The multigene family of PYR/PYL abscisic acid receptors plays a major role for plant response to drought

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Abscisic acid (ABA) is a key hormone for plant growth, development and stress adaptation. Because of its essential function in plant drought response, elucidating the ABA signaling pathway holds enormous promise for application in agriculture. A crucial advance was the discovery of the 14-member PYR/PYL family of ABA-receptors. However, perception of ABA through other types of receptors, i.e. GCR2, GTG1/GTG2 and Mg-chelatase H-subunit, has been also reported. PYR/PYL ABA-receptors interact and inhibit in an ABA-dependent manner clade A phosphatases type-2C (PP2Cs), which are key negative regulators of the pathway. Inhibition of PP2Cs leads to activation of sucrose non-fermenting 1-related subfamily 2 (SnRK2) kinases, which regulate key events for plant survival under drought stress. Theoretically, the combinatorial possibilities of interactions, i.e. 14 PYR/PYLs, 9 clade A PP2Cs and 3 ABA-activated SnRK2s, provide a sophisticated fine-tuning of the ABA response.

Impairment of ABA perception through PYR/PYL receptors reduces vegetative growth and seed production, leading to a severe open stomata and ABA insensitive phenotype, even though other branches for ABA perception remain active. An *Arabidopsis* sextuple mutant impaired in PYR1, PYL1, PYL2, PYL4, PYL5 and PYL8 receptors was able to germinate and grow even on 100 □M ABA. Whole-rosette stomatal conductance (Gst) measurements revealed that leaf transpiration in the sextuple *pyr/pyl* mutant was higher than in the ABA-deficient *aba3-1* or ABA-insensitive *snrk2.6* mutants. The gradually increasing Gst values of plants lacking three, four, five and six PYR/PYLs indicate quantitative regulation of stomatal aperture by this family of receptors.

The sextuple mutant lacked ABA-mediated activation of SnRK2s and ABA-responsive gene expression was dramatically impaired as was reported in *snrk2.2/2.3/2.6*. In summary, these results show that ABA perception by PYR/PYLs plays a major role to

regulate seed germination and establishment, basal ABA signaling required for vegetative and reproductive growth, stomatal aperture and transcriptional response to the hormone.