136/B

Drought-induced guard cell signal transduction involves calcium dependant protein kinase 8; (CDPK8)

Disna Ratnasekera*
Department of Agricultural Biology, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya

Drought is a major constrain for plant growth and crop productivity. Plants loss over 90 % of water by transpiration through stomatal pores formed by pairs of guard cells on the leaf surface. The cytosolic free Ca^{2+} shown to be elevated in guard cells in response to stress stimuli which triggers stomatal closure. The plant-specific calcium-dependent protein kinases (CDPKs) play important roles in regulating downstream components of calcium signaling. The objective of this study was to elucidate the function of CDPK8 gene in response to drought stress. CDPK8 knockout mutant plants were compared with the wild type *Arabidopsis thaliana* ecotype Colombia in response to drought. Water loss by leaves was observed to compare their transpiration rates. Stomatal apertures were measured with H_2O_2 and Ca^{2+} treatments. CDPK8 gene expression was compared by RT-PCR in wild type and mutant plants.

Our data indicated that *Arabidopsis* CDPK8 gene (encoded by *WDSS1*) is involved in plant responses to water stress. *WDSS1* knockout mutants (*wdss1*) showed more sensitive phenotype and higher transpiration rate under water deficit condition compared to wild type plants. The GUS staining studies confirmed that *WDSS1* was expressed in guard cells. The finding of strong expression of *WDSS1* in guard cells suggests that *WDSS1* may play a role in stomatal function. Stomatal experiments showed that pre-opened *wdss1* stomata failed to close in response to H_2O_2 and Ca^{2+}, which is consistent with the inability of *wdss1* plants to reduce water loss upon drought. Our data indicated that the *wdss1* mutations do not cause a general defect in stomatal functioning but specifically disrupt H_2O_2 signaling in guard cells. The drought susceptibility and stomatal impairment in response to H_2O_2 and Ca^{2+} of the *wdss1* mutant plants implicated that *WDSS1* gene is a compulsory molecule in the transduction of H_2O_2 signal in guard cells in response to drought stress.

*dratnasekera@yahoo.com Tel: 060-2412599