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International Meet on Agricultural Science and Technology

AUGUST 14, 2023 | Webinar

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FOREWORD

It is our pleasure to invite all scientists, academicians, young researchers, business delegates, and students from all over the world to attend the to International Meet on Agricultural Science and Technology, (AGRIMEET2023), August 14-16, 2023, Vancouver, Canada.

AGRIMEET2023 shares an insight into the recent research and cutting edge technologies, which gains immense interest with the colossal and exuberant presence of young and brilliant researchers, business, delegates and talented student communities.

AGRIMEET2023 goal is to bring together, a multi-disciplinary group of scientists from all over the world to present and exchange breakthrough ideas relating to Food Science and Technology.

It promotes top-level research and globalizes the quality of research in general, thus making discussions and presentations more internationally competitive and focusing attention on the recent outstanding achievements in the field of Agricultural Science and Technology.

We’re looking forward to an excellent meeting with scientists from different countries around the world and sharing new and exciting results in Agricultural Science and Technology.

COMMITTEES

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Ram Prasad	Mahatma Gandhi Central University, India
Renata Bažok	University of Zagreb, Croatia

Plenary Abstracts

Concept of Irrigation Development in the Context of Global Climate Change

Irina G.Bondarik,

Department, for ecosystem's water use, All-Russian scientific institute for Hydraulic engineering and land reclamation, Bolshay Academicheskay st. 44, Moscow, Russia

Abstract

The article discusses the prospects for the development of irrigation in order to increase agricultural production against the background of the growth of the world's population, reducing the potential of natural resources in the face of climate change. As you know, rain-fed agriculture is completely dependent on the amount of precipitation and moisture accumulated in the soil. This form of agriculture is possible only in regions where precipitation distribution ensures the constant availability of moisture in the soil during critical periods of crop cultivation. Irrigated agriculture occupies about 30% of the area in developing countries. The development of irrigation will increase food production and achieve food security for the least developed countries of the world.

Currently, "Precision farming" is being increasingly introduced into the practice of agricultural production; it can be defined as a strategy based on observing, measuring and responding to temporal and spatial variability to improve agricultural production sustainability. Precision farming technology is difficult to implement without precision land reclamation systems, in the sense, that precise regulation of the complex of factors of plant life and soil biota should be the main tool of precision farming. Precise reclamation is based on devices that allow creating optimal conditions for plant growth at the right time, at the right point and with accurate dosing of exposure rates. Thus, another factor influencing irrigated agriculture potential in the context of climate change is the development and implementation of precision land reclamation systems into the practice of agricultural production in the world and in Russia, in particular.

Keywords:

agricultural production; irrigation; climate change; precise reclamation.

Biography

Dr. Bondarik obtained her Doctorate in hydro-geology in the year 1988. With more than 35 years of professional experience, she has been participating in various ICID events since 1997. Dr. Bondarik was the force behind the organisation of the 55th IEC meeting in Moscow in 2004; 12th International Drainage Workshop in St Petersburg, Russia in 2014. Dr. Bondarik was instrumental in bringing out the ICID Multilingual Technical Dictionary on Irrigation and Drainage in Russian language, which was released during the 55th IEC meeting at Moscow, 2004. She has immensely contributed in various capacities to ICID Working Groups, such as Working Group on Technology and Research Uptake and Permanent Finance Committee;

head of European Regional Working Group; secretary of WG on Sustainable Drainage, have been served as vice-president of ICID 2016-2019 yy. Dr. Bondarik has contributed more than 150 scientific papers, articles and technical reports on land reclamation; reclaimed agro landscapes etc. in Russian language with more than 25 in English.

Currently Dr. Bondarik is a Leading Researcher of All-Russian Scientific Institute for Hydraulic Engineering and Land Reclamation and Secretary General of the National Committee of the Russian Federation on Irrigation and Drainage (RUCID) (since 1998), Vice-president *Honorary ICID.*

Challenges for Sustainable Pest Management: European Perspective

Renata Bažok,

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Abstract

In the second half of the 20th century, crop protection relied primarily on pesticides, and this practice led to growing consumer concern about the effects of pesticides on the environment and human health. This concern was also reflected in key European Union (EU) strategic documents and EU legislation (EC Directive 1107/2009/EEC and Directive 2009/128/ EC) aimed at achieving sustainable use of pesticides in the EU by reducing the risks and impacts of pesticide use. EU member states' pesticide reduction measures are guided by the principles of integrated pest management (IPM). However, the widely varying interpretation and implementation of these principles has not led to the desired pesticide reduction goals, and pesticides still play a central role in agricultural production. Recently, the European Green Deal (EGD) has set new targets and established a roadmap with several strategies, including Farm to Fork and Biodiversity 2030. Very ambitious targets have been set for the agriculture and food sector. In particular, the use and risks of chemical pesticides are to be reduced by 50% by 2030. A 10-20% reduction in pesticide use is possible through efficiency improvements such as precision agriculture and/or improved decision-making tools and mechanical or biological technologies. However, to achieve a 50% reduction, farming and food systems must be completely transformed. To support this transformation, EU member states are currently discussing the new proposal for a regulation on the sustainable use of pesticides to replace Directive 2009/128/ EC. The expected transition brings new challenges for the agricultural sector, namely (i) the reduced number of active substances available and approved for pest control; (ii) the increased risk of pest resistance development due to the use of a limited number of active substances with the same mode of action; (iii) the difficulties in cultivating certain agricultural crops, as adequate protection against pests is not possible and consequently the cultivation of these crops is abandoned; (iv) the lack of research at the local level to improve forecasting methods, develop forecasting systems, discover new active ingredients, and develop new strategies to control pests without or with minimal use of chemical pesticides; (v) the need to develop a training system for farmers to train them in the use of new technologies. While the above challenges are relevant to all countries, some challenges are much greater in countries that do not have a long tradition of applying the principles of IPM. This is mainly related to the lack of local research activities necessary for the improvement and development of non-pesticidal protection methods and the problem of insufficient training and willingness of farmers to accept the new paradigm. To solve these problems, all existing capacities must be mobilized, from scientists to policy makers. Otherwise, the lack of appropriate alternative crop

protection strategies could result in significant yield losses due to pests, diseases, and weed competition, which could weaken domestic food security and lead to higher food imports.

