



Deciphering the genetic determinism of bud phenology in apple progenies: a new insight into chilling and heat requirement effects on flowering dates and positional candidate genes

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Auteur	Celton, Jean-Marc [1], Martinez, Sebastien [2], Jammes, M-J. [3], Bechti, A. [4], Salvi, S. [5], Legave, J-M. [6], Costes, Evelyne [7]
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Mots-clés	apple (<i>Malus × domestica</i>) [8], budbreak [9], candidate gene [10], chilling requirement [11], heat requirement [12], phenology [13], QTL analysis [14]
Résumé en anglais	<p>The present study investigates the genetic determinism of bud phenological traits using two segregating F1 apple (<i>Malus × domestica</i>) progenies. Phenological trait variability was dissected into genetic and climatic components using mixed linear modeling, and estimated best linear unbiased predictors were used for quantitative trait locus (QTL) detection. For flowering dates, year effects were decomposed into chilling and heat requirements based on a previously developed model. QTL analysis permitted the identification of two major and population-specific genomic regions on LG08 and LG09. Both 'chilling requirement' and 'heat requirement' periods influenced flowering dates, although their relative impact was dependent on the genetic background. Using the apple genome sequence data, putative candidate genes underlying one major QTL were investigated. Numerous key genes involved in cell cycle control were identified in clusters within the confidence interval of the major QTL on LG09. Our results contribute towards a better understanding of the interaction between QTLs and climatic conditions, and provide a basis for the identification of genes involved in bud growth resumption.</p>
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