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TRANSESTERIFICATION OF CASO WITH LOW AMOUNT OF FREE FATTY ACIDS AND ITS OPTIMIZATION

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ABSTRACT

This study revealed the application of ANN as a tool for optimization of transesterification of Chrysophyllum albidium seed oil (CASO) to Chrysophyllum albidium oil biodiesel (CAOB). 30 experimental runs were generated and used to determine the effects of four reaction variables namely reaction temperature, reaction time, catalyst amount and methanol/oil molar ratio on CAOB yield. It was noted that the highest observed yield obtained in this study was 89.30% (w/w) at the following variable conditions; reaction temperature 60 °C, catalyst amount of 0.7 (wt. %), reaction time of 50 (min) and methanol/oil molar ratio of 5. The coefficient of determination R^2 and the adj. R^2 were found to be 0.99919 and 0.998439, respectively. The root mean square error (RMSE) of 0.14261 was obtained. Meanwhile, the qualities and fuel properties of CAOB produced were found to be within the ASTM D6751 and DIN EN 14214 biodiesel standards. The fatty acid profile of the CAOB revealed that CAOB is highly unsaturated (78.505%). Hence, the study established that CASO is a good alternative seed oils for fuel production which are renewable, cheap and environmental friendly.

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Keywords: *Chrysophyllum albidium* seed oil, Biodiesel, Transesterification, Optimization, Artificial neural network, Fatty acid profile.

Contribution/ Originality

This study is one of very few studies which have investigated the use of CASO to produced biofuel.

1. INTRODUCTION

The urgent needs for a more environmentally friendly, biodegradable, cost effective and readily available source of fuel is not only borne out of concern to protect the environment from the challenges pose by fossil fuel, but also due to the fluctuation of crude oil price in the