Keywords:
pesticide reduction measures, farming system, European Green Deal, Farm to Fork, Regulation on the Sustainable Use of Pesticides.

Biography

Prof. Bažok works at the University of Zagreb as member of the Faculty of Agriculture as full professor. She was recipient of two fellowships including a USDA/ARS, Cochran, and Fulbright fellowship. She participated and led the TEMPUS projects, participated in four ERASMUS+ Strategic partnership projects and coordinated an Erasmus+ capacity building project focused on the development of a joint international PhD study program in plant health. She has been an investigator in two USDA/CRO projects and in several national scientific projects. She was principal investigator in 4 national scientific projects and national training coordinator of FAO project. She coordinated a structural project jointly funded by the EU and Croatia and a project on the development of human potential in plant medicine. She has extensive experience in organizing trainings with farmers and professionals. Her research proficiencies are applied entomology, integrated pest management, plant protection, and phytopharmacy. She has been conducting research on integrated control of Colorado potato beetle, wireworms, sugar beet pests, oilseed rape pests, western corn rootworm, and other maize pests. Her publication includes 150 referred journal articles and over a 100 miscellaneous. Her current research interests are integrated pest management (IPM) in field crops (maize, sugar beet, potato) and insect resistance development. The overall research emphasis is focused on the development of safe, effective, and economical methods of IPM, and the biological/ecological interactions related to insect species and their environment. Under her mentorship, nine students completed their dissertations and currently she is mentoring two PhD students.

Keynote Abstracts

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Improving Wheat Tolerance to Heat and Drought in Current and Future Climates

Karine Chenu[1,*], Najeeb Ullah[1,2], Brian Collins[1,3], Jack Christopher[1]

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[3] current address: College of Science and Engineering, James Cook University, Douglas QLD 4811, Australia

Abstract

Heat and drought stress limit wheat production in major production regions worldwide. With climate change, increases in CO2 concentration, temperature, evaporative demand and rainfall variability are projected to impact different crop processes and their interactions. Here, we used a modelling approach to characterise the type of abiotic stresses that wheat crops are currently and will experience in projected climate scenarios across the Australian wheatbelt. Over the last 30 years, wheat crops (when considering at the same standard genotype and management) have been increasingly affected by post-flowering heat stress, drought and frost. To best tune crop development with environmental variability, genotype and management adaptations were assessed in terms of crop maturity type and sowing date for current and future climate scenarios. Overall, for the future climate scenarios tested, results highlighted a shift towards earlier optimum sowing windowsorearliermaturing genotypes by 2050. Heat and its interaction with drought appeared as the dominant sources of yield loss across the Australian wheatbelt in the future climate scenarios. The resultsas well asadvance in physiological adaptationsand phenotyping methods will be discussed to promote increasing yield performance and stability.

Keywords:

Global warming; Water stress; Crop adaptation; Phenotyping methods

Biography

Karine Chenu is a crop ecophysiologist and modeller. She leads a team that develops new knowledge and innovative approaches to improve crop adaptation to changing environments. Karine started her career in France and moved to Australia, where she is now Associate Professor at the University of Queensland. She is passionate about adapting crops and society to current and future challenges. Her research mainly concerns understanding trait physiology and genetics, improving models and exploring novel combinations of genotypes, environments and management practices to assist productivity improvement in changing environments. Karine has published over 60 papers in high-ranking international journals, and over 60 book chapters and refereed conference papers, including some breakthrough papers on crop modelling, plant response to heat and drought, and genetics.

Environmental Impact Assessment of Cotton Ginning Agricultural Machinery

Vijayan Gurumurthy Iyer,
Bihar Institute of Public Administration & Rural Development (BIPARD), Gaya, Bihar, 823 001, India

Abstract
This paper realizes the hazards of chromium contamination and pollution caused in the use of chrome composite leather-clad (CCLC) rollers commonly used in cotton roller ginning industries and attempts to eliminate the chromium contamination and pollution during this environmental impact assessment (EIA) process. The cotton roller ginning process is the mechanical separation of cotton fibres from their seeds by means of one or more rollers to which fibres adhere while the seeds are impeded and struck off or pulled loose. Most of the cotton ginning operations are done using roller gins. The CCLC roller coverings contain about 18,000 to 30,000 mg/kg (ppm) as total chromium of trivalent and hexavalent forms which are toxic to human health. When the seed-cotton is ginned, due to the persistent rubbing of CCLC rollers over the fixed knives, the cotton and its products get contaminated with the total chromium of trivalent and hexavalent forms. Gin mill workers are exposed to the cotton dust and chromium pollution and are susceptible to health hazards such as premature death, cancer, byssinosis, and ulcers in cotton ginning air environment since toxic effects are produced by prolonged contact with airborne or solid or liquid chromium compounds even in small quantities. Noise pollution of agricultural ginning machinery in seed-cotton ginning mills has been found out to be 102-103 dB(A) decibel levels. To offset this problem, pollution-free rubberized cotton fabric (RCF) eco-friendly rollers for both the laboratory and commercial studies have been designed, fabricated and used in experiments in rollers gins. This nullifies chromium contamination and pollution during the complete process. Cotton technological parameters are well proven for commercial acceptance.

Keywords:
cotton; environment; roller; ginning, health.

