Engineering yeast lipids for production of designer biodiesel

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Abstract

Biodiesels constitute a growing class of fuel in the world which is increasingly inclined towards more ecological and sustainable energy. Despite their advantages, biodiesels are of limited cold flow properties and of larger NOx emissions, which are mostly attributed to the chemical composition of their oil feedstocks. This study presents a novel approach to produce Genetically Engineered Biodiesel from genetically manipulated oleaginous yeast oils for improving biodiesel properties and performances. Using full-factorial central composite design, the best chemical composition of an optimal biodiesel was predicted. Then, simple and combined MFE1, PEX10 and POX2 mutants of the oleaginous yeast Yarrowia lipolytica were constructed and showed interesting lipid profiles whose biodiesel is predicted to have better cold flow properties. These mutants showed also higher lipid titers by 2-3 folds compared to the parent strain. This study provides a genetic engineering strategy for tailor design of biodiesel properties and performance.

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