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Identification of genes involved in responses to environmental stress using reverse genetic approaches

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Transcriptional reprogramming forms a major part of a plant's response to environmental stress. We investigated the effects of combinations of biotic and abiotic stresses on the transcriptome level of *Arabidopsis* genome using comparative microarrays. We showed a unique program of gene expression was activated in response to each biotic and abiotic stress. In addition, abiotic stress-induced genes were commonly regulated with *Botrytis cinerea* infection. The *Arabidopsis* cell wall *expansin-like A2 (EXLA2)* gene was identified based on its down-regulation in response to infection by the necrotrophic pathogen *B. cinerea*, and on the reduced susceptibility of its mutants to the same pathogen. The *exla2* mutants also enhanced tolerance to the phytoprostane-A_1 (PPA_1). Our results suggest that the absence or down-regulation of *EXLA2* leads to increased resistance to *B. cinerea* in a COI1-dependent manner, and this down-regulation can be achieved by PPA1 treatment. The *EXLA2* is significantly induced by salinity and cold, and exogenous application of abscisic acid (ABA). The *exla2* mutant also showed hypersensitivity towards increased salt and cold, and this hypersensitivity required a functional ABA pathway. Overall, *EXLA2* appears to be important in response to environmental stress, particularly in the pathogenesis of necrotrophic pathogens and tolerance to abiotic stress. Future directions to further analyze the functions of commonly expressed genes in response to environmental stress will increase our understanding of the plant stress response.

Biography

Synan F AbuQamar completed his PhD from Purdue University in Department of Botany & Plant Pathology in 2007 and Post-doctoral studies at the same university in the area of Molecular Genetics of Plant Immunity. In August 2008, he joined the Department of Biology at the United Arab Emirates University as an Assistant Professor. Currently, he is an Associate Professor at Arab Emirates University. His current research interest is in the area of Plant Molecular Genetics/Plant Biotechnology. He is co-author of number of publications in peer-reviewed international journals and serves as an Editorial Board Member in reputed journals.

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