Biography
Dr. Iyer Vijayan Gurumurthy is a distinguished Professional Engineer and Doctor, known for his expertise in environmental science and mechanical engineering. With a wealth of educational achievements, including a PhD in Environmental Science and Engineering from Indian School of Mines University, Dhanbad, he has contributed over 450 indexed publications to the field. Holding various positions, such as Professor and Principal at esteemed institutions like Dr M G R University and Narasaraopeta Engineering College, he has left a mark on academia. As a

Plenary Invited Lecturer, he has graced international platforms in Shanghai, Athens, Beijing, and more. He's an Editorial Board Member and Reviewer for numerous prestigious journals and has received honors like Rashtriya Ratna and Kendriya Sachivalaya Hindi Parishad. With a professional footprint spanning across continents, Dr. Iyer's expertise shines through in his contributions to the scientific community.

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Edible Antibodies an Alternative to Antibiotics

Pani Prasad Kurcheti,
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Abstract
Aquaculture, probably the fastest growing food-producing sector, now accounts for nearly 50 percent of the world's food fish. The decline in the fisheries of traditional marine species has been an incentive for the diversification of today's aquaculture sector into the intensive rearing of many finfish species. Intensive fish farming lead to outbreaks of diseases difficult to control without using drugs/chemicals and especially antibiotics against bacteria. The success of any farm operation depends on health management systems. For this, proper disease diagnosis, prophylactic measures and control measures should be provided. Due to the increase in the pathogens especially the bacterial pathogens, antibiotics are largely used. Antimicrobial resistance (AMR) is recognized as one of the complex problems and bacteria have acquired resistance to a wide range of antimicrobials used due to its abuse in growth promotion, treatment of diseases etc. An unsolved and growing problem nowadays is known to be an antimicrobial resistance which have created a worldwide health crisis. Identifying the alternatives and bringing out comprehensive alternatives to antibiotics is the need of the hour, to further reduce the impacts. IgY or edible antibodies is one of the latest concept in health management and is highly cost effective. Specific antibodies produced in chickens offer several important advantages over the antibodies produced in other mammals, viz, the productivity of antibodies from egg yolk is nearly 18 times greater than that from rabbits, based on the weight of antibody produced per animal. IgY production is also less invasive, requiring only the daily collection of eggs compared to blood collection in mammals. Much less antigen is required to produce an efficient immune response in chicken and the chicken antibodies recognize different epitopes than mammalian antibodies, resulting in a different antibody repertoire. In contrast to mammalian serum, egg yolk contains only a single class of antibody (IgY), which can easily be isolated from the yolk by precipitation techniques. These IgY antibodies could be used for either developing immunodiagnostic kits or in passive immunotherapy against diseases. This will help to reduce the use of chemicals/antibiotics etc. in the aquatic environment. Moreover, it is becoming difficult in raising antibodies by invasive methods in rabbits and other animals due to new rules coming into vogue day by day. Therefore, the method of large scale production of antibodies and as an alternative to use of antibiotics in aquaculture is important and discussed in the light of available literature.

Keywords:
Edible antibodies; Alternative to antibiotics; AMR; Bacterial infections

Biography

Dr. K. Pani Prasad is a highly experienced Principal Scientist at the Central Institute of Fisheries Education, Mumbai. With 30 years of expertise, he has made significant contributions in aquatic animal health, particularly in disease diagnostics and control. He has developed innovative immunodiagnostic kits for rapid and sensitive detection of fish and shrimp diseases. Dr. Prasad has served as a National Consultant for FAO, Rome, and the Dept. of Fisheries, Government of Andhra Pradesh, focusing on quality control at shrimp hatcheries and labs. His impactful work includes over 150 research publications, 12 externally funded research projects as Principal Investigator, and research guidance for 13 Ph.D. and 66 Masters' students in Fisheries Science. Additionally, he has conducted 22 training programs on various aspects of aquatic animal health, including Antimicrobial resistance (AMR) and diagnostics, benefiting stakeholders, farmers, teachers, trainers, and students. Dr. Prasad's dedication and accomplishments have earned him a prominent place in the field of fisheries science.

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Heme oxygenase-1 in Modulating Antioxidant Defence Responses and its Mitochondrial-Chloroplast Sub-Cellular Localization

G.S. Shekhawat,

Department of Botany, Jai Narain Vyas University, Jodhpur-342005, India

Abstract

Hemeoxygenase originally identified as Heme degradation regulator in animals and subsequently characterized as a distinct protein entity in photosynthetic organism. Hemeoxygenase has recently been identified as a molecule involved in ROS scavenging mechanism in plants. It has been established that HO is induced in plants by several environmental and chemical factors including salinity, heavy metals, UV- radiation and ROS, but precise mechanisms of these responses are in need to be establish.

Present study is an attempt to know metal/salt induced changes in metabolism of Glycine max & Brassica juncea, paying special emphasis on various defence mechanisms involved in oxidative stress adaptations and finding the role of HO in cadmium induced oxidative stress tolerance in B. juncea. Hemeoxygenase-1 (HO-1) degrades free heme released from heme proteins with the generation of ferrous iron (Fe2+), biliverdin-IXa (BV-IXa), and carbon monoxide (CO). The mechanism of heme cleavage has been conserved between plants and other organisms even though the function, sub-cellular localization, and cofactor requirements of HO-1 differ substantially. Study confirms the cytoprotective role of HO-1 in Cd/NaCl induced stress. Activity of HO-1 appeared to be located within chloroplast due to its role in phytochrome synthesis but mitochondria also share its localization. Mitochondrial location of HO might be on its inner membranous space due to its role in the synthesis of electron donor species which facilitates HO catalyzed reaction. Study reports the co-localization of HO-1 in chloroplast and mitochondria.

