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Abstract :

Plant oils containing omega-7 fatty acids (FA) (palmitoleic 16:1 Δ^9 and cis-vaccenic 18:1 Δ^{11}) have potential as sustainable feedstocks for producing industrially important octene via metathesis chemistry. Engineering plants to produce seeds that accumulate high levels of any unusual FA has been an elusive goal. We have achieved high levels of omega-7 FA accumulation by systematic metabolic engineering of *Arabidopsis thaliana*. A plastidial 16:0-ACP desaturase has been engineered to convert 16:0 to 16:1 Δ^9 with specificity >100-fold that that of naturally-occurring paralogs such as that from *Doxantha unguis-cati* L. Expressing this engineered enzyme (Com25) in seeds increased omega-7 FA accumulation from