-Long Qiu[2]

[1]Nova Southeastern University, College of Allopathic Medicine, Davie, FL, USA
[2]Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, MI, USA

Going Beyond Statistics to Understand the Weaknesses of Chloroplast Phylogenetic Analysis

Plastid gene sequences have been used commonly to resolve phylogenetic relationships of different groups of land plants. These relationships include basal monilophytes Equisetum, *Ophioglossaceae, Psilotaceae, Marattiaceae*, and *Leptosporangiatae*, as well as rosid clades of angiosperms, the malvids (rosid II), the COM and the Nitrogen-fixing lineages. However, the plastid phylogenies are sometimes contradicted by those inferred from mitochondrial and nuclear genes and morphology. Close examination of the plastid genomic data, specifically the fast-evolving genes and certain nucleotide sites, were able to falsify the phylogenies inferred from these data on the basis of convergent evolution of proteins, that is, functional constraints on proteins led to certain sites convergently evolving the same nucleotides in different lineages. These troublesome sites were found to have contributed to high bootstrap values at some nodes, which disappeared upon removal of the sites from the data. The matrices without these sites actually produced phylogenies that agreed with those reconstructed with mitochondrial and nuclear gene sequences as well as morphology. This study demonstrates that molecular phylogenies even with high bootstrap support should not be taken for granted as a representation of the underlying organismal phylogeny, and they should be falsified using as much external evidence as possible.

Audience Take Away:

- The audience will learn about the convergent nature of plastid genomes.
- The audience will learn why certain plant phylogeny relationships exist when they are based off of plastid genomes.
- The audience will learn how to track points of interest (aka certain nucleotides) in a fast-evolving genome that can be removed to possibly remove the effect of convergence.

Biography

Aaiz Hussain is currently a medical student at Nova Southeastern University, College of Allopathic Medicine in South Florida. He attended the University of Michigan where he received his Bachelor of Science in Biomolecular Science. During his time at the University of Michigan, he conducted research on plant phylogenies with Professor Yin-Long Qiu to understand the convergent nature of the plastid genome that were possibly resulting in false phylogenies. He has also conducted research in various medical topics in medical school ranging from rheumatoid arthritis, pancreatic adenocarcinoma, biomarkers in relation to Covid-19 severity, CRISPR therapy for HIV and ovarian carcinoma, etc.

KEYNOTE FORUM

DAY 02

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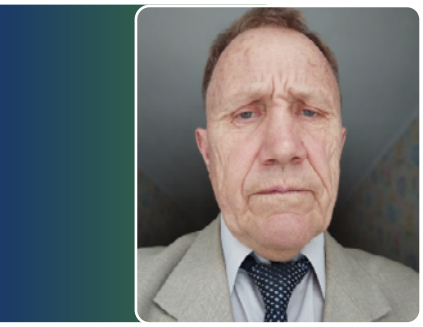
01-02 SEPT



Vashchenko V.F

Elets State University, Russian Federation.

Adaptive potential as a result of hormonal balance regulation of the initial cell of the apex, secondary meristems in the environment

A model experiment with treatment with an exogenous hormone ethylene inhibitor and then foliar treatment with a nitrogen-containing complex fertilizer Chelatonik on potatoes showed a visual drooping of the apex visually drooping top vertically and then a return of erection. Homologous reactions have been established on wild, field, garden and vegetable plants. The adaptive potential and placement of crops correspond to the influence of the environment, the year and region of cultivation, agricultural practices, including adaptation of the sowing period. The effect on organogenesis and phenotype and seed productivity of plants with sequential and simultaneous dominance were the same in terms of the effect on physiologically important organs and differed in the rate of formation of productive organs and the phases of their development. The exogenous effect of the hormone inhibitor is identical to the effect of natural dry phenomena on morphogenesis, as well as drought. All natural factors affect the balance and the final status of hormone balance in a direct way and have a stimulating or inhibitory effect on the quantitative indicators of the plant and its physiological or phonological and final effect throughout the entire organogenesis and vegetation period. Thus, lodging of barley is best prevented by exogenous treatment with ethylene at the end of the formation of the first ear and has the effect of accelerating the current phase of ontogenesis and compensating for positive productive organs on stems of the second order on winter barley in the steppe zone and spring barley in the forest-steppe zone. On spring barley, only curling of the main stems prevents in earlier phases. In spring rapeseed with simultaneous dominance, it only affects seed conditions, since it does not inhibit all apexes. Thus, during the growing season, it is possible to model and predict the influence on the formation of utilitarian important productive organs of natural and anthropogenic factors, the theory of the formation of agricultural plants

In the genotype, the material mechanisms of regulation and perception of adaptive environmental signals are preserved, while the adaptive potential represents the spectrum of reactions from the regulation of the whole plant by the hormones of the initial apex cell and the functional and physiological reactions of the secondary meristem. Ontogeny develops when hormones perceive favorable environmental conditions, as well as nutrition. The sequence of development of stems, branches and the initiation of their amount of water factor and thermal conditions of the year and territory. Growth and development is integral to the perception of environmental signals and ontogeny is realized in the phenotype of a year or territory. Environment (soil and climatic, agro technical factors) and trophic factors have a direct bearing on the balance of hormones. are integrated in the balance of stimulants and inhibitors hormones, which solve the problems of adaptation by growth and development of quantitative plant traits such as growth initiation and dominance of stems and branches, yield structure. The structure and value of seed productivity and seed condition also have compensation mechanisms in the plant and sowing. agro technical practices may be less important than the perception of the environment in the optimal zone of industrial cultivation of the species and variety or year of cultivation, but in any case should have an adaptive value, which is the point of biological farming. The cell's versatility comes from its ability to perform both, initiation of organogenesis and somatic functions. Thus, the Mechanisms of molecular regulation of nutrition and the environment are of integral importance for growth and development. The regulatory system, triggered by the status of hormone balance, is responsible for the growth and

