

# DNA TESTS FOR STRAWBERRY

## $\gamma$ -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  $\gamma$ -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<sup>1,2</sup>. The entire gene is absent in individuals that do not produce  $\gamma$ -decalactone and present in individuals that produce  $\gamma$ -decalactone. To determine if the gene is present in an individual, the marker qFaFAD1 was developed<sup>2</sup> 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  $\gamma$ -decalactone (no fruity aroma).

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

<sup>1</sup>Chambers et al. (2014) BMC Genomics 15:217

<sup>2</sup>Sánchez-Sevilla et al. (2014) BMC Genomics 15:218

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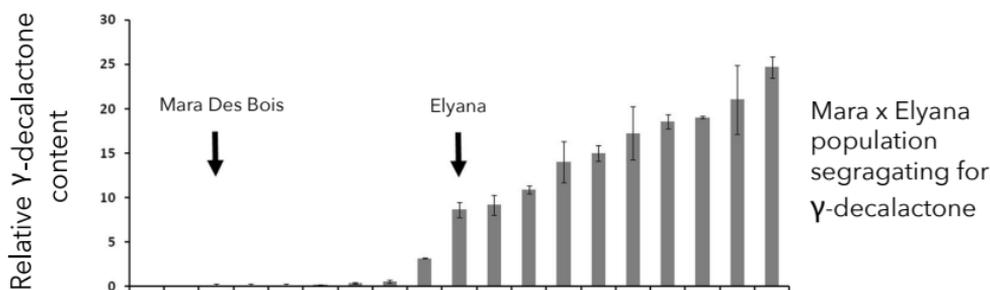


### When to Assay

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  $\gamma$ -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](http://www.rosbreed.org/breeding/dna-testing).

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