PGC
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PMBWC 2024

AUGUST 17-18

Plant Science and Molecular Biology World Conference

Theme: Exploring the Interplay of Plant Biology and Molecular Research

Venue:
Sercotel Sant Boi
Barcelona, Spain

Contents

About Precision Global Conferences

Precision Global Conferences is a highly established scientific conference organizer. We take high integrity in conveying your achievements to the world and emphasize your incredible work and scientific contribution. Precision global conferences have developed the progression, broadcast, persistence, research, and development activities in cancer, neurology, and nursing science,

We support the beacon of quality research works and efforts of academicians, researchers, scientists, doctors, and all the future young to be experts to confide their outstanding works fearlessly. Our primary goal is to make health care accessible and understandable to people. We are ecstatic to pass on the ray of research, developments, and cutting-edge therapies worldwide. Hence, we are here to organize and conduct highly esteemed conferences.

This conference will emphasize the outstanding works and their medicinal consequences through hybrid presentations. If you're searching for a perfect podium that can reflect your professional ethics and voice your appointment, we are here with the best team, welcoming your honourable presence.

About Plant Science and Molecular Biology World Conference

The Plant Science and Molecular Biology World Conference PMBWC 2024 focuses on advancing innovation and research in plant science and molecular biology. Our main goal of the conference is to explore the latest developments and discoveries as this is a very dynamic field. The conference revolves around the challenges in plant science, providing a platform for scientists, researchers, and practitioners to explore emerging trends and pioneering methodologies. We strive to pave the way for groundbreaking advancements in plant science and molecular biology, ultimately contributing to a deeper understanding of the intricate mechanisms that govern the world of plants and genetics.

Conference theme: "Exploring the Interplay of Plant Biology and Molecular Research".

Significant progress in plant science and molecular biology, including synthetic biology and gene editing using CRISPR-Cas9, are revolutionizing agriculture. This has a global impact by giving the ability to develop resilient and high-yielding crops. In turn, it helps to address the global food security crisis and reduces the environmental impact. It shows great potential for enhancing crop nutrition and sustainability.

DAY 1

Plant Science and Molecular Biology World Conference

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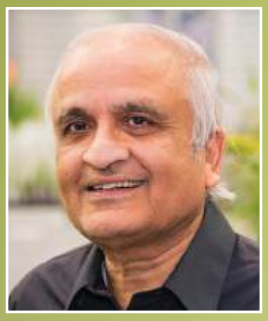
KEYNOTE SPEAKERS



Nodule-specific Cysteine-Rich Peptides: Antifungal Activity, Modes of Action and Potential for Development as Bioinspired Fungicides

Dilip M. Shah

Donald Danforth Plant Science Center, St Louis, MO, USA;

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Fungal pathogens cause significant losses of crop yield globally. Chemical fungicides have been instrumental in protecting crops from fungal diseases. However, increasing fungal resistance to many of the single-site chemical fungicides calls for the development of safe and sustainable fungicides with novel multi-site modes of action (MoA). The cysteine-rich plant antimicrobial peptides with potent antifungal activity have emerged as promising candidates for developing novel peptide-based fungicides.

Hundreds of nodule-specific cysteine-rich (NCR) peptides are expressed specifically during nodule development and differentiation in nitrogen-fixing legumes such as Medicago truncatula and Cicer arientinum. Several such peptides exhibit potent antimicrobial activity. However, their structure-activity relationships and mechanisms of action against fungal pathogens are still largely unknown. A highly cationic 36-amino-acid NCR044 peptide with two disulfide bonds is expressed in the nodules of M. truncatula. It exhibits potent antifungal activity against Botrytis cinerea and Fusarium graminearum. NCR044 peptide has a unique, highly dynamic three-dimensional structure and exhibits multi-faceted mechanisms of action against B. cinerea. Confocal and super-resolution microscopy shows peptide localization at the cell wall, foci adjacent to the plasma membrane, cytoplasm, and nucleoli of this fungus. A carboxy-terminal 17-amino-acid sequence motif essential for the antifungal activity of NCR044 has been identified.

NCR13 is a highly cationic 32-amino-acid peptide from Cicer arientium and contains three predicted disulfide bonds. Surprisingly, its expression in Pichia pastoris leads to the production of two disulfide variants that are identical in the amino acid sequence but differ only in the arrangement of disulfide bonds. These two variants have striking differences in their antifungal potency in vitro, stability after internalization into fungal cells, and multi-faceted modes of action.

Exogenous application of NCR044 confers resistance to a gray mold disease caused by B. cinerea in tobacco and tomato plants and post-harvest products. The exogenous application of the two NCR13 disulfide variants on tomato and pepper plants also confers strong resistance to gray mold. However, these two disulfide variants differ in their potency against this disease. Our work paves the way for the future development of NCR peptides as spray-on bioinspired fungicides.

Biography

Dr. Dilip Shah has been a Principal Investigator at the Donald Danforth Plant Science Center in Missouri since 2001. His lab investigates the mechanisms of action and biotechnological applications of naturally occurring antifungal peptides called defensins and defensin-like NCR peptides. These peptides have the potential for development as antifungal agents for the control of fungal diseases in agriculture. Dilip Shah has over 35 years of experience in plant molecular biology and agricultural biotechnology. During his previous tenure at Monsanto Company, he contributed substantially to developing Roundup herbicide-resistant crops. He is a co-inventor on several patents, and his patents on glyphosate-tolerant crops were listed as “Ten Patents That Changed the World” in the 2003 year-end publication of Intellectual Property Worldwide. He won the 2019 Bar Association of Metropolitan St Louis Inventor of the Year Award. He is also a co-founder of the Peptyde Bio Company, which designs and develops antimicrobial peptides for crop protection.

Improving Zinc Bioavailability in Rice (Oryza Sativa L.) Grain Grown in Red Acidic Soil of West Bengal

Sunandana Mandal

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Zn deficiency has become a major problem which causes reduction in yield and nutritional quality of the cereal grain, thus affecting human health. Zn deficiency appears to be more acute in case of rice consumers as rice is more prone to Zn deficiency amongst other cereals. Hence, biofortification of rice grain appears to be a high priority research area. Keeping in view of this, the laboratory and field experiments were carried out in lateritic soil of West Bengal, India.

100 surface soil samples were collected from five selected blocks of Birbhum district, West-Bengal, India to delineate available Zn status along with other available micro and macronutrients status. The soils were found strongly acidic to neutral in soil reaction and available Zn content varied from deficient to marginal range. For better crop quality and yield, Zn fertilizer needs to be applied.

Five soil profiles, at three different depths, were collected from those blocks to study the vertical distribution of available Zn along with macro and other micronutrients with the help of GPS and recorded the longitude and latitude of the area. Available macro, micronutrients and different Zn fractions decreased down the profile. The information obtained from vertical distribution study is helpful for both deep and shallow rooted crops.

Field experiments on biofortification of Zn in rice grain were carried out in Agricultural Research Farm during 2017 (wet season) and 2018 (dry season). The experiments were conducted in a randomized block design (RBD) with three replicates, comprising in total of twenty four plots. Treatment combinations are: T1: No Zn i.e. control; T2: NPK + Zn @ 5 kg Zn/ha (basal); T3: NPK + Zn @ 5 kg Zn/ha (25 days after transplanting); T4: NPK + Zn @ 5 kg Zn/ha (at the time of flowering); T5: NPK + Zn @ 5 kg Zn/ha (half of $ZnSO_4.7H_2O$ at the time of land preparation + half of $ZnSO_4.7H_2O$ after 25 days of transplanting); T6: NPK + Zn @ 5 kg Zn/ha (half of $ZnSO_4.7H_2O$ at the time of land preparation + half of $ZnSO_4.7H_2O$ at the time of flowering); T7: NPK + Zn @ 5 kg Zn/ha (half of $ZnSO_4.7H_2O$ after 25 days after Transplanting + half of $ZnSO_4.7H_2O$ at the time of flowering); T8: NPK + 0.03% Nano Zn application (spray) at the time of flowering and post-flowering.

Results obtained from field experiments revealed that plant height, chlorophyll content, 1000-grain weight increased significantly with Zn treatments over control. Zn fertilization had significant effect on grain, straw and biological yield. Highest grain yield was received for the treatment T5. Grain and straw Zn concentration significantly increased with Zn fertilization at various growth stages of rice crop in comparison to control. Soil Zn application was found more effective in increasing yield whereas in terms of increasing grain Zn concentration, foliar Zn application was found more effective. N, P, K, Zn uptake also increased significantly with Zn fertilization over control. Significant and positive correlations were recorded between different plant parameters.

Biography

Dr Sunandana Mandal is working as an Assistant Professor in the department of Chemistry at Moyna College (Affiliated to Vidyasagar University), India. She completed her Ph.D. degree from Visva-Bharati in Soil Science and Agricultural Chemistry under the guidance of Prof. Goutam Kumar Ghosh. During her Ph.D. work, she received Rajiv Gandhi National Fellowship (RGNF) funded by UGC from 2015 to 2020.

She has published research papers in various prestigious journals (UGC approved, Wos indexed, DOI). She acts as reviewer for several international journals. Till March 2024, there are several publications to her credit which are peer reviewed, UGC care list approved, Web of Science Indexed reputed Journals at National and International Levels.

She has delivered lectures and presented papers in various seminars and conferences at National as well as international level.

DAY 1

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ORAL SPEAKERS

Diverging Adaptive Strategies to Drought Stress and Stalk-lodging Resistance in Maize

Silvia Calderone*, Nuria Mauri, Alba Manga-Robles, Silvia Fornalé, Lluís García-Mir§, María-Luz Centeno, Camila Sánchez-Retuerta, Robertas Ursache, José-Luis Acebes2, Narciso Campos, Penélope García-Angulo, Antonio Encina and David Caparrós-Ruiz

Centre for Research in Agricultural Genomics (CRAG) Consorci CSIC-IRTA-UAB-UB Edifici CRAG Campus de Bellaterra de la UAB, Cerdanyola del Valles, Spain

In maize (Zea mays L.), a globally cultivated and strategic crop, stalk-lodging and drought are two significant stressors affecting yield. However, little is known about the impact of drought on maize varieties and their stalk-lodging resistance. The plant cell wall is a dynamic and adaptable structure, crucial as the first defense against environmental challenges. Maize, as all commelinid monocot species, is characterised by a type II cell wall, where the main hemicellulose is arabinoxylan instead of xyloglucan, typically present in type I cell walls.

In this study, we explored the cell wall biochemical and molecular mechanisms underlying the responses to drought of two maize inbreds with opposite stalk-lodging phenotypes, one resistant and one susceptible to this stress. We characterized the different cell wall biochemical alterations and associated those changes with differential gene expression patterns during drought stress, especially in cell wall-related genes. Identifying sets of genes differentially expressed in the two inbreds prompted us to search for transcription factors that might be acting as upstream regulators.

Our results revealed unique adaptive strategies in response to drought in each inbred, offering valuable insights into the broader context of plant adaptation. Surprisingly, the stalk-lodging-resistant inbred was more severely affected by drought than the lodging-susceptible inbred. The latter responded by increasing arabinose-enriched polymers, pectins, and their side-chain modifications while decreasing lignin content. In contrast, the stalk-lodging resistant inbred displayed a more profound rearrangement of cell walls, including alterations in lignin composition and increased uronic acids conjugated with hemicelluloses. Transcription factor enrichment assays uncovered some inbred-specific gene regulatory networks that may orchestrate the expression of cell wall genes specific to each inbred, possibly in an ABA-dependent manner.

These findings reveal that the stalk-lodging susceptible inbred had a more dynamic, loose, and plastic cell wall matrix. In contrast, the stalk-lodging resistant inbred required a more profound reprogramming of cell wall genes to readapt its cell wall metabolism to drought conditions. Therefore, the high selection pressure upon breeding to increase stalk-lodging resistance had possibly led to a reduced cell wall plasticity, affecting its capacity to face drought stress.

Our work underscores the critical role of the cell wall polymers and their side-chain modifications during drought stress, controlling the hydration of the cell wall and serving as a determinant factor in protecting plants from this stress. In conclusion, this study contributes to unraveling the complexity of maize responses to various environmental stressors, emphasizing the need to consider inbred-specific biochemical and molecular mechanisms to enhance crop resilience and agricultural sustainability.

Biography

Silvia Calderone, a 4th-year PhD candidate at the Centre for Research in Agricultural Genomics (CRAG) in Barcelona, Spain, explores the intricacies of metabolic engineering of lignocellulosic biomass and the molecular mechanisms of circadian clock function in maize, under the guidance of PhD David Caparrós and PhD Paloma Mas. Her academic journey includes an M.Sc. in Plant Biotechnology – Molecular Plant Breeding and Pathology from Wageningen University and Research. Silvia's keen interests revolve around unraveling the molecular secrets of plant development and their adaptive responses to environmental stresses, showcasing her passion for advancing agricultural genomics.

The DRO1 Gene Under Spotlight of Functional Genomics for Improving Tomato Root Architecture

Dalila Trupiano*, Eleonora Greco, Mohamed Kouhen, Adriano Sofo, Leonardo Bruno

Associate Professor in Botany at Department of Biosciences and Territory - University of Molise, Italy

Due to population growth, urbanization, and climate change, the competition for water resources is expected to increase, with a relevant impact on the agrosystems, where water is used for irrigation. Notably, different plant species counteract drought conditions by modulating the functionality of the root system that ultimately determines their access to water. An area of recent interest is examining the genetic determinant for improving root traits that increase plant water use efficiency and, expressly, maintain their productivity under drought conditions.

Recently, research on root plasticity has focused on the utility of specific root traits under water limitation, and an increasing number of quantitative trait loci (QTL) and genes have been reported in different crop/model species. Among them, DRO1 was found to be a significant root QTL in rice and Arabidopsis. It is strictly related to deep-growing root systems, allowing plants to reach deeper groundwater and survive during drought periods. However, it is notable that the specific root traits regulated by this gene (root angle, root length, etc.) were distinct in the above-mentioned plant species. Therefore, shedding light on the DRO1 function in other crop species could provide the necessary resources and reference to improve their productivity and performance under water shortage, putting this understanding into practice.

In this scenario, our study - funded by the European Union - Next-GenerationEU project – and the Italian National Recovery and Resilience Plan - aims at functionally characterizing the DRO1-controlled root phenotype in tomato (Solanum lycopersicum L.) plant, an important crop grown worldwide. To accomplish this, an omics-driven approach combining phenomics and cutting-edge genomics was implemented to functionally analyze DRO1 gene, at a spatio-temporal level, and decipher the networks/mechanisms orchestrating tomato root architecture changes under challenging conditions.

Such insights promise to enhance plant fitness and resilience in evolving climatic conditions.

Biography

Dalila Trupiano is an Associate Professor in Botany at the Department of Biosciences and Territory - University of Molise (Italy). Her research activities are carried out in the Plant Biology Laboratory, narrowing down its focus on plant environment interactions (from the cellular up to the organism level) by using morphological, anatomical, physiological, and molecular analyses. Furthermore, comparative proteomic analysis and phytohormones profiling, coupled with bioinformatics-modelling pipelines, are used to comprehend factors in plants response to different stresses. Innovative phenotyping image-based approaches are being developed to predict plant growth in different growth conditions

Genomic Basis of Ecological Plasticity in Chouardia litardierei (Hyacinthaceae)

Sara Laura Šarančić*, Damjan Mitić , Krešimir Križanović , Ivan Radosavljević

Division of Botany, Department of Biology, Faculty of Science, University of Zagreb, Croatia

By imposing different selection pressures on populations occupying contrasting habitats, environmental heterogeneity drives the process of lineage diversification that can lead to the emergence of new ecotypes and, ultimately, species. Through various mechanisms, natural selection purges the genes maladapted to different environmental conditions and supports the ones that will positively influence the adaptation of generations to come in specific surroundings. Chouardia litardierei (Hyacinthaceae) is a bulbous perennial monocot species that occupies highly contrasting habitats in different climate zones. From wet meadows in coastal areas of the eastern Adriatic, through periodically flooded karst poljes at higher altitudes across the Dinaric Alps, and finally to rocky, exposed, and arid slopes of limestone and dolomite mountains in southern parts of its distribution range, different groups of C. litardierei populations are adapted to highly contrasting environmental conditions. We performed a comprehensive genome-environment association analysis to investigate the genomic background of local adaptation and characterize regions of the genome strongly associated with specific environmental variables. After sequencing 129 samples from 33 selected populations of C. litardierei across its distribution range, we tested for association between 8537 obtained SNPs and available bioclimatic variables. Different analytical approaches aimed at recognizing loci underlying local adaptation were implemented. Finally, we annotated the recognized loci against the available species' draft genome, and the results are being discussed.

Biography

Sara Laura Šarančić is a dedicated researcher and Ph.D. candidate at the University of Zagreb, Croatia, with a solid foundation in Biology and Chemistry, holding a master's degree in biology and chemistry education. Currently, I am actively contributing to the project 'Amethyst Meadow Squill (Chouardia litardierei, Hyacinthaceae): A Study System for Ecological Divergence,' funded by the Croatian Science Foundation, where my research revolves around the fascinating realms of adaptation genomics, population genetics, GWAS (Genome-Wide Association Studies) and GEA (Genome-Environment Association Studies). As a quick learner, I am actively expanding my skills in the dynamic bioinformatics field. I believe in the power of data-driven insights to propel scientific discoveries.