development of traits from the environment, fertilizers and agricultural practices. The initiation of organogenesis in ontogeny - phenotype, productive potential, genetic determination - is encoded by substance-molecules. The regulators themselves are made up of molecules of a substance and can turn into molecules that are inert for regulation or have other activity and consist of a chain of reactions. The regulatory system consists of perception, transference, balance and its status. All external factors have an immediate impact on the status of the balance of hormones and, accordingly, the initiation of the growth of leaves, and their size, stems (branches) and the number of seeds. Since the status refers to the initial cell of the apex and, according to the hierarchy, to the initial cells of the secondary meristem, it largely determines the adaptive and productive potential. Most likely, the very possibility of regulation schemes is determined in the genotype, and the result is determined by the adaptation of the year of development. Thus, regulation determines adaptive traits of resistance to drought and flooding, twisting of barley stalks or their order of dominance, shortening and erection, homologous to wild and cultivated, horticultural crops and trees.

Biography

He 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 70 scientific articles in journals.

Vittoria Locato*, Sara Cimini, Laura De Gara

Unit of Food Science and Human Nutrition Campus Bio.Medico of Roma University, Rome, Italy

Identification of tolerance traits in crops under climate change scenario

Plants have continuously to cope with changing environmental conditions. In this context, soil salinization is a major environmental challenge reducing the yield of crops, which are mostly salt sensitive species. Soil salinization primarily depends on geological processes, such as those involving rock erosion and inland sea water intrusion. Evolving climate conditions exacerbated this process by promoting drought and desertification. In this situation, adaptive strategies emerge increasing biodiversity. Therefore, the identification of intra-species variability in terms of molecular responses activated toward oncoming adverse situations, represents a research goal aimed at increasing crop resilience under climate change scenario. Baldo (B) and Vialone Nano (VN), two rice cultivars grown in the North of Italy, have been identified for showing different susceptibility to soil salinization. In particular, VN plants showed more marked growth reduction and earlier suffering symptoms than B ones under NaCl exposure. Being root the organ primarily involved in sensing this stress, the effects of salt stress on root phenotype and metabolism have been investigated. Different root growth inhibition was reflected in different alteration of cell cycle progression and cellular viability. Upon perception of stress, ROS, as molecular warning signals, were rapidly modulated to trigger plant defence mechanisms. The higher capability to face a constraint condition by plants also involves a more efficient anti-oxidative system and a higher capacity to promptly modulate ROS after stress exposure. Consistently, the salt tolerant B shows a different H_2O_2 signature compared to VN. Studies on root redox state, metabolite concentrations, expression and activity of the enzymes involved in glutathione biosynthesis and metabolism as well as the modulation of miRNA involved in S uptake and metabolism suggest a fine cross-talk between GSH metabolic network and the modulation of growth pathways differently exerted in tolerant versus sensitive cultivars. Taken together the obtained results contribute to highlight the role of ROS and anti-oxidative pathways as a part of a complex signalling network working in plant responses against salt stress. A better knowledge of the mechanisms acting in tolerant varieties as B, will also allow the identification of effective strategies aimed at promoting crop resilience toward environmental stress and, consequently, increasing food availability for humans worldwide.

Audience Take Away:

- The identification of molecular and genetic determinants of plant tolerance to salt is a complex matter, being salt exposure a multifaceted stress for plants.
- The study of intra-species variability can help to identify breeding and biotechnological strategies to increase crop resilience to salt.

Biography

Vittoria Locato is Associate Professor of Plant Physiology at Campus Bio-Medico of Rome University (CBM) from 2018. She has obtained a Master Degree in Biological Sciences cum laude (2003) and a Doctorate in Physiology and Cell Biotechnology (2008) from University of Bari. During an international collaboration with prof. Christine Foyer's group, she worked 6 month at the Rothamsted Research Institute, UK (2006-2007). Then, she moved to CBM where she firstly had a post-doc position (2008-2010) and then obtained a permanent position as researcher (2010-2018). She is author of 32 publication with IF.

Rueda Puente Edgar Omar*

Department of Agriculture and livestock - University of Sonora, Mexico

International experiences of the pandemic and the agrifood Sector: reconversion as an option

COVID-19 (coronavirus) plunges the world economy into the worst recession since World War II. As a result of severe distortions to domestic supply and demand, trade, and finance, economic activity in advanced economies is expected to contract by 7% in 2020. The world's agricultural economies of the main countries that produce Basic grains (corn, soybeans) are being altered (USA, China, Brazil, Argentina). For the remaining agricultural countries, it is an opportunity for agricultural reconversion. The reconversion of crops refers to the change of product or activity that allows a better use of the soil, favors its fertility and breaks the biological cycles of pests and diseases to have an effective control and prevent them from becoming immune or resistant. Therefore, this change, whether of product or activity, represents greater economic profitability and social viability for the producer, because comparative and competitive advantages are taken advantage of, and products with value can be offered in the internal and external markets. The types of conversion that can be carried out are: change from an annual crop to another of the same cycle; change from annual crops to perennials, for example, in the area of cultivation that was destined for cereal to establish in its place a certain fruit tree, another example is when annual seasonal crops are intercropped by grasslands. Likewise, there may be shift changes between the different productive sectors, for example, when moving from an agricultural activity to a livestock or from a livestock to a forestry one.

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.