Keywords:

Abiotic Stress, Heme oxygenase-1; Antioxidant defence, sub-cellular localization

Biography

Prof. (Dr.) G. S. Shekhawat presently working as Professor in Department of Botany (UGC-CAS), Jai Narain Vyas University, Jodhpur. Dr. Shekhawat has recipient of a prestigious BOYSCAST fellowship and worked at the Department of Interdisciplinary Science, University of South Florida Tampa, USA, on Nano-Biotechnology. Dr. Shekhawat has been also awarded by INSA International Exchange Fellowship, and honoured by Young Research Award. Prof. Shekhawat was also awarded the Professor YS Murthy Gold medal by Indian Botanical society for his significant contribution in plant Biotechnology in 2016.

Prof. G.S. Shekhawat has published: 75 research papers in journals of international repute with consolidated 145 Thomson Reuters Impact factor and 28 Scopus H-Index, he also published 2 Books and 15 Book chapters. Prof. Shekhawat has supervised 12 research students for their Ph.D. degrees in the field of Plant Sciences. Presently Prof. G.S. Shekhawat is working on Heme oxygenase-1 (HO-1), Nitric oxide (NO) signalling and its role in plants, and conservation, propagation of medicinal plants.

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New Biotechologies Experiencies: Cannabis spp. as a New Form to Produce Under Dry Arid and Deserts Zones

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

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

Keywords:
cbd; dry arid zone; desert.

Biography
Dr. Edgar Omar Rueda Puente is a distinguished individual, having been honored with a Doctor Honoris Causa degree by the International Organization for Inclusion and Educational Quality. He holds Level two recognition in the National System of Researchers by CONACyT. He has received the distinguished award on multiple occasions, showing his excellence and dedication. With qualifications in auditing and implementing management systems, including ISO standards, Dr. Rueda Puente demonstrates expertise in quality, environmental, educational, and energy management. He is also certified in labor competence for teaching. Additionally, he serves as a member of the Inter-secretarial Commission for Biosafety of Genetically Modified Organisms in Mexico.

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Hormonal and Lipidomics Background and the Possible Regulatory Role of Rht (DELLA) Genes in the Light-Regulated Cold Acclimation of Wheat and Barley

Galiba G [1,2]*, Pálmai T[1], Borbély P[1], Gulyás Zs[1], Kovács T[3], Kovács L[3], Vankova R[4], Tarkowska D[5], Börner A[6], Ahres M[1]Co-Authors[2],

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Abstract

Many studies reported that apart from the cold the modulated spectra of the incident white light is also influencing the expression of CBF genes and frost tolerance in Arabidopsis and winter cereals. In case of cereals, the increased ratio of far-red (FR) light in the spectrum activates the main genes of calcium signaling pathway which in turn induces the expression of CBF-regulon, responsible for the enhanced frost tolerance. More recently the involvement of blue light in cold acclimation was also highlighted in Arabidopsis and also in cereals. To illuminate the inherent changes, some metabolites (not published yet), plant hormone content and lipid composition were determined from leaf samples by advanced MS spectroscopy. In order to discriminate among the light and cold induced changes, the barley plants were raised at both 5 and 15°C under control white light and under supplemental FR and blue illumination. In addition to the metabolite changes, the expression of some key hormone and lipid biosynthesis related genes was measured and will be also presented. CBF genes interact with both the gibberellin (GA) biosynthesis and DELLA (Rht) genes. Consequently, our interest is to work with different wheat GA insensitive Rht mutants and with wheat slender and barley denso mutants with altered GA biosynthesis. Some very recent (unpublished) results will be presented how these mutations alter the light spectrum induced freezing tolerance and GA content.

Funding:

This work was supported by the National Research, Development and Innovation Of-fice ‘OTKA’ K 128575 and and TKP2021-NKTA-06.

Keywords:
cereals; cold acclimation; Rht genes; light regulation.

Biograghy

Prof. Gabor O. Galiba Scientific adviser at Agricultural Institute, Centre for Agricultural Research ELKHMartonvásár (Hungary) and he is Professor at Department of Agronomy, Hungarian University of Agricultural and Life Sciences, Gödöllő (Hungary). Galiba serves as Board Member of the Agricultural Biotechnology Committee, of the Hungarian Academy of Sciences since 2007. Between 2011 and 2014 Head of the Agricultural Res. Committee 1 of the Hungarian Research Fund OTKA. 2020-till now he is member of the Teaching Board of the PhD course in Agri-Food Sciences, Technologies and Biotechnologies of the University of Modena and Reggio Emilia, Italy.2022 One month Visiting Professorship at the University of Modena and Reggio Emilia, Italy.2023 Conference Co-chair of 7th Conference on Cereal Biotechnology and Breeding (7–10 November 2023 / Wernigerode, Germany) what is organized by the Cereal Section of EUCARPIA (European Plant Breeding Society). In fact he was the Co-chair of the last four CBB conferences. He also participated in EU 7 KBBE.2011.2-04 research grant called "ADAPTAWHEAT" which aim was to elucidate the genetics and physiology of wheat development to flowering. His ongoing research project deals with the light spectrum regulation of freezing tolerance in cereals using genomics, lipidomics, plant hormonal and metabolomics platforms. Moreover, using LED light sources he studies the effect of different light spectra and intensities on plant development and yield quality. His new research topic is to work with different wheat Rht mutants and with wheat denso and barley slender mutants with altered GA biosynthesis.

