Biodiesel production by lipase-catalyzed transesterification of Ocimum basilicum L. (sweet basil) seed oil

Zeynab Amini\textsuperscript{a,}\textsuperscript{b}, Hwai Chyuan Ong\textsuperscript{b}, Mark D. Harrison\textsuperscript{c}, Fitranto Kusumo\textsuperscript{b}, Hoora Mazaheri\textsuperscript{b}, Zul Ilham\textsuperscript{a,}\textsuperscript{*}

\textsuperscript{a} Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia
\textsuperscript{b} Department of Mechanical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia
\textsuperscript{c} Centre for Tropical Crops and Biocommodities, Queensland University of Technology, Brisbane 4001, Australia

\begin{abstract}

The increasing global demand for fuel, limited fossil fuel resources, and increasing concerns about the upturn in greenhouse CO\textsubscript{2} emissions are the key drivers of research and development into sources of renewable liquid transport fuels, such as biodiesel. In the present work, we demonstrate biodiesel production from Ocimum basilicum (sweet basil) seed oil by lipase-catalyzed transesterification. Sweet basil seeds contain 22\% oil on a dry weight basis. Artificial neural network with genetic algorithm modelling was used to optimize reaction. Temperature, catalyst concentration, time, and methanol to oil molar ratio were the input factors in the optimization study. While fatty acid methyl ester (FAME) yield was the key model output. FAME composition was determined by gas chromatography mass spectrometry. The optimized transesterification process resulted in a 94.5\% FAME yield after reaction at 47 °C for 68 h in the presence of 64 w/w\% catalyst and a methanol to oil ratio of 10:1. The viscosity, density, calorific value, pour point, and cloud point of the biodiesel derived from sweet basil seed oil conformed to the EN 14214 and ASTM D6751 standard specifications. The antioxidant stability of the biodiesel did not meet these specifications but could be improved via the addition of antioxidant.

\end{abstract}

\* Corresponding author.

\textcopyright 2016 Elsevier Ltd. All rights reserved.

Please access the full article at: \url{http://dx.doi.org/10.1016/j.enconman.2016.11.017}