

OLEIC ACID MODIFICATION IN COTTONSEED

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Abstract

While fiber is the most valuable product derived from cotton, seed oil is also a valuable raw material. Cotton ranks third as an oilseed crop behind soybean and canola with approximately 5.8 metric tons of oil per year produced in the United States. Cottonseed typically contains 28% saturated oils, mostly palmitic acid, and 72% unsaturated oils, about 15% of which is oleic acid (18:1). Cottonseed oil has unique flavor enhancing properties that make it an excellent cooking oil, however, reported health benefits attributed to oleic acid have increased demand for oils with a greater proportion of oleic acid in the oil. Efforts to develop “high” oleic cotton genotypes through selection or chemical mutagenesis have proven unsuccessful. Here oleic acid was successfully modified using genetic engineering to suppress the enzyme that converts oleic acid to linoleic acid (18:2), thereby elevating the level of oleic acid and decreasing linoleic acid. This was accomplished using a desaturation gene (*fad2*) from canola, fusing it to a seed-specific promoter and inserting it into cotton via *Agrobacterium* mediated transformation. The resulting transformed plants were assayed for the presence of the gene, and their morphological characteristics were evaluated. Seed from the primary transformed plants, T₁ and T₂ progeny were analyzed for oleic acid content. Variation among transformed lines across generations, and variation within lines was evaluated to determine if individuals could be identified that had elevated levels of oleic acid which remained stable from one generation to the next.