

## The Interaction of Photoperiod and Vernalization Inducible Flowering Pathways through *AGL 20* Gene

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### Abstract

The late-flowering trait of *Arabidopsis* winter annual ecotypes is regulated mainly by two genes, *FRIGIDA* (*FRI*) and *FLOWERING LOCUS C* (*FLC*). A MADS box gene, *AGAMOUS-LIKE 20* (*AGL20*) is isolated from a *FRI* suppressor mutant obtained by activation tagging mutagenesis of *FRI* containing Columbia. Overexpression of *AGL20* suppresses the effect of *FRI* and *FLC* on delaying the phase transitions during all stages of plant development including the transition to flowering. However, the effect of *FRI* and *FLC* on the delay in the conversion from secondary shoot to flower is weakly suppressed by *35S::AGL20* due to the repression of *LFY* by *FRI* and *FLC*. The expression of *AGL20* is positively regulated by both vernalization and the genes in autonomous pathway regardless of the presence of *FLC*. Thus, vernalization and autonomous pathway regulate *AGL20* positively and *FLC* negatively. The expression of *AGL20* is also positively regulated by the genes in photoperiod pathway, although photoperiod pathway appears to require other factor(s) downstream of *CONSTANS*, *GIGANTEA*, *FLOWERING LOCUS T* as well as *AGL20* for full induction of flowering. Our results suggest that the *AGL20* gene integrate the vernalization and photoperiod inducible pathways and autonomous pathway and flowering time is regulated mainly by the modulation of *AGL20* activity.