**ABA signaling components functioning in drought tolerance of rice and their applications**

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**Abstract**

Abscisic acid plays critical roles in drought tolerant gene expression and stomatal closure of guard cells to adapt adverse environments. We identified the core ABA signaling components functioning in gene expression and stomatal closure of rice systematically. Firstly we demonstrated that ABA signaling components consist of *OsPYL/RCAR*s (ABA receptors), *Clade A phosphatases 2C* (OsPP2Cs), *SAPK*s, *bzip*s and *ABRE* cis-element using interaction networks, phenotyping of over-expression plants and reconstitution of signaling components in rice protoplasts. And then we demonstrated that *OsPYL/RCAR10*, *OsPP2C50*, *OsPP2C53* and *OsSLAC1* function in guard cell based on the guard cell specific gene expression, interaction networks and stomatal phenotypes using water loss assay.

After identification of ABA signaling components we compared the transgenic rice overexpressing *OsPYL/RCAR*s. Several transgenic rice lines enhanced strongly the drought tolerance but had severe growth defects. However, *OsPYL/RCAR7* can enhance drought tolerance without growth defects even though the tolerance is not strong as much as *OsPYL/RCAR9* or *OsPYL/RCAR10*. Thus *OsPYL/RCAR7 is* a good candidate to develop drought tolerant rice. These results lay the foundation for a strategy to improve drought tolerance of crop without yield penalty emphasizing the activity regulation.