Exploring Microalgae-Plant Interactions: Insights from Plate Assays, Greenhouse Experiments, Auxin Biosynthesis and Microscopy Analysis

Margaret Mukami Gitau*, Farkas Attila, Gergely Maroti

Department of Molecular Genetics, Center for Research in Agricultural Genomics (CRAG), CSIC-IRTA-UAB-UB, Barcelona, Spain

Microalgae have emerged as promising biostimulants for sustainable agriculture due to their ability to influence plant growth and development. In this study, we investigated the interactions between different microalgae species and plants, employing a multifaceted approach that integrated plate assays, greenhouse experiments, auxin biosynthesis analysis, and microscopy techniques.

Plate assays provided initial insights into microalgae's impact on seed germination and early seedling growth under controlled laboratory conditions. Subsequently, greenhouse experiments validated these findings and evaluated the long-term effects of microalgae inoculation on plant growth in agricultural settings.

Concurrently, biochemical assays were used to investigate the auxin biosynthesis capabilities of various microalgae species, highlighting strains with potential as bio-stimulants for plant growth promotion. Additionally, microscopy analysis utilizing specific dyes confirmed the presence of exopolysaccharides in microalgae cultures.

Our integrated approach revealed significant variations in the effects of different microalgae species on plant growth parameters and identified strains with notable auxin biosynthesis capabilities. Moreover, microscopy analysis provided insights into microalgae-plant interactions at the cellular level.

Overall, our study enhances our understanding of microalgae-plant interactions and offers valuable insights for developing sustainable agricultural practices that improve crop productivity and environmental sustainability.

Biography

Gitau Margaret Mukami studied Natural Sciences and botany at the University of Chinese Academy of Science and graduated with an MS in July 2017. She joined the Institute of Genetics in Biological Research Centre, Szeged, Hungary, for a 1-year International Training Course. In September 2018, she joined the research group of Dr. Gergely Maróti at the Institute of Plant Biology at the same institution. She enrolled for her Ph.D. in Biological Sciences at the University of Szeged. She graduated with a Ph.D. in June 2023. She then joined the Centre for Research in Agricultural Genomics (CRAG), Barcelona, Spain, under the MSCA-COFUND project Agricultural Genomics Transversal (AGenT) as a postdoctoral fellow. Her work involves harnessing green plant biostimulants from microalgae for sustainable agriculture. She has published three articles about this work in SCI(E) journals.

Molecular diversity Analysis of Retama Species using ISSR, REP-PCR, ITS, and Plastidic Genes

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Centre de Biotechnologies végétales et microbiennes, Biodiversité et Environnement, Faculty of Sciences, Mohammed V University in Rabat, Rabat, Morocco

Abstract:Retama is an important Mediterranean legume genus known for its significant ecological and medicinal importance. This study aimed to assess genetic diversity within the Retama genus species through the application of molecular markers, including ISSR, REP as well as seven potential DNA barcodes including matK, rbcL, rpoC, trnL, Pspb, ycf, and ITS to generate a reference database to authenticate and facilitate the identification of Retama genus species collected from different parts of Morocco.

ISSR and rep-PCR resulted in 48 and 18 bands respectively, of which 83.33% and 88.89% were polymorphic, with 0.70 and 0.78 polymorphic information content (PIC) values obtained with ISSR and rep respectively. The combined data revealed low variations (25%) among the Retama species, whereas high variations (75%) were obtained within the species, using the analysis of molecular variance (AMOVA). The sequences phylogenetic analysis of the DNA barcode region confirmed the closeness between R. monosperma and R. dasycarpa, which clustered with R. raetam; whereas R. sphaerocarpa was far from the other species.

The cluster analysis and the principal coordinate analysis assembled the different samples into three groups. They showed that R. monosperma and R. raetam are highly similar, whereas R. dasycarpa, clustered differently, although close to this first group. Retama sphaerocarpa was confirmed to be far from the three other species.

Using such simple markers will simplify the identification of Retama species and reduce the confusion between the four plant species

Biography

I am a doctoral student at the Centre for Biotechnology, Biodiversity and Environment, Faculty of Sciences, Mohammed V University, Rabat. My research focuses on the genetic diversity of legumes, particularly Retama species, as well as their microsymbionts. Through the use of molecular markers, I explore patterns of genetic diversity within this plant genus. Guided by my passion for science, I strive to advance knowledge in this crucial field of biology, contributing to scientific research and innovation.

Study of the Effect of Controlled Deficit Irrigation, Age and Year of Harvest on the Physical and Chemical Characteristics of the Fruits of Two Varieties of Pomegranate Grown in Morocco

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The physical and chemical characteristics response of the two varieties of pomegranate (Punica granatum L) Sefri and Wonderful to change of fruit age (5,10,13,22 and 36 years) and to three fractions of crop evapotranspiration; 50% ETc, 70% ETc and 100% ETc, aged 5 years was determined.

The effect of water deficiency on the quality of pomegranate fruit varies according to its intensity and variety. In the Sefri variety, water deficiency induces an overall deterioration in fruit quality, even at a moderate intensity of 70% ETc. The effects are very considerable on this variety under a hydrous regime of 50% ETc, marked by decreases in fruit size, juice

density, sweetness of the juice (°Brix) and increases in acidity and dry matter of the arils.

The only positive effect of water stress on the quality of the juice of this variety is the increase in the red coloration intoncity of the juice by increasing the values of a*, b* and c* concentration of water-soluble tannins. In the Wonderful variety, the hydric deficit at the threshold of 50% ETc does not affect neither the size of its fruit nor the sweetness and not the pH of its juice. However, a moderate deterioration of the fruit quality for this variety is noted concerning the decrease in juice density as well as the increase in the dry matter of the arils.

For both cultivars, the fruit harvested in 2018 shows more deterioration of physical quality compared to the 2017 and 2009 harvest years, notably fruit weight, lower arils weight and higher seed weight. On the other hand, the content of certain biochemical compounds (antioxidant capacity, flavonoids, anthocyanins, proteins, water-soluble tannins) is the lowest in 2009.

The results of the effect of age on the quality of the fruit in both varieties of pomegranate, show an influence for the majority of parameters for both cultivars by the existence of decrease in quality for the Sefri variety including the decrease in weight, fruit sweetness (°Brix), flavonoids, proteins and water-soluble tannins for fruit older than 22 years. However, for the Wonderful variety, no deterioration was noted due to the growth of the majority of the quality parameters essentially at the age of 22 years of its fruit but that it exists at the age of 36 years.

The climate as well as the age of the fruit play a direct but also indirect role by influencing many other characteristics of the cultivar and even of the species. The media coverage of these and other effects studied on more cultivars have the merit of bringing back to the forefront.

Biography

I hold a PhD in Plant Biology and Biochemistry. My doctoral research focused on the "Pomological and chemical diversity of the pomegranate tree cultivated in Morocco and the effect of water deficit on fruit quality". This degree was awarded by the Faculty of Science and Technology at Sultan Moulay Slimane University in Beni Mellal, Morocco. During my doctoral thesis, my practical work was conducted at the national agronomic research institute in Meknes for 3 years.

Identification of the Symbiosome Secreted Host Proteins Involved in Symbiotic Nitrogen Fixation

Ilayda GOKTEPE-ATILGAN*, Onur OZTAS

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Nitrogen is vital for all living organisms. Even though it is the most abundant gas in the atmosphere, organisms cannot use free nitrogen from the air for their metabolism. Legumes can overcome this nitrogen limitation through a symbiotic relationship with soil bacteria (Rhizobium spp.). Sinorhizobium meliloti can convert inert nitrogen to ammonium and nitrate with nitrogenase enzyme activity in a specialized root organ named 'nodule.' In the presence of low nitrogen concentration, some signal exchange triggers infection thread formation, where bacteria invade plant cells. When the bacteria enter the plant cell through infection thread, it surrounds by plant cell membrane. Then, this bacteroid structure differentiates to a symbiosome, which can fix nitrogen. Different factors and peptides highly regulate the differentiation processes. More than 600 NCR peptides were characterized in the Medicago truncatula plant and moved NCR peptides and other factors from ER to symbiosome by the DNF1-dependent nodule-specific protein secretory pathway.

DNF1 protein is located on the ER membrane, a subunit of a signal peptidase complex responsible for cleaving N-terminal signal sequences of differentiation-related cargo proteins to direct them to the symbiosome. In dnf1 mutants, it is shown that the transportation of those proteins stops, and those proteins are trapped and accumulate in the ER. Also, microscopic analysis indicates that bacteroids cannot develop as symbiosomes and are arrested at early stages of differentiation. So, it is crucial to elucidate other proteins that have roles in the dependent nodule-specific protein secretory pathway. However, using classical protein-protein interaction (PPI) methods have several limitations to performing highly sensitive analysis: inefficient extraction, purification steps, reaction condition differences between in vivo and in vitro, and difficulties of capturing weak and transient interactions. Enzyme-catalyzed proximity labeling (PL) approaches overcome the limitations of those PPI methods. In the presence of a biotin substrate, an engineered biotin-ligase enzyme (miniTurbo, mT) can biotinylate proximal proteins close to the protein of interest. The stabilization of covalently attached biotins makes in-depth proteomic assays, such as immunoprecipitation and mass spectrometry, possible.

Here, we focused on identifying interaction partners of DNF1 in the symbiotic nitrogen fixation pathways using the mini turbo proximity labeling approach for the first time. Therefore, Medicago truncatula seedlings are infected by the Agrobacterium rhizogenes ARqua1 strain for hairy root transformation. Transgenic plants inoculated by Sinorhizobium meliloti for nodule initiation. Nodules were collected at 21 days post-inoculation and then treated with biotin. Biotinylated proteins are immunoprecipitated for in-depth proteomic analysis to identify interacted partner candidates of DNF1.

Biography

İlayda Goktepe-Atilgan is a Ph.D. candidate at Koc University, Istanbul, Turkey. She graduated from Istanbul University and received her master's degree from the Molecular Biotechnology and Genetics program with her thesis 'Biotechnologically Production of Anticancer Taxanes in Hazelnut (Corylus avellana) Cell Cultures' in 2020. In 2021, she joined the Koc University Plant Biology lab as a Ph.D. student. She received a National Ph.D. Scholarship from the Turkish National Science Foundation (TUBITAK). Her primary research focuses on symbiotic nitrogen fixation in legumes.

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POSTERS

Mechanisms of Temperature Acclimatization in the Psychrotolerant Green Alga Coccomyxa subellipsoidea C-169

Kinga Kania*, Maksymilian Zienkiewicz, Anna Drożak

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Coccomyxa subellipsoidea C-169 is a unicellular green alga adapted to a challenging Antarctic environment. It is a psychrotolerant (with optimum growth temperature 20°C) characterized by a wide range of temperature tolerances (up to + 30°C) and high lipid content. As the first sequenced eukaryotic microorganism from a polar environment, it can serve as an attractive model for studies of the acclimatization to different temperatures and, finally, adaptation mechanisms to cold.

These results aim to clarify the acclimatization mechanisms that enable the psychrotolerant green alga C-169 to grow in a broad temperature spectrum. The contents of various biochemical compounds in cells, the lipid composition of the entire cells' biological membranes, the thylakoid fraction, the electron transport rate, and PSII efficiency were shown. The results demonstrate an acclimatization mechanism that is specific for C. subellipsoidea and that allows the maintenance of appropriate membrane fluidity, for example, in thylakoid membranes. It is achieved almost exclusively by changes within the unsaturated fatty acid pool, like changes from C18:2 into C18:3 and C16:2 into C16:3 or vice versa. This ensures, for example, an effective transport rate through PSII and, consequently, a maximum quantum yield in cells growing at different temperatures. These findings add substantially to our understanding of the acclimatization of psychrotolerant organisms to a wide range of temperatures and prove that this process could be accomplished in a species-specific manner.

This work was supported by the National Science Centre grant 2021/41/N/NZ3/04319.

Biography

Kinga Kania is a PhD student at the University of Warsaw. My main topic of interest is understanding the mechanisms responsible for acclimating the photosynthetic apparatus too cold in psychrotolerant organisms. I focused mainly on the green algae Coccomyxa subellipsoidea C-169.

DAY 2

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Sercotel Sant Boi, Barcelona, Spain

VIRTUAL PRESENTATIONS

Agriculture High Quality Development

Zhongsheng Guo*

Northwestern A & F University,Yangling,Shaanxi, China

Since 2017, the term high-quality development has been proposed in China, so Agriculture development has entered the new stage of Agriculture high-quality product, which is to take some measures and methods to make the land produce the maximum output and services to meet people's yearning for a better life and the needs of agricultural production services. However, because of the overuse of fertilizer pesticides and the introduction of un-native plant species or vatiaries, exotic plant species or varieties, plant resources relationship has changed into unbalanced relation, which will easily result in soil degradation, vegetation degradation and crop failure or waste of soil water resources, and are unfavorable for the sustainable utilization of resources and Agriculture high-quality development. Therefore, adjusting the plant resources relationship and obtaining the maximum yield and services is necessary to realize the sustainable utilization of resources and crop high-quality management. However, there is no universally accepted theory to regulate plant resource relationships in practice. Here we show that the theories of sustainable use of soil resources and Agriculture high-quality development include the resources use limit by plants (RULP), vegetation carrying capacity (VCC) and the critical period of plant resource relationship regulation, which includes the space resources use limit by plants (SRULP), space vegetation carrying capacity (SVCC) and the critical period of plant space relationship regulation in soil water and soil nutrient-rich regions, the soil water resources use limit by plants (SWRULP), soil water vegetation carrying capacity (SWVCC) and the critical period of plant water relationship regulation in the water-limited regions and the soil nutrient resources use limit by plants (SNRULP) , soil nutrient vegetation carrying capacity (SNVCC) and the critical period of plant nutrient relationship regulation in soil nutrient limited regions. The SWRULP is the soil water resources in the maximum infiltration depth (MID) in which the soil water content in every soil layer is equal to the wilting coefficient. The wilting coefficient is expressed by the wilting coefficient of the indicated plant in a plant community. SWVCC is the population or density of indicator plants in a plant community when the soil water supply is equal to soil water consumption in the root zone in the critical period of plant resources relationship regulation (CPPSRR), which changes with plant community type, site condition, and time. When soil water resources in the MID are equal to the SWRULP, the plant water relation enters CPPSRR. The ending time of CPPSRR is the ineffective time. To get the maximum yield and service, we must select the best plant species or varieties, take suitable initial planting densities, and use effective measures or methods to ensure the plant is normal to grow and achieve the cultivation goal. If the plant density is more than the VCC in the critical period of plant resources relationship regulation, the plant resources relationship has to be regulated based on VCC to get the maximum yield and service to realize sustainable use of soil resources and high-quality production. As for fruit or crops, the leaf and delicate fruit relation has to be regulated according to the quantity of leaf when the plant density is equal to the VCC in the critical period of plant resources relationship regulation. High-quality fruit is the fruit that meets the needs of the market.

Keywords: Soil resources; Soil degradation; crop failure; maximum infiltration depth, resources use limit by plant; carrying vegetation capacity; the critical period of plant resources relationship regulation; sustainable use of soil resources; high-quality production.

Biography

Dr. Zhongsheng Guo studied soil sciences at Northwestern A & F University, China, and graduated with an MS in 2000. He then researches the high-quality and sustainable method of forest, grass, crop and soil and water conservation in Northwestern A & F University, CAS & MWR. He received him PhD degree in 2004 at the Northwestern A & F University. He obtained the position of an Professor at Northwestern A & F University,CAS & MWR. He has published a couple of research articles in SCI(E) journals. He put forward the resource use limit by plants (RULP), vegetation carrying capacity (VCC) , the critical period of plant resource relationship regulation, and the new theory of soil and water conservation.

Study of Bioadsorption Kinetics for Heavy Metals

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The heavy metals are toxic and cause water and soil pollution. These heavy metals are cadmium, lead, zinc, arsenic, chromium, nickel, mercury, etc. The chemical methods for removing heavy metals from contaminated soils and wastewater have disadvantages. The bioadsorption is an easy, eco-friendly, and cheap method for removing heavy metals from contaminated soils, aqueous solutions, wastewater, etc. The work here describes the kinetics study for bioadsorption of heavy metals by the agroindustry by-products viz., peanut shell, corn cob, sawdust, paddy husk, and pressmud. The Langmuir and Freundlich equations and constants were studied. The study showed the Langmuir and Freundlich isotherm models best fit the experimental data for the adsorption of heavy metals viz., Zn, Cd, Pb, and Ni. The study indicates second-order pseudo kinetics is obeyed.

Biography

Dr. Aparna Gunjal has completed her M.Sc. in Microbiology and Ph.D. in Environmental Sciences. She has ten years and 12 years of research experience. She has 190 research papers to her credit, and one German patent is granted. She has 15 National and International awards to her credit. She is an Editor and Reviewer for many National and International journals. She is a Life member of the Biotech Research Society India (BRSI) and the Indian Women Scientist Association (IWSA).

Tannin Extraction from Prosopis Pallida (Mesquite)

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Florida International University / SUXILU. Miami, FL, USA

Prosopis pallida, also known as Mesquite or Algarrobo in America, is considered a useful species for depleted soils, especially in arid or desertic climates, and of particular interest for urban forestry programs in areas lacking precipitation or irrigation. While the trees are of rapid growth, they require thinning, pruning, and other cultural practices to increase efficiency in soil restoration and carbon fixation. Those tree management activities produce large quantities of wood waste, normally left in the field for decomposition or burned out, turning into an economic inefficiency and an environmental nuance when previously fixated CO2 is released.

As biochar production from those wood wastes is being studied, a secondary approach might include the valorization of polyphenols and tannins before their carbonization due to their potential high-value properties.

