

Role of bud dormancy in the control of flowering time in winter annuals

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Abstract

In annual plants the primary role of winter chilling is to promote floral initiation, in a process known as vernalisation. In contrast temperate perennial species require chilling in early to break endodormancy and enable growth and flowering the following spring. The response to chilling is known to be conferred by a class of MADS box transcription factors which exhibit transcriptional silencing during winter cold.

Here we show that in major arable crops, flowering is controlled not primarily by the effect of chilling on floral initiation, but by bud dormancy release. In oilseed rape we show that vernalisation in autumn leads to flower bud formation, but does not play a large role in the timing of flowering itself. This flower buds resemble those of perennial species and chilling of these buds accelerates bud break in spring and leads to earlier flowering, and reduces abscisic acid levels.

Genetic analysis of bud dormancy in oilseed rape revealed that bud dormancy was contingent on the presence of specialised isoforms of the *FLOWERING LOCUS C* gene that respond to cold not prior to floral initiation, but specifically during bud dormancy release. We conclude that endodormancy-like processes play an important role in annual plant phenology.