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Dynamics of bud metabolites during dormancy in sweet cherry genotypes with contrasted chilling requirements

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Abstract

Bud dormancy is a mechanism enabling temperate fruit trees to survive over winter's unfavorable conditions. The dormancy entrance takes place during autumn and buds will accumulate chill to alleviate endodormancy (physiological dormancy), and warmth to overcome ecodormancy (ecological dormancy), giving them the ability to flower. Chilling requirement, which is defined as the necessary chill accumulation for the endodormancy release, is genotype dependent. Global warming may affect the satisfaction of the chilling requirement and thus directly the yield. The physiological mechanisms taking place during bud dormancy are still poorly known. Studies show a global reprogramming of metabolism during the dormancy entrance and release period. In order to deepen the knowledge of the events during the dormancy period, we quantified several key metabolites of vegetative and floral sweet cherry buds throughout the dormancy period, from summer growth until spring flowering, in several genotypes that are contrasted regarding their chilling requirements. Results show a temporal lag in the dynamic of accumulation of these metabolites. Moreover, global accumulation of sugars during chilling requirement indicates a weak catabolism of the buds during this period, and a sharp shift to high catabolism upon the endodormancy release period. These results could be valuable for high-throughput phenotyping of large cultivar sets and for quantitative genetics studies of dormancy in sweet cherry and for phenological modeling.