PBIV-1

MULTIPLE REGULATORY MECHANISMS IN AUTONOMOUS FLOWERING PATHWAY IN ARABIDOPSIS

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Arabidopsis winter annuals flower very late but vernalization accelerates their flowering time dramatically. Such flowering trait is mainly regulated by two floral repressor genes, *FRIGIDA (FRI)* and *FLOWERING LOCUS C (FLC). FLC,* encoding a MADS box protein, is positively regulated by *FRI* but negatively regulated by autonomous pathway and vernalization. To elucidate genetic mechanism governing flowering behavior of Arabidopsis winter annuals, we performed fast neutron mutagenesis in a line *FRISF2 FLCCol* and isolated two early flowering mutants *suppressor of FRI3 (suf3)* and *suf4.* Both mutants showed similar flowering time with summer annual ecotype Col that has *fri* mutation, thus has weak expression of *FLC.* However, the *suf3* mutant showed relatively small reduction of *FLC*expression and stronger response to vernalization than the *suf4* mutant. The positional cloning of *SUF3* showed that it encodes Actin Related Protein 6 (ARP6), which is a component of chromatin remodeling SWR1 complex in yeast. Molecular analysis showed that *SUF3* represses the expression of two flowering pathway integrators, *FT* and *SOC1* through both *FLC* dependent and *FLC* independent mechanisms. In contrast, *SUF4* encoding two zinc finger protein mainly regulates *FLC*expression through the interaction of *FRI* and *LD,* a gene involved in autonomous flowering pathway. The protoplast transfection assay showed that SUF3 localizes at the nuclear laminaand SUF4 colocalizes with FRI and LD in the nucleus. Our results demonstrate that the autonomous pathway is controlled by multiple regulatory mechanisms.