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IDENTIFICATION OF GENES RESPONSIBLE OF THE SYNTHESIS OF THE VOLATILE METHYL KETONE IN WOODLAND STRAWBERRY

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Woodland strawberry (*Fragaria vesca*, 2x) is the diploid closest ancestor of the cultivated strawberry (*F. x ananassa*, 8x) and the model species for genetic studies in the *Fragaria* genus. It is naturally distributed across Europe and it is appreciated for its delicate aroma and flavor.

Methyl ketones are compounds with demonstrated insect repellent effects (Antonious *et al.*, 2003). Its synthesis, reported to take place in glandular trichomes of wild tomato (*Solanum habrochaites*), is mediated by a thioesterase (ShMKS2) and a decarboxylase (ShMKS1) (Fridman *et al.*, 2005; Ben-Israel *et al.*, 2009; Yu *et al.*, 2010).

Through genome wide association analysis (GWAS) in a natural collection of European woodland strawberry (199 accessions), we identified a series of polymorphisms linked to the accumulation of C7, C9 and C11 methyl ketones (2-heptanone, 2-nonanone, 2-undecanone), their respective secondary alcohols (2-heptanol, 2-nonanol, 2-undecanol) and their precursors (methyl octanoate, methyl decanoate, methyl dodecanoate). In addition, the candidate region presented three different haplotypes with different patterns of methyl ketones accumulation, suggesting differences in enzymatic activity and/or substrate affinity.

The candidate region includes two thioesterases homologues to ShMKS2, FvMKS2A, FvMKS2B. Functional validation of both genes has revealed methyl ketones synthesis ability in transient expression in *Nicotiana benthamiana* and *E. coli*. The specificity of these candidate genes is currently under study though several approaches, including transient expression in different hosts and enzymatic function characterization.

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Ben-Israel I, et al. 2009. Plant Physiology 151, 1952–1964.
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Yu G, et al. 2010. Plant Physiology 154, 67–77.