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Identification of candidate genes involved in *Arabidopsis* responses to abiotic and biotic stresses using a transcriptomic approach

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 expansion-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-A1 (PPA1). 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.

Recent Publications

1. Saeed E E, Sham A, Salmin Z, Abdelmowla Y, Iratni, R, El-Tarabily K A and Abu Qamar S (2017) *Streptomyces globosus* UAE1, a potential effective biocontrol agent for black scorch disease in date palm plantations. Frontiers in Microbiology 8:1455.
2. Sham A, Moustafa K, Al Shamisi S, Alyan S, Iratni R and Abu Qamar S (2017) Microarray analysis of *Arabidopsis* WRKY33 mutants in response to the necrotrophic fungus *Botrytis cinerea*. PLOS One 12(2): e0172343.
3. Abu Qamar S, Moustafa K and Tran L S P (2017) Mechanisms and strategies of plant defense against *Botrytis cinerea*. Critical Reviews in Biotechnology 37(2):262-274.
4. Abu Qamar S, Moustafa K and Tran L S P (2016) Omics and plant responses to *Botrytis cinerea*. Frontiers in Plant Science 7:1658.
5. A Sham, K Moustafa, S Al-Ameri, A Al-Azzawi, R Iratni and S Abu Qamar (2015) Identification of candidate genes in *Arabidopsis* in response to biotic and abiotic stresses using comparative microarrays. PLOS One 10(5):e125666.

Biography

Synan F Abu Qamar has completed his PhD at Purdue University, Department of Botany & Plant Pathology in 2007 and Postdoctoral 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. His current research interest is in the area of Plant Molecular Genetics/Plant Biotechnology. He has co-authored a number of publications in peer-reviewed international journals. He is serving as an Editorial Board Member of reputed journals.

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