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Short Communication

Viscosity modeling and flow properties of non-edible oils as feed-stock in biodiesel production

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Abstract

In a previous study, non-edible plant seeds were sought as sources of vegetable oils as alternatives to soybean oil which is the major source of oil feedstock for the manufacturing of biodiesel in the United States of America. Soybean oil as a resource also doubles as a staple food: it is the most widely consumed cooking oil (frying, baking and a condiment in salads). Commercially, soybean oil is also used in printing ink and oil paint formulations. Hence the motivation for the search for other oil sources especially for the non-edible/non-staple sources. In this study, several plant seeds which were selected based on their ease of cultivation and short maturation periods were investigated for the yields, densities and the degrees of saturation and compared to the soybean output as a benchmark. A further investigation is undertaken in the present study to compare the viscosities and the Cloud Point (CP) temperatures of the benchmark soybean oil and the non-edible oils that compared favorably to the soybean oil in terms of the yields and Iodine Values (IV).

Different mathematical models were applied in the fitting of the measured viscosity data. However, since the models did not adequately represent the data in the region of interest (lower temperatures), a new mathematical model was developed which in combination with measured data were used to infer the Cloud Point temperatures of the oil samples. The inferred Cloud Point temperatures ranged from -17oC for the Lavender oil to 8oC for the Morning Glory oil. For the benchmark oil (Soybean), the Cloud Point temperature was inferred to be 0oC. Therefore, most of the sample oils had Cloud Point temperatures lower than for the benchmark which confirms these oil candidates as possible replacements of the benchmark.

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