Invited Abstracts

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Identifying Wheat Genotypes that Retain Grain Quality under Post-Flowering Heat Stress

Muhammad Yahya[1*], Daniel Cozzolino[2], Najeeb Ullah[1], Jack Christopher[1], and Karine Chenu[1*],

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[2] The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Brisbane, St Lucia, Queensland, 4072 Australia

Abstract

In the Australian wheat-growing regions, heat waves during the grain-fillingperiod can disrupt protein biosynthesis, leading to inferior grain quality. The effect of post-anthesis heat stress on grain quality was studied in irrigated field trials with twenty-eight genotypes or more planted at three locations in Southern Queensland, Australia, for three consecutive years (2018, 2019, and 2020) using both standard and late sowing dates. Significant genotype x environment interactions were observed, both for grain size and grain quality across trials ($p<0.001$). Late-sown cropswere exposed to more frequent and more severe heat shocks during the early-to-midgrain filling period, and produced significantly smaller grains with increased protein content. Variations in gluten content in grains, an important quality factor, are currently being assessed. This research will aid in developing screening methods to select genotypes that sustain grain quality despite late-season heat stress.

Keywords:
Hot temperature;Genotype x environment interactions;Grain size; Proteincontent

Biography

Muhammad Yahyais currently enrolled as a Ph.D. student at the Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Australia. Muhammad's project focuses on the impacts of late season heat stress on wheat grain quality with the aim of identifying genetic variation for improved adaptation to heat stress.

This current project is in line with his main interests in studying the effects on plant growth in response to abiotic stresses including heat, drought, and salt stresses. This project is based on extensive field trials carried out at three locations across southern Queensland. Muhammad's research aims to uncover mechanismsunderlying heat stress adaptation at the crop level. Muhammad is passionateabout producing new knowledge and developing new tools for researchers, breeders and growers, to enable them to deliver food and prosperity to a growing population in the face of increasingly hot environments due to climate change.

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Post-Flowering Drought and Root Architecture in Wheat

Kanwal Shazadi, Jack Christopher, Karine Chenu*

The University of Queensland, QAAFI, Leslie Research Facility, PO Box 2282, Toowoomba, QLD 4350, Australia

Abstract

The root system plays an important role in crop performance particularly under rain fed conditions. Limited crop production under water deficit conditions requires a genetic solution as irrigation and other management practices are not viable options in many cropping areas. We studied the impact of post-flowering water stress on root development in two wheat cultivars, Mace and Scout, grown under well-watered and terminal water-stress conditions during late development. Plants were cultivated in 1.5m poly vinyl chloride (PVC) tubes under (i) well-watered conditions, (ii) post-flowering mild water-stress treatments, or (iii) post-heading severe water stress. Little difference in dry root biomass and root length density were observed between genotypes under well-watered conditions either at flowering or at maturity. Mild water stress resulted in root senescence at depth (100-150 cm) in Mace but not in Scout which maintained its deep-root biomass, while for shallow roots (0-50 cm) data suggested the occurrence of root senescence in both genotypes. Severe water stress was associated with shallow and deep root senescence in both genotypes.Above ground, Scout retained leaf greenness for only slightly longer than Mace under well-watered conditions. In contrast, under moderate water stress, Mace showed rapid post-anthesis leaf senescence while Scout was affected little if at all. Grain yield per plant was similar between genotypes in well-watered conditions but more reduced for Mace under moderate stress. Post-flowering differences in root growth and senescence can influence water use and yield establishment in drought-prone environments. Screening for this could assist crop improvement for drought tolerance. Results suggest that post-flowering mild water stress can be used to highlight genotypic differences in root dynamics in wheat and to identify wheat genotypes with root architecture better adapted to terminal drought.

Keywords:

Root architecture; Root development; Drought; Phenotyping method.

Biography

Kanwal Shazadi is a PhD candidate at the Queensland Alliance for Agriculture and Food innovation (QAAFI) at the University of Queensland, Australia. She is working with Dr KarineChenu and Dr Jack Christopher and is based at the Leslie Research Centre in Toowoomba in southern Queensland at the eastern edge of the northern grain cropping region. Kanwal's research focuses on characterising genotypic variations in wheat root architecture late in crop development to improve yield and yield stability under water-limited conditions. To achieve this, she carried out field experiments and laboratory work at Leslie Research Centre, in Toowoomba. Prior to coming to Australia, Kanwal completed a Bachelor of Science (BSc)

in Plant sciences at the University of Punjab, Pakistan in 2010. She has also been awarded a Master's degree (MSc) in Botany from the Quaid-e-Azam University (QAU), Islamabad, Pakistan in 2012. During her Masters candidature she carried out a multi-faceted plant science study in plant breeding, genetics and plant physiology. Kanwal also completed a Master of Philosophy (MPhil) in molecular plant breeding and genetics focusing on "Exploring new allelic diversity for drought tolerance in synthetic wheat derivatives" in 2015 at QAU. She had a 12-month research experience in 2016 with the Wheat Wide Crosses and Cytogenetics Program at the National Agriculture Research Center (NARC) in Islamabad, during which she focused on enhancing wheat's tolerance to abiotic stresses such as drought, salinity, and heat. She also had a two-year experience lecturing undergraduate students. Kanwal is passionate about improving agriculture. When not concentrating on her academic work, she likes cooking exotic food.

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Salinity Stress Genes of Banana: An Exploration of miRNA Regulated Transcription

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Abstract

One of the most challenging and urgent global issues is ensuring food security in the face of climate change. Agricultural production is already impacted by new extremes of temperature and water stress. Another major issue is the salinization of soils through increased incidences of coastal flooding and from agricultural practices. Bananas are one of the most productive food crops in terms of starch yield per hectare, and are a food security crop, notably in many of the low and middle income countries that will be most impacted by climate change. However, banana plants are highly sensitive to the abiotic stresses of salinity and drought that accompany climate change. The analysis of stress response transcriptomes is a powerful approach for the identification of novel genes and their regulators, including microRNA (miRNA), that have potential applications for crop stress relief. Through the analysis of banana root mRNA, sRNA and degradome data, miRNA-regulated transcripts were identified as candidate abiotic stress-relieving genes. A functional genetic approach was used to validate two of these candidate banana abiotic stress genes in the model plant Arabidopsis. It was shown that the constitutive expression of a banana cytoplasmic G protein cDNA in Arabidopsis can trigger stress responsive root adaptation that improves ability of the plants to adapt to drought conditions. Similarly, a banana ZFP that is located in the plant nucleus, was demonstrated to relieve salinity stress when ectopically expressed in Arabidopsis. In both studies, the plants had low levels of ROS, high biomass and healthy roots, showing this to be a promising approach towards the development of climate resilient bananas. These studies demonstrate the usefulness of exploring miRNA regulatory networks for candidate stress genes in less studied crops.

