bZIP71 delays flowering by suppressing Ehd1 expression in rice

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Abstract

Flowering time is a fundamental factor determining the global distribution and final yield of rice (Oryza sativa). Although diverse flowering time genes have been reported in this crop, the transcriptional regulation of its key flowering genes are poorly understood. Here, we report that a basic leucine zipper transcription factor, bZIP71, functions as a flowering repressor. The overexpression of bZIP71 delays flowering, while the bzip71 mutant flowers early in both long-day and short-day conditions. A genetic analysis showed that the regulation of flowering by bZIP71 might be independent of Heading date 2 (Hd2), Hd4, and Hd5. Importantly, bZIP71 directly associates with the Early heading date 1 (Ehd1) promoter and represses its transcription, and genetically the function of bZIP71 is impaired in the ehd1 mutant. Moreover, bZIP71 interacts with major components of polycomb repressive complex 2 (PRC2), SET domain group protein 711 (SDG711), and Fertilization independent endosperm 2 (FIE2), through which bZIP71 regulates the H3K27me3 level of Ehd1. Taken together, we present a transcriptional regulatory mechanism in which bZIP71 enhances the H3K27me3 level of Ehd1 and transcriptionally represses its expression, which not only offers a novel insight into a flowering pathway, but also provides a valuable putative target for the genetic engineering and breeding of elite rice cultivars.

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