



World Congress on

PLANT GENOMICS AND PLANT SCIENCE

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Scientific Tracks & Abstracts

SESSIONS

Plant Nanotechnology | Plant Tissue Culture | Plant Nutritional Genomics | Plant Synthetic Biology and Transcriptome

Session Introduction

Session Chair

S M Paul Khurana
Amity Institute of
Biotechnology, India

- Title: Optimizing the seed germination of *Garcinia mangostana* L. through priming treatments** Puzon Juliana Janet M, University of the Philippines, Philippines
- Title: Antimicrobial activity of *Moringa oleifera* and *Terminalia arjuna* leaf extracts against fungal pathogens**
Shikha Khandelwal, Amity Institute of Biotechnology, India
- Title: *In vitro* mass cloning of *Stevia rebaudiana* and extraction and quantification of stevioside by high performance thin layer chromatography**
Manju Anand, Amity Institute of Biotechnology, India
- Title: Identification of transcription factors involved in the response to both BPH infestation (biotic stress) and different levels of nitrogen (abiotic stress) in rice cultivars**
Uma Priya Kupusamy, Newcastle University, United Kingdom
- Title: Growth and biochemical responses of okra (*Abelmoschus esculentus*) to phosphorus sources supplemented with humic acid**
Maqsood Ahmed, Mirpur University of Science and Technology, Pakistan

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OPTIMIZING THE SEED GERMINATION OF *GARCINIA MANGOSTANA* L. THROUGH PRIMING TREATMENTS

Puzon Juliana Janet M

University of the Philippines, Philippines

Garcinia mangostana L., commonly known as mangosteen, has recalcitrant seeds that remain dormant unless exposed to optimal environmental conditions. In various crops, seed priming treatments are known to enhance seed germination, and alter the seed's metabolic activity before germination. The study aimed to optimize the germination of *G. mangostana* seeds through different priming treatments, namely, soaking the seeds in H₂O, H₂O₂ and acid scarification with HNO₃. The effectiveness of the priming treatments in inducing seed germination was compared. The lipid and carbohydrate components of the seeds that had undergone priming were determined. Mangosteen seeds were subjected to three different methods of seed priming, namely soaking seeds in distilled water, H₂O₂ acid scarification with HNO₃ before germinating in the dark for seven days. The germination percentage, mean germination time, and germination rate were measured every day. After 7 days of germination, total lipids and total carbohydrates in ungerminated and germinated seeds were quantified using modified Folch method, and Dubois assay, respectively. The results of seed germination showed that soaking the seeds in 0.5% H₂O₂ was the most favourable among all the priming treatments based on the values of measured germination parameters. A significant difference between the mean % germination of seeds was observed, while there was no significant difference between the mean germination rates and mean germination time of seeds between treatments. Increasing concentrations of H₂O₂ and HNO₃ reduced the lipid content of seeds. The carbohydrate content of the germinated seeds primed with distilled water and increasing concentrations of H₂O₂ decreased, while seeds primed with increasing concentrations of HNO₃ had increasing carbohydrate content. Therefore, the concentrations of H₂O₂ and HNO₃ in the priming treatments greatly affect the lipid and carbohydrate contents of the seeds. Results of this study serve as a significant contribution to the improved propagation of *G. mangostana* L., an economically valuable species.

BIOGRAPHY

Puzon Juliana Janet M is a botany professor in the Institute of Biology, College of Science, University of the Philippines, Diliman, Quezon City. She teaches botany subjects and heads the Plant Physiology Research Laboratory in this institute. Her current research interests include plant stress physiology, phytotechnologies, bioactive secondary metabolites, and physico-chemical and phytohormonal control of seed germination.

janetmpuzon@gmail.com



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ANTIMICROBIAL ACTIVITY OF *MORINGA OLEIFERA* AND *TERMINALIA ARJUNA* LEAF EXTRACTS AGAINST FUNGAL PATHOGENS

