

Flower bud development and winter dormancy in sweet cherry (*Prunus avium* L.)

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Abstract

In temperate fruit trees, chilling accumulation during winter dormancy is required for proper flowering, and is one of the main drawbacks of growing temperate trees in warmer latitudes. Chilling requirements are specific for each cultivar, suggesting a tight genetic control. The importance of chilling requirements, for cultivar adaptation to particular areas, has resulted in the development of different empirical models to quantify low temperatures. However, the biological processes behind these requirements remain unveiled. In *Prunus* species flower development requires several months from differentiation, at the end of the previous summer, until bloom the following spring. Development is halted during the winter, when the flower buds enter a dormant stage. To evaluate any possible changes behind the requirements for chilling, in this work flower development has been examined in sweet cherry (*Prunus avium* L.) and related to temperature, light, and chilling requirements. Anatomical characterization of flower buds, from the autumn to the spring, showed that the flower buds survive the winter at a particular stage of flower development. While no anatomical changes were detected during the theoretical chilling fulfillment, further cytochemical characterization revealed that conspicuous changes occurred in the pistil. Quantification of these changes with an image analysis system fitted to the microscope sheds light on the biological basis for chilling requirements.