Keywords:

Abiotic stress; Banana; CCCH Zinc finger protein; G protein

Biography

Originally from the UK, but a permanent resident of Malaysia, Prof. Dr. Jennifer Ann Harikrishna completed her BSc in Microbiology at the University of Surrey, spending a year working in industry as a part of her degree programme. She was awarded a Whitbread Scholarship which enabled her to pursue her doctoral thesis in the molecular genetics of industrial yeast at Cranfield University, U.K. for which she was awarded the Chancellors Gold Medal for the most outstanding graduate student in the University in 1990. After post-doctoral fellowships at the University of California in San Francisco (UCSF), then later at the Universiti Malaya, she held positions at TropBio Research Sdn. Bhd., University Putra Malaysia and the Malaysia University of Science and Technology. Jenni rejoined the University of Malaya in 2006 where she has been a full professor since 2011.

Prof Jenni is currently the Director of the Centre for Research in Biotechnology for Agriculture (CEBAR) at the Universiti Malaya, holding joint appointments as a Professor in the Microbiology and Molecular Genetics Programme under the Faculty of Science at the Universiti Malaya and as an Honorary Visiting Fellow in the Department of Genetics and Genome Biology at the University of Leicester, UK. Prof. Jenni's current research interests are fundamental research and its application through biotechnology for use in agriculture, including the molecular genetics of tropical plants and the use of microbes to help crops deal with the effects of climate change.

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Breaking the Cycle of Fodder Scarcity and to Enhance Dairy Productivity in India: A System Dynamics Modeling Approach for Effective Interventions

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Abstract

India is currently the world's largest milk producer; yet animal milk productivity is far below its potential. The primary reason is malnutrition among the cattle, which stems from an uneven distribution between the demand for and availability of feed and fodder within the country. This research seeks to explore the causes of fodder scarcity and solutions to enhance availability and milk productivity. It evaluates the utility of landrace, multicut, and dual-purpose sorghum cultivars that thrive in drought-prone areas with limited water. The study aims to establish a sustainable sorghum fodder-dairy value chain to improve smallholders' income and meet the rising demand for milk in India and beyond. The outcomes will help develop effective strategies to enhance dairy productivity, yielding significant socioeconomic benefits. Using a system dynamic modeling approach, we developed a dynamic value chain model and ex-ante assessed the dynamic impacts of various interventions scenarios on the sorghum fodder dairy value chain. The model aims to identify leverage points to improve farm income and performance of the value chain. We have developed a model consisting of six modules, namely sorghum grain & fodder production, herd, feed, milk production & sales, cost & returns of sorghum, and cost & returns of the dairy. We evaluated scenarios to improve dairy farm productivity through group model building, focusing on improving the fodder system via multi-cut sorghum varieties and silage adoption. Scenarios included increasing dual-purpose grain sorghum area, sorghum fodder proportion, dairy cow numbers, and combinations of these. The analysis showed that implementing these interventions would boost farm income significantly. Specifically, increasing the multi-cut-fodder area by 5%, the sorghum fodder proportion in total feed by 5%, herd size by 10%, or a combination of these interventions would result in income increases of 7.29%, 8.17%, 10.11%, and 18.01%, respectively. Our simulations demonstrate the long-term profitability of improving the feed and fodder system to boost milk production and fodder yields. The study highlights how crop-livestock integration can increase farm income in India's semiarid areas. This model can help the policymakers to evaluate and design sustainable strategies for dairy fodder systems improvement, enabling them to make informed decisions to improve the sorghum fodder-

dairy value chain and smallholder livelihoods. This is the first of its kind dynamic sorghum fodder-dairy value chain analysis for India, identifying intervention points for enhancing milk production and farmers' income.

Keywords:
System Dynamics; Fodder-Dairy; Value chain; Milk production.

Biography
Harishankar is an Assistant Professor (Agricultural Economics) at Department of Social Sciences, S. Thangapazham Agricultural College, and Affiliated with Tamil Nadu Agricultural University, India. He completed his B.Sc. Agriculture, M.Sc. Agriculture in Economics and Ph.D. in Agricultural Economics from Tamil Nadu Agricultural University. His area of research interests are Production Economics, Natural Resource Economics and System Dynamics Modelling. He is a recipient of the ICSSR Doctoral Fellow Award in 2019 during his doctoral program. He has also an international research work experience in the field of system dynamics modelling of farming systems from 2019 to 2022 in International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad. His publication includes 25 articles in well-reputed national and international journals and 30 miscellaneous short communications.