This report analyzed three extraction methods in lab conditions on wood pulp and bark separately cellulose content and total polyphenols, total tannins, and condensed tannins. Solvents included 4% sodium sulfite, distilled water, and methanol-hydrochloric acid solution.

The extractive protocol, type of solvent, temperature, extraction velocity, and sample freshness can greatly affect the quantity and quality of the extracted products. The test results showed a relevant difference in tannins content between the bark and the wood pulp, recovering on average 33% content on 59% extraction efficiency and 18% content on 47% extraction efficiency, respectively. Also, in condensed tannins, 13% were condensed tannins in bark, while less than 1% were in wood pulp, and cellulose content and structure seemed unchanged after tannins extraction.

Dried wood in ambient conditions under shelter seemed to concentrate tannins, increasing extraction efficiency after 60 days since wood collection.

For scaling up, further analysis of uncharacterized compounds needs to be performed to define extraction methods and long-term efficiencies better.

Biography

Paul Luzuriaga is a PhD candidate in Environmental Engineering from the University of Calgary and a Doctor in Business Administration from Florida International University, with about 20 years of experience in forest research and soil regeneration.

Lipoic Acid, a Multifunctional Molecule at the Intersection between Metabolism, Development and Stress

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Developmentally, ripening is associated with metabolic and texture changes in fruits, whilst senescence is a way to remobilize resources for their use elsewhere. As an oxidative process, senescence can be temporarily delayed by adding antioxidants to neutralize ROS. In the plant, ripening and senescence are tightly regulated, and ethylene is the main hormone responsible for their induction. Ethylene is made from S-adenosylmethionine (SAM), a substrate also used by lipoyl synthase (LIP1), a Senescence Associated Gene, whose expression rises during this process. LIP1 is required in the synthesis of lipoic acid, a powerful antioxidant that is also a cofactor of key enzymes in primary metabolism and plays a role in abiotic stress tolerance. We aim to dissect the interplay of the usage of SAM using LIP1 as a lever. To do so, we identified and functionally characterized LIP1 from tomato (SlLIP1) at the molecular and biochemical levels. We stably transformed plants with SlLIP1 under the control of a constitutive (35S), and a fruit-specific (PG) promotor, and are developing tools to up- and down-regulate its expression in a more fine-tuned manner. Our results show that SlLIP1 has the molecular characteristics of a lipoyl synthase, is located in the mitochondria, heterologously complements a bacteria lipoyl synthase mutant, and is ubiquitously expressed, especially in fruits. SlLIP1 overexpression increases lipoylation levels and spraying tomato plants with lipoic acid increases their tolerance to saline stress and delays leaf senescence. However, when expressed constitutively, plants suffer delayed development, especially at the reproductive phase, yet when expression is confined to fruits, plants develop normally. Interestingly, ethylene levels were higher in developing fruits, indicating a misbalance of SAM usage, and metabolomic analyses reveal modifications in primary metabolites in these organs. Funding: Fondecyt 1231417 (MH), ACT210025 (MH), Fundación María Ghilardi Venegas (MPC, PC) and ANID Doctoral Scholarship (21210768, FU).

Biography

Michael Handford is a Full Professor in the Biology Department of the Faculty of Sciences at the Universidad de Chile. Since completing his PhD and postdoctoral fellowships at the University of Cambridge, he has focused his research on various aspects of plant metabolism, such as cell wall synthesis, and more recently on the metabolic changes that plants undergo in order to withstand abiotic stress conditions, including antioxidant and sugar alcohol metabolism. He also carries out multiple teaching (undergraduate and postgraduate) and administrative commitments in the University, and in Chilean

Effects on the Sporogenesis and Biocontrol Functions of Trichoderma spp. by the Mycoviruses

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Trichoderma spp. is known to impact host plant growth and defense activities. With the findings of the mycoviruses from Trichoderma spp., more and more effects on the sporogenesis and biocontrol functions of hosts induced by mycoviruses were known. In our research, Trichoderma harzianum partitivirus 2 (ThPV2) from T. harzianum strain (T673) showed higher mycelial density, conidiospore, and chlamydospore production than in the virus-infected strain T673-F, as well as moderately but statistically significantly improved biocontrol activity when compared with strain T673-F in the experiments with cucumber seeds inoculated with Fusarium oxysporum f. sp. cucumerinum. Trichoderma harzianum mycovirus 1 (ThMV1) from T. harzianum strain (T525) not only affected the phenotype of the host strain but also reduces its biocontrol function on F. oxysporum f. sp. cucumerinum. Using the yeast two hybrid nuclear system to screen, 57 proteins involving the interaction between T525 and ThMV1 have been obtained, among which 40 proteins interacted with ThMV1-RdRP, 29 proteins interacted with ThMV1-CP and 12 proteins interacted with both ThMV1-RdRP and ThMV1-CP. For the hexokinase1 (HXK) and the interacted protein with ThMV1-CP, the hexokinase gene (hxk) knockout mutant (T525-hxk) and reverse mutant (T525Rhxk) of T525 were obtained. Connecting the results of transcriptomic analysis, Real-time RT-PCR, and the phenotype of cucumber, the interaction of ThMV1-CP/HXK in T525 was proved to negatively regulate the disease resistance pathway of T525 and positively regulate the growth promotion effect of T525 in the cucumber.

Biography

Beilei Wu works at the Institute of Plant Protection, Chinese Academy of Agricultural Sciences (CAAS), china: her research interests are the Collection, diversity, and evaluation of Trichoderma spp. and the Investigation of the fermentation process for Trichoderma chlamydospore production and industrialization, Identification and evaluation of Mycovirus from Trichoderma. spp, Interactions among Trichoderma spp., pathogen and plant, Collection resource and evaluation on endophytes from the plant.

Genetic basis of high photosynthetic efficiency and high yield in wheat

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China Agricultural University, Beijing, China

The elongation of photosynthesis, or functional stay green, represents a feasible strategy to propel metabolite flux toward cereal kernels. However, achieving the above goal remains a stunting challenge in food crops. Here, we report the cloning of wheat CO2 assimilation and kernel enhanced 2 (cake2), the mechanism underlying the photosynthesis advantages, and natural alleles amiable for breeding elite varieties. We isolated cake2 from a tetraploid wheat EMS mutant library. We detected a premature stop mutation in the A-genome copy of the ASPARTIC PROTEASE 1 (APP-A1) gene (henceforth app-A1) that co-segregating with the cake2 phenotype. A splicing mutant in the B-genome homeolog (app-B1) and the double mutant (app1) enhanced photosynthesis and grain size/weight. On the contrary, overexpression of APP-A1 accelerated leaf senescence and complemented the cake2 phenotype. APP-A1 A genome is an active chloroplast protease, bound and degraded PsbO, the protective extrinsic member of photosystem II (PS II). A dysfunction mutant of PsbO (psbo-2A) partially complemented the app1 double mutant, indicating PsbO's contribution to the enhanced function of PS II and grain development in app1. Furthermore, a natural polymorphism of the APPA1 gene in common wheat reduced APP-A1's activity and promoted photosynthesis and grain size/weight. This work demonstrates that modification in APP1 can positively affect photosynthesis and grain size and inform future steps to understand and engineer the functional stay-green phenotype. The genetic resources could propel photosynthesis and high-yield potentials in tetraploid and hexaploidy wheat elite varieties.

Biography

Prof. Jin-Ying Gou mainly studies the molecular genetics of wheat stripe rust resistance and yield. Prof. Gou cloned genes promoting wheat stripe rust endurance and CO2 assimilation rate to explore their molecular mechanism. Prof. Gou focused on metabolic regulation to explore strategies toward durable and broad-spectrum resistance potential. To comprehensively investigate the application potential of candidate genes, Prof. Gou examined their effect on photo-assimilation rates and yield traits. Prof. Gou evaluated their disease resistance, yield potential, and functional quality to explore the strategy of coupling disease resistance, high yield, and nutritional function regulation. The work could provide a theoretical basis and valuable germplasm resources for disease-resistance breeding.

Production of High Purity Lignin from OPEFB: An Overview

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This study examines the practicable method of lignin delignification and fractionation from oil palm empty fruit bunches (OPEFB) to produce high purity products. A review on the current literature progress in this field indicated two development phases that involves several early studies on lignin delignification and lignin product purification, and the later phase provides initial attempts to improve lignin recovery efficiency and overcome technical barriers for obtaining high purity lignin. It is found that there are significant gaps in understanding to achieve efficient removal of lignin, good recovery of lignin from high purity products and the removal of silica residuals on OPEFB surfaces. Accordingly, the high technical barriers to achieve high-purity lignin products are Pidentified, including the need for an improved method to delignify and fractionate lignin for the purpose of producing a higher purity product. It can be concluded that fractions of lignin may be segregated and isolated by using the ultrafiltration method based on molecule mass and recovery to a higher purity product with over 98 wt.%. High purity applications of OPEFB lignin, such as the propylene stabilizer and chemical sunscreen products, can therefore be produced. Accordingly, this review also provided an opportunity to further develop product applications towards anti-ultraviolet, antioxidant and antibacterial functions.

Keywords: Delignification; OPEFB; Lignin fractionation; Ultrafiltration.

Conclusion: This overview concluded that there is a practicable method of lignin delignification and fractionation which can be used to produce high purity products. In an analysis of literature progress in developing a OPEFB delignification method it appears that there are gaps in understanding to achieve efficient removal of lignin, good recovery of lignin from high purity products and the removal of silica residuals on OPEFB surfaces. This is due to the high technical barriers to achieve high-purity lignin products for high-value applications that necessitate an efficient lignin recovery method from OPEFB. Major difficulties have arisen because of the complex nature of OPEFB polymer that acts as an insoluble three-dimensional network. A method to delignify and fractionate lignin for the purpose of producing a higher purity product is suggested. It indicates that, using the ultra-filtration method based on molecule mass and recovery to a higher purity product with more than 98 wt.%, lignin fractions can be separated and isolated. For instance, in use of propylene stabilizers and chemical sunscreen, it is therefore possible to produce OPEFB lignin for high purity applications. Therefore, for example in the use of propylene stabilizers and chemical sunscreens, it is possible to mature OPEFB lignin to high purity applications. Furthermore, the results of this study also provide an opportunity to further develop product applications for anti-ultraviolet, antioxidant and antibacterial functions.

Biography

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Implication of the Population Epigenomic Diversity on the Adaptation of a Plant Clonal Species

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Climate change poses a significant threat to plant species, potentially pushing them beyond their adaptive capacities. Epigenetic modifications, such as DNA methylation, have emerged as a key mechanism enabling plants to quickly adapt to environmental changes by generating locally adapted phenotypes. These phenotypic changes can even be inherited across multiple generations, thus potentially becoming targets of natural selection. However, whether natural selection can act on these epialleles has hardly been tested directly. Addressing this knowledge gap is crucial as population survival may heavily rely on DNA methylation, especially in populations with restricted genetic diversity, such as within clonal plant species.

We compared the genomic and epigenomic diversity from seven natural populations of four individuals of woodland strawberry clonal species (Fragaria vesca). We distinguished the epigenome on the three methylation contexts (CG, CHG, CHH). Specifically, we investigated the effect of the wide altitudinal range on the diversity of these epigenomes and of the genome. Moreover, we studied the heritability of the epigenetic diversity across clonal generations in new environments at low altitudes.

Our analyses found a wide intra- and interpopulation epigenetic diversity despite a considerably low genetic diversity. We identified heritable epialleles exhibiting signs of positive selection associated with altitude in the CG, CHG, and CHH contexts. Interestingly, some of these epialleles were independent of genetic variation, suggesting they may have arisen stochastically or in response to environmental variation. These findings hint at the role of epigenetic variation in facilitating rapid adaptation to varying environments in the face of reduced genetic diversity, as in clonal species.

Biography

Le Veve Audrey is a French postdoc of 29 years old. In 2016, after a bachelor's degree in agronomic sciences, she did a master's degree in genetics at the University of Nice. For two years, she focused on population and evolutionary genetics. In March 2022, she defended her thesis, supervised by V. Castric, on the evolutionary consequences of dominance at the self-incompatibility locus. Since April 2022, she has been working with Clément Lafon-Placette in Prague.

Molecular Insights into Cannabis Photochemistry: Examining the CBD and THC Effect on Photochemical Efficiency and Quantum Yield

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Plant Science & Agrotechnology Division, Indian Institute of Integrative Medicine (CSIR), Canal Road, Jammu, India

Cannabis sativa L. is a multifaceted botanical resource, encompassing robust fibers, nutritious seeds, and medically relevant phytocannabinoids such as tetrahydrocannabinol (THC) and cannabidiol (CBD). Light, a critical environmental factor, has been recognized as a pivotal modulator influencing biomass and cannabinoid yield, acting through a responsive photochemical apparatus. This study aims to elucidate the intricate relationship between escalating metabolic THC levels and photochemical efficiency in Cannabis. The investigation involved comprehensive analyses encompassing chlorophyll fluorescence kinetics, photosynthetic pigments, and immune detection of photosynthetic machinery across seven Cannabis accessions originating from diverse environments. Concurrently, cannabinoid content assessment facilitated the categorization of accessions into three distinct groups based on their relative CBD and THC content. Our findings reveal a stoichiometrically negative correlation between THC content and key photochemical performance indicators, as assessed through OJIP kinetics. Notably, Zeaxanthin-dependent quenching emerged as a predominant contributor to reduced Non-Photochemical Quenching (NPQ) in Group III, characterized by elevated THC content (THC > 6%). Further validation through THC treatment in Arabidopsis thaliana corroborated a dose-dependent decline in photochemical efficiency, underscoring the exclusive role of THC in eliciting this response. Concurrently, the observed phenomenon damaged essential photosynthetic proteins, including D1, RbCL, and Lhc1 protein holo-complex, compromising overall plant health and yield. Furthermore, the study introduces a novel screening method for Cannabis based on cannabinoid content, offering practical insights into the intricate interplay between THC, photochemical efficiency, and the holistic health of the plant. These findings contribute to the broader understanding of Cannabis physiology and cultivation practices for optimized biomass and cannabinoid production.

Keywords: Cannabidiol, Cannabis sativa, Photochemical efficiency, non-photochemical quenching, OJIP Kinetics

Biography

Manu Khajuria has earned her Ph.D. in Botany, specializing in plant adaptive biology. Since 2014, her research has been dedicated to understanding the adaptive potential of high-altitudinal plants in the Ladakh Himalayan region. Furthermore, her studies explore the correlation between photochemical efficiency and Δ9 – tetrahydrocannabinol content in Cannabis sativa L., presenting a novel investigation within plant biology. Currently positioned as a Scientist in the Plant Sciences and Agrotechnology Division at CSIR-Indian Institute of Integrative Medicine in Jammu, India, she continues to advance scientific knowledge in the intricate field of plant adaptation. Her work is a valuable contribution to the broader scientific community, shedding light on the intricate interplay between environmental factors and plant physiology in challenging ecosystems.

Nanoparticles in the Management of Fusarium Oxysporum Causing Fusarium Wilt of Cucurbits

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Nanotechnology stands as a formidable weapon against several plant diseases that causes huge losses in its production. Nanoparticles provide a novel opportunity to mitigate the challenges in plant disease management. Fusarium wilt is the most common and destructive disease of many economically important crops including cucurbits. Fusarium wilt disease not only hampers the production of the crop but also affects the quality of cucurbit fruits widely. The wilt pathogen, Fusarium oxysporum has the ability to survive in the soil for a long period of about 10-15 years, and hence it is regarded as the most damaging soil-borne fungus. Use of nanoparticles in agriculture is helpful for reducing the input of chemical pesticides as well as fertilizers which in turn reduce the chemical load on the ecosystem. It will also help in promoting plant growth and increase the crop production to contribute to meet growing global needs. They may be used efficiently as biomarkers for detection of important plant diseases. Nowadays, metal and metal oxides nanoparticles of zinc, silver, gold, titanium, copper, etc. have been proved to inhibit the fungal, bacterial and viral plant pathogens. In the recent years, great attention has been focused on the green synthesis of nanoparticles from plants as it helps in the formation of nanoparticles that are environmentally friendly, stable, biocompatible, and cost-effective. Keeping in view their efficiency, zinc oxide nanoparticles have been synthesized through green synthesis from mung bean plants and then the efficacy of these zinc oxide nanoparticles was checked at different concentrations against Fusarium oxysporum causing Fusarium wilt of cucurbits. Zinc oxide nanoparticles were found to be very effective against Fusarium oxysporum and it causes inhibition of the pathogen which proved its potential in the management of this destructive pathogen causing Fusarium wilt of cucurbits. Since these nanoparticles were synthesized through green synthesis, hence they were environmentally friendly also.

Biography

Dr Shumaila Shahid received her Ph.D. in Plant Pathology from Aligarh Muslim University, Aligarh in 2018, respectively. She is currently working as Scientist (ARS- Agricultural Research Service) in the Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi, India. She is Co-Principal Investigator of seven ongoing major research projects at IARI and has also successfully completed three major research projects. She has 13 years of experience in research and teaching (Ph.D. and M.Sc.). She has published many research papers in peer-reviewed International and National Journals, edited books and published several book chapters. She has been honoured with various prestigious awards such as Scientist of the Year 2023 Award, Young Woman Scientist Award 2023, Dr Rajendra Prasad Excellence Scientist Award 2022, Young Scientist Award in Plant Pathology 2021, Research Excellence Award 2019 etc. She is a life member of many renowned societies.

