Second Laureate
Fundamental Research

Project title: Identification of drought, salinity and phosphorus deficiency genes and mechanisms

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Abstract:

Most of the land that is farmable is under conditions suboptimal for plant growth. About 70% of yield potential has been calculated to be lost to unfavorable environmental conditions. Plant breeding for stress tolerance can have a great impact in increasing crop productivity. However, it has been a slow and inefficient approach, particularly for abiotic stresses, due to the shortage of information on the molecular events underlying the tolerance. The advent of proteomics has made it possible to identify a broad spectrum of proteins in living systems and discover molecular mechanisms of stress tolerance. In this project, we analyzed the proteome of rice, wheat, sugar beet, Suaeda aegyptiaca, and Elymus elongatum under drought, salinity, and phosphorous deficiency stress conditions which results in new insight into plant stress tolerance mechanisms. We extended our studies from vegetative tissues such as leaf and root to reproductive tissues including young panicle and seed. We also studied the response of rice leaf plasma membrane proteome to salinity stress. Owing to contrasting changes in inter- and intra-species and the tolerant and susceptible genotypes, several proteins and mechanisms emerged as key participants in the stress tolerance. These results pave the way for molecular breeding of plant for stress tolerance.