

Fuel properties of biodiesel produced from selected plant kernel oils indigenous to Botswana: A comparative analysis

Jerekias Gandure, Clever Ketlogetswe & Abraham Temu

Abstract

Abstract

Fuel characteristics of biodiesel derived from kernel oils of *Sclerocarya birrea*, *Tylosema esculentum*, *Schiziphyton rautanenii* and *Jatropha curcas* plants were investigated in comparison with petroleum diesel. The fuel properties under review include flash point, cloud point, kinematic viscosity, density, calorific value, acid value, and free fatty acids. These were determined and discussed in light of major biodiesel standards such as ASTM D 6751 (American Society for Testing and Materials) and EN 14214 (European standards). The best biofuel in terms of cold flow properties was *S. rautanenii*, with a cloud point of 0 °C and a pour point of –5 °C. The good cold flow properties demonstrate operational viability during the cold season. The heating values of *S. birrea* and *S. rautanenii* biodiesel fuels were found to be 9.2% and 10.3% lower than that of petroleum diesel while those of *T. esculentum* and *J. curcas* were both 9.7% lower. Other fuel properties analysed demonstrate that biodiesel fuels produced from kernel oils of *S. birrea*, *T. esculentum*, *S. rautanenii* and *J. curcas* plants have properties that are comparable to, and in some cases better than, those of petroleum diesel. The results of this study indicate the feasibility of producing quality biodiesel fuel from indigenous seed oils found in Botswana. A balanced allocation of resources however needs to be established to ensure that the cultivation of these oil-bearing plants does not compete with the cultivation of food crops.

Keywords: Biodiesel; Fuel; Properties; Indigenous