Deciphering Genome-Wide Molecular Interaction Networks to Uncover the Regulatory Mechanism of SG Biosynthesis in Stevia rebaudiana

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Sugar-rich diets and modern lifestyles contribute to various metabolic disorders. To reduce sugar intake, a widely adopted global strategy is the use of low/no-calorie sweeteners (LNCSs). Among the various plant-derived LNCSs, Stevia rebaudiana is commercially popular due to its ability to accumulate more than 60 Steviol glycosides (SGs). However, the acceptability of these SGs is limited by their bitter aftertaste. Therefore, current breeding efforts focus on creating superior cultivars that increase the accumulation of desirable SGs while eliminating the bitter aftertaste. Gene co-expression network studies are valuable for uncovering gene correlations, identifying plausible candidate genes, and understanding the molecular mechanisms of complex traits. In this study, we first constructed the phased genome of a superior Stevia cultivar. We then predicted a genome-wide interlog protein-protein interaction (PPI) network, (~12000 proteins with 1.2 lakh interactions). A high-confidence network, hc-StPIN, consisting of (~5,000 nodes with ~80,000 interactions), was predicted by combining interlog and domain-based approaches. Furthermore, RNA sequencing data were used to construct a gene co-expression network (GCN) regulating SG biosynthesis. Overall, 30 co-expression modules were identified, with 5 modules playing a pivotal role in the targeted accumulation of desired SGs. The reliability of the network was assessed, and major hub proteins associated with SG biosynthesis were identified. This study enhances our understanding of the molecular networks regulating SGs and identifies key regulators that promote the higher accumulation of desired SGs.

Biography

Mamta Masand is a passionate Ph.D. research scholar working under the supervision of Dr Ram Kumar Sharma at the CSIR-Institute of Himalayan Bioresource Technology, Palampur, Himachal Pradesh. She completed her M.Sc. in Bioinformatics from the Central University of Himachal Pradesh. She was awarded the prestigious ICMR-SRF direct fellowship in 2022 to support her Ph.D. studies. Her research is focused on the genetic improvement of Stevia rebaudiana, a plant known for its natural sweeteners. She employs transcriptomics, genome studies, and molecular docking studies to uncover and characterize the key regulators involved in the biosynthesis of desirable Steviol glycosides. Her work aims to improve the quality and sweetness of Stevia, addressing the challenge of its bitter aftertaste. She has published nine research articles and has presented her findings at an international conference.

The impetus for tissue cultures research on secondary metabolites originating from flower and leaf buds of European ash.

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Abiotic factors related to climate change, i.e. increased soil salinity, heavy metal water and soil contamination, and the increasingly common drought, adversely affect the physiological condition of forest trees. Long-term impact of unfavourable abiotic factors negatively affects the quantity and quality of the generative material produced by trees, such as seeds. Problems with collecting and storing high-quality seeds became the basis for research aimed at obtaining healthy seedlings, among others, from embryos isolated from seeds and other parts of woody plant organs in vitro. The experiments used common ash explants, which were flower buds and leaf buds. The research material was obtained from trees located in the Olkusz Forest District in southern Poland. Before starting laboratory tests, the research material was disinfected according to an innovative procedure. Disinfection of buds was performed to protect both types of buds against spontaneous infections and their destruction. Then, the disinfected and grown flower and leaf buds were placed on the nutrient solution covered by patent no. PL 242938, which was in crystallization dishes and Petri dishes. The results of the research showed that plant material such as flower and leaf buds are not suitable for micropropagation due to the presence of large amounts of endophytic fungi in both types of buds and the lack of morphogenesis in callus and seedlings. It was observed that both flower and leaf buds produce biochemical compounds, most likely secondary metabolites. It was found that flower buds developed structures resembling certain callus-like features. The appearance of an aqueous substance produced by flower buds directly affected by endophytic fungi was also observed. In the case of leaf buds, it was additionally observed that plant tissue that changed its colour from green to brown is less susceptible to secondary fungal infections. This phenomenon may indicate the production of metabolites that limited the growth and development of fungi. Based on the experiments carried out, it was concluded that tissue cultures of flower and leaf buds collected from common ash have great potential for conducting research to determine the usefulness and further possibilities offered by ash buds, including secondary metabolites. The results of further research on the isolation and identification of biologically active substances in plants will be used to determine their potential use in many industries, such as medicine, pharmacy, production of biopesticides.

Biography

2013-2016 - first-cycle studies at the University of Agriculture. Huggon Kołłątaj in Kraków, obtaining the title of forestry engineer with a grade of 4.5.

2016-2018 - second-cycle studies at the University of Agriculture. Huggona Kołłątaj in Krakow, obtaining a master's degree in forestry with a grade of 5.0.

2018-2019 - internship at the State Forests State Forests, Olkusz Forest District, receiving a job under the agreement on the employment of the best graduates of state forestry universities.

Since 2019, work in the Olkusz Forest District based on an employment contract - permanent work.

2019-collaboration with Dr. Prof. Katarzyna Nawrot-Chorabik with Department of Forest Ecosystems Protection, Faculty of Forestry, University of Agriculture in Krakow in the field of forest tree biotechnology, doctoral dissertation supervisor.

2019-2020-postgraduate studies at the Jagiellonian University in Krakow at the Faculty of Biochemistry, Biophysics and Biotechnology. Receiving a postgraduate diploma with ocean 4.5.

The Role of Si Application in the Resistance of Chestnut Plants Against Phytophthora Cinnamomi

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Castanea sativa has been severely affected by Phytophthora cinnamomi, a problematic disease in Portugal that was responsible for the disappearance of more than 50% of the chestnut-producing area since the beginning of the 20th Century. Unfortunately, it continues to be one of the most devastating root rot pathogens of chestnut, being essential to finding alternative strategies that can help the trees to increase their resistance against it.

Silicon (Si) fertilization appears as a possible inducer of tolerance against P. cinnamomi infection, acting as a plant protector against this and other biotic stresses in different crops of the world. This study's main objective was to evaluate

Si effect on plant protection against P. cinnamomi. The chestnut seedlings were fertilized with 10 mM Si, and one month after half of them were inoculated with the oomycete. The mortality rate of chestnut trees treated with Si was 10%. In the in vitro study, realized by Si application in a PDA medium to evaluate its fungi toxic capacity, results showed that 10 mM Si solutions presented a stronger inhibition zone (90%) against P. cinnamomi comparatively to the control treatment (0%) two weeks after incubation. Data obtained in this research demonstrated that Si could act as an elicitor that triggers rapid action by the biochemical defense system. The present research suggests that Si fertilization could be successfully used in the control of

P. cinnamomi by increasing the physical and chemical defense mechanisms of chestnut plants, expands the protection of plants and consequently the quality of the chestnut fruit.

Keywords: biotic stress; chestnut plant; ink disease, phytophthora cinnamomic, phytoliths

Characterization and Valorization of Autochthonous Bean (phaseolus vulgaris l.) and lentil (lens culinaris medik) Ecotypes

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Autochthonous ecotypes or local varieties are plant genetic resources characterized by high genetic variability, specific adaptation to the environmental conditions of the cultivation area (i.e., tolerance to biotic and abiotic stresses), and the presence of specialized metabolites (terpenoids, flavonoids, alkaloids) and health-promoting compounds. Thus, their diversity is relevant not only in nutritional terms but also due to the content of phytochemicals or secondary metabolites. However, local varieties are gravely threatened by extinction mainly for their replacement by modern genetically uniform varieties. Untargeted metabolomics is a strong approach that allows for investigating a wide range of metabolite classes. It gives crucial data for identifying distinct local varieties, identifying their metabolic fingerprints, and promoting their valorization and conservation. The current study aimed to provide a global view of the metabolite diversity of three autochthonous lentil ecotypes from different villages of Molise region (Italy) - Capracotta, CA; Rionero Sannitico, RS; and Agnone, A - in comparison to one ecotype from Umbria region (Italy) - Castelluccio di Norcia, CS - and three autochthonous bean ecotypes from Molise region (Italy) - Ciliegino bean, CI -, Basilicata region (Italy) - Spanish Ciliegino bean (CI SP). Untargeted metabolomics, performed by liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) allowed the detection of 344 and 544 differential accumulated metabolites (DAMs) for bean (Be) and lentil (Le) ecotypes, respectively. The annotation of the DAMs, by consulting home-made spectral and MS libraries (e.g., the GNPS Public Spectral Library) and a molecular network approach (MetGem and Cytoscape software), allowed 53% and 54% of them to be assigned to different metabolic categories (10 for Be and 13 for Le). Flavonoids were the most represented metabolic category (66 for Be, 87 for Le), followed by amino acids and derivatives (59 for Be, 61 for Le) and cinnamic acids (22 for Be, 50 for Le). Significant variations in Be and Le metabolite composition were also observed through the combination of univariate and multivariate statistical analyses. According to the PCA scores plot, A, CA, and RS lentil ecotypes were separated from CS by the PC1 (56 % variance).

Similarly, CI and CI SP were separated from SMR by the PC1 (58 % of variance). Two clusters for Be and Le, respectively, were revealed by hierarchical cluster analysis, indicating the distinctiveness of the traditional varieties. A partial least squares-discriminant analysis (PLS-DA) found 15 variables important in the projection (VIP) scores of metabolites belonging to flavonoids, amino acids, and terpenoids metabolic categories for Le and flavonoids for Be. The enrichment analysis is in progress to assess the presence of enriched metabolomic categories, allowing the selection of ecotypes-specific metabolic features. In addition, the antibacterial and antioxidant activity of both legume extracts has been evaluated and analyzed in light of each ecotype's distinct metabolic profiles to understand better the beneficial/ health-promoting effect of some bioactive compounds

Biography

Alessandra Renella is a Ph.D. student in Biology and Applied Sciences at the University of Molise researching the characterization and conservation of agro-biodiversity, particularly autochthonous legume ecotypes. In detail, supervised by Prof. Gabriella Stefania Scippa and Prof. Dalila Trupiano, she is studying the metabolomic profile of autochthonous legume ecotypes to explore their characteristics and support their valorization and, more in general, biodiversity conservation strategies. Ms. Renella obtained a master's degree from the University of Molise in 2021, during which she worked on the physiological and biochemical responses of autochthonous bean ecotypes to abiotic stress.

The Relationship of δD and δ18O in Soil Water and its Implications for Soil Evaporation Across Distinct Rainfall years from Winter Wheat Field in the North China Plain

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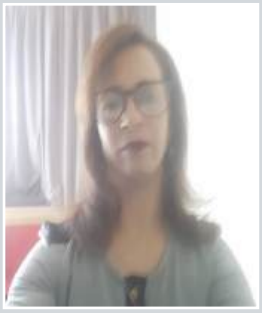
Soil evaporation has a significant role in regulating the local climate and non-productive water loss. The stable isotope ratios of water (2H/1H and 18O/16O) are excellent tracers for studying water movement and flux. According to the principle of evaporation enriching isotope ratios, three indicators, including the deuterium excess (d-excess), the slope of soil water evaporation line (SEL), and the line conditioned excess (lc-excess), have been established to express the soil evaporation process. However, their differences and the factors affecting these indicators must be better understood under distinct rainfall years' conditions. In this study, d-excess, SEL, and lc-excess were calculated according to the hydrogen and oxygen isotopes of soil water content during the main growth period of winter wheat under distinct rainfall (wet, regular, and dry) years. The influencing factors of d-excess, SEL, and lc-excess, respectively, soil, vegetation, and meteorology, were analyzed using various methods. The current study revealed a decreased correlation between slope and lc-excess/d-excess during the wet, regular, and dry years. Three analytical methods showed that meteorological factors were the main controlling factors for d-excess, SEL, and lc-excess during the wet year. During the dry and regular years, meteorological, soil, and vegetation and their interactions combined to influence d-excess, SEL, and lc-excess. Compared with the slope of SEL, the lc-excess can better indicate the combined results of soil evaporation because it can be simultaneously affected by soil, vegetation, and meteorological factors. In contrast, the slope of SEL can only be affected by meteorological factors. The results of this study may help calculate soil evaporation by lc-excess.

Biography

Dr Mounkiala Hamani Abdoul Kader is a postdoctoral researcher at the College of Tropical Crops, Hainan University, Haikou, China. He obtained his Master and PhD degree in 2020 and 2023, respectively at the Graduate School of Chinese Academy of Agricultural Sciences. Throughout his training in Agricultural Water-Soil Engineering and Agronomy, he has been fascinated by the ability to conduct research, which has both scientific and intellectual potential. After completing his graduate studies and gaining significant research experience in the fields of Agronomy and Irrigation Science, he sees himself in an academic career as a future research institution member, working with young scientists and engineers to develop innovative solutions with scientific potential and application. His research focuses on agricultural water-fertilizer management and mitigation of greenhouse gas emissions.



Valorisation of Pancratium Maritimum , Halophyte Plant from Northern Tunisian is Dependent on Stage of Plant and Organs

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Soil salinity is one of the utmost abiotic stresses in the world. It severely limits yields and threatens land productivity in arid and semi-arid regions of the Mediterranean area, which leads to a reduction in cultivable areas and represents a threat to the environmental balance of these regions. Identifying more adapted species and the selection of variety tolerant to salinity would remain the most efficient economic way to exploit the salt-affected lands. P. maritimum L. is one of the best-known endangered species in its natural habitats due to urbanization, tourism development and overharvesting. This research aims to study the physiological and biochemical characteristics and their evolutions in the different vegetative stages of a plant from the northern Tunisian coast (Pancratium maritimum). The results showed significant plant behavior differences depending on the growth stage. The mature stage shows the highest biomass production and the growth in length. Thus, this plant maintains a high relative leaf water content (90.19%) and is considered a species resistant to drought and salinity. In addition, germination of seeds under different salt concentrations to enhance the ability of the plant to adapt to high salt concentrations (200 Mm NaCl) showing a slow cycle of germination of the plant. This plant is rich in vegetable fibers and polyphenols, so the seeds are loaded with Total Nitrogenous Matter (TMA), which is suggested as a fodder plant.

Biography

Mbari Sonia is PhD researcher in Topic Plant science. Researcher lecturer in Plant Biology in the National Research Institue of Rural Engineering, Water and Forest (INRGREF) 2016-2021. Post doc in Faculty of Agrobiology food and Natural Resouces in Prague Czech Republic 2019/2020. She has PhD in biological science in a fellowship between Faculty of Science in Tunisia and Centre of Edafologia et Biologia CEBAS-CICIC Spain. During her PhD she was interested in soil biology, microbiology, abiotic stress in plants grown under organic amendment. Current research interest covers plant tolerance and screening different germoplasm to salt stress tolerance, secondary metabolites accumulation under abiotic stress special salt stress. She has published about 23 book chapters and journal papers. Member of ATAE association Abel Grenier/Tunisian Association for Environmental Agriculture, member ASPB plant biology association.

The Interplay of Dietary Fibers and Intestinal Microbiota Affects Type 2 Diabetes by Generating Short-Chain Fatty Acids

Muhammad Mazhar*

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Foods contain dietary Fibers which can be classified into soluble and insoluble forms. The nutritional composition of fast foods is considered unhealthy because it negatively affects the production of short-chain fatty acids (SCFAs). Dietary Fiber is resistant to digestive enzymes in the gut, which modulates the anaerobic intestinal microbiota (AIM) and fabricates SCFAS. Acetate, butyrate, and propionate are dominant in the gut and are generated via Wood-Ljungdahl and acrylate pathways. In pancreatic dysfunction, the release of insulin/glucagon is impaired, leading to hyperglycaemia. SCFAs enhance insulin sensitivity or secretion, beta-cell function, leptin release, mitochondrial function, and intestinal gluconeogenesis in human organs, which positively affects type 2 diabetes (T2D). Research models have shown that SCFAs either enhance the release of peptide YY (PYY) and glucagon-like peptide-1 (GLP-1) from L-cells (entero-endocrine) or promotes the release of leptin hormone in adipose tissues through G-protein receptors GPR-41 and GPR-43. Dietary Fiber is a component that influences the production of SCFAS by AIM, which may have beneficial effects on T2D. This review focuses on the effectiveness of dietary Fiber in producing SCFAs in the colon by the AIM as well as the health-promoting effects on T2D.

Biography

Muhammad Mazhar, a doctoral student at Guizhou University China, is leading this research project, which is expected to be completed by the next year. The present study focuses on the investigation of Adzuki beans and their endogenous components, including the determination of their glycaemic index, phenolic profile, and fermentation by human gut microbiota. Additionally, this research aims to explore the genomics and metabolomics of fermented beans. The findings of this study are expected to provide valuable insights into the nutritional and health benefits of Adzuki beans and their potential as a functional food source. The combined effects of endogenous components of adzuki beans will be evaluated for type 2 diabetes patients.

Nanotechnology as Emerging Trend

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Nanoparticles have been reported to mitigate biotic and abiotic stresses in different fruits and vegetables. In this study, tomato fruit with black rot symptoms were collected and diagnosed. To control this disease, manganese oxide nanoparticles (MnO NPs) were synthesized in bacterial broth culture. Based on microscopic, morphological, and genetic analyses, the pathogen causing black rot disease was identified as Aspergillus niger. MnO NPs were successfully synthesized in broth-culture of Bacillus subtilis, following the process of calcination and characterized. Fourier transform infrared (FTIR) spectrum revealed the existence of stabilizing and reducing agents (carboxylic acid, alkenes, and alkyl halides) on the surface of MnO NPs. X-ray diffraction (XRD) analysis revealed the size (39 nm) and crystal-like nature of synthesized MnO NPs. Energy-dispersive X-ray spectroscopy (EDX) described the mass percentage of manganese (26.4%) and oxygen (23.3%). Scanning electron microscopy (SEM) displayed the nearly spherical shape of MnO NPs and confirmed their nano-size. These MnO NPs exhibited significant mycelial growth inhibition of A. niger and notable control of tomato black rot disease of tomato. Though, all concentrations exhibited considerable effects, medium concentrations of MnO NPs (2.5 mg/mL) performed best in both in vitro and in vivo analyses. At this concentration, tomato fruit maintained a higher percentage of soluble solids, total sugars, reducing sugars, and fruit firmness. These results proved a very effective application of bacteria-supplemented MnO NPs for the control of black rot disease of tomatoes. To our knowledge, this is the first study of tomato black rot, caused by A. niger in Pakistan.