Shikha Khandelwal and SM Paul Khurana

Amity Institute of Biotechnology, India

Medicinal plants are rich sources of biologically active compounds to combat various diseases. The present study evaluated antifungal activity of aqueous extracts in phosphate buffered saline (PBS, pH 7.2), potassium phosphate buffer (PPB, pH 7.0), sodium phosphate buffer (SPB, pH 7.0) and sodium acetate buffer (SAB, pH 5.2) and in organic solvents (ethanol, hexane, dichloro methane, butanol, and methanol) with different polarity from the plants, *Moringa oleifera* and *Terminalia arjuna*, selected on the basis of their use in traditional medicine. The leaf extracts were analyzed qualitatively and quantitatively for phytochemicals and found having flavonoids, phenols, tannins, steroids, glycosides, alkaloids saponins etc. The antimicrobial activity was evaluated based on the zone of inhibition, in agar well diffusion assay against three fungi (*A. niger*, *T. rubrum* and *Fusarium sp.*). Maximum antimicrobial activity was observed in extracts with PBS for *M. oleifera* against *A. niger* (30±0.05 mm) followed by *T. rubrum* (27±0.03 mm) whereas *T. arjuna* extract showed maximum activity against *A. niger* (30±0.05 mm). Similarly, antimicrobial activity in organic solvents showed dichloro methane extract of *M. oleifera* with maximum activity against *A. niger* (15±0.03mm) and *T. arjuna* extract against *A. niger* (13±0.04 mm). The plant extracts least activity against *Fusarium sp.* Minimum inhibitory concentration (MIC) for *M.oleifera* showed an overall highest activity in PBS buffer @ 24.35±0.02 mg/ml against *A. niger* and dichloro methane extract against *A.niger* (MIC 56.26±0.05 mg/ml) whereas *T. arjuna* extract registered maximum activity against *A. niger* with MIC 45±0.05 mg/ml in PBS buffer and 83±0.43 mg/ml in dichloro methane, respectively. These extracts proved to be having fungicidal effects, supporting their traditional use.

BIOGRAPHY

Shikha Khandelwal obtained BSc (2005) degree from MDS University, Ajmer and MSc in Biotechnology (Gold Medalist, 2007) from Rajasthan agricultural University, Bikaner. She joined IBI Biosolutions Pvt. Ltd. (2007) Panchkula, for one year project based on "Biotech Industrial Training Programme 2007-08" organized by Biotech Consortium India Limited, where she worked on various aspects of Bioinformatics tools and techniques including 'In silico drug designing, Programming Language (PERL) and comparative sequence analysis'.

writein.shikha@gmail.com



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IN VITRO MASS CLONING OF STEVIA REBAUDIANA AND EXTRACTION AND QUANTIFICATION OF STEVIOSIDE BY HIGH PERFORMANCE THIN LAYER CHROMATOGRAPHY

Manju Anand

Amity Institute of Biotechnology, India

Stevia rebaudiana Bertoni (family Asteraceae) popularly known as “Sweet leaf” is an important medicinal plant used for obesity, heart disease, dental caries, as contraceptive and anticancerous agent. The leaves of *Stevia* are the source of diterpene glycosides and among these stevioside is a high intensity, non-caloric, high potency sweetener being 300 times sweeter than sucrose. An efficient and reproducible *in vitro* protocol was established for the mass cloning of this valuable plant followed by extraction and purification of stevioside—the major secondary metabolite from micropropagated plants and cell cultures using High performance thin layer chromatography (HPTLC). It exhibited a high propensity of *de novo* adventitious shoot formation both directly from the leaf explants and indirectly through leaf callus on variously augmented Murashige and Skoog’s medium. Individual shoots were rooted on half strength basal MS medium and plantlets were acclimatized and successfully established in the field. Extraction of stevioside from leaves of micropropagated plants collected at different time intervals (3, 4, 5, 18, 30 months), callus and suspension cultures were achieved following solvent extraction with petroleum ether, methanol, diethyl ether and butanol. The crude extract was initially purified on glass TLC followed by its fine purification on pre-coated silica gel 60 F254 plates by using High performance thin layer chromatography scanned at 210 nm. The highest amount of stevioside was obtained from thirty months old plants which yielded 94.9 µg/ml of stevioside followed by 69.40 µg/ml and 44.37 µg/ml in suspension cultures harvested at stationary phase and callus respectively.

BIOGRAPHY

Manju Anand has completed her PhD from Panjab University, Chandigarh, India. Presently she is a Professor in Amity Institute of Biotechnology, Amity Institute of Biotechnology, Haryana, India. A professional in Plant Biotechnology specializing in Plant Tissue Culture, she has rich experience of working on the micropropagation of some economically important hardwood and softwood trees and edible bamboos and ascertaining their clonal fidelity through different molecular markers. Presently she is working on the mass propagation of some valuable and endangered medicinal plants and extraction of secondary metabolites from *in vitro* cultures and their evaluation as therapeutic agents. She has nearly 40 publications in peer reviewed journals that have been cited over 192 times and her publication H-index is 9.

manand@ggn.amity.edu



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IDENTIFICATION OF TRANSCRIPTION FACTORS INVOLVED IN THE RESPONSE TO BOTH BPH INFESTATION (BIOTIC STRESS) AND DIFFERENT LEVELS OF NITROGEN (ABIOTIC STRESS) IN RICE CULTIVARS