SPEAKERS

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Md Amirul Alam

Faculty of Sustainable Agriculture, University Malaysia Sabah, Sandakan Campus, Sandakan, Sabah, Malaysia

Exploration of indigenous and underutilized crops species for the mitigation of climate change effects on food security and sustainability

The biggest challenge of the present time is the global climate change which is clearly having a severe adverse effect on the entire environment including nature; from where it is not possible to get rid of immediately. This change did not happen overnight but gradually over many years and this variable is now obvious. As we have modernized everything, we have done such an intolerable cruelty to nature that we are paying the terrible price now. We have also been very successful in terms of the maximum yields for majorities of our commonly cultivated crops. But unfortunately, in doing this we have narrowed down the broad genetic base to organize objective oriented some limited traits into our commonly cultivated crop plants destroying their wider adaptability. So that our well-known and widely produced crop plants are showing serious vulnerability to adapt to this changing climatic condition (high temperature, low temperature, drought, flooding, salinity etc.). Now we can understand so clearly and a specific solution has to be made dealing with a sustainable manner. We know that weedy type plants are naturally very strong in particular and can grow very naturally even in very adverse environments (including various biotic and abiotic stresses) which is very surprising that our regular crops are not. Many of us know that people in remote areas of different countries have been using many indigenous and underutilized plants, especially weeds for a long time as their daily food and medicine. Though many of which have already been researched and found very fruitful results but from the huge germplasms hardly accumulated a minimum and solely it is not possible for us to collect data of all those used plants from people in remote areas. So now it is the time to think about and we need to undertake a common project globally and find some plants that are not affected by cold or heat that are climate independent more clearly, I can say "global plants". For example; Dandelion (*Taraxacum officinale*), Chickweed (*Stellaria media*), wild Brassica (*Brassica species*), Wood sorrel (*Oxalis spp*.), Nettle (*Urtica urens*), Purslane (*Portulaca oleracea*), wild Amaranth (*Amaranthus spp*.), Centella (*Centella asiatica*), wild pepper (*Piper sarmentosum*), Alligator weed (*Alternanthera philoxeroides*), Water Spinach (*Enydra fluctuans*), Brazilian spinach (*Alternanthera sissoo*) and many more these can be used as an alternative source of nutritious food crops as well as medicinal. In this regard we need to form a global research team where the researchers throughout the world will be connected in a common platform. They will go to very rural and remote areas, collect data and at the same time build up a germplasm center in the particular areas and the most climate smart plants will be selected to facilitate potential research with utmost importance sending those germplasms to every corner of the world. So that we can take the immediate necessary initiatives to increase their production, processing, marketing, commercialization and distribution as quickly as possible to the most vulnerable areas first then others to ensure food security and sustainability.

Audience Take Away:

- The audience will be much more concern about global climate change and its effect on environment and cultivated crops species.
- They will be more conscious about cultivation of climate smart crop plants.
- This will be a practical solution to ensure food security and sustainability by finding out new climate smart crops species.
- This will change the as usual crops cultivation practices among producers to a new amendment's-based crops selections again climate change.
- Ultimately it will ensure future food security and sustainability.

Biography

Dr. Md Amirul Alam completed his Bachelor degree (B.Sc.) in "Agriculture" from Patuakhali Science and Technology University (PSTU), Bangladesh and Master of Science in "Genetics and Plant Breeding" from Bangladesh Agricultural University (BAU). Then he started working as "Plant Breeder" at Lal Teer Seed Limited (formerly East-West Seed Bangladesh Ltd.) and continued since August 2011. He was awarded PhD fellowship by Emerging Nations Science Foundation (ENSF, Italy) and International Graduate Research Fellowship (IGRF - UPM Malaysia) and obtained his PhD in "Agronomy" from Putra University Malaysia (UPM) and continued working as Postdoctoral researcher since December 2015. After that he joined as "Senior Lecturer" at the Sultan Zainal Abidin University (UniSZA), Terengganu, Malaysia and continued working since June 2018. In July 2018 he started working as "Senior Lecturer" at University Malaysia Sabah (UMS) and currently working there. Dr. Alam is already very well-known as professional reviewer of various international peer reviewed journals and already reviewed 67 journal manuscripts and published about 80 research articles. Dr. Alam's current Google Scholar h-index is 19, RG score 25.73 with h-index 18 and Scopus h-index 14. He is now working on nutritional biofortification of several crops through agronomic and breeding approach; evaluation of indigenous, underutilized crop plants along with diverse weed germplasms to find out alternative food crops for the future to mitigate the effect of climate change on food security and sustainability. He is also involved in microgreen productions and quality seed production of various crops.

Hisashi Okamoto* & Sayaka Kitamura

Mori laboratory of Plant Physiology, 443-5 Enden Mori, Shizuoka, Japan

Why and how the bio-electric activity of plant roots is awoken when the leaves need water? A very rapid signal transmission from aerial part to root

The simplest and scientific method to determine the bioelectric activity of a plant root is the measurement of the"trans-root electric potential"(TRP) i.e. the electric potential difference between the xylem apoplast and the earth surrounding the root. (Observation of a tree TRP for a very long term is possible when a liquid junction is formed via an injection needle filled with dilute KCl aquous solution stuck into the xylem apoplast (connected to the input terminal of an operational amplifier of high input resistance via unpolarizable Ag/AgCl electrode), while a liquid earth is set in the root-sphere via the similar electrode(Okamoto & Masaki 1999).

During the above long observation on a kaki tree in the field, we became aware of the following two conspicuous phenomena

(1) The amplitude of the diurnal osscillation of TRP increases very much just before the unfolding of a tree leaf buds when the transpiration activity is still poor, and rapidly decreases after unfolding of the new buds (Fig. 1).

(2) When the transpiration from tree leaves is inhibited by heavy rain or by sudden fall of air temperature in summer, there takes place a very rapid positive shift of TRP, almost simultaneously(Fig. 2)

This phenomenon suggests a very rapid signal transmission from leaves to roots. We established a hypothesis: this signal should be the lift of the xylem hydraulic pressure (transmitted for a long distance with a sonic speed in water).

