

DNA TESTS FOR STRAWBERRY

γ -decalactone “Fruity” Aroma qFaFAD1



Strawberry fruit produce hundreds of volatile compounds that contribute to the characteristic flavor of the fruit that many enjoy. One important compound is gamma-decalactone. This compound has been described as “peachy” and is indeed a very valuable compound contributing to the characteristic flavor of peach. In strawberry, when mixed with other desirable volatiles, -decalactone contributes to a “fruity” aroma in strawberries where present.

Genetics of the Trait

The presence or absence of γ -decalactone is determined by a single locus, FaFAD1. The gene encodes an omega-6 fatty acid desaturase, an enzyme important to the biosynthesis of the compound^{1,2}. The entire gene is absent in individuals that do not produce γ -decalactone and present in individuals that produce γ -decalactone. To determine if the gene is present in an individual, the marker qFaFAD1 was developed² within the sequence of FaFAD1. Unfortunately, qFaFAD1 is not able to distinguish between heterozygous and homozygous individuals.

Allelic Variation

qFaFAD1 is a presence/absence marker that produces a 140 bp allele when FaFAD1 is present in the strawberry, resulting in berries with a fruity aroma. Individuals without this allele will not produce γ -decalactone (no fruity aroma).

Genotype	Example Cultivars	Trait Level
140 bp Present	Radiance Sweet Sensation Winterstar	Fruity aroma (γ -decalactone produced)
140 bp Absent	Camarsosa Mara des Bois Winter Dawn	No fruity aroma (γ -decalactone not produced)

¹Chambers et al. (2014) BMC Genomics 15:217

²Sánchez-Sevilla et al. (2014) BMC Genomics 15:218

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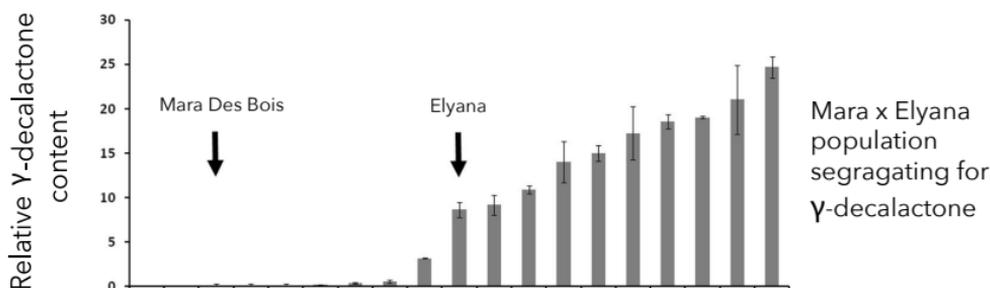


When to Assay

The qFaFAD1 test is excellent for choosing parents with desired flavor profile. It can also be used at any stage in the breeding program.

Predictive Capacity

qFaFAD1 is 100% accurate at detecting the presence or absence of FaFAD1 because it was developed from the gene controlling the trait. The presence of the gene in a strawberry individual is usually associated with the presence of the fruity aroma. However, other genetic and environmental factors can influence the amount of γ -decalactone present in berries.



Technical Details

qFaFAD1 is a PCR-based test consisting of two primers that can be analyzed by agarose gel electrophoresis. This test has been successfully combined with the FaOMT-SI/NO test which produces alleles at 417 bp and 448 bp. For more details on this DNA test and new tests in development for strawberries or other rosaceous crops www.rosbreed.org/breeding/dna-testing.

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