Biography

My academic life journey is one characterized by the relentless pursuit of academic excellence and a profound commitment to research and innovation. Born and raised in Pakistan, My passion for knowledge was ignited at an early age, setting on a trajectory marked by remarkable achievements.

Among many achievements, I received the Commonwealth Award stands as a testament to my exceptional talent and dedication. This esteemed honor not only acknowledges my academic achievements but also underscores my commitment to fostering global collaboration and understanding.

In addition to my academic pursuits, I also ventured beyond borders to broaden my perspective and expertise. As a research student at the University of Brighton, I also embraced the opportunity to engage with diverse perspectives and cutting-edge research methodologies. My time at the University of Brighton has not only enriched my academic journey but has also positioned me as a leading figure in my field on the international stage.

Living Matter as A Factor in the Formation of The Elemental Composition of the Environment

Korzh V.D*

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Currently, the most pressing problem is the growing environmental crisis on a global scale. The previously established attitude towards nature, towards the biosphere as an endless reservoir of resources for human activity, turned out to be a dangerous delusion. The biosphere is a complex, integral, self-developing organism. The scale of modern human influence on nature is such that it is beginning to destroy the biosphere as an integral biogeochemical system. The impending environmental catastrophe requires developing new scientific principles and strategies for the relationship between man and nature.

Living organisms, absorbing chemical elements, convert them into new chemical compounds by their physiological needs. Thus, tremendous work is continuously being carried out on the biogenic differentiation of environmental elements. This work is devoted to identifying the patterns of these processes on a global scale.

Suppose an individual living organism is forced to adapt to its environment. According to our research, the totality of all living organisms (living matter) can create and maintain its environment (elemental composition) unchanged in accordance with its needs.

The objective of this work is to identify the basic laws for the creation by living matter of the elemental composition of their habitat and its maintenance in an unchanged form under conditions of intensive exchange of chemical elements of the hydrosphere with the lithosphere and to determine the constants of these processes. Global pollution leads to the destruction of the harmonious nature of the relationships between all living organisms that has developed over many years of evolution and to the loss of stability of dynamic biogeochemical processes in the biosphere.

The founder of biogeochemistry (a new direction in geological sciences) V.I. Vernadsky noted: "...Living matter embraces and regulates all or almost all chemical elements in the biosphere. They are all needed for life and enter the body for a reason. There are no special elements inherent to life. There are dominant ones. ... Life is a planetary phenomenon and mainly determines chemistry, the migration of chemical elements of the upper earth's shell - the biosphere, the migration of all chemical elements" [1].

We have studied the migration of all quantifiable chemical elements in the ocean-atmosphere-continent system. We considered the elemental compositions of the hydrosphere, atmosphere, and soil cover as separate parts of the biosphere, which continuously transform and exchange matter.

The dynamics of the global process of transfer of chemical elements in the ocean-atmosphere-continent-ocean system have been studied. An active participant in these processes is living matter. The general patterns of redistribution of average elemental compositions in the biosphere between the solid and liquid phases (lithosphere - hydrosphere) have been determined.

We have determined for the first time that, due to metabolic processes, living matter constantly creates and invariably maintains an increased concentration of microelements in its habitat. The biocenosis of the hydrosphere transforms the flow of substances in the direction of increasing the soluble forms of trace element compounds in its habitat. The biocenosis of the lithosphere acts in the opposite direction, increasing the concentration of insoluble forms of microelements in the soil cover.

Living Matter as A Factor in the Formation of The Elemental Composition of the Environment

Korzh V.D*

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Nonlinear laws of the redistribution of average elemental compositions in the biosphere between the liquid and solid phases (hydrosphere - lithosphere) have been established. For the first time, the universal nonlinearity constant of these processes in the biosphere has been determined to be approximately equal to 0.7 [2-4]. This constant, indicating the normal functioning of the biosphere as an integral system, should be used as an environmental standard. Violation of this constant (as a result of anthropogenic impact on natural biogeochemical processes) will inevitably lead to irreversible, practically insoluble ecological problems on a global scale.

Biography

Korzh V.D was Born in Moscow in 1941. Graduated from the Faculty of Chemistry of Moscow State University. He studied in a group of theorists with advanced knowledge of mathematics. Joined the Institute of Oceanology in 1967. He defended his candidate's dissertation in 1972 and his doctorate in 1997. The main scientific activity is related to the problem of studying the processes of exchange of chemical elements in the ocean-atmosphere-continent-ocean system. I have about 200 publications in scientific journals and collections and three monographs. Participant of 7 scientific expeditions in the oceans and seas. Member of the International Working Group SCOR (No. 44) “OAMEX” Ocean-Atmosphere Material Exchange.

Anti-Wrinkle Properties of Angelica Gigas Nakai Root Extracts

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Angelica gigas Nakai is used as an herbal pharmaceutical material in Korea. To investigate the anti-wrinkle effects of A. gigas Nakai root extracts (ARE) using mineral-rich water in vivo trials. During a double-blinded in vivo clinical study, participants were randomly assigned to use the sample and placebo formulations for the left and right sides of their faces over an 8-week period. We evaluated the anti-wrinkle properties of the formulations using PRIMOS Lite. The use of an ARE lotion significantly reduced the presence of crow's feet wrinkles in comparison with the use of the placebo after 8 weeks. The use of ARE with mineral-rich water has anti-wrinkle effects in clinical trials.

Biography

I am currently working as the College of Fusion and Convergence, Seowon University. I am working on infrastructure construction of natural product research, functional cosmetics, and biomarker development in the skin. Currently, we are focusing on a new therapy that combines plant science and bioinformation analysis.

Exploring Foliar and Soil Silicon Application for Drought-Resilient Crop Production

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The anticipated increase in future drought occurrences accentuates the imperative to identify sustainable strategies for augmenting food production. Silicon (Si) application offers fortification against the detrimental impacts of environmental stresses on plants. While conventional soil-based application has been the predominant mode for Si application, foliar application exhibits promising potential for mitigating drought and fostering environmental sustainability. Therefore, this research investigated the responses of wheat and lentil plants to foliar and soil Si application approaches, aiming to identify the more efficient approach for enhancing plant resilience and increasing yield under drought stress conditions. The experiment was conducted in a controlled environment in a glasshouse at the University of Melbourne, Australia. Soil Si was applied at sowing, while foliar Si was applied at specific growth stages. Each application used two distinct Si sources, culminating in four different Si treatments and the control treatment groups. Plants were grown and watered daily until the reproductive stages. Then, severe drought was imposed by gradually reducing irrigation till pots were at 35 + 3% field capacity (FC). Pots were maintained at 35 + 3% FC for two weeks. At the end of drought stress, physiological data were taken, and plants were watered to continue growth till they were harvested at maturity. Data was statistically analyzed using ANOVA and Tukey pairwise comparison tests for mean comparisons between treatments. Results show that drought stress significantly reduced physiological traits and plant yield. However, Si application significantly increased physiological characteristics and grain yield. A comparison between the effects of foliar vs soil application of Si showed varied effects on physiological traits. Nevertheless, foliar application of Si produced higher yield than soil application.

Biography

Olajumoke (Jummy) completed her master's degree in Agricultural Sciences with a specialization in food sustainability at the University of Melbourne, Australia, in 2020. Currently, she is pursuing her PhD at the University of Melbourne, with a research focus on enhancing plant resilience to the challenges posed by drought stress. With over a decade of experience, she has actively contributed to various projects while working with the government of Nigeria.

How can High Throughput Phenotyping Help Food Security in the Mediterranean Area?"

Wejden Brahmi*, Donatella Danzi, Michela Janni, Ali Ltifi, and Domenico Pignone

1Laboratory of Biotechnology Applied to Agriculture, National Institute of Agronomic Research of Tunisia (INRAT), University of Carthage, Rue Hédi Karray, Tunisia

According to the IPCC 2014 report, the Mediterranean region will be affected by climatic solid changes in terms of average temperature and precipitation regime. Different approaches can be deployed to implement a climate-smart agriculture paradigm and a sustainable increase in agricultural productivity. Agriculture alone consumes 70% of the entire water available on the planet. In our work, we focused on a typical Mediterranean crop: Barley. When we explored the possibility of identifying genotypes resilient to water stress for future breeding aims, we used high throughput phenotyping (HTP). Many traits were considered: digital biovolume, the health index, and green index, measures based on imaging techniques in the RGB domain, and a non-destructive, non-invasive approach, as opposed to destructive and time-consuming traditional methods. Our results indicate that HTP can discriminate genotypes. In addition, these methods based on RGB quality images can easily be scaled to field phenotyping structure USVs or UAVs.

Biography

Wejden Brahmi has an Agronomic Engineering degree. I am a 5th-year doctoral student in Biological and Integrated control in agriculture. I enrolled at INAT's Institut National Agronomique de Tunis' and am researching at INRAT's National Institute of Agronomical Research in Tunisia.' The title of my thesis is «Production of drought-tolerant barley-doubled haploid by culture of anthers in vitro.»My thesis advisor is Dr Ltifi Ali. My research centers around the selection of drought-tolerant lines.

Retama monosperma (L.) Boiss.: A Review of its uses in Traditional Medicine, Chemical Constituents, and Pharmacologic Activities

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Laboratory of Medicinal Chemistry, Department of Drug Sciences, Faculty of Medicine and Pharmacy, Mohammed V University in Rabat, Morocco

Introduction: Retama monosperma (L.) Boiss., which belongs to the Retama genus, is a medicinal plant endemic to the Mediterranean basin. It is used in traditional medicine to treat skin diseases, diabetes, rheumatism, and hypertension. This review highlighted previous information on the taxonomy, botanical description, geographical distribution, uses in traditional medicine, chemical composition, and pharmacologic activities of Retama monosperma (L) Bioss.

Methods: The data on Retama monosperma (L) Bioss was collected using the scientific research databases PubMed, Scopus, and Web of Science. The compiled bibliography contains twenty-one references. The Plant List and the "Inventaire National du Patrimoine Naturel" authenticated the scientific names. The information presented in this paper summarises the phytochemicals, uses in traditional medicine, and pharmacologic properties of Retama monosperma (L) Bioss.

Results: In traditional medicine in the Mediterranean region, Retama monosperma (L) Bioss is used to treat various diseases including diabetes, abortive, rheumatism, and hypertension. Overall, these studies show that the extracts of different parts of Retama monosperma (L) Bioss have five main pharmacologic activities such as anticancer, antioxidant, anti-inflammatory, anti-fungal, and anti-aging activities. The phytochemical analysis by GC/MS, HPLC/MS, and NMR of the essential oil and the extracts of Retama monosperma (L) Bioss revealed the presence of different classes of secondary metabolites bioactive such as cyclitols, alkaloids, flavonoids, terpenes, and sterols. In this study, we inventoried 60 compounds isolated and identified from different extracts of Retama monosperma (L) Bioss.

Conclusions: Many aspects of Retama monosperma (L) Bioss extracts and their secondary metabolites have not been investigated; further studies on toxicity and clinical activity are needed to explore the untapped potential of this plant.

Biography

Fatima Zahra Benkhouili is a PhD student at the Faculty of Medicine and Pharmacy, Mohammed V University in Rabat. Before that, she achieved a BSc in Biology and an MSc in phytochemistry (2020) from Ecole Normale Superieure (ENS), Mohammed V University in Rabat. Her PhD research focuses on valorizing a medicinal plant from Morocco, traditionally used by the local population in the pharmaceutical field.

Synthesis and Evaluation of the Biological and Electrochemical Properties of Pyridazine Derivatives

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Laboratory of Applied Chemistry and Environment, Mohamed I University, Faculty of Science, Morocco

The starting compounds 6- (styryl) -4,5-dihydropyridazinones 4, used for the condensation, alkylation and alkaline hydrolysis reaction, were prepared from levulinic acid 1 according to Scheme 1. The treatment of compound 1 with the aromatic compound aldehydes 2 produced intermediate benzylidenelevevulinic acid 3. The resulting derivatives 3 were then treated with hydrazine hydrate in regenerating acetic acid to obtain the desired styrylpyridazinones 4. Scheme 2 describes the synthesis of compounds 5, 6, 7 as follows: the new compounds were synthesized by condensation of pyridazinone derivatives with the appropriate aromatic aldehyde 2 in the presence of sodium methanoate. The compounds 5, in turn, were alkylated with ethyl bromoacetate to give the esters. The alkaline hydrolysis of the compounds 6 gave the new carboxylic acids 7.

The 3 (2H) -pyridazinones are the pyridazine derivatives containing two nitrogen atoms adjacent to positions 1 and 2 in a six-membered ring and a carbonyl group in third position and they have different functionalities in their structure Several studies have been oriented towards the organic synthesis of pyridazines. These heterocyclic nitrogen compounds are of biological importance and therefore the design and strategy of their synthesis is important. In addition, it has been proven that different pyridazinone products are known for their intense biological activity.

Biography

S. Daoui is a distinguished figure in the field of chemistry, known for his contributions to applied chemistry and environmental science. Iam currently serves as a researcher at the Laboratory of Applied Chemistry and Environment, situated at Mohamed I University in Oujda, Morocco.

Antibacterial Activity of Bioactive Compounds Extracted from the Egyptian Untapped Green Algae Rhizoclonium Hieroglyphicum

Amhed Diab Mohamed Ahmed El Esawy*

Drinking Water and Sanitation Company, Egypt

Finding alternative powerful antibacterial drugs of natural origins is a crucial prerequisite today due to the resistance of some bacterial strains to commercial and widely used medications. Algae are characterized by their bioactive constituents and have a wide spectrum of biotechnological aspects, particularly antibacterial implications. During this study, four concentrations (5, 10, 20, and 40 mg mL 1) of the Egyptian untapped green algae Rhizoclonium hieroglyphicum (Chlorophyta) were prepared using the polar solvents ethanol, methanol, and acetone. The antibacterial activity of the extracts mentioned above was assessed using the agar disc diffusion technique against three pathogenic bacteria, Staphylococcus aureus ATCC 6538, Escherichia coli ATCC 8739, and Pseudomonas aeruginosa ATCC 9027, which was compared to standard antibiotics. The minimal inhibitory concentrations (MICs) were also assessed and determined using a broth dilution assay. Our findings revealed that the R. hieroglyphicum ethanolic extract exhibited the most potent antibacterial effect. Its MIC values were 0.533, 2.25, and 5.34 mg mL–1 against P. aeruginosa, E. coli, and S. aureus, respectively. A gas chromatography–mass spectrometry (GC–MS) approach to the crude R. hieroglyphicum ethanolic extract uncovered 30 different bioactive constituents, mainly including long-chain polyunsaturated and saturated fatty acids such as myristic (C14:0), palmitic (C16:0), stearic (C18:0), α-linolenic (C18:3; ω–3), and oleic (C18:1, ω–9) acids, which synergistically make this potent antibacterial action. The mechanism of action of these fatty acids was also discussed. Conclusively, R. hieroglyphicum could be a good candidate for producing and developing promising antibacterial agents.

Biography

Amhed Diab Mohamed Ahmed El Esawy is the Director of the Al-Haddadi plant for drinking water purification in Sidi Salem, Kafr El-Sheikh, Egypt, and the director and medical analysis specialist at Tiba laboratories for Medical Analysis in Sidi Salem, Kafr El-Sheikh, Egypt. He completed a BSc Degree in Chemistry and Microbiology at the Faculty of Science, Menoufia University, Egypt.

Effect of Seed Sources and Poly Pot Sizes on Early Seedlings Growth and Development in Jatropha curcas L in Taraba State, Nigeria

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Understanding genetic variation patterns in forest tree species is the cornerstone to matching a well-adapted seed source to the right physiographic region. Jatropha curcas L., a tropical herbaceous species family (Euphobiaceae), has recently attracted tremendous research attention following its commercial oil and degraded forest landscape reclamation potentials. The species was investigated for its genetic variation using seeds from different agro-ecological ranges of the species in Taraba State, Nigeria. The silvicultural study assessed three seed sources and three pot sizes on early seedlings' growth and development. The State was stratified into three ecological zones representing each seed source (Jalingo S1, Northern Guinea), (Gassol S2, Central Guinea) and (Wukari S3, Southern Guinea). Twenty-five (25) ripe fruits at the rate of 5 fruits-1 tree were collected directly from the forest floor from 5 different mother trees, producing 75 fruits for the three sources. Seeds were extracted separately based on the sources, and 30 seeds were sown source-1 in 3 plastic sieves containing sterilized river sand. All plastic sieves were placed under a mist chamber, watered daily, and monitored for two weeks. At the end of the two weeks, the 15 most vigorous seedlings source-1 were selected, and 45 were used. The 45 seedlings were randomly potted into three different poly pot sizes; small (P1), medium (P2), and large (P3) (3x3x5 factorial design. Seedlings' growth morphological parameters (total seedlings height, diameter, and number of leaves) were collected fortnightly for 12 weeks and statistically analyzed. Findings showed that the Wukari seed source (S3) attained 70% germination at 14 days. For all the morphological parameters, optimum growth performance for seedling height (21.17cm), seedlings diameter (2.59cm), and leaf number (6.64) were observed from seed source (S3) and least from Jalingo (S1). The pot sizes effect showed optimum performance in large pot size (P3) followed by medium and least in small pot size. Seed sources and pot sizes interaction was significant (p.>0.05). Wukari seed source (S3) and large pot size (P3) are recommended for mass seedling production in the species.