We constructed an apparatus which enables simultaneous recording of TRP and artificially applied xylem pressure and demonstrated the positive shift of TRP(up to 80 mv) with the application of the excess xylem hydraulic pressure(up to 100 kPa) in the seedlings of 11 tree species, without exception

This reaction is season-dependent, not observed in winter, most vigorous in summer

What does mean the positive shift of TRP?

We can analyze its meaning through the investigation by the "theory of the electro-physiological structure of the plant axial organ", established during 1978~1984 by the research group in Nagoya University, Japan.

The TRP has the following structure:

TRP = Vps – Vpx (=Vxs)

Vps: electric potential difference across root surface side symplast membrane, more than -100mV; the larger half is generated by the activity of the surface-side electrogenic proton pump. (The residue is the equilibrium potential of K+across cell membrane).

Vpx: electric potential difference across root **xylem** side symplast membrane, more than -100mV in cold season, the larger half is generated by the activity of the xylem side electro-genic proton pump, which decreases during hot season when the transpiration is vigorous. (pump is in resting state).

Theoretically, the positive shift of the TRP is produced by **the activation of the xylem proton pump**(hyper-polarization of Vpx), or "inhibition of the surface proton pump" (de-polarization of Vps)which although seems to be too unnatural from the view point of the plant life strategy

We have settled up this problem by means of the intra-cellular micro-elecrode technique ; by the simultaneous determination of the change in Vps and in Vpx caused by the application of the excess hydraulic pressure. Throughout 15

experiments, no inhibition of the surface pump was observed. Just the xylem pump was activated in its resting season (except winter) by the hydraulic signal

This activation did not take place under anoxic condition, showing it is the “pump phenomenon” in its primary meaning but not the channel phenomenon

Concluding Remarks is shown in Fig.3, where the established fact is surrounded by the continuous line, while the problem for future molecular physiological research is by the discontinuous line.

Appendix

Comparison between the velocity of bio-signals

Mechanism	Velocity(m/sec)	Receptor	Effector
Action potential			
Charophyte			?
Mimosa petiol	0.04 ~0.4	Inter-nodal cell	Pulvinus
AnimalNeuron	0.04	Leaf	Muscle
Variation pot. of	3 ~ 1000	Sensory organ	
Higer plants			Leaf(peptidase-
	0.01~0.2	Leaf	Inhibitor gene)
			?
	30 ~40	Root	
Hydraulic signal			Leaf(guard cell)
In higher plants		Root	
			Root
	1500	Leaf	(xylemH+pump

Ren Na[2*], Yanjie Luo[1], Long Yan[2], Xiaolei Shi[2], Julia S. Nowak[1], Yang Qiu[3], Qing Shi Lu[1], Chunyan Yang[2], Frédéric Marsolais[1] and Lining Tian[1]

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[3] Institute of Vegetables and Flowers, Chinese Academy of Agricultural Sciences, Beijing 100081, China

Establishment of soybean infecting virus based genome editing system

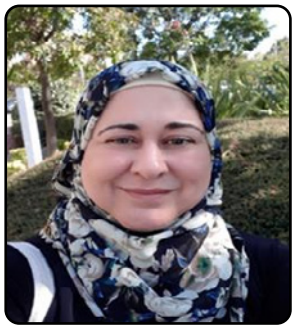
To develop a ALSV-based gRNA delivery system, the Cas9-based Csy4-processed ALSV Carry (CCAC) system was developed. In this system, we engineered the soybean-infecting ALSV to carry and deliver gRNA(s). The endoribonuclease Csy4 effectively releases gRNAs that function efficiently in Cas9-mediated genome editing. Genome editing of endogenous *phytoene desaturase* (*PDS*) loci and exogenous *5-enolpyruvylshikimate-3-phosphate synthase* (*EPSPS*) sequence in *Nicotiana. benthamiana* (*N. benthamiana*) through CCAC was confirmed using Sanger sequencing. Furthermore, CCAC-induced mutagenesis in two soybean endogenous GW2 paralogs was detected. With the aid of the CCAC system, the target-specific gRNA(s) can be easily manipulated and efficiently delivered into soybean plant cells by viral infection. This soybean genome editing system can be used for gene function study and trait improvement.

Audience Take Away:

- Our work developed a genome editing system, in which plant virus ALSV can be used to delivery RNA in genome editing system to generate mutant in *N. benthamiana* and soybean.
- This system also can be applied to multiple loci editing at once to aid the gene function analysis.
- Csy4 nuclease can be used in gRNA releasing process in the virus based plant genome editing system.

Biography

Dr. Na studied biological science and technology at Inner Mongolia University of Science & Technology in China and graduated as BS in 2017. She then worked on plant pathology with the research group of Dr. Jun Zhao at Inner Mongolia Agricultural University and received PhD degree in 2013. During her PhD study, she also studied at Dr. Gijzen's group at Agriculture and Agri-Food Canada for two years as an exchange student. After two year postdoctoral fellowship supervised by Dr. Mengchen Zhang and Dr. Yuanchao Wang at Institute of Cereal and Oil Crops (ICOC), Hebei Academy of Agricultural and Forestry Sciences, she worked as staff at ICOC. She has published more than 10 research articles.



