research highlights

CHLOROPLAST PROTEINS

Fight drought

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In the face of climate change and increasing demands for food and energy, researchers are eager to develop high-yield crops that can cope with adverse conditions, such as drought. Understanding how plants coordinate photosynthesis and stress responses will help to develop effective strategies. A recent paper published by Jian-Kang Zhu's group from the Chinese Academy of Sciences, Shanghai, China, reported that two chloroplast proteins, which are essential for thylakoid formation, act as negative regulators of drought resistance in *Arabidopsis*.

Wang *et al.* screened more than 1,000 chloroplast mutants under drought stress. One mutant that showed increased drought resistance had a mutation in *HIGH CHLOROPHYLL FLUORESCENCE 106* (*HCF106*). *HCF106* protein is localized in the chloroplasts and its expression is mainly detected in guard cells. Through co-immunoprecipitation, the group further identified *HCF106*-associated proteins, among which *THYLAKOID FORMATION 1* (*THF1*) was chosen for genetic characterization. Mutations of both *HCF106* and *THF1* resulted in decreased stomatal aperture and water loss, and at the same time there was a significant increase in the production of reactive oxygen species in guard cells. These findings shed light on the role of chloroplast proteins in drought resistance.

In many plant species, guard cells are the only cells possessing chloroplasts in the epidermis. This study builds a bridge between guard cell chloroplasts and plant drought resistance.

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