Biodiesel Production from Unrefined *Krating (Calophyllum Inophyllum)* Seed Oil Using Supercritical Methanol

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ABSTRACT

This study investigated the feasibility of biodiesel production from unrefined Krating (Calophyllum inophyllum) seed oil using supercritical methanol transesterification reaction. The experiments were conducted under various conditions of reaction temperature (200, 240, 260, 300, and 350°C), pressure (8, 12, 14, 16, and 18 MPa), and oil-to-methanol molar ratio (1:20, 1:40, and 1:60). All reactions were run at a constant reaction time of 10 minutes. Results showed that oil-to-methanol molar ratio, temperature, pressure, and their interactions significantly affected fatty acid methyl ester (FAME) yield. The highest FAME yield of 90.4% by weight was achieved at 260°C, 16 MPa, and an oil-to-methanol molar ratio of 1:40. This study also showed a significant decrease in acid value of Krating seed oil from 29 mg to 0.3 mg KOH per gram of oil compared to its biodiesel product. Moreover, most physical properties (kinematic viscosity, density, iodine number, flash point and water content) of our biodiesel product were comparable to the standard biodiesel EN14214.

Keywords: Biodiesel, Transesterification, *Calophyllum inophyllum, Krating* seed oil, Supercritical methanol

INTRODUCTION

Biodiesel is a renewable fuel that can serve as an alternative to petro-diesel. It is not only renewable and environmentally friendly, but also biodegradable (Demirbas, 2009). In the early period of biodiesel production, many edible plant oils, such as palm, soybean, sunflower, and rice bran oils, were used as raw materials, or feedstock (Georgogiannia et al., 2008; Kasim et al., 2009; Biktashev et al., 2011; Carrillo and Medina, 2011). However, as edible vegetable oils are expensive (Rizwanul Fattah et al., 2014), attention has turned to finding non-edible vegetable oils to replace them.