Nisreen A. AL-Quraan[1]*, Nezar H. Samarah[2], Ayah A. Tanash[1]

[1]Department of Biotechnology and Genetic Engineering, Faculty of Science and Arts, Jordan University of Science and Technology, Irbid 22110, Jordan.
[2]Department of Plant Production, Faculty of Agriculture, Jordan University of Science and Technology, Irbid 22110, Jordan

Effect of Drought Stress on Wheat (Triticum durum L.) Growth and Metabolism: Insight from GABA Shunt, Reactive Oxygen Species and Dehydrin Genes Expression

This study investigated the physiological, biochemical, and molecular mechanisms that triggered in post- germination and seedlings of four durum wheat (*Triticum durum* L.) cultivars (Umqais, Hurani75, Sham1, and Acsad65) in response to water deficit (80%, 50% and 20% water holding capacity) through the characterization of seed germination pattern, seedling growth (plant height, fresh and dry weight, and water content), GABA shunt metabolite levels (GABA, Glutamate, and Alanine), oxidative damage (malondialdehyde (MDA) level) and the expression of *glutamate decarboxylase* (GAD) and dehydrins (dhn and wcor) genes. Data showed a significant decrease ($P \leq 0.05$) in seeds germination percentage, seedling length, fresh weight, dry weight, and water content as water availability was decreased. GABA shunt metabolites abundances were significantly increased with negative correlation under all water stress treatments. MDA content increased in post-germination and seedling stages in all durum wheat cultivars under all water stress levels. However, decreased water content and prolonged exposure of durum wheat cultivars to drought stress increased the GAD expression that activated GABA shunt pathway especially at seedlings growth stage. The activation of GABA shunt through up-regulation of *GAD* expression was correlated with GABA accumulation to maintain carbon-nitrogen balance, metabolism of amino acids and carbohydrates, and the regulation of growth under drought stress. *dhn* and *wcor* mRNA transcript significantly increased as water availability decreased in all wheat cultivars during post-germination stage to enhance drought tolerant by membrane protection, cryoprotection of enzymes and prevent ROS accumulation in response to drought stress. Generally, our data clearly showed that different durum wheat cultivars responded differently to water stress during seedling growth stage. The degree of tolerance in durum wheat might be connected with ROS scavenging systems and the activation of antioxidant enzymes that was associated with activation of GABA shunt pathway and the production of GABA in response to drought stress.

Audience Take Away:

- The activation of GABA shunt through up-regulation of GAD expression was correlated with GABA accumulation to maintain carbon-nitrogen balance, metabolism of amino acids and carbohydrates, and the regulation of growth under drought stress.
- *dhn* and *wcor* mRNA transcript significantly increased as water availability decreased in all wheat cultivars during post germination stage to enhance drought tolerant by membrane protection, cryoprotection of enzymes and prevent ROS accumulation in response to drought stress.
- The degree of tolerance in durum wheat might be connected with ROS scavenging systems and the activation of antioxidant enzymes that was associated with activation of GABA shunt pathway and the production of GABA in response to drought stress.

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.

Uday Bhan Prajapati
PHRD, Patanjali Research Institute, Haridwar, Uttrakhand, India

Botanical Identification Tools of The 21st century: DNA Barcoding

During Presentation author tried to explain Plant Taxonomy, The International Code of Nomenclature for algae, fungi, and plants (ICN), DNA Barcodiing, The Angiosperm Phylogeny Group (APG), Advantage of DNA barcoding, Its Application, Barcode limitations and about Worldwide DNA Barcoding Community. DNA barcode is a short genetic sequence that can be used for biological species identification. With a possible nucleotide position of four nitrogenous bases (ATGC) at each site, there are 4n probable codes for any given sequence ('n' nucleotides long), making it possible to identify every taxon. The survey of just 15 nucleotide positions can identify up to one billion species. A region of approximately 648 bp of the mitochondrial gene cytochrome C oxidase 1 (COI) was initially proposed as the barcode source to identify and delimit all animal species while Two regions of the plastid DNA (*mat*K and *rbc*L) have been recommended for terrestrial plants. DNA barcoding has been considered an efficient aid to traditional taxonomy. Taxonomy, for instance, is purely morphological *i.e* require proper description of the organism and not molecular while in barcoding, the use of molecular data in the discovery of new species. DNA Barcoding and taxonomy complement each other is also widely accepted by modern scientific community.

Audience Take Away:

- Plant conservation is a global concern due to various reasons. In this scenario when we identify thing, it will be more valuable for Us, therefore this technique help to identify species easily by a layman who is not technically a taxonomist.
- Worldwide DNA Barcoding Community always welcomes those people who have knowledge in concern streams.
- It Opens the way for an electronic handheld field guide, the life barcoder and make Speed writing the life of encyclopedia.

Biography

Dr. Uday Bhan Prajapati educated in Science from DDU Gorakhpur University, India and received PG and Doctorate degree in Botany 2010 from the same. He worked as a RA with Rockefeller Foundation, USA, Presently working as Scientist-C at the Patanjali Research Institute, Haridwar, India. He has contributed for Herbarium Acronym 'PRFH' and Member of Society of Herbarium Curator, Los Angeles, Fellow of Indian Science Congress Association. He has published a book and more than 34 research papers in various national and international journals. He awarded with Dr. Satya Jangid Smriti Samman (2019) by BJSS & PS, Delhi University and several others.

Aparna Gunjal

Department of Microbiology, Dr. D. Y. Patil, Arts, Commerce & Science College, Pimpri, Pune, Maharashtra, India

Compost as value-added product from lignocellulosic wastes

The lignocellulosic wastes viz., peanut shell, wheat straw, rice bran, coconut shell, orange peels, etc. are generated in huge amount. These wastes are disposed directly to the landfills. The management of these lignocellulosic wastes is necessary, which can be done by conversion to various value-added products (e.g., compost) by using solid state fermentation. Solid state fermentation requires the use of substrate, where lignocellulosic wastes can be used as source of the substrates. This will help in the management of lignocellulosic wastes which is the need of the hour. The value-added products from lignocellulosic wastes are eco-friendly and economical. This is also a sustainable approach. The two things are achieved from this, i.e., management of lignocellulosic wastes and useful products can be obtained with large industrial applications.

Keywords: Eco-friendly, Economical, Lignocellulosic, Solid state fermentation, Sustainable.

