

The Role of *CRY1* in Mediating Seed Germination and Early Seedling Development in Response to Light Intensity

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One of the most important factors regulating seed germination and early seedling growth is light. Some seeds require light for germination, and the promotion and inhibition of seed germination are regulated by different wavelengths of light. Plants sense the light signal through three major classes of photoreceptors: phytochromes (red/far red light), cryptochromes (UV-A/blue light), and phototropins. To understand the role of photoreceptors in seed germination and early seedling development in response to light intensity, we conducted the experiments using the transgenic plants overexpressing or underexpressing Cryptochrome1 (*CRY1*). The germination kinetics were determined by measuring the time of radicle emergence in seeds subjected to light intensities of 6, 60, or 600 $\mu\text{mol m}^{-2} \text{s}^{-1}$. In wild type plants, the final germination percentage was unaffected by different light intensity, but high light intensity caused a significant delay in germination. Interestingly, plants overexpressing *CRY1* showed reduced germination percentage and a delay in the timing of germination under both low and high light intensities. Surprisingly, the lower germination percentages in the *CRY1* overexpressors can be reversed by high light intensities in contrast to seeds of wild type. From the analysis of the co-expressed genes, it showed that *CRY1* was highly related to anti-oxidant genes such as *VTE5*, *LYC*, *AtGPX1*, and *HPR*. It has been published that reactive oxygen species were involved a novel mechanism for seed dormancy alleviation. Therefore, we hypothesized that *CRY1* may be involved in the reactive oxygen species signaling pathway and mediated the seed germination and early seedling development.