MaizeNET: Artificial Intelligence for Precision Agriculture

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Abstract

The increasing gap between the demand and productivity of maize crop is a point of concern for the food industry, and farmers. Its' susceptibility to diseases such as TurcicumLeaf Blight, and Rust is a major cause for reducing its production. Manual detection, and classification of these diseases, calculation of disease severity, and crop loss estimation is a time-consuming task. Also, it requires expertise in disease detection. Thus, there is a need to find an alternative for automatic disease detection, severity prediction, and crop loss estimation. The promising results of machine learning, and deep learning algorithms in pattern recognition, object detection, and data analysis motivate researchers to employ these techniques for disease detection, classification, and crop loss estimation in maize crop. The research works available in literature, have proven their potential in automatic disease detection using machine learning, and deep learning models. But, there is a lack none of these works a reliable and real-life labelled dataset for training these models. Also, none of the existing works focus on severity prediction, and crop loss estimation. The authors in this manuscript collect the real-life dataset labelled by plant pathologists. They propose a deep learning-based framework for pre-processing of dataset, automatic disease detection, severity prediction, and crop loss estimation. It uses the K-Means clustering algorithm for extracting the region of interest. Next, they employ the customized deep learning model 'MaizeNet' for disease detection, severity prediction, and crop loss estimation. The model reports the highest accuracy of 98.50%. Also, the authors perform the feature visualization using the Grad-CAM. Now, the proposed model is integrated with a web application to provide a user-friendly interface. The efficacy of the model in extracting the relevant features, a smaller number of parameters, low training time, high accuracy favors its importance as an assisting tool for plant pathologyexperts.The copyright for the associated web application 'Maize-Disease-Detector' is filed with diary number: 17006/2021-CO/SW.

Biography

Eugenio Vocaturo received a Laurea Degreein Management Engineering, aMasterDegreein Design and Development of Web and Mobile Applications and a PhD Degree in Information and Communication Technologies at the University of Calabria, Italy. He also received a Master Degreein Industrial Process Management and a Master Degree in Finance issue d by SDAB occoni. He has decades of experience as company director,being head of editorial production of important IT publishing houses and co-founding partner of the start-up BigTech. He is currently researcher at CNR-Nanotec and contract professor of Informatics, Process Mining, Data Mining and Information Systems and Data Base at University of Calabria. His

current research interests include Artificial Intelligence, Optimization, Health Informatics, Process Mining, Cultural Heritage, Agritech. He ismemberof Topical Advisory Panel and Editor Reviewer of several international journals and permanent member of the program committee of international conferences, being author of several papers in international journals, conferences and books. He is Chair of the international workshop AIDA(AI-Driven Agriculture: opportunities and challenges) at IEEE Big Data, member of SIBIM (Italian Scientific Society of Biomedical Informatics), of HL7 Italy (formed in 2003 as part of HL7 International),
and of AIXIA (Italian Association forArtificial Intelligence).

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Exploring the Production, Characterization and Potential Food Application of Plant-Derived Proteases

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Abstract

Proteolytic enzymes (peptidases, proteases and proteinases) catalyze the hydrolysis reaction of peptidebonds in which proteins break down into smaller peptides and/or individual amino acid residues. Thisclass of biocatalyst are the most commercially important because of their multiple applications in foodprocessing. Throughout history, people have utilized plant proteases to obtain various foods. Plant extracts are essential in different traditional practices, playing a pivotalrole in important food processing, such as meatt end erization and cheese production.
However, proteolytic enzymes have also found a new use in modern food processing technologies.Hydrolysis of dietary proteins is essential for food's bio- and techno-functional characteristics. Theirhydrolysis impacts the properties of the food matrix, such as changes in sensory quality (texture orflavour),increased digestibility, decrease dallergenicity, or release of bio active peptides.
The extensive and advantageous application of proteases requires a low cost in their production, suchas large-scale production, and those of microbial origin underway replace the plant enzymes. Recently, various pharmaceutical and bio technological industries havetak enarenewedinterestinplantproteases, and this is due to their substrate specificity and catalytic effective ness across multiple temperatures and pH values.Never the less, theenzyme source and application perspective influence the urgency to innovate process technologies to reach sustainability goals and promote a circular economy.
The present study focused on extracting proteases from different vegetable materials, considering their applications and potential in food processing. We studied various extraction methods on multiple plant samples to achieve the research objective. We then compared the proteolytic extracts by evaluatingtheir catalytic parameters. The extracted enzymes were also studied by defining their technologicalefficiency in cheese making process. In the past decade, there has been a pursuit for different rennetenzymes to coagulate milk, and several plant sources were investigated. The main disadvantage of vegetable milk coagulant is the development of a bitter taste and low curd yield. Our research is focused on the feasibility estimation ofproteases isolated fromvegetables in the cheese-making process. We have developed a miniaturized laboratory-scale cheese for curdling and sensory analysisfor cheese-making feasibility assessment. The obtained results reveal that the plant protease may have potential application for cheesemanufacture, demonstrating a different technological prospect depending on the plantprotease's source.

Keywords:
Food processing; Proteases; Sustainability; Vegetable enzyme.

Biography

Since December 2021, Katia Liburdi has been an Associate Professor in the Food Scienceand Technology sector at the Department of Agricultural and Forestry Sciences (DAFNE)-UniversityofTuscia.Shehasbeenalecturerincourses(Oenology,FoodChemistryandFoodTechnology)forthe bachelor's degree in food science and technology and Agricultural and Environmental Sciences.Moreover,shespentdifferentperiodsabroadforresearchactivities. Duringthepastfiveyears,shewas "Research Visiting" at the University of Debrecen (Hungary), a "Research Assistant" at theUniversity College of Cork (Ireland) and "Invited Professor" at the Faculty of Animal Science andBiotechnology, University of Agricultural Sciences and Veterinary Medicine (USAMV, Romania).Prof. Liburdi conducted research activity devoted to enzyme application in food processing. Recently,she studied the application of vegetable proteases of different origins to the cheese-making process.The derived knowledge has been published in 44 peer-reviewed quality journals (h-index 18, TotalCitation: 790 (by 361 documents); Scopus ID: 14016315000, Web of Science: R-8222-2018. IDORCID: https://orcid.org/0000-0002-3175-5364). Since 2019, she has been Associate Editor of theFood Bioscience journal (IF: 5,318; JCR Q1 journal) and a member of the Editorial Board of Acta Alimentaria (ScopusandWoSindexedwithIF:0.384) and Foods (IF:5,561;JCRQ1journal) journals.

