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Molecular and Biochemical Mechanism of Heavymetal Tolerance in Plants

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Heavy metal is a major environmental pollutant which inhibits the growth of plants, thus reduces its productivity. In response to heavy metal toxicity, plants employ various strategies such as chelation, vacuolar sequestration, and root to shoot translocation. To understand the dynamic ways of survival and adaptation, we are using different approaches. First, a metal-specific domain of plant vacuolar metabolite transporter was determined using yeast genetic selection system. Second, a protein kinase which is induced by heavy metal was cloned. Third, metal-tolerant and sensitive mutants of yeasts were isolated, and their mutated genes are in the process of cloning. Fourth, hydrogen peroxide was induced by chromium, but independently of oxalate oxidase activity. Fifth, one variety of rice which is tolerant to cadmium was shown to accumulate less Cd, and to have only one transporter while rice has generally two. Details of each approach will be addressed.

Keywords: heavy metal, vacuolar transporter, yeast mutants, hydrogen peroxide