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Pollen meiosis and chilling requirements in sweet cherry

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Abstract

In sweet cherry, as other temperate woody perennials, cycles of growth and dormancy are synchronized with the seasons. Flower primordia survive to low winter temperatures entering a dormant stage, but chilling is also required for a proper blooming. However, the biological mechanisms behind dormancy and chilling requirements are still not fully understood. In other species, pollen meiosis has been reported as one of the first biological events occurring after dormancy, but this process has not been studied in sweet cherry. In this work, pollen development has been characterized under the microscope in the cultivars 'Burlat' and 'Bing' in relation to winter dormancy up to anthesis during five years. The chilling requirements of both cultivars were empirically determined, and the dates of chilling fulfilment were related to meiosis and flowering time. During endodormancy, the anthers presented the sporogenous tissue formed by the pollen mother cells. First changes in pollen mother cells were detected about three weeks after chilling fulfillment as prelude of anther meiosis, which was completed within a week. Then pollen development continued during two or three weeks up to anthesis. Positive correlations were found between the dates of chilling fulfilment, pollen meiosis and full bloom for both cultivars. These results showed the influence of chilling winter temperatures on pollen meiosis time.