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CULTIVATION OF MICROALGAE IN MEDIUM CONTAINING PALM OIL MILL EFFLUENT AND ITS CONVERSION INTO BIOFUEL

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ABSTRACT

The production of renewable energy has become an important element in worldwide energy policy aimed to reduce greenhouse gases caused by fossil fuels. Biodiesel derived from transesterification of vegetable oil or animal fats, with alcohol in the presence of catalyst has been considered as one of the alternative resources to replace fossil fuels. However, the biodiesel produced from these materials may not be enough for total replacement; hence microalgae are used as another potential alternative due to their high photosynthetic efficiency and biomass productivity. In this study, a microalgae species i.e. Chlorella vulgaris *UMACC 001 having high oil to biomass ratio was cultured, harvested and characterised. It showed very high growth rate, μ (0.29 per day) and biomass productivity (0.14 mg litre per day). In addition, the resulting algal oil showed almost equal amount of saturated fatty acid (48.9%) and unsaturated fatty acid (51.1%). When converted to biodiesel, the ester content was 68.9% and comparable with that produced in previous study (71.0%). Thus,* Chlorella vulgaris *can be considered as a potential feedstock for biofuel production in the future.*

Keywords: biodiesel, microalgae, photosynthetic efficiency, *Chlorella vulgaris*, biomass productivity.

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INTRODUCTION

It was reported that the world oil reserves of about 1.3 trillion barrels shall be shrinking within the next 50 years if the oil utilisation is at a rate of 80 to 90 million barrels a day (Abdullah *et al*., 2007). To overcome this, a new source of renewable energy having high energy content and low carbon dioxide production should be introduced. The United Nation's Intergovernmental Panel on Climate Change has reported on a significant greenhouse gas emissions in the last 30 years, and due to increasing awareness on global warming, development of sufficient recourses for clean energy is important (Rogner *et al*., 2007). Biodiesel is believed to be the best candidate in helping to reduce greenhouse gas emissions as it is carbon natural, environmental-friendly, biodegradable and can be produced from edible or non-edible vegetable oils, animal fats and microalgae.

Biodiesel is a diesel substitute derived from non-toxic renewable sources. It has potential in reducing about 78%, 98% and 50% emissions of CO_2, SO_2 and particulate matters, respectively when it is burnt. It has lower combustion emissions profile, sulphur and aromatic contents that make it a better fuel

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