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Molecular Mechanisms Underlying Antagonistic Role of Two Soybean *FT* Homologs, *GmFT2a* and *GmFT4*, in Soybean Flowering

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[Introduction]

FLOWERING LOCUS T (*FT*) is a major determinant of day length-dependent flowering in plants. To understand the role of *FT* homologs in the short-day flowering soybean plant, we identified soybean *FT* genes, *GmFTs*, and analyzed their roles in photoperiod-dependent flowering of soybean.

[Materials and Methods]

The cDNAs for soybean *FT* homologs were cloned based on the genome sequence information taken from plant genome website Phytozome v.12.1 (http://www.phytozome.net). The *in silico* analysis of cis-acting element of *GmFTs* was performed in 2000 bp upstream region of each *GmFT* by using PlantCARE web bioinformatics tool. To screen binding partners of GmFTs, we used the Matchmaker Gold Yeast Two-Hybrid System (Clontech) constructed with soybean cDNAs.

[Results and Discussions]

We identified 10 homologs of *FT* gene in soybean, a short-day plant. Analyses of gene expression patterns in response to day-length and ectopic expression in Arabidopsis suggest the antagonistic roles of *GmFT2a*/*GmFT5a* and *GmFT4* in soybean flowering. To uncover the molecular mechanism of diversification in expression patterns between *GmFT2a*/*GmFT5a* and *GmFT4*, we analyzed cis-acting regulatory elements in the promoter regions of those genes. The motifs involved in light perception were commonly found among those genes. Compared to *GmFT4*, *GmFT2a* and *GmFT5a* contain more diverse regulatory elements, such as hormone-dependent, biotic-, and abiotic-stress related motifs. To understand the mode of biological functions of GmFT5a, floral activator, and GmFT4, floral reppressor, in soybean flowering, we performed yeast-two-hybrid screening by using GmFT5a and GmFT4 as baits. We identified 145 and 38 candidates for GmFT5a- and GmFT4-binding proteins, respectively. Moreover, 17 candidates were identified to bind both GmFT5a and GmFT4. These results suggest that, in some conditions, *GmFT5a* and *GmFT4* genes function in the same flowering pathway, but simultaneously, these two genes might have specific function in soybean flowering by differentially modulating gene expression and employing different binding partners.

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