Biography

Dr. Aparna B. Gunjal has completed her B.Sc. from Annasaheb Magar Mahavidyalaya, Hadapsar; M.Sc. from Modern College Arts, Commerce and Science College, Ganeshkhind and Ph.D in Environmental Sciences subject from Savitribai Phule Pune University, Pune, Maharashtra, India. She is working as Assistant Professor in Department of Microbiology at Dr. D.Y. Patil, Arts, Commerce and Science College, Pimpri, Pune, Maharashtra, India. Her research areas of expertise are solid waste management; plant growth promoting rhizobacteria; e-waste management; bioremediation; etc. Aparna has 95 publications to her credit. She has received 15 Awards for the Best Paper presentations and also received the travel grants. Aparna has also received Pune Municipal Corporation Award for excellent work in Environmental Sciences Research in 2015, The Elsevier Foundation - TWAS Sustainability Visiting Expert Programme" in 2018 and Young Researcher award with Innovative Technology. She has worked on composting aspect as a Senior Researcher Assistant at Hongkong Baptist University, Hongkong. Aparna is Reviewer for many Journals.

Sara Bosi*, Giulia Oliveti, Antonio Fakaros, Giovanni Dinelli, Lorenzo Negri

Department of Agricultural and Food Sciences, Alma Mater Studiorum - University of Bologna, Bologna, Italy

Weed biocontrol with alternative natural compounds

Over the last decade, about 6.1 billion kilograms of the herbicide glyphosate [N-(phosphonomethyl) glycine] have been applied worldwide. Despite being the most heavily applied herbicide in the world, in 2015 glyphosate was classified as 'probably carcinogenic to humans' by the International Agency for Research on Cancer. The strong pressure form consumer associations and green organizations on European regulatory bodies could cause in a relatively short time the ban of glyphosate. Moreover, among the concrete targets to transform the EU food system, the objective in reducing the use and risk of pesticides by 50% is one of the most ambitious measures that will require the development of alternative and effective solutions.In this context, the aim of the present research was to identify some possible alternative treatments for weed control by using less harmful compounds for the human being and the environment than glyphosate based herbicides. Weed control trials were carried out in a completely randomized experimental design with 3 replications. During the experiment, data were collected considering a monocotyledon (Lolium perenne L.) and a dicotyledon (Vicia sativa L.). In the first trial, 5 acetic acids (concentrated natural vinegar, glacial acetic acid, lactic acid, citric acid, and acetic acid from food processing waste) were compared applying a volume of 300 L/ha. Images of the weed cover were collected 4 and 7 days after treatment (DAT). Results showed that total weed control ranged from 13,5 ± 5,7% for citric acid to 74,8% ± 9,0% for acetic acid from food processing waste. In addition, specific data were collected on the optimal dose to improve treatment efficacy and persistence. Finally, the effect of adjuvants was also considered. In conclusion, results confirmed the potential of acetic acids as bioherbicide. However, additional research efforts are needed to fine-tune product distribution and agronomic management of the crop.

Audience Take Away:

- The presentation is focused on the illustration of experimental data based on practical research activity. So, the audience could try to repeat the experimentation and/ or use these innovations.
- Biopesticide use is growing and is urgent identify new strategies for weed control by using less harmful compounds.
- For sure. This kind of research could be repeated by other colleagues.
- Yes, weed control with natural or less harmful compounds is an important topic to be solve. European Commission adoptedstrategies that will strengthen an improved use of safe alternative methods to protect crops from pests and diseases.

Biography

Sara Bosi - (F): PhD in Agro-environmental Science, she is currently Senior Researcher at the Department of Agricultural and Food Sciences of the University of Bologna. She is involved in the study of food quality with particular emphasis on plant secondary metabolites production as affected by agronomic managements, environmental conditions and abiotic stresses. She had published 40 scientific papers on international journals with impact factor. Her research activity focuses on studying the physiological response and adaptive capacity of resilient arable crops to ensure high production and nutritional value. The research approach aims to identify crops and resilient agro-ecosystem management techniques to reduce the overall use and risk of chemical pesticides, favoring the development of alternative solutions.

Dan Singh Jakhar

College of Agriculture, Sumerpur (Pali), Agriculture University, Jodhpur-342304, Rajasthan, India

Microsatellites facilitated investigation of quantitative trait loci for TLB resistance in maize

Turcicum leaf blight (TLB) incited by *Exserohilum turcicum* is a most persistent and destructive foliar disease of maize in a range of countries, including India. In Indian scenario, the states of Karnataka, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Orissa, and Andhra Pradesh are the most affected by TLB disease. It causes substantial reductions in grain yield due to epiphytotics, these losses can range from 25% to 90%, depending on the severity of the disease. With the help of two mapping populations, $F_{2:3}$ families and $F_{2:6}$ families (RILs, Recombinant Inbred Lines), in two different environments, E_1 (Varanasi, Uttar Pradesh, India; 25^0N, 83^0E) and E_2 (Nagenahalli, Karnataka, India; 12^0N, 76^0E) under artificial epiphytotic condition, this study attempts to identify quantitative trait loci (QTL) by using microsatellites. A total of 23 QTLs for maize TLB resistance were found. Eight of these QTLs were found in the F2:3 mapping population of the CM 212 x V 336 cross, while fifteen QTLs were found in the RILs of the CM 212 x CM 145 cross. In order to advance resistance breeding programmes, this work attempts to identify and map the novel QTLs for TLB resistance in maize.

Audience Take Away:

- Development of appropriate mapping population to map QTLs for TLB resistance in maize.
- Locating and mapping of QTLs for TLB resistance in maize.
- Identification of additional SSR markers for fine mapping of TLB in maize.
- This study might help to develop the TLB resistance lines.

Biography

(Dr. Singh graduated at the Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani in 2012 and Post-graduated at the Mahatma Phule Krishi Vidyapeeth, Rahuri in 2014. He received his PhD degree in 2018 at the Banaras Hindu University, Varanasi in the discipline of Genetics & Plant Breeding and he obtained the position of Assistant Professor at the Agriculture University, Jodhpur. He has published 20 research papers in referred Journals, 2 Books, 4 Booklets or Practical manuals, 15 Popular articles, 6 Book chapters, 6 Review articles, as well as actively participated in 20 Seminar/Symposia/Workshop at national and International level.)