Keywords: Jatropha curcas, seed source, pot size, morphological variables, nursery evaluation

Biography

Prof Peter I. Oni is a British-trained forest ecology and conservation geneticist and a seasoned forester with professional experiences spanning over 30 years. He is a fellow of the Forestry Association of Nigeria (FFAN). He obtained his B.Sc and M.Sc from the premier University, University of Ibadan in (1986 and 1992). He later proceeded to the University of Wales, Bangor, United Kingdom, in 1993 and bagged his Ph.D. in Forest Ecology and Conservation Genetics. By 2015, he became a Professor at the Federal University Wukari, Taraba State, Nigeria. He supervised several undergraduate and postgraduate students, with over 65 peer-reviewed scientific publications to his credit (onshore and offshore). Over the years, he has attracted several research grants within and outside the country. He belongs to several professional bodies, including the Ecological Society of Nigeria (ECOSON) and the Science Association of Nigeria (SAN). He is an external examiner to several Nigerian universities and research institutes and a consultant at national and international levels, including FAO and World Bank-Assisted National Fadama projects.He is widely travelled within and outside the country for postdoctoral courses, conferences and workshops. He is ICT compliant, has valid E-driving license and E-International passport. Happily married and blessed with lovely children.

Synergistic Effects of Drought and Heat Stress on the Photosynthetic Efficiency and Osmolytes Accumulation in edamame (Glycine max L. Merril)

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In nature, drought and heat stress often co-exist. However, previous studies focus on the effects of such stresses separately. Edamame is a nutritious legume but sensitive to drought stress. There is a knowledge gap in edamame's physiological and biochemical responses to combined drought and heat (DH) stress. Therefore, this study compared three edamame cultivars (UVE14, UVE17, AGS429) in terms of their photosynthesis efficiency and some metabolites of osmotic adjustment under drought and heat separately, and DH stress at two growth stages (flowering and pod filling). Non-destructive handheld instruments were used to determine the photosynthetic efficiency in a greenhouse and destructive methods were used to quantify the chloroplast pigments, non-structural carbohydrates, and proline content spectrophotometrically. The DH stress had a more negative impact than drought or heat stress alone in edamame as it affected the photochemistry at both growth stages. Chloroplast protection by carotenoids resulted in AGS429 having more photosynthetic pigments and NDVI, thus a higher rate of photosynthesis than the other cultivars. Cultivar UVE17 had most of its reaction centres deactivated under DH stress and thus had the lowest photosynthetic efficiency of all cultivars at both growth stages. In addition, cultivars AGS429 followed by UVE14 performed better because they accumulated starch, maintained glucose balance through starch hydrolysis, and accumulated trehalose and proline, which resulted in high osmoregulation. In contrast, the cessation of UVE17 to accumulate proline at pod filling could have reduced Osmo protection and poor photosynthesis. Plant breeders can use this knowledge to select traits that confer tolerance to DH stress.

Biography

Jeremiah Hlahla is a South African PhD student in Botany (plant stress physiology) at the University of the Free State (UFS, South Africa). He holds a Bachelor of Science (BSc) in Botany and Biochemistry (University of Johannesburg, South Africa). Honours in Botany (Marine ecology) from Nelson Mandela University (South Africa), and a Master of Science (MSc) degree in Botany (Plant Stress Physiology) from the UFS. He currently works as a research assistant at UFS and does a lot of work in plant physiology. His master's program investigated the effect of drought stress on the physiology and biochemistry of six edamame cultivars. In his PhD, he investigates the impact of combined drought and heat (DH) stress on three edamame cultivars' biochemistry, physiology, morphology, and yield.

Genetic Variation Associated with Increased Lambda-Cyhalothrin Resistance in Spodoptera Frugiperda (Lepidoptera: Noctuidae) in West Africa

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Spodoptera frugiperda (J.E. Smith) is a new serious destructive and widespread pest of corn which recently invaded subtropical regions worldwide. As this invasive species is spreading across the continent, it is vital to assess its susceptibility to insecticides and establish the potential underlying resistance mechanism to better inform control programs. In this study, we characterized the strains from eighteen fall armyworm (FAW) populations from West Africa, established their susceptibility profiles to the main insecticides and genotyped the target site resistance alleles. The RFLP-PCR method showed that the majority of the population tested was a corn strain (72.5–100%) compared to the probable rice strain. Tpi sequencing of the suspected rice strains revealed that almost all the samples analyzed were from corn (>97%). Additionally, among the three insecticides tested, λ-cyhalothrin and chlorpyrifos induced the lowest toxicity against this pest, while emamectin benzoate exhibited moderate toxicity. Synergism tests performed to investigate the biochemical mechanism used by FAW to breakdown λ-cyhalothrin indicated that metabolic enzymes play major roles in the resistance of λ-cyhalothrin observed in western Africa. Target mutation tests (qPCR) combined with previous synergetic tests showed that resistance to organophosphates and pyrethroids could be due to a biochemical mechanism + amino acid mutations (presence of the F290V mutation) or a biochemical mechanism (absence of the T929I mutation), respectively. The results of this study provide valuable information for supporting decisions related to sustainable FAW control and applied resistance management.

Biography

I'm molecular agricultural entomologist /ecotoxicologist based at the International Institute of Tropical Agriculture (IITA) in Benin. Since 2013, I have been assigned various pests management projects who targeting resistance mechanisms. I was also involved in the susceptibility profile of agricultural pests in several insecticides and molecular biology to screen the genes involved in the resistance.

Conservation and Prosperities of Growing Ferula Tadshikorum Pimenov in Botanical Garden

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Ferula tadshikorum is a representative of the genus Ferula L. It is endemic to Central Asia, its habitat covers Southern Uzbekistan and Southern Tajikistan (southwestern Pamir-Alai) (Korovin et al., 1984; Rakhmonov, 2017; Khojimatov et al., 2018). Since ancient times, raw materials Ferula tadshikorum in traditional medicine have been used for medicinal purposes to treat many diseases (Sadykov, 2003; Small, 2012; Sharopov, 2018). Both the underground (air-hardened milky sap of the roots) and the above-ground parts are medicinal raw materials.

Recently, the natural populations of the medicinal plant Ferula tadshikorum have been in a negative state, therefore, research on the peculiarities of development in ex-sity conditions is required to preserve and obtain medicinal raw materials. Reducing of the duration of stages in juvenile and immature individuals in ontogenesis was established, as well as the transition to the virginile stage from the 3rd year of plant life on the base of 5-year experiments on the introduction of Ferula tadshikorum in the Tashkent Botanical Garden.

The analysis of the data obtained from five growing seasons allowed us to identify some morphological features of the leaves for different age conditions. So juvenile plants have only simple leaves, immature individuals have two varieties of leaves, trifoliate and 5-6-lobed, or rarely 7-lobed in the fifth year of vegetation, virginile plants have once or twice pinnately dissected leaves in different numbers.

Naturally, the development of the aboveground part is synchronously accompanied by an increase in the size of the root system. In the fifth growing year, some virginile plants have leaf segments of the first order twice or thrice pinnately dissected. In the fifth growing season (2023), we observed a sharp increase in the ratio of virginile individuals to other individuals, which indicates the prosperities of the introduction.

Biography

Leading researcher of laboratory Introduction of medicinal plants of Tashkent Botanical Garden, Academy of Science of the Republic of Uzbekistan

Abiotic Stress Tolerance in Cereals by Physiological, Biochemical, Molecular Approaches, and Breeding Methods

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Cereal crops hold a prominent position in the global agricultural landscape, serving as a crucial source of sustenance for a substantial proportion of the world's population. Abiotic stresses, such as drought, salinity, heat, and cold, significantly diminish the productivity and quality of cereal crops. The aforementioned stresses present significant obstacles to attaining global food security, underscoring the pressing requirement to devise approaches that can augment the capacity of cereals to withstand abiotic stress. In the past few years, there has been notable advancement in comprehending the signaling pathways that regulate stress responses in cereal crops. This compilation of articles under the Research Topic investigates various physiological, biochemical, molecular, and breeding strategies utilized to enhance the tolerance of cereals towards abiotic stress. The contributing articles in this Research Topic shed light on the intricate physiological and biochemical responses of cereals to abiotic stresses. They delve into the roles of osmoprotectants, antioxidants, hormones, and signaling molecules in conferring stress tolerance. Through cutting-edge techniques and experimental approaches, these studies provide insights into the regulatory networks and molecular pathways that govern stress response and adaptation in cereals. By unraveling these mechanisms, researchers aim to identify key genes and proteins that can be targeted for improving stress tolerance in cereals. Advancements in molecular biology and biotechnology have revolutionized the field of plant stress tolerance. The articles in this Research Topic highlight the use of genetic engineering, transcriptomics, proteomics, and metabolomics to unravel the intricacies of abiotic stress responses in cereals. They showcase innovative techniques for the identification and characterization of stress-responsive genes, transcription factors, and functional markers that can be utilized in breeding programs to develop stress-tolerant cereal varieties. The application of genome editing technologies, such as CRISPR/Cas9, has also shown promise in enhancing abiotic stress tolerance by precisely modifying key genes involved in stress response pathways.

Biography

Mehdi Rahimi was born in Shiraz, Iran, in 1978. He is an Associate Professor in the Department of Biotechnology, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran. His research interests are in plant breeding (classical breeding, biometry, abiotic stress, molecular breeding, genomics, gene expression). He received his Ph.D. in plant breeding at Tarbiat Modares University during 2008-2013, M.Sc. in plant breeding at the University of Guilan during 2004-2007, and his B.Sc. in agronomy and plant breeding from Shiraz University.

Evaluation of the Seed Oil Quality Properties of Rapeseed Contributed to Drought Stress

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Optimizing the profile of fatty acids in rapeseed (Brassica napus L.) is critical for maximizing the value of edible oil. Climate change and water scarcity are among the significant limited factors that constrain the production and development of oilseed crops, especially rapeseed (Brassica napus L.), in arid and semi-arid areas. Seeds of 121 accessions of Brassica napus were analyzed for seed oil content (SOC) and fatty acid composition through gas chromatography–mass spectrometry (GC–MS) analysis. The experimental design was a lattice by patterning 11 × 11 with three replicates under two irrigation regimes for two years (2017-2019) in Shiraz, Iran. The SOC and fatty acid composition of oil among the genotypes were significantly different (P-value <0.01). Among those fatty acids detected, oleic acid (75.7-94.9%) was the predominant fatty acid, followed by linoleic acid (0.2-1.8%), arachidic acid (0.1–0.6%), heneicosylic acid (0.1–0.6%), ecosadienoic acid (0.05–0.69%), and behenic acid (0.5–0.5%). The SOC of all rapeseed genotypes was rich in omega-9 fatty acid (oleic acid), which makes the oil nutritionally beneficial to human health by preventing the onset of various disorders. The results showed that drought stress significantly decreased SOC by 6.08%. Variety G85 showed the highest SOC (38.62%) under drought stress, and it had a high-quality oil due to the high percentage of oleic acid (> 80%). Therefore, the G85 variety might be a promising genotype for starting a crop improvement program to achieve a more drought-tolerant rapeseed genotype with high-quality seed oil content.

Biography

Maryam Salami studied plant breeding at the Isfahan University of Technology as an MS in 2012. She then joined Prof. Bahram Heidari's research group at Shiraz University's Department of Plant Production and Genetics. She received her PhD degree in 2022 from Shiraz University. She has published nine research articles in SCI(E) journals.

Benzodioxoles Structures in Apiaceae Family

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Apiaceae, one of the most influential families of flowering plants, consists of 3800 species in 434 genera and is distributed worldwide. Most of its members are indigenous to Mediterranean region and Southwest Asia including Iran. This family is rich in phytochemicals, and members of this family create a lot of added value due to having many biochemical precursors, such as benzodioxoles.

Benzodioxoles inhibited human cancer cell growth and induced apoptosis, albeit at relatively high concentrations. Many years ago, after clearing the role of Benzodioxoles in cancer, a new class of synthetic antineoplastic drugs showed derivatives of benzodioxole. These compounds inhibit microtubule assembly.

Crop plants of the family Apiaceae, such as dill, parsley, fennel, and parsnip, contain considerable amounts of benzodioxoles like apiol, dillapiol, myristicin, and allyltetrame-thoxybenzene. These remarkable structures exhibited a wide range of biological effects, including anti-inflammatory, antiproliferative, antioxidant, antimicrobial, antifungal, and insecticidal activities, along with effects on nervous, cardiovascular, and genitourinary systems.

Two important benzodioxoles, apiol, and myristicin, are present in almost all essential oils of the Apiaceae family. These two calcium channel antagonists (apiol and myristicin) are toxic to insects. They are used as insecticides in research works.

In this decade, five new benzodioxole structures were obtained from the root extract of Astrodaucus persicus (Apiaceae) for the first time, which had significant antimalarial and cytotoxic effects.

5-((propanoyl methyl)amino)-4,7-dimethoxybenzo[d][1,3]dioxole

5-(3-ethyloxiran-2-yloxy)-4,7-dimethoxybenzo[d][1,3]dioxole

4,7-dimethoxy-5-(propanonyl) benzo[d][1,3]dioxole

4-ethoxybenzo[d][1,3]dioxol-6-carbaldehyde

4-(O-β-D-glucopyranosyl)-6-(3-propanyloxiran-2-yloxy)benzo[d][1,3]dioxole

Biography

Saied Goodarzi is a medicinal Plants Research Center, Faculty of Pharmacy, Tehran University of Medical Sciences, interested in Pharmaceutical Biology. He completed a Ph.D. in Pharmacognosy.

Attenuating Pb over-availability Damages on the Growth, Physiological Esponses, and Essential Oil Composition of Salvia officinalis L. Through Salicylic Acid and Funneliformis Mosseae Application

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Heavy metals toxicity is a tremendous threat to the efficient production of several plants in many locations of the world. The combined effects of foliar application of salicylic acid (SA) and inoculation with arbuscular mycorrhizal fungi (AMF) were investigated on the growth and physiological responses of sage (Salvia officinalis L.) plants under lead stress in a greenhouse experiment. The experiment followed a completely randomized design based on a factorial experiment with three replications. Three levels of lead (Pb) stress (0, 100, and 200 mg kg 1) were applied to the planting soil, along with the inoculation of 0 or 5 g/kg of AMF. After one-month, salicylic acid was sprayed at 0 or 100 µM levels. The results revealed that the fresh and dry weight of shoots, chlorophyll index (SPAD), the relative water content (RWC) of leaves, electrolyte leakage (EL), membrane stability index (MSI), plant height, anthocyanin, Pb (root and shoot), chlorophyll a and b content, carotenoids (CARs), as well as essential oil (EO) content in the plants were improved by the treatments. The fresh and dry weight of shoots, chlorophyll a, b, a/b ratio, SPAD, height, RWC, MSI, and chlorophyll fluorescence indices of Fv and Fv/Fm decreased under Pb stress; however, these attributes were mitigated by the combined application of SA and AMF. Furthermore, F0 increased under Pb stress but declined with co-treatments. The results revealed that carotenoids content and Fm data decreased under Pb stress but improved with AMF inoculation. The Pb content (shoot and root) and EL increased under Pb stress; however, the related data decreased due to the independent effects of AMF inoculation and SA foliar application. Anthocyanin content increased in response to Pb stress, but it was further enhanced by the sole application of AMF and SA. Otherwise, Fm decreased under Pb stress and increased with SA foliar application. The combined application of SA and AMF enhanced the carotenoids content. The essential oil content was highest in soil with 100 mg of Pb kg-1 of soil, and this content increased with AMF and SA treatments. Furthermore, the major essential oil components, such as 1,8-cineole, camphor, and thujone, showed enhancing patterns under Pb stress, AMF inoculation, and SA foliar application. Overall, the treatments with AMF and SA helped alleviate the negative impacts of lead stress. Upon further evaluation, the findings could be valuable for the extension section and could be utilized for the viable production of sage species in Pb-contaminated soils.

Biography

My name is Farzad Rasouli, and I earned a Ph.D. in the breeding and production of vegetables from Tabriz University in Tabriz, Iran. I am a faculty member at the University of Maragheh, Iran. I have researched vegetable breeding, arbuscular mycorrhizal fungi symbiosis, mushroom breeding and production, seaweed effect on phytoremediation and other abiotic stress, and vegetable transplant production.

The Potential of Hyperaccumulator Plants on Ni-Lateritic Soils for Medicinal Use, NE Fars Province, Iran

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Ni-bearing soils occur discontinuously between the Sedimentary Zagros Orogenic (SZO) and Metamorphic Sanandaj-Sirjan (MSS) belts in Fars province, Iran. These are the only known Ni-bearing regoliths in southwest Iran that were derived from serpentinized harzburgite in ultramafic rock complexes. Plants were collected, identified, and analyzed for serpentine-associated metals including Ni, Cr, Cu, Mn, and Fe. The maximum Mn concentration of the studied soils is 6972 µg g-1. Many soil characteristics in the study area were investigated, such as Mg/Ca ratio, exchangeable metal fraction, extraction efficiency (EF), pH, organic content (OM), texture, cation exchange capacity (CEC), and metal transfer to plants. Vegetation types of the area mainly include open shrublands and semi-desert steppes. The highest concentrations of Mn measured in Berberis integerrima leaves were up to 2547 µg g-1. Investigating the indices for different elements demonstrated that these species had a bioconcentration factor (BCF) value greater than 10, for example, the BCF for Mn in this plant is more than 10. Then, biogeochemical studies on the predominant plant species indicated that Berberis integerrima can be introduced as an Mn hyperaccumulator. Mn-hyperaccumulator plants growing on nickel (Ni)-laterite deposits represent a potential resource for medicinal Mn production. This study investigates the feasibility of utilizing these plants for this purpose. The suitability of Mn derived from these plants for medicinal applications was investigated by considering factors like purity, elemental composition, and potential Ni contamination. By evaluating the feasibility of this approach, we can contribute to the development of sustainable and efficient methods for producing high-quality medicinal Mn.

