



## Reconstruction of multi-generation pedigrees involving numerous old apple cultivars thanks to whole-genome SNP data

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A number of European apple cultivars are old, some of them dating back to the Renaissance, Middle Ages or even earlier. Many other cultivars have been developed during subsequent times. In order to decipher the relationships that link some of these old cultivars, whole-genome SNP data (~ 250K) for over 1400 genotypes were analyzed to infer first-degree relationships and reconstruct pedigrees. We used simple exclusion tests based on a count of Mendelian error to identify up to a thousand potential parent-offspring duos, including 295 complete parent-offspring trios and a hundred duos that could be oriented. grand-parents for some missing parents could also be inferred. Combining all this information allowed us to reconstruct pedigrees (up to 6 generations) highlighting the central role of major founders such as 'Reinette Franche', 'Margil', and 'Alexander'. Haplotypes were deduced from genotypic data and pedigrees, and used to measure haplotype sharing between supposedly unrelated cultivars, allowing investigating further links between them. To our knowledge, such a large analysis to reconstruct multigeneration pedigrees involving (very) old cultivars selected over such time has never before been performed in perennial fruit species.

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