Sergey Rodimtsev[1]*, Ninel Pavlovskaya[2]

[1]Department of Service and Repair of Machines, Orel State University named after I.S. Turgenev, Oryol, Oryol Region, Russia
[2]Department of Biotechnology, Orel State Agrarian University named after N.V. Parakhina, Oryol, Oryol Region, Russia

Grain yield forecasting based on vegetative index data

To predict the yield, some current indicators of the vegetation process are used, which are associated with the productivity of the crop. The results of the methodology for predicting grain yields based on the maximum value of the NDVI index, when the heading phase has begun, are proposed. The seasonal dynamics of NDVI in the phases of crop development was studied, peaks of NDVI values were noted in the heading phase of crops. Prognostic models of crop yields based on polynomial functions have been obtained.

Audience Take Away:

- An analysis was made of the dynamics of changes in the vegetation index NDVI, according to long-term studies, for winter wheat and spring barley at the production sites of the Research and Production Center “Integration” of the Oryol State Agrarian University.
- By studying the seasonal dynamics of the NDVI vegetation index by phases of crop development, peaks of NDVI values were noted in the heading phase of crops.
- Correlation coefficients between the maximum seasonal values of NDVI indices and productivity were 0.79 and 0.75 for winter wheat and spring barley, respectively.
- Received predictive models of crop yields based on polynomial (second degree) functions.
- The results of the study give an idea of the dependence of yield properties on the values of the vegetative index in a particular phase of plant development. This was obtained for winter wheat and spring barley, in the conditions of central Russia.
- This may be of interest for a comparative assessment of prognostic indicators of crop yields in specific soil-climatic zones.
- These results can be used in the preparation of agricultural students. As an example of the implementation of one of the methods for predicting crop yields.
- Specific prognostic mathematical models are given. They can be used for crop planning on farms. Such forecasts are very relevant in unfavorable years, when a significant crop shortfall is expected.
- Usage forecasts allows you to organize preventive measures to damage minimization. In favorable years, to determine the possible volumes grain exports and markets. They are an important link in management decision support system in the agrarian sector.
- Statistical data of long-term estimates of the dependence of yield on the vegetative index may be useful. In addition, illustrative material can be used in presentations for student learning purposes.

Biography

Doctor Rodimtsev studied engineering at the Highway Institute of the city of Tashkent, Uzbekistan. He graduated from graduate school at the Oryol Agrarian University in 2001. In the same year he defended his Ph.D. thesis at the Russian Agrarian University. In 2008, in the same place, he defended his doctorate in agricultural mechanization. He worked at the Oryol Agrarian University as a teacher, head of the department, director of the institute, vice-rector for scientific work. He currently works at the Department of Machine Service and Repair of Oryol State University. More than 180 scientific papers have been published.

Mohammad Shameem Al Mamun
Entomology Division, Department of Pest Management, Bangladesh Tea Research Institute, Srimangal, Moulvibazar, Bangladesh

Integrated Pest Management (IPM) Strategies for Sustainable Tea Cultivation

Tea (*Camellia sinensis* L.) is a major cash crop as well as export commodity of Bangladesh meeting almost the entire domestic demand. Tea plants are subjected to the attack of several insect, mites and nematodes. Globally 1034 species of arthropods and 82 species of nematodes are associated with tea plants. Among them, 25 species of insects, 4 species of mites and 10 species of nematodes are recorded from Bangladesh. Enormous crop loss was incurred due to the attack of these pests and largely responsible for the declining productivity of tea. Management of these pests is an important operation in sustainable tea cultivation. Extensive use of chemical pesticides began only a few decades ago with tremendous immediate economic gains but its abuses were not foreseen or ignored. As a consequence there arose the development of resistance to pesticides, pest resurgence and undesirable pesticide residue in made tea as the major problems. Current trends in eco-friendly insect pest management practices such as cultural control measures like plucking, pruning, shade regulation, field sanitation, fertilizer application, destruction of alternate hosts and selection of pest resistant/tolerant varieties; mechanical mechanisms like manual removal, sticky traps, light traps; use of bio-pesticides, bio-control agents and sex pheromone traps need to be given more importance in pest management programme in tea. Under cultural control measures, light pruning (LP) significantly reduced the infestation of pests of tea other than skiff pruning. Seven days regular plucking round, weeding and field sanitation reduced the incidence of Helopeltis and other foliar pests of tea. Under mechanical control measures, solar power light trap & yellow sticky trap captured greater number of thrips, jassids, white fly, aphids, moths of looper caterpillar and other flying insects in tea plantation. In respect of host plant susceptibility, BT1, BT2 & BT15 clones were found less attacked by Helopeltis. BT5, BT6 & BT17 clones were found less attacked by Red spider mite. BT3, BT4, BT8, BT9, BT12, BT13, BT14, BT15, BT18, BT19, BT20 clones were found less infested by thrips. BT4, BT6, BT7, BT8, BT9 clones were found less attack by termites. Among the botanicals, fresh leaves, succulent stems, seeds of Akonda (*Calotropis procera*), Basok (*Adhatoda vasica*), Bishkatali (*Polygonum hydropiper*), Bhat (*Clerodendron infortunatum*), Burweed (*Xanthium strumarium*), Castor bean (*Ricinus communis*), Datura (*Datura metel*), Garlic (*Alium sativum*), Lantana (*Lantana camara*), Mahogani (*Swietenia mahagoni*), Neem (*Azadirachta india*), Nishinda (*Vitex negundo*) and Tobacco (*Nicotiana tabacum*) have strong insecticidal properties and can be used as an alternative to chemical pesticides. Bio-control agents i.e. *Chrysoperla carnea*, Preying mantis, *Oligota flaviceps*, *Oxypes* spider, lady bird beetle and Stethorus beetle have been identified as the predators against pests of tea. Erythmelus helopeltidis as egg parasitoid against *Helopeltis* and *Bracon hebetor* as a larval parasitoid against looper caterpillar were found very effective. Entomopathogens viz., *Beauveria bassiana, Verticillium lecani, Metarhizium anisopliae, Hirsutella thompsonii, Pseudomonas fluorescens* and *Bacillus thuringiensis* were found the toxic on *Helopeltis*, red spider mite, thrips and looper caterpillar infesting tea and significantly reduced the pest population. Therefore, the developed strong based IPM strategies of major pests of tea will be easily adopted by the planters in large scale for their high return of the production of pesticide free, high value commodities for domestic as well as export markets.