Uma Priya Kupusamy

Newcastle University, United Kingdom

Plants have evolved to develop astonishing survival strategies to adapt to variations in environmental conditions include rapid onset of abiotic and biotic stresses. These extreme conditions have caused constraints on the growth and development of plants as well as caused enormous economic loss globally to crops. Rice, *Oryza sativa* is one of the most important staple foods for more than half of the world population. In order to fulfil the food demand of the growing population, rice production needs to be increased significantly to 42%, from its current level. Stresses such as nitrogen (N) deficiency (abiotic stress) and brown planthopper (BPH) infestation (biotic stress) has been a major constraint in rice growing areas. The present study identified two TF genes which were involved in the combination of the reduced levels of N and BPH infestation in TN1 (susceptible to BPH) and IR70 (resistant to BPH) rice cultivars. *OsNCL1* and *OsNCL2* which was previously reported to be potentially related to BPH-resistance showed differential expression patterns in response to the combination of both the stresses. These TFs were up-regulated in response to the reduced levels of N (1.04 mM NH_4NO_3 , 0.64 mM NH_4NO_3 and 0.24 mM NH_4NO_3) compared to the optimal N level (1.44 mM NH_4NO_3) at different time points of BPH infestation whilst the resistant IR70 was down-regulated to a greater magnitude in response to the reduced levels of N compared to the optimal upon BPH infestation. Down-regulation of both the genes in the resistant IR70 cultivar under the reduced levels of N and in the presence of BPH infestation shows that these TFs have repressed many active pathways to prevent further damage and is an efficient method of defence against infestation of the insect pest. Ultimately understanding the gene-regulatory network is important to develop or select for stress-tolerant and high yielding rice cultivars.

BIOGRAPHY

Uma Priya Kupusamy has completed her PhD recently (Jun 2018) from Newcastle University, United Kingdom. Her field of study involved molecular responses of rice to abiotic and biotic stress. She is currently the head of food microbiology section in the department chemistry, Malaysia and also a member of reputed working groups in Malaysia.

uma.priya0406@gmail.com



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GROWTH AND BIOCHEMICAL RESPONSES OF OKRA (*ABELMOSCHUS ESCULENTUS*) TO PHOSPHORUS SOURCES SUPPLEMENTED WITH HUMIC ACID

Maqsood Ahmed

Mirpur University of Science and Technology, Pakistan

Phosphorus (P) is an essential nutrient for plant growth and is often the limiting nutrient in agricultural ecosystems owing to its low availability in soils. The present work investigates the stimulating effect of organic P sources; compost and poultry manure (PM) and rock phosphate (RP) supplemented with humic acid (HA) on the growth, yield, nutrient uptake and antioxidant activity of okra (*Abelmoschus esculentus*) under greenhouse condition. The experiment was laid out under Complete Randomized Design and replicated thrice; the treatments include: T₁ = control; T₂ = RP equivalent to 90 kg P₂O₅ ha⁻¹; T₃ = PM equivalent to 90 kg P₂O₅ ha⁻¹; T₄ = compost equivalent to 90 kg P₂O₅ ha⁻¹; T₅ = RP + PM equivalent to 90 kg P₂O₅ ha⁻¹ (50:50 ratio); T₆ = RP + compost equivalent to 90 kg P₂O₅ ha⁻¹ (50:50 ratio); T₇ = RP + PM + HA (RP + PM in 50:50 ratio equivalent to 90 kg P₂O₅ ha⁻¹ and HA @ 100 mg kg⁻¹ soil); and T₈ = RP + compost + HA (RP + compost in 50:50 ratio that is equivalent to 90 kg P₂O₅ ha⁻¹ and HA @ 100 mg kg⁻¹ soil). The results indicated that the plant height, shoot dry weight, leaf chlorophyll and pod yield were highest where RP and PM were supplemented with HA. Plant P uptake was maximum in treatments receiving compost either with or without HA application. Biochemical data regarding DPPH radical scavenging showed superiority of RP while the phenolic content showed dominance of RP + compost with the highest phenolic content (1.22 mg GAE/g). Maximum hemolysis was observed in PM treatment followed by compost and the least was recorded in RP + PM. The study reflects that the application of HA and integration of RP with organic P sources increased the okra yield and improved biochemical quality of pods.

BIOGRAPHY

Maqsood Ahmed starts his job as University faculty member in 1988 after his graduation. Later, he has completed his PhD degree in 2009 and Post Doc from Republic of China in 2013. He served as Director Advanced Studies and Research Board, Mirpur University of Science and Technology for more than 1 year. He also worked as Chairman Department of Biotechnology, MUST and now he is working as Dean Faculty of Arts since 3rd February 2017.

dr.maqsood@must.edu.pk



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