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**A new class of plant-specific genes required for flowering control in temperate grasses**

Establishment of a vernalization requirement in *Brachypodium distachyon* requires *REPRESSOR OF VERNALIZATION1.*

**The Science**

To better understand flowering time control in temperate grasses, we sought to identify which genes prevent a grass from flowering until it has undergone prolonged cold exposure. After screening for and identifying mutants in the grass species *Brachypodium distachyon*, we identified a mutant that flowers rapidly without cold exposure and described and characterized a new gene we named *REPRESSOR OF VERNALIZATION1* (*RVR1*).

**The Impact**

Increasing biomass yield could improve the economics of biomass as an energy source. By furthering the molecular-level understanding of the flowering regulatory network in the model grass *Brachypodium distachyon*, we are advancing the potential to manipulate flowering time in bioenergy grass crops to increase biomass yield.

**Summary**

The timing of flowering is a key trait for biomass yield. A requirement for vernalization, the process by which prolonged cold exposure provides competence to flower, is an important adaptation to temperate climates that ensures flowering does not occur prior to the onset of winter. In temperate grasses, vernalization results in the up-regulation of *VERNALIZATION1* (*VRN1*) to establish competence to flower; however, little is known about the mechanism underlying repression of *VRN1* in the fall season, which is necessary to establish a vernalization requirement. Here we report that a plant-specific gene containing a bromo adjacent homology (BAH) and transcriptional elongation factor S-II(TFIIS) domain, which we named *REPRESSOR OF VERNALIZATION1* (*RVR1*), represses *VRN1* prior to vernalization in *Brachypodium distachyon*. Thus, *RVR1* plays a role in establishing a vernalization requirement in *B. distachyon* and is likely to play the same role in other vernalization-requiring pooid grasses. Interestingly, *RVR1* is a plant-specific gene that is conserved across the plant kingdom, and this study provides the first example of a role for this class of plant specific-genes.

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**Publications**

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<http://www.pnas.org/content/early/2017/05/31/1700536114.abstract>

**PM Recommendation for SC Web Publication**