Audience Take Away:

- The audience will learn the different techniques of IPM for sustainable tea cultivation.
- The learnt knowledge will be helpful for the audience in their job for the advancement of their research.
- This research could be used to expand their research or teaching for the other faculty.
- The research technology would solve the pest problem eco-friendly and efficiently.
- The IPM technology will improve the accuracy of a design of pest management in tea plantation
- IPM technology significantly reduced the risk of pesticide and chemical load on tea, while improving quality, health and welfare of the environment.

Biography

Dr. Mohammad Shameem Al Mamun studied in Bachelor Science in Agriculture and Master of Science in Entomology at Bangladesh Agricultural University, Mymensingh in 2001 and 2005, respectively. Then, he joined as Scientific Officer (Entomology) at Bangladesh Tea Research Institute in 2007. He also awarded Post Graduate Diploma (PGD) in Tea Plantation Management with a Colombo Plan Scholarship from Kothari Agricultural Management Centre, Tamil Nadu, India in 2010. He received a PhD degree with a dissertation on 'Integrated Pest Management of Red Spider Mite in Tea' from Shahjalal University of Science and Technology, Sylhet in 2017. He has published more than 100 articles in peer reviewed standard journals, proceedings, circular/booklets, newspapers articles, online articles, bulletin & books/book chapters etc.

Lovina Udoh
Akwa Ibom State University, Nigeria.

Sequencing and Validation of Single Nucleotide Polymorphism markers linked to carotenoids in Cassava (Manihot esculenta Crantz)

Cassava is a widely grown staple in Sub-Saharan Africa and consumed as a cheap source of calories, but the crop is deficient in micronutrients including pro-vitamin A carotenoids. This challenge is currently being addressed through biofortification breeding that relies on phenotypic selection. Gene-based markers linked to pro-vitamin A content variation are expected to increase the rate of genetic gain for this critical trait. We sequenced four candidate carotenoid genes from 167 cassava accessions representing the diversity of elite breeder lines from IITA. Total carotenoid content was determined using spectrophotometer and total β-carotene was quantified by high performance liquid chromatography. Storage root yellowness due to carotenoid pigmentation was assessed. We carried out candidate gene association analysis that accounts for population structure and kinship using genome-wide single nucleotide polymorphisms (SNPs) generated through genotyping-by-sequencing. Significant SNPs were used to design competitive allele-specific PCR assays and validated on the larger population for potential use in marker assisted selection breeding. Candidate gene sequencing of the genes β-carotene hydroxylase (crtRB), phytoene synthase (PSY2), lycopene epsilon cyclase (lcyE), and lycopene beta cyclase (lcyB) yielded a total of 37 SNPs. Total carotenoid content, total β-carotene, and color parameters were significantly associated with markers in the PSY2 gene. The SNPs from lcyE were significantly associated with color while those of lcyB and crtRB were not significantly associated with carotenoids or color parameters. These validated and breeder-friendly markers have potential to enhance the efficiency of selection for high β-carotene cassava, thus accelerating genetic gain.

Keywords: Cassava. Single nucleotide polymorphism. Marker-assisted selection. Candidate gene association. Vitamin A. Biofortification

Biography

Dr. Lovina I. Udoh is currently a Lecturer of Plant Genetics and Molecular Biology, Department of Botany, Akwa Ibom State University. She is an alumnus of the international association of research scholars and fellows at the International Institute of tropical agriculture where she was visiting research fellow and research fellow for M.Sc. and Ph.D. programs, in 2011, 2016, respectively. She was part of the HarvestPlus breeding program where her research contributed greatly to provide molecular tools for marker assisted selection breeding for Vitamin A Cassava. Her present research focuses on biofortification of staple crops and DNA barcoding of important medicinal plants.

Sama Rahimi Devin[1]*, Sayyed Mohammad Ehsan Mahdavi[1] and Ebrahim Latifikhah[2]

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Application of biostimulants in horticultural crops

In modern agriculture, it is a high priority to seek eco-friendly ways to enhance plant growth and promote crop productivity. Biostimulants are a group of substances derived from natural origin contributing towards boosting plant yield and nutrient uptake, while reducing the dependency on chemical fertilizers. They are usually able to improve the nutrient use efficiency of plants and enhance tolerance of biotic and abiotic stresses in them. In leaf vegetables which are highly susceptible to accumulation of nitrate, biostimulants can play an important role to keep away the nitrates from them and improve the quality. Moreover, biostimulants can increase leaf pigments (chlorophyll and carotenoids), stimulate root growth, and enhance the potential of antioxidant in plants. In floriculture, biostimulants utilize in plant production stimulated the growth of plants reached the blooming and commercial stages earlier. In fruit trees, biostimulants improve fruit set, retention, yield, fruit quality, and vegetative growth. In this review, the state of the art and future prospects for biostimulants are reported and discussed.

Keywords: biostimulants, fruit quality, floriculture, antioxidant, leaf pigments, vegetables, nitrate

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