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A TRANSCRIPTOMIC STUDY ON PEACH FLORAL AND VEGETATIVE BUDS DURING WINTER DORMANCY

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Dormancy, in deciduous fruit trees, has long been seen as a simply a survival mechanism during the period of harsh winter weather. But our recent studies on peach, a model organism in the *Rosaceae* family, have revealed that this is in fact a significant period of rest and development focused on the buds preparing them for subsequent springtime. In particular, we have demonstrated that there is no dormancy and growth cessation in peach flower buds during winter chilling accumulation.

Changes at the transcript level of key genes associated with hormone metabolism and flower bud development as well as histone modifications (H3K4me3 and H3K27me3) and DNA methylation have been identified to display distinct roles during cold development (Canton et al. in revision). These studies point towards the potential development of molecular breeding strategies to control bloom time which could buffer crop losses and ensure the sustainability of fruit production. However, the role of the vegetative buds during this cold season has remained inconclusive. The peculiar organisation and common origin of floral and vegetative buds in peach in this context, would mean that we would have to characterise both buds to understand the bigger picture. Initial studies have hinted towards a shared-fate relationship between the two buds even though their functions post-dormancy are quite distinct and initiated at different stages. In this study we performed a comparative transcriptomic analysis on both flower and vegetative buds over the course of fall and winter at different timepoints based on chilling accumulation. Differential gene expression analyses revealed distinct profiles which confirm previous hypotheses regarding the

divergent developmental activity of the two buds, while at the same time opening new paths indicating the pivotal role of environmental stimuli during winter. Additionally, genes related to the transport and assimilation of nitrogen were identified and co-related with the accumulation of these nutrients in the buds. This shines a new light on the distinct metabolic and regulatory activities taking place within the flower and vegetative buds during chilling accumulation and thereby preparing them for bud-break and resumption of growth respectively.