

Accepted Manuscript

Review

Genetic Manipulation of Non-Classic Oilseed Plants for Enhancement of Their Potential as a Biofactory for Triacylglycerol Production

Xiao-Yu Xu, Hong-Kun Yang, Surinder P. Singh, Peter J. Sharp, Qing Liu

PII: S2095-8099(17)30399-5
DOI: <https://doi.org/10.1016/j.eng.2018.07.002>
Reference: ENG 90

To appear in: *Engineering*

Received Date: 20 July 2017
Revised Date: 30 October 2017
Accepted Date: 2 July 2018

Please cite this article as: X-Y. Xu, H-K. Yang, S.P. Singh, P.J. Sharp, Q. Liu, Genetic Manipulation of Non-Classic Oilseed Plants for Enhancement of Their Potential as a Biofactory for Triacylglycerol Production, *Engineering* (2018), doi: <https://doi.org/10.1016/j.eng.2018.07.002>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Research

Crop Genetics and Breeding—Review

Genetic Manipulation of Non-Classic Oilseed Plants for Enhancement of Their Potential as a Biofactory for Triacylglycerol ProductionXiao-Yu Xu ^{a,b}, Hong-Kun Yang ^a, Surinder P. Singh ^a, Peter J. Sharp ^{b,*}, Qing Liu ^{a,*}^a CSIRO Agriculture and Food, Canberra, ACT 2601, Australia^b Plant Breeding Institute and Sydney Institute of Agriculture, School of Life and Environmental Sciences, The University of Sydney, Sydney, NSW 2006, Australia

* Corresponding authors.

E-mail: Qing.Liu@csiro.au (Qing Liu)

E-mail: peters@camden.usyd.edu.au (Peter J. Sharp)

ARTICLE INFO*Article history:*

Received 20 July 2017

Revised 29 October 2017

Accepted 20 November 2017

Available online

Keywords:

Plant vegetable oil

Triacylglycerol

Genetic engineering

Edible oil

Biodiesel

ABSTRACT

Global demand for vegetable oil is anticipated to double by 2030. The current vegetable oil production platforms, including oil palm and temperate oilseeds, are unlikely to produce such an expansion. Therefore, the exploration of novel vegetable oil sources has become increasingly important in order to make up this future vegetable oil shortfall. Triacylglycerol (TAG), as the dominant form of vegetable oil, has recently attracted immense interest in terms of being produced in plant vegetative tissues via genetic engineering technologies. Multidiscipline-based “-omics” studies are increasingly enhancing our understanding of plant lipid biochemistry and metabolism. As a result, the identification of biochemical pathways and the annotation of key genes contributing to fatty acid biosynthesis and to lipid assembly and turnover have been effectively updated. In recent years, there has been a rapid development in the genetic enhancement of TAG accumulation in high-biomass plant vegetative tissues and oilseeds through the genetic manipulation of the key genes and regulators involved in TAG biosynthesis. In this review, current genetic engineering strategies ranging from single-gene manipulation to multigene stacking aimed at increasing plant biomass TAG accumulation are summarized. New directions and suggestions for plant oil production that may help to further alleviate the potential shortage of edible oil and biodiesel are discussed.

1. Introduction

Vegetable oils produced to meet the demands for food, feed, and industrial applications are largely derived from oil palm (*Elaeis guineensis*) and several major temperate oilseed crops, including soybean (*Glycine max*), rapeseed (*Brassica napus*), sunflower (*Helianthus annuus*), and peanut (*Arachis hypogaea*); the existing vegetable oil production platforms have been developed from these sources [1,2]. However, due to the booming global population, the consumption of vegetable oils has increased remarkably [3]. In recent years, the shortage of vegetable oils has

Download English Version:

<https://daneshyari.com/en/article/8953626>

Download Persian Version:

<https://daneshyari.com/article/8953626>

[Daneshyari.com](https://daneshyari.com)