ABA-induced cytoplasmic translocation of COP1 enhances ROS accumulation through the HY5-ABI5 pathway to modulate seed germination

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Abstract

Seed germination is a physiological process regulated by multiple factors. Abscisic acid (ABA) can inhibit seed germination to improve seedling survival under conditions of abiotic stress, and this process is often regulated by light signals. Constitutive Photomorphogenic 1 (COP1) is an upstream core repressor of light signals, and is involved in several ABA responses. Here, we demonstrate that COP1 is a negative regulator of the ABA-mediated inhibition of seed germination. Disruption of COP1 enhanced *Arabidopsis* seed sensitivity to ABA and increased ROS levels. In seeds, ABA induced the translocation of COP1 to the cytoplasm, resulting in enhanced ABA-induced ROS levels. Genetic evidence indicated that HY5 and ABI5 act downstream of COP1 in the ABA-mediated inhibition of seed germination. ABA-induced COP1 cytoplasmic localization increased HY5 and ABI5 protein levels in the nucleus, leading to increased expression of ABI5 target genes and ROS levels in seeds. Together, our results reveal that ABA-induced cytoplasmic translocation of COP1 activates the HY5-ABI5 pathway to promote the expression of ABA-responsive genes and the accumulation of ROS during ABA-mediated inhibition of seed germination. These findings enhance the role of COP1 in the ABA signal transduction pathway.

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