

Molecular Identification of the Olive Fruit Gene Mainly Responsible for the Linoleic Acid Content in the Virgin Olive Oil

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Olive oil is characterized by its unique organoleptic characteristics including aroma, color and flavor, and with outstanding nutritional properties due to its well balanced fatty acid composition, as well as the presence of minor components such as natural antioxidants. Oleic acid is the major fatty acid (55-83%) in the olive oil, while linoleic acid accounts for 3.5-21%, depending on the cultivar and growth conditions. The linoleic acid content greatly affects not only nutritional characteristics of the olive oil, but also technological properties such as its oxidative stability. Olive oils with a relatively high content of this fatty acid are characterized by a low oxidative stability, especially if they also possess a low content of polyphenols.

Unlike oilseeds, little information is available on the regulation of fatty acid biosynthesis in oil fruits. Two different oleate desaturases, the plastidial (*FAD6*) and the microsomal (*FAD2*) oleate desaturases, which differ not only in their cellular localization, but also in the lipid substrates and electron donor systems, are responsible for the synthesis of linoleic acid from oleic acid, which is the main product of the plastidial fatty acid biosynthesis. Recently, we have isolated and characterized one *FAD6* (*OepFAD6*) and two *FAD2* genes (*OepFAD2-1* and *OepFAD2-2*) from olive fruit using a PCR approach (Hernández et al., 2005).

In this work, we have determined the linoleic acid content and the expression levels of *FAD6* and *FAD2* genes using real time quantitative PCR in different olive tissues, particularly in mesocarp and seed from olive fruits corresponding to several cultivars at different ripening stages, and with distinct water regimes. The results clearly indicate the oleate desaturase gene that is mainly responsible for the linoleic acid content of the virgin olive oil, allowing for the development of molecular markers to control this character in marker assisted selection of new olive varieties.

- Hernández ML, Mancha M, Martínez-Rivas JM. *Phytochemistry* 66: 1417-1426 (2005)