**A Unique Acyl-Acyl Carrier Protein Fatty Acid Desaturase Gene from Pelargonium**

**Disclosure Number**

* 1468

**For Licensing Information
and Patent Status**

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A novel plant fatty acid desaturase gene and the associated enzyme responsible for formation of the novel 16:1 Δ11 and 18:1Δ13 fatty acids has been identified, sequenced and characterized.

**Invention Background**

The common garden geranium (Pelargonium xhortorum) is naturally resistant to certain insect pests including spider mites and aphids. The biochemical responsible for this resistance is a class of secondary compounds known as anacardic acids (6-alkyl salicylic acid). Specifically, resistance is due to the presence of 22:ω5 and 24:1ω5 anacardic acids. Novel Δ11 16:1and Δ13 18:1fatty acids are precursors to the 22:1ω5 and 24:1ω5 anacardic acids, respectively. These observations led to the search for a unique fatty acid desaturase enzyme responsible for the production of the novel fatty acids, the ω5 anacardic acids, and ultimately, pest resistance in geraniums.

**Invention Description**

A novel plant fatty acid desaturase gene and the associated enzyme responsible for formation of the novel 16:1 Δ11 and 18:1Δ13 fatty acids has been identified, sequenced and characterized. The gene codes for a Δ9 14:0-ACP fatty acid desaturase. This enzyme places a double bond at the Δ9 position of 14:0-ACP fatty acid substrate thereby producing the Δ9 14:1 unsaturated fatty acid. Many plants, including geraniums, efficiently elongate this unsaturated fatty acid to two unique fatty acids, Δ11 16:1 and Δ13 18:1. In geraniums, these two unique fatty acids are further processed by known pathways to form 22:1ω5 and 24:1ω5 anacardic acids.The Δ9 14:0-ACP fatty acid desaturase gene has been cloned into E. coli. The resulting recombinant protein has similar enzyme activity in E. coli as it has in geraniums. E. coli expressing the cloned desaturase gene produce Δ9 14:1 fatty acid which does not accumulate, but rather is efficiently elongated to form two unsaturated fatty acids, Δ11 16:1 and Δ13 18:1, which do accumulate. These two fatty acids do not occur naturally in E. coli.

**Advantages**

* Modifying the fatty acid and oil composition of economically important seed crops including soybeans, rapeseed, corn, sunflower, safflower, cotton, peanut, coconut and palm.
* ncreasing the unsaturated fatty acid content of economically important seed crops.
* Modifying pest resistance in plants.
* Designing/engineering non-edible oils.