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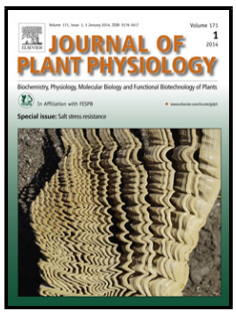

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Ectopic expression of a *Musa acuminata Root Hair Defective 3* (*MaRHD*3) in Arabidopsis enhances drought tolerance

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Abstract

Genetic improvement is an important approach for crop improvement towards yield stability in stress-prone areas. Functional analysis of candidate stress response genes can provide key information to allow the selection and modification of improved crop varieties. In this study, the constitutive expression of a banana cDNA, *MaRHD3* in Arabidopsis improved the ability of transgenic lines to adapt to drought conditions. Transgenic Arabidopsis plants expressing *MaRHD3* had roots with enhanced branching and more root hairs when challenged with drought stress. The *MaRHD3* plants had higher biomass accumulation , higher relative water content , higher chlorophyll content and an increase in activity of reactive oxygen species (ROS) scavenging enzymes; SOD , CAT , GR , POD and APX with reduced water loss rates compared to control plants. The analysis of oxidative damage indicated lower cell membrane damage in transgenic lines compared to control plants. These findings, together with data from higher expression of *ABF-3* and higher ABA content of drought-stressed transgenic *MaRHD3* expressing plants, support the involvement of the ABA signal pathway and ROS scavenging enzyme systems in *MaRHD3* mediated drought tolerance.

Keywords: Abiotic stress; banana, osmotic stress; ectopic expression; reactive oxygen species; G protein