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# A TRIPLE FLORIGEN SYSTEM IN RICE

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Plants measure seasonal changes in the photoperiod to time specific developmental transitions, including the transition to reproductive growth. In rice, shortening days induce expression of the florigens *HEADING DATE 3A* (*Hd3a*) and *RICE FLOWERING LOCUS T 1* (*RFT1*) in the phloem of leaves. The cognate proteins move systemically to the shoot apical meristem (SAM) to accelerate its conversion into a reproductive meristem that will ultimately branch to form a panicle. The florigens modify gene expression patterns by forming a heterohexameric complex comprising 14-3-3 proteins and the OsFD1 bZIP transcription factor. The complex binds the promoter of target genes to regulate their expression.

RNA-Seq profiling of the early stages of the SAM-to-panicle conversion identified several transcripts, among which those belonging to *FLOWERING LOCUS T-LIKE 1* (*FT-L1*) strongly increased during photoperiodic induction, and upon induction of Hd3a and RFT1 using an inducible system. The FT-L1 protein shows strong sequence homology to Hd3a and RFT1, but its transcripts could be detected only in reproductive SAMs. This regulatory pattern suggests that FT-L1 might sustain the transition to reproductive growth of the apex, redundantly with Hd3a and RFT1, that it affects other meristematic transitions during panicle development, or both.

We isolated *ft-l1* mutants from Italian (Volano) and Asian (Dongjin) varieties. Both genotypes flowered late compared to the corresponding wild types, indicating delayed transition of the SAM to reproductive growth. FT-L1 protein could not establish interactions with 14-3-3 proteins expressed at the SAM, as did Hd3a, indicating different modes of molecular action. Finally, inflorescences of the Volano *ft-l1* mutant developed more secondary branches and spikelets, suggesting a delay in the specification of secondary branch meristems of the panicle. These data indicate the existence of a regulatory circuit at the SAM, based upon florigen proteins, and suggests that its modification can alter panicle architecture and possibly yield.