

FLOWER DEVELOPMENT

Blueberry fooled into flowering

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Credit: Simon Forster / Alamy Stock Photo

Vernalization is a process by which plants guard against premature flowering by requiring an extended period of cold before becoming competent to develop floral organs. The molecular mechanisms underlying vernalization have been extensively studied in annuals such as *Arabidopsis thaliana*, but are less well understood in woody plants. Guo-qing Song, of Michigan State University, and colleagues have identified a central regulator of dormancy-breaking in blueberries.

The researchers were studying a strain of blueberry that had emerged from studies to increase the cold tolerance of the popular commercial variety, Legacy, by introducing a gene from a more cold-tolerant cultivar called Bluecrop. A number of the transgenic lines produced showed increased resistance to low temperatures; however, one transgenic line, named Mu-Legacy, was also smaller than the untransformed Legacy plants and its 48 transgenic cousins. It also produced flower buds earlier and had a reduced chilling requirement for normal flowering. By comparing the transcriptome and metabolome of leaves, flower buds and mature flowers from Legacy, transgenic Legacy and Mu-Legacy plants, the team identified a wealth of differentially expressed

genes, many of which are associated with either cytokinin or gibberellin synthesis and signalling.

The changes seen in the levels of phytohormones and associated genes can account for the observed growth and flowering phenotypes of Mu-Legacy plants. Their ultimate cause was insertion of the transgene into a stretch of DNA with significant similarity to a retrotransposon of rice. This transferred DNA insertion site is upstream of the *RESPONSE REGULATOR 2*-like gene (*VcRR2*) whose transcription is increased in Mu-Legacy, presumably due to the action of the transgene's promoter. It thus appears that, while attempting to engineer greater cold tolerance in blueberries, Song and colleagues have uncovered a transcription factor capable of inducing developmental programs for both dwarfing and the chilling dependency of flowering — highly desirable traits for growing blueberries, as well as many other fruits from cold environments, in areas with milder and more variable winters.

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