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Targeting Allatostatin Receptor for Pesticides

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Abstract

Insects represent the most crowded animal groups on Earth. Although mammals have approximately 5000 species, insects have more than 1.4 million species. Accordingly, theyhave very vitalrole sinecology and agriculture. Despite this, they can also act aspests.

Tremendous benefits have been derived from using pesticides in forestry, public health, andagriculture. However, they have profound health implications for man and the environment. Insect neuropeptides have been suggested as ideal candidates, which do not affect humans,but their disadvantage is their low bio availability and high cost of using them as a pesticide. So, designing an agonist for their receptors, which are G-protein-coupled-receptors (GPCRs), is an alternative to using the peptide. Allatostatin neuropeptides are inhibitors of juvenilehormone in insects that regulates metamorphosis, food intake, and many other essential physiological functions. AstRs are GPCRs, found in the cell membrane and activated after binding their ligands, resulting in the expression of relatedgenesand finally responding to this stimulus.

The targeted insect species is the pine processionary moth (Thaumetapoeapityocampa),whic hfeedsfrom the leaves of pinetrees and damages pine forests mainly in South Europe/South Africa/Mediterranean Countries. It is allergic to mammals due to its urticatinghairs. Using whole-genome sequencing, we identified the receptor and ligand sequence. To determine the orthosteric pockets of the receptor, we performed lig and docking/molecular dynamic/ simulationstudiesbyscreenings malllibraries(ChemDiv).We identified 4molecules that bind to the receptor. Further verification was done by site-directed mutagenesis. Weperformed in vitro assays by TGFα shedding assay (EC50 EC50 4.6µM, 2.12 µM, 6.7 µM, 34µM). In vivo, studies were done by feeding the insects with pine tree leaves, which were applied with different concentrations of the design edagonist (LC50443.646mg/L).

The current study discovered novel AlstR-C targeted specific hit agonists with no harmful effects on other insects. Our study is an essential initial advance toward an insect GPCR-targeted next-generation pesticide design. In addition, our approach may apply to otherinvertebrateGPCRs involved in vital metabolic path ways.

Keywords:

Molecular Biology and Genetics, Ab-initio Molecular Dynamics, Bioinformatics, Biopesticide, Juvenile hormone.

Biography

Dr. Necla Birgül is an Assistant Professor at the University of Bogazici, Department of Molecular Biology and GeneAcs. She completed her Ph.D. at the University of Hamburg. During her Ph.D., she could clone the allatostaAn receptor (AlstR) and isolate its naAve ligand from drosophila melanogaster by reverse physiology for the first Ame. Allatosta AnneuropepAdes are inhibitors of juvenile hormone in insects that regulates metamorphosis, food intake, and many other essenAal physiological funcAons. AstRs are GPCRs, found in the cell membrane and acAvatedaLer binding their ligands, resulAng in the expression of related genes and finally responding to this sAmulus. GPCRs are the target of the currently used drugs. Dr. Birgul did her postdoc in Cape Town with Prof. Gaede, South Africa. Her main area is to find molecules that target the allatostaAn receptor in different pests, such as pine processionary moths. Her studies primarily focus on homology modeling and simulaA on using bioinformaAc techniques and then on in vitro and in vivo experiments. Prof. Birgula Rended many internaAonal conferences and published 21 research papers in internaAonal journals.

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Application of Soil Moisture Datasets Based Water Sensingin River Basins of Southeastern United States

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Abstract

Water sensing is essential for understanding the dynamics of groundwater recharge and for sustainable groundwater management. Conventionally, groundwater recharge is predicted using conventional process-based modeling, volumetric and hydraulic head methods, and water remote sensing-assisted water balance techniques. Recent studies have explored the applicability of data assimilation techniques individually and as ensembles in the simulations of groundwater recharge. However, they do not address (1) the unevenness in the availability of spatial data across the watersheds for validating the data assimilation products, (2) apple-to-apple verification of the developed or downscaled data from remote sensing against models or historical results, (3) non-point sources of contamination like agricultural waste and atmospheric pollutants, and (4) point sources of contamination like reservoirs and diversions. The objective of this work is to evaluate the results of groundwater recharge using various scenario-based data assimilation approaches fused into process-based hydrological models. To avoid data gaps and to capture the spatial variability of groundwater recharge across the regional watersheds, the analysis will be carried out in river basins of Southeastern United States. The hydrological modeling is performed using the Soil and Water Assessment Tool (SWAT). A careful water balance evaluation will be performed in the study area based on the SWAT outputs to check the hydrological response predictions by SWAT in the calibrated and validated settings. The scenarios-based analyses will be developed by assimilating soil moisture data from three different remote sensing sources, such as the Gravity Recovery and Climate Experiment (GRACE), Soil Moisture Active Passive (SMAP), and Sentinel, and fusing them into a process-based watershed model, SWAT. The point and non-point sources of contamination will be accounted for in the SWAT model by managing the water quality data modules in SWAT and by including the reservoirs and ponds within the river basins, respectively. These kinds of assessments serve as pioneer frameworks for realistic water sensing to facilitate regional hydrological predictions and groundwater governance.

Biography

Dr. Pooja Parvathy Preetha is an accomplished environmental and water resources engineer, serving as an Assistant Professor at Alabama A&M University, USA. She holds a Ph.D. in Civil & Environmental Engineering, specializing in water quality modeling from the University of Alabama in Huntsville. With expertise in GIS, remote sensing, and data analytics, her research aims to address water resource challenges and promote environmental health. Dr. Preetha's contributions include 15 articles in esteemed journals, 22 conference proceedings, and 11 presentations. She has also led significant research projects funded by institutions like the National Science Foundation, demonstrating her commitment to making a positive impact on society and the environment.

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