**Roots of Drought and Flooding Tolerance in Rice**

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**Abstract**

Climate change is shifting weather patterns to more extremes. Drought and flooding are recognized as the two most widespread and damaging environmental stresses, and their occurrence has increased in frequency and intensity over the last decades. The plant root system architecture (RSA) is essential for water and nutrient uptake, anchorage, and interactions with microbes in soil; all functions that impact growth rate, abiotic stress tolerance and yield. Breeding efforts to improve crop yield have been in general focused on aboveground shoot traits, however, root traits are becoming key research focus and breeding goals as a second green revolution for boosting production of food grains such as rice and wheat. Understanding of the “hidden half” is essential for manipulation of RSA traits for optimizing plant growth and productivity under drought and flooding conditions. Roots exhibit a wide range of plasticity of morphological and physiological functionality in response to drought and flooding. We observed that rice root development is tightly regulated by crosstalk among hormone signals, such as auxin, ABA, ethylene, and jasmonic acid under abiotic stresses. We have identified several rice genes that control RSA under drought and flooding conditions, studied their functions, and devised strategies to manipulate the expression of these genes for conferring multi-stress tolerance in rice.