3rd International Conference on
Ecology, Ecosystem and Conservation Biology
3rd International Conference on &
Microbial Ecology & Eco Systems
March 18-19, 2019 | Chicago, USA

VIDEO PRESENTATIONS | **DAY 2** *JOURNAL OF ECOSYSTEM & ECOGRAPHY 2019, VOLUME 9 | DOI: 10.4172/2157-7625-C1-044*

UPLC-HRMS based untargeted metabolic profiling reveals changes in chickpea (*cicer arietinum*) metabolome treated with PGR and PGPR

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Genetic improvement for drought tolerance in chickpea requires a solid understanding of biochemical processes involved with different physiological mechanisms. The objective of this study is to demonstrate physiological changes and altered metabolic levels in chickpea varieties (tolerant and sensitive) treated with PGPR and PGRs and grown under contrasting water regimes. Ultrahigh performance liquid chromatography-high resolution mass spectrometry (UPLC-HRMS) analyses was carried out to classify metabolites associated with drought tolerance in chickpea. The seeds of two chickpea genotypes (Punjab Noor-2009 and 93127) differing in sensitivity to drought were soaked for 2-3 h prior to sowing in 24 h old cultures of isolates. The salicylic acid (SA) and putrescine (Put) were sprayed (150 mg/L), on 25 days old seedlings of chickpea. The result showed that plants treated with consortium of PGPR and PGRS significantly enhanced the chlorophyll, protein and sugar contents. Highly significant increases were recorded for relative water content in PGPR and PGRs treated plants. Leaf proline content, lipid peroxidation and activities of antioxidant enzymes (CAT, APOX, POD and SOD) were increased in response to drought stress but decreased due to PGPR. Grain weight, number of nodules, pod weight and total biomass were higher in PGPR and PGR treated plants grown in sandy soil. Proline, L-arginine, L-histidine, L-isoleucine and tryptophan were accumulated in the leaves of chickpea exposed to drought stress. Consortium of PGPR and PGRs induced significant accumulation of riboflavin, L-asparagine, aspartate, glycerol, nicotinamide, and 3-hydroxy-3-methyglutarate in leaves of chickpea. Sensitive genotype showed significant accumulation of nicotinamide and 4-hydroxy-methylglycine in PGPR and PGR treated plants at both time points (44 and 60 days) as compared to non-inoculated drought plants. Arginine accumulation was also enhanced in the leaves of sensitive genotype under drought condition. Metabolic changes in light of drought condition and in presence of PGPR and

PGRs highlighted pools of metabolites that affect the metabolic and physiological adjustment in chickpea that reduced drought impacts. Therefore, the integrative use of consortia of PGPR and SA could be an effective eco-friendly approach to induce drought tolerance in crop plants.

Biography

Naeem Khan has his expertise in the field of Plant-Microbe Interactions and Plant Sciences. His scientific interest includes the study of Plant-Microbe Interactions, Abiotic stresses, Phytoremediation and Metabolic responses of Plants to environmental stresses. He employed a non-targeted global ultrahigh performance liquid chromatography-high resolution mass spectrometry (UPLC–HRMS) analysis to identify metabolites from the leaf tissue of irrigated and drought-stressed chickpea plants inoculated with PGPRs. He has published many papers in well reputed international journals related to plant-microbe interactions, plant metabolites and role of PGPR in phytoremediation.

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