BRC Science Highlight
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Towards the synthetic design of camelina oil enriched in tailored acetyl-triacylglycerols with medium chain fatty acids

Background/objective

The ability to manipulate expression of key biosynthetic enzymes has allowed the development of genetically modified plants that synthesize unusual lipids that are useful for biofuels and bioproducts. The objective is to produce 3-acetyl-1,2-diacyl-*sn*-glycerols (acetyl-TAGs) with medium-chain fatty acids (MCFAs) in the oilseed crop *Camelina sativa* by metabolic engineering.

Approach

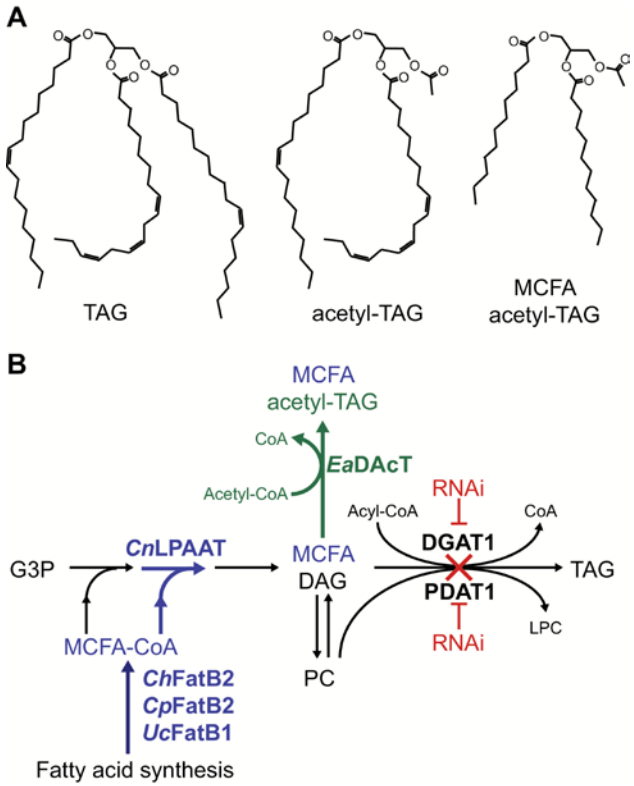
- Different transgenic camelina lines that had been genetically modified to produce MCFAs through the expression of MCFA-specific thioesterases and acyltransferases were retransformed with the *Euonymus alatus* gene for diacylglycerol acetyltransferase (EaDAcT) that synthesises acetyl-TAGs.
- Concomitant RNAi suppression of acyl-CoA: diacylglycerol acyltransferase was designed to increase the levels of acetyl-TAGs.

Results

- We successfully generated the metabolically engineered camelina that produces acetyl-TAG molecules containing medium-chain fatty acids.

Significance

- These tailored lipids with a designed structure are potentially useful for production of biofuels and bioproducts in crops such as sorghum.



Strategy for the production of MCFA acetyl-TAGs in biofuel crops

Bansal S, et al. (2018) "Towards the synthetic design of camelina oil enriched in tailored acetyl-triacylglycerols with medium-chain fatty acids." ***Journal of Experimental Botany****, 69,: 4395-4402, DOI:10.1093/jxb/ery225.*

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