Keywords: Manganese, Medicinal use, hyperaccumulator plants, Ni-laterite soils.

Biography

My name is Pegah Rahbar, and I completed my Ph.D. degree in Pharmacy at Shiraz University, Iran. Recently, I have become interested in medicinal plants and the use of hyperaccumulator plants that grow on soils rich in elements and important metal deposits. For this reason, Dr. Rasti from Shiraz University, who works on nickel-rich soils, and we did a project together, and the results were compiled in the form of an article that I will present at this international conference. Reciprocally, I believe that it would be most helpful for me to gain advanced insights into my major and interdisciplinary majors. As a young researcher, I would like to pursue this topic in the future. I enjoy all aspects of research and am very much interested in carrying out my research in such a cutting-edge field.

Toxicity of Biopesticide (k-mite) Against Rice Weevil Sitophilus Oryzae (L.)(Coleoptera: Curculionidae) at Different Temperature

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The rice weevil, Sitophilus oryzae is the most important and widely distributed throughout the world. It is one of the most notorious pests which cause heavy losses of stored grain both quantitatively and qualitatively throughout the world. The present study was designed to find out the effects of bio pesticide k-mite on the mortality of adult rice weevil, their progeny and repellency. The result showed that the highest mortality rate of S. oryzae adults using bio-pesticide (K-mite) at 15°C temperature was 40%, 76%, 94% in 3200ppm dose at 24H, 48H, 72H exposure periods respectively and the lowest was 2%, 10%, 23% in 50ppm doses at 24H, 48H and 72H exposure periods respectively. The result revealed that the highest mortality rate at 20°C temperature was 38%, 56%, 78% in 3200ppm dose at 24H, 48H, 72H exposure periods respectively and the lowest was 6%, 11%, 13% in 50ppm doses at 24H, 48H and 72H exposure periods respectively. The result noticed that the highest mortality rate at 25°C temperature was 45%, 67%, 82% in 3200ppm dose at 24H, 48H, 72H exposure periods respectively and the lowest was 3%, 6%, 10% in 50ppm doses at 24H, 48H and 72H exposure periods respectively. The result also showed that the highest mortality rate at 30°C temperature was 22%, 46% in 1600pp dose & 98% in 3200ppm dose at 24H, 48H, 72H exposure periods respectively and the lowest was12%, 33% in 50ppm doses at 24H, 48H and 72H exposure periods respectively. The repellent effect of bio-pesticide (k-mite) against the adult rice weevil S. oryzae, in R1, R3, R4 and R5 replications, 100% insects (Sitophilus oryzae) went to non-poisonous food. In R2 replication, 96% insects (S. oryzae) went to non-poisonous food and only 4% insects (S. oryzae) went to poisonous food.

Key words: Sitophilus oryzae, Mortality, Temperature, Stored-grain pest, Parts per million (ppm), Exposure, Repellency.

Biography

I have completed post-doctoral research work taking plant extracts and Inert dusts against stored-grain pests at Key Laboratory of Insect Resources Utilization and Sustainable Pest Management, College of Plant Science & Technology, Huazhong Agricultural University, Wuhan - 430070, Hubei, P.R. China, Since January 2007 to December 2009. Ongoing research on Application of Integrated Pest Management and Eco-friendly Management of Crop Production Reducing Environmental Pollution and Sustainable Development. I have completed five-year research programme taking Phytochemicals and Diatomaceous earth (DE) for the management of Stored-grain pest in Bangladesh, under the scholastic supervision of Dr. Md. Mahbub Hasan (mmhbgd@yahoo.com), Professor Dept. of Zoology, University of Rajshahi, Banglades and finally got Ph.D. award. I have also completed one and half of a year research work taking synthetic and botanical pesticides and their comparison on stored-grain pests in Bangladesh in the laboratory of Entomology department, Bangladesh Agricultural University, Mymensingh under the scholastic supervision of Dr. Farid Ahmed Talukder (f.a.talukder@gmail.com) in the year of 1995–1996 and got M.S.in Entomology degree. I have gathered Teaching and Research experiences twenty (20) years, supervise ten Masters, two M.Phil and two Ph.D. fellows, besides Entomology I have successfully conducting teaching classes on Plant Pathology, Genetics and Plant Breeding, Agronomy and Agricultural Extension at Under Graduate level.

Potential of Sunflower Associated Endophytic Diazotroph Towards Lowering the Chemical Fertilizer Pollution Crises and Soil Health

Afshan Majeed*

Department of Soil and Environmental Sciences, University of Poonch, Rawalakot, Azad Jammu and Kashmir, Pakistan

The health of soil plays an essential role in the ability of plants to produce food, fuel, and fiber for a growing world population. To keep pace, the total area of cultivated land worldwide has increased by over 500% in the last five decades, with a 700% increase in fertilizer use and a several-fold increase in pesticide use (Banerjee et al., 2019). However, it resulted in a remarkable increase in crop yield. Still, it drastically reduced soil fertility, increased production costs, food prices, and carbon footprints, and depleted fossil reserves and soil health with huge penalties to the environment and ecological sustainability. Moreover, the continuous release of these chemical inputs causes toxic compounds such as metals to accumulate in the soil and move to the plants with prolonged exposure, ultimately impacting human health. Besides, Pakistan is the world's third-largest edible oil importer, imposing an enormous burden on the country's economy. Sunflower (Helianthus annuus L.) has great potential to bridge the gap between production and consumption of edible oil. Using plant growth-promoting rhizobacteria is a promising strategy for sustainable agriculture production and is a potential alternative to chemical fertilizers and pesticides. Despite its economic importance, little is known about the response of sunflowers towards inoculation with PGPR. This study was envisaged for (a) the isolation, characterization, and identification of a potent plant root-associated beneficial bacteria from the soil samples collected from different sites of sub-division Dhirkot, AJK using biochemical and molecular techniques, (b) analysis of bacterial diversity using polyphasic techniques, (c) documenting exo and endo-rhizospheric bacterial interaction in sunflower using different microscopy techniques, i.e., Transmission Electron microscopy and Confocal Laser Scanning Microscopy and (d) sunflower plant inoculation and evaluation of potential plant growth promoting rhizobacteria under controlled conditions and field environment to select the candidate bacteria for inoculum production of sunflower. A potential Azospirillum brasilense AF-22 was isolated from Bandi, Himalayan Mountain region of Dhirkot (subdivision), Azad Jammu and Kashmir. The bacterium produced 24.67µgmL-1 indole-3-acetic acid, showed 137.84nmoles mg-1 protein h-1 nitrogenase activity, and solubilized 40.11µgmL−1 insoluble phosphorus and showed a significant decrease in pH (from 7 to 4.74) due to the production of oxalic acid, malic acid, and gluconic acid. The Az spirillumBrasiliense AF-22 was metabolically diverse (utilized 68 out of 96 carbon sources), resistant to many antibiotics, and showed antagonistic activity against Fusarium oxysporum. Inoculation with this bacterium to sunflower grown in soil-free (hydroponic) medium, sterilized soil, and under natural field conditions at two locations, i.e., Rawalakot, Azad Jammu and Kashmir, and Faisalabad, Pakistan, showed a significant increase in sunflower growth, yield and oil contents and achene NP uptake compared with non-inoculated control treatments. Azospirillum brasilense AF-22 could colonize on sunflower roots, forming a biofilm-like structure, documented through yfp-labeling by confocal laser scanning microscopy and immunogold labeling coupled with transmission electron microscope. This study concludes that the Az spirillum brasilense AF-22, containing multiple plant growth-promoting traits, can be a potential candidate for the production of biofertilizers for sunflower crops to enhance yield with reduced application of chemical (NP) fertilizers, hence reducing the chemical fertilizer pollution crises.

Biography

Dr Afshan Majeed is a highly accomplished professional with a rich academic background, specializing in Soil Microbiology and Biotechnology. She completed her Ph.D. in Soil and Environmental Sciences from the University of Azad Jammu and Kashmir in collaboration with the National Institute for Biotechnology and Genetic Engineering (NIBGE), specializing in Soil Biotechnology. Guest Researcher at Imperial College London, Department of Microbial Ecology, to update her biotechnological expertise

With a strong research and teaching background, Dr. Majeed's expertise lies in microbial biotechnology, focusing on isolating, purifying, and characterizing plant-beneficial microbes. Her research interests encompass plant-microbe interactions, biofertilizer production, microbial wastewater treatment, and the biodegradation of organic waste. Dr. Majeed possesses hands-on experience in lab, greenhouse, and field trial settings,

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demonstrating proficiency in microbial isolation, identification, transformation, and characterization through various analytical techniques, including biochemical, molecular, phylogenetic, and microscopic analyses (TEM, CLSM). Additionally, she is adept at conducting microbial colonization studies. She has published several research articles in reputable journals, showcasing a strong track record of plant microbiological and biotechnological contributions. Her comprehensive knowledge spans molecular biology, biotechnological tools, statistical data interpretation, and bioinformatics analysis, ensuring a holistic approach from the field to the bench to the field.

Presently, she is working as an Assistant Professor at the Department of Soil and Environmental Sciences, University of Poonch Rawalakot, Azad Jammu & Kashmir, with a Job Description of Teaching and supervising students at the undergraduate and postgraduate levels. She is looking after the Additional Duties as Manager of Research Management, ORIC, UPR, and Lab In charge.

Dr Afshan Majeed's multidimensional experience and commitment to research and education make her a valuable asset to the academic community. Her journey from the lab to the classroom seamlessly integrates theoretical knowledge and practical application, making her a dynamic and engaging contributor to Soil and Environmental Biotechnology.

Allelopathic Influence of Aqueous Extracts of Phalaris Minor R on Germination and Seedling Growth of Wheat (Triticum Aestivum L.)

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Wheat (Triticum Aestivum L.) is an imperative cereal and principal food source in the Indo-Pak continent and throughout the Globe. In the world, it is ranked first in cereal regarding cultivating area and production. Weeds hamper wheat by releasing allelochemicals through its body parts. Dumbi Sitti (Phalaris minor R) Family Poaceae is found to be a significant wheat weed. A scientific observation concerning allelopathy and interference of Phalaris minor in wheat is carried out in the Laboratory, Department of Agronomy, Faculty of Agriculture, Gomal University, D.I.Khan, KPK., Pakistan. In this trial, the influence of 15% aqueous extract of roots, stems, leaves, and whole plant parts was examined against the germination, emergence, and seedling development in Wheat. Aqueous extract of leaves had strong allelopathic potential (negative) that inhibited wheat germination (84% reduction in germination). Other parameters, such as MGT, germination index, seedling length, fresh and dry biomass, and growth parameters, were suppressed by leaf extract. It is concluded from this trial that Phalaris minor R. has a strong allelopathic influence on wheat seedlings. This weed is the most notorious and harmful among all winter annual weeds.

Keywords: Wheat, Phalaris minor R, Allelopathy, Germination physiology

Biography

Dr Iqtidar Hussain has served the Department of Agronomy as an Assistant Professor in the Faculty of Agriculture at Gomal University since 2014. He did PhD in 37 years from Gomal University in Agronomy (plant sciences). He has substantially improved his capacity building through meaningful participation as keynote speaker/ resource person/ focal person/ organizer in various training sessions, seminar, conference and workshops at national and internal levels. He got distinction to become members of Member of Soil Science Society of Pakistan, Weed Science Society of Pakistan, Pakistan Botany Society and Pakistan Allelopathy Society. He succeeded in publishing 115 research articles in national as well as international repute research journal across the country and around the globe. He served Education Department as Teacher and Subject Specialist for 17 years and Gomal University as Assistant Professor for 8 years.

Omics Analysis Reveals the Involvement of Carbon and Flavonoid Biosynthesis in Low Phosphorus Tolerance in Cotton

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Low phosphorus (P) is one of the limiting factors in sustainable cotton production. However, little is known about the performance of contrasting low P tolerant cotton genotypes that might be a possible option to grow in low P condition. In the current study, we characterized the response of two cotton genotypes, Jimian169 a strong low P tolerant, and DES926 a weak low P tolerant genotypes under low and normal P conditions. The results showed that low P greatly inhibited growth, dry matter production, photosynthesis, and enzymatic activities related to antioxidant system and carbohydrate metabolism and the inhibition was more in DES926 as compared to Jimian169. In contrast, low P improved root morphology, carbohydrate accumulation, and P metabolism, especially in Jimian169, whereas the opposite responses were observed for DES926. The strong low P tolerance in Jimian169 is linked with a better root system and enhanced P and carbohydrate metabolism, suggesting that Jimian169 is a model genotype for cotton breeding. Results thus indicate that the Jimian169, compared with DES926, tolerates low P by enhancing carbohydrate metabolism and by inducing the activity of several enzymes related to P metabolism. This apparently causes rapid P turnover and enables the Jimian169 to use P more efficiently. Moreover, the transcript level of the key genes could provide useful information to study the molecular mechanism of low P tolerance in cotton.

Biography

Dr Asif Iqbal received his Ph.D. from the Graduate School of Chinese Academy of Agricultural Sciences, China (CAAS) with Chinese Government Scholarship. Later, he completed his postdoctoral fellowship at CAAS, China. He also worked as an Associate Professor at Peking University Institute of Advanced Agricultural Sciences, China. Currently, he is working as Assistant Professor Agriculture at Hazara University Mansehra, Pakistan. His main research interests include the genetic evaluation of crop germplasms resources and adaptive mechanisms in crop plants under abiotic stresses. He is the author and co-author of more than 70 peer-reviewed journal articles, 6 conference proceedings and abstracts, 5 chapters, 2 books, and 4 articles for growers. He is also serving as the editorial board member and reviewer for international peer-reviewed journals like BMC Plant Biology and Journal of Cotton Research. He has supervised 16 master's level students at Hazara University Mansehra, Pakistan.

Cytochrome P450 Enzyme CYP716A is a Gatekeeper of Bitter and Hemolytic Triterpenoid Biosynthesis in Chenopodium Quinoa

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Chenopodium quinoa is a nutritionally rich and climate-resilient pseudocereal gaining attention globally. Quinoa seeds are gluten-free and rich in protein and micronutrients. However, they taste bitter due to the presence of antinutritional oleanane-type triterpenoid saponins viz. oleanolic acid, hederagenin and ursolic acid. Oleanolic acid sapogenin is the major saponin found in C. quinoa seeds. Oleanolic acid-containing saponins are bitter and hemolytic. Oleanolic acid is synthesized by the cyclization of 2,3-oxidosqualene by beta-amyrin synthase followed by the oxidation of beta-amyrin. Oxidation of beta-amyrin is catalyzed by the action of cytochrome 450 enzymes. Plant genomes contain cytochrome P450 (CYP) supergene family involved in the biosynthesis of sapogenin aglycones. Here, by performing homology-based sequence analysis we identified a CYP716A in C. quinoa, which converts beta-amyrin into oleanolic acid. The functional validation was carried out by homologous transient overexpression and virus-induced gene silencing (VIGS) of CYP716A through agro-infiltration in the leaves of C. quinoa, followed by UPLC-MS quantification of the metabolites. Furthermore, heterologous expression in tobacco and Arabidopsis demonstrated the biological functionality of CYP716A in growth and stress responses. In summary, we discovered a novel beta-amyrin 28-oxidase enzyme (CYP716A) that catalyzes the biosynthesis of oleanolic acid in C. quinoa and explored its role in growth and defense. These results provide a strong foundation for understanding triterpenoid saponin biosynthesis in C. quinoa and designing saponin-free varieties.

Biography

Pravesh Kundu is a Ph.D. research scholar in the lab of Dr. Gaurav Zinta at CSIR-Institute of Himalayan Bioresource Technology, Palampur, H.P

Pravesh did her B.Sc. and B.Ed. from Kurukshetra University, Haryana, and M.Sc. Botany from Punjabi University, Patiala.

Pravesh qualified national level exam CSIR-UGC-NET-JRF in 2019 with an All-India Rank-94 to pursue her Ph.D. studies.

In her Ph.D., she is working on the nutritional quality of Chenopodium species and implementing tools related to metabolomics, transcriptomics, and gene functional analyses. So far, she has published one book chapter, participated in two national and international conferences, and published four research/review articles.

Specifically, she is deciphering the biosynthetic pathway of triterpenoid biosynthesis in Chenopodium quinoa. She is currently identifying and characterizing the upstream transcriptional regulators involved in triterpenoid biosynthesis, followed by the characterization of downstream enzymes involved in specialized metabolite (oleanolic acid) biosynthesis.

Chloroplast Genome-Wide Analysis Reveals New Single-Nucleotide Polymorphism Resources for the ARMS-qPCR Identification of Dendrobium Brymerianum

Afifa Kamal*, Jiapeng Yang, Mengting Wang, Zhenyu Hou, Chao Li, Zhitao Niu, Qingyun Xue and Xiaoyu Ding

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Dendrobium brymerianum Rchb. f. is a species of orchid with pharmacological interest for its potential to inhibit the growth of human lung cancer cells. The identification of the Dendrobium species is a notable problem due to morphological similarities and the limitations of universal DNA barcodes. To overcome these difficulties, this study employed complete chloroplast (cp) genome sequences as useful resources for the identification of D. brymerianum. Based on Illumina sequencing, the complete cp genomes of five D. brymerianum individuals were assembled. These genomes were in the quadripartite structure, diverse in length between 151,832 and 152,189 bp, and comprised 126 genes. Moreover, significant differences were found in the Small Single-Copy (SSC) and Large Single-Copy (LSC) regions in comparison to the Inverted Repeat (IR) regions. This study recognized hotspot regions and simple sequence repeat (SSR) loci, providing valuable insights into genetic markers. The phylogenetic relationship of Dendrobium species was discovered, highlighting the need for more precise differentiation practices. To address this, ARMS-specific primers, mainly AAob1/AAob2, confirmed strong specificity, permitting the accurate identification of D. brymerianum from other species through ARMS-qPCR. Overall, this study of D. brymerianum chloroplast genomes has generated valuable data about sequence variations, phylogenetics, and mutation dynamics. These perceptions will be valuable in future research on population genetics, taxonomy, and species identification within the Dendrobium genus

Biography

Afifa Kamal is a dedicated botanist and researcher with extensive expertise in genomic analysis and molecular identification of medicinal plants. She earned her Ph.D. from Nanjing Normal University, China, where her research focused on the comparative genomic analysis of chloroplasts and mitochondria in Dendrobium brymerianum. Afifa has a strong background in molecular biology techniques and has developed innovative methods for species authentication. She has published her findings in reputable journals and is committed to advancing plant science and contributing to the conservation of medicinal plants. Afifa also actively promotes education and social development in remote areas of Pakistan.

Biochar Mediated and Plant Growth Enhancement through Antioxidant Improvement in Mentha Arvensis

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The potential of biochar has increased interest in recent decades due to the increasing agricultural yield and nutritional value of products. However, scarce data have been published about the impact of biochar on the nutritional quality of products. Therefore, in this study, we assess the effects of biochar on plant health and productivity with different percentages (%) of the biochar e.g., 0%, 30%, 50%, and 70%. The gas chromatography (GC) analysis of M. arvensis treated with different concentrations of biochar showed different arrays of compounds, especially 33 compounds found in 30% biochar with an abundant source of 2-Propyl-5-acetoxy-5-methyltetrahydropyran, p-Menthan-3-one, 1,2-epoxy, and 2-Hydroxyhexadecyl butanoate. Similarly, the physicochemical characteristics of the plants showed that 30% of biochar application significantly ($p > 0.05$) improved the plant growth attributes e.g., shoot and root length, and fresh and dry biomass. The electrical conductivity (EC), pH, phosphorous, nitrogen, and organic compounds were also significantly ($p > 0.05$) improved with the addition of biochar in the soil and compared to only soil. The nutrient profiling showed that the biochar treatment significantly improved Ca, Mg, Na, and Ni compared to the soil. Antioxidant enzymes (CAT, GST, POX, and SOD) in plant and antioxidant activity of plant extracts such as DPPH, superoxide, Hydroxyl radical scavenging, TPC, and FTC were significantly improved by 30% biochar compared to control as well as 50, and 70% of biochar. The overall conclusion showed that 30% biochar application in the soil improved the valuable compounds in the soil and enhanced nutrients and antioxidant activities in M. arvensis, which improved the growth and development of plants.

Keywords: biochar, plant growth, Antioxidant, secondary metabolites, nutrients

Biography

Department of Forestry, Bamboo Research Institute, Engineering Research Centreof Chinese Ministry of Education for Edible and Medicinal Fungi, Jilin Agricultural University.

Soil Communities' Recovery Associated to Gaultheria Poeppigii (Ericaceae) Rhizosphere after 7 years of a High Severity Wildfire in a Temperate Forest in the Andes Range

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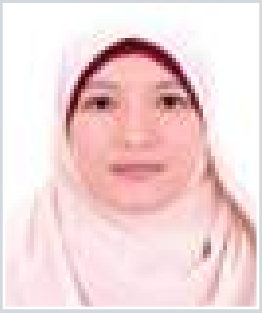
Rhizosphere is a key space in soil where plants interact with soil communities and soil abiotic factors, sustaining a rich environment that promotes positive feedback between the plant and soil organisms. However, aggressive perturbations such as high severity wildfires, can eliminate not only plant communities but organic soil as well in a few hours, leading to a retrogression of soil ecosystem and therefore, soil communities. In this work, we explore microbial and invertebrate communities associated to Gaultheria poeppigii (Ericaceae) rhizosphere in a temperate forest located in the Andes range after 7 years of a high severity wildfire. We sampled soil microbial and invertebrates from soil associated to the rhizosphere of G. poeppigii, and bulk soil in areas affected by high and low severity wildfire, as well as in sites not affected by fire (control) in China Muerta National Park (Chile). We extracted soil DNA and performed molecular analysis with Real Time PCR for Bacteria (16S), Archaea (16S) and N fixing bacteria (nifH). Also, we used Berlesse funnels for invertebrates' extraction. Our results indicate that after 7 years of ecosystem succession, soil communities have not fully reestablished, bacteria and N fixing bacteria are significantly less abundant in high and low fire severity sites, compared with control sites. We also found that rhizosphere soil had higher abundance of N fixing bacteria than bulk soil in control sites, but not in sites affected by wildfire. Surprisingly, Archaea was more abundant in rhizosphere soil in low severity sites, compared to high severity and control sites. On the other hand, invertebrates were also more abundant, and communities were more diverse in control sites and in rhizosphere soil, but the later not always was statistically significant. These results highlight the role that plants play through their roots in soil ecosystem, facilitating habitat to soil communities and promoting soil regeneration after severe perturbations such as wildfires. Furthermore, these results are important because wildfires as such are a relatively novel phenomenon in these ecosystems, which means that plants and soil organisms in this region have not evolved with this kind of perturbations, and therefore it is crucial to assess the effects they have in soil to propose ecological restoration measures.

Biography

Camila is a biologist with a master's degree at Universidad de Chile, she is currently making her PHD thesis in Ecology and Evolutionary Biology program in Universidad Austral de Chile. Her research is about plant and soil interactions, and soil communities in forests, and how anthropogenic development has impacted this ecosystem. She has studied soil biodiversity associated to forestry industry in southern Chile, and now she is studying how high severity wildfires -that are a relatively new phenomenon in Chile- are affecting soil ecosystem in endangered native forests.



Different Indole-3-Acetic Acid and 6 Benzyl Amino Purine Concentrations Enhances Growth, Yield and Phytochemical Potential of Mentha Rotundifolia L.

Hadjer Kecis, Mekircha Fatiha, Yahia abdelouhab

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Although the use of phytohormones for crop improvement has great potential, little is known about the molecular effects of phytohormones in crops. This work investigated the effect of the exogenous application of plant growth regulators (PGRs), Indole-3-acetic acid (IAA), and cytokinin-like 6-benzyl amino purine (BAP) on plant biomass and the phytochemical and biological parameters of Mentha rotundifolia L aerial parts and roots. The results showed that the application of IAA and BAP significantly influenced the accumulation of phenolic compounds in the plant organs. Treatment with PGRs also induced remarkable increases in the amounts of individual phenolic compounds, with the greatest increases observed for salvianolic and rosmarinic acids in the aerial parts treated with 20 mg/mL or 10 mg/mL of BAP. Salvianolic acid also showed the most significant increase in the roots of plants treated at 10 mg/mL (from 18.232 to 41.317 ug/g of extract). Furthermore, we observed enhanced antioxidant and inhibitory enzyme effects in the treated plants. Our findings suggest that exogenous hormones could be used to improve the synthesis of phenolic compounds and, as a result, the bioactivity of medicinal or food plants.

Biography

I'm hadjer kecis, I hold a doctoral degree specializing in Biodiversity and Enhancement of Natural Resources from Abdelhafid Boussouf Mila University Centre, with a background in phytochemistry. My recent research has concentrated on enhancing secondary metabolites in plants through the application of plant hormones, investigating their impact on plant bioactivity. I have contributed to several publications in prestigious journals and have presented at multiple international conferences. I am deeply passionate about phytochemistry and committed to advancing knowledge and innovation in this field.

Keywords: Mentha rotundifolia, IAA, BAP, Exogeneous hormones, Phenolic compounds, LC–ESI–MS analysis, antioxidant effect

Morphological and Molecular Variations of Euryops Prostratus B. Nord. and Euryops Pinifolius A. Rich. (Asteraceae) Based on ITS and trnL trnF Markers

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The genus Euryops belongs to the Asteraceae family. Among the Euryops species recorded from all over the world, only three species occur in Ethiopia, which are also endemic to the country. These are E. prostratus B. Nord., E. antinorii (Avetta) S. Moore, and E. pinifolius A. Rich. Altho ugh there attempts of phylogeographic studies for most of Euryops species, detailed evaluation of the genetic diversity and divergent history of the Ethiopian taxa are limited. Thus, the main objective of this study is to investigate the morphological and molecular variation of tw o of the three endemic species of Euryops in Ethiopia. A total of 180 samples were collected from Bale Mountains, Mt. Choke, Mt. AbuneYosef, and Guassa Community Conservation Area. Th e cpDNA trnL-trnF regions and ITS of nrDNA were used to understand the geographic structure and reconstruct the evolutionary history of E. prostratus and E. pinifolius. CodonCode was used f or DNA sequence editing and alignment. A total of 54 samples of E. prostratus and 88 samples o f E. pinifolius were sequenced for ITS region. On the other hand, a total of 33 samples of E. pros tratus and 38 samples of E. pinifolius were sequenced for trnL-trnF region. The morphological analysis of variance using different characters showed a significant variation among the two species. The Maximum Likelihood, Neighbor-Joining, and Maximum Parsimony methods separated the two species with a reliable bootstrap support value. The divergence time of the species based on ITS marker suggested that E. prostratus and E. pinifolius diverged 4 Ma years ago during the early Pliocene but based on trnL-trnF marker they diverged 11Ma years ago during the late Miocene. The population structure result using the AMOVA test both in ITS and trnL-trnF markers revealed the presence of high genetic variation within populations than among populations. Similarly, all populations were best clustered at K=2 except for E. prostratus clustered at K=9 based on trnL-trnF marker. The neutrality tests have revealed that the populations of E. prostratus and E. pinifolius have experienced recent population expansion events and population bottlenecks. Regarding the distribution of molecular variants both species

have shown different haplotype patterns. Whereas E. prostratus has 3 ITS and 2 trnL-trnF haplotypes, E. pinifolius has 7 ITS and 4 trnL-trnF haplotypes. Sanetti Plateau, Mt. Choke, and Guassa showed more haplotypes. Generally, any conservation effort should take in to account genetic variations and diversity of these endemic species.

Biography

My name is Hanny Lidetu. Currently, I am a lecturer at Addis Ababa University, Addis Ababa Ethiopia. Qualified Botanist with having Masters's degree in Plant Biology and Biodiversity Management. A committed and dedicated professional with a proven ability to work in Plant areas, motivated and supportive to all level colleagues to make best use of knowledge & performance by encouraging them to create a positive & energetic environment. Experience gained during my research stay in Germany on Molecular laboratory work and Phylogenetic analyses. I completed a course on Species Distribution Modeling and R programming and trained in taxonomic revision of plant species in the Royal Botanic Garden, Kew, London. In my free time, I like exploring a new place.

Key Words: Divergence, Euryops, ITS, Haplotype, Phylogeny, Phylogeographic, trnL-trnF

First Description of Simplicillium lanosoniveum, a PotentialAntagonist of the Coffee Leaf Rust from Cuba

Isel González Marrero*, Yamilé Baró Robaina, María Elena Lorenzo Nicao, Rafael F. Castañeda Ruiz, De-Wei Li, Amaia Ponce de la Cal, Haifa Ben Gharsa , Romina G. Manfrino, Christina Schuster and Andreas Leclerque

The fungal genus Simplicillium (Cordycipitaceae: Hypocreales) has an extensive distribution and a broad spectrum of hosts and substrates. The species Simplicillium lanosoniveum is amycoparasite with potential for biological control of coffee leaf rust, Hemileia vastatrix. Morphologically,Simplicillium closely resembles microparasitic and entomopathogenic Lecanicillium fungi, often resulting in misidentification. A fungal isolate was obtained from leaf-rust-infested coffee plantsfrom Cienfuegos Province, Cuba. (2) Combined analyses of morphology and molecular markers (ITS, LSU, EF-1alpha) were used for fungal identification. (3) In the NJ, ML, and BI phylogenies which were reconstructed, the isolate LBSim-01 was in the Simplicillium lanosoniveum clade. This species-level identification was supported by morphological features. (4) The isolate LBSim-01 wasassigned to the species Simplicillium lanosoniveum. This is the first description of a Simplicillium fungusassociated with coffee leaf rust in Cuba. The presented results hold implications for the biologicalcontrol of this economically relevant plant disease.

Keywords: Simplicillium; microparasitic fungi; Hemileia vastatrix; phylogeny; molecular taxonomy. Internal transcribed spacer; LSU; translation elongation factor 1 alpha

Nanotech Revolution in Aquaculture: A Review of Synthesis Strategies and Emerging Applications

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The aquaculture industry faces growing challenges to meet the rising global demand for seafood while ensuring environmental sustainability. Nanotechnology presents a revolutionary approach to address these challenges by utilizing nanoparticles with unique properties. This review explores the current state of nanotechnology in aquaculture, focusing on synthesis strategies and emerging applications. We discuss various top-down and bottom-up approaches for nanoparticle synthesis, highlighting bioinspired methods for eco-friendly production. Tailoring nanoparticle properties for specific functionalities like size and surface charge is addressed. The review emphasizes emerging applications of nanoparticles in aquaculture, including enhanced disease prevention and treatment through targeted drug delivery using nanocarriers. Improved nutrient delivery and utilization in fish and shrimp using nanoparticles is also explored. The potential of nanomaterials for bioremediation of aquaculture effluents and real-time monitoring of water quality through nano sensors is discussed. Finally, the review briefly considers the environmental impact of nanomaterials in aquaculture and the regulatory landscape for their implementation. This review provides a comprehensive overview of the transformative potential of nanotechnology in revolutionizing sustainable aquaculture practices.

Biography

Currently I am pursuing PhD in Dept. of Aquaculture. My research work is in nano technology, fish feeding, early gonadal maturation of feed and fish breeding.

Keywords: Aquaculture, nanotechnology, nanoparticle synthesis, drug delivery, nutrient delivery, bioremediation, sensors, water quality

Leveraging Next Generation Sequencing for Gene Discovery in Crops

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Short read sequencing and genome wide association studies have accelerated gene and quantitative trait loci discovery in crops. High quality reference plant genome assemblies and construction of pan genomes is now providing a source for SNPs and novel structural variant discovery. We are utilizing long read sequencing in multiple facets for novel gene discovery in soybean and cotton. QTL identification and fine mapping of genes is refined by oxford nanopore sequencing to deconvolute complex highly repetitive regions of the genome previously inaccessible with short read sequencing. Fine mapping combined with transcriptome sequencing provides a robust method to identify candidate genes associated with plant pathogen response. High throughput marker technologies coupled with advanced phenotyping platforms provide new avenues for marker trait associations, genotyping, and genomic assisted selection. We leverage next generation sequencing technologies for QTL detection and gene discovery to support breeding and enable crop improvement.

Biography

Anita Samuga is a Principal Scientist in the Seeds and Traits Division of BASF Agricultural Solutions. She received her PhD in Plant Molecular Genetics and Biotechnology at Michigan Technological University in 2003 and is an expert researcher in molecular genomics at BASF in North Carolina, USA. She has been with BASF since 2009 and has worked on several crops such as maize, rice, cotton, and soybean. She is a Sr. Team Lead and manages the Applied Genetics lab where she utilizes molecular genomics and genetics to innovate and support crop breeding for product discovery and development.

Agromorphological and Chemical Diversity of the Genus Mentha for a Future Selection Programme of Interesting Genotypes

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In recent years, the world's top mint producer, Morocco, has faced a significant challenge: an increase in mint's production coupled with a notable decline in exports. This situation is directly related to the product's declining quality as a result of contamination by pesticide residues used to ward against harmful agents in its cultivation.

As researchers attempting to handle this situation, our aim is to assess the chemical, and morphological diversity of Mentha species in order to develop new, disease-resistant, productive varieties.The agromorphological study was conducted at the flowering stage of the 25 representatives genotypes using 30 descriptors which included both quantitative and qualitative. GC-MS was used to analyse the profiles of essential oils obtained by Clevenger hydrodistillation.

Significant diversity was observed in shape, length and width measurements, pilosity, margins and leaf tips. Stem width, length and colour.

Essential oil yield varied from 0.39% to 2.12%. A high chemical diversity was observed by analysing the composition of the essential oils of the progeny of the MV species. Among the abundant chemotypes in this collection are those rich in Carvone - Limonene D, Carvone - Dihydrocarvyl Acetate, Piperitone oxide - Limonene D and P-menth-4(8)-En-3-One.

Biography

Benjeddi Abir, a PhD student at the National Institute for Agricultural Research, is also a member of the Microbiology and Molecular Biology team at the Faculty of Science in Rabat, Morocco. She holds a master's degree in applied microbiology and Bioengineering and a bachelor's degree in biomedical engineering. She is passionate about medicinal and aromatic plants and her research, culminating in her thesis, builds on this long-standing interest. Abir actively participates in national and international congresses, showcasing her evolving expertise in botanical, molecular and biomedical sciences.


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