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Title: Evaluation of Fuel Properties of Sal (*Shorea robusta*) Seed and Its Oil from Their Physico-chemical Characteristics and Thermal Analysis

Abstract:

In search of alternative and eco-friendly sources of fuel, biofuel received enormous attention over the world. Although Bangladesh is a land of biomass and natural resources, an intensive study of the potential use of these resources for biofuel production has not yet been reported. *Shorea robusta*, commonly known as ‘Sal tree’, is the major plant of