Researchers investigate drought stress tolerance in plants

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Drought can directly impact plant growth and plant yield. Therefore, it's important to explore the regulation mechanism of drought stress response and breed drought-tolerant plants.

Endoplasmic reticulum-associated degradation (ERAD) plays an important role in the growth and stress response of plants by clearing the misfolded proteins and also some normal folding proteins.

A research team led by Prof. Xie Qi from the Institute of Genetics and Developmental Biology of the Chinese Academy of Sciences revealed that the UBC32-Rma1 complex increases drought stress tolerance in plant, which provides a new mechanism of ERAD in drought stress regulation.

Their findings were published in *The Plant Cell* on May 20.

UBC32 is an ubiquitin conjugating enzyme localized on endoplasmic reticulum membrane. The expression of UBC32 can be induced by multiple stresses. As an ERAD component, UBC32 mediates the degradation of misfolded proteins, and at the same time, it can be regulated by ERAD system.

Researchers found the overexpression of UBC32 significantly increased drought tolerance of Arabidopsis, while UBC32 mutants reduced the drought tolerance.

They also discovered that aquaporins PIP2;1 and PIP2;2 interacted with UBC32. UBC32 promoted the turnover of PIP2;1 and PIP2;2. RING type E3 ligase Rma1 formed E2-E3 pair with UBC32 and this pair was associated with the S280/283 phosphorylated PIP2;1, then ligated ubiquitin to the 276th lysine residue of PIP2;1 and promoted the degradation of PIP2;1 to increase plant drought tolerance.

These findings provide a possibility for breeding and/or engineering of drought tolerant rice and other crops in the future.

More information: Qian Chen et al, ERAD-related E2 and E3

enzymes modulate the drought response by regulating the stability of PIP2 aquaporins, *The Plant Cell* (2021). DOI: 10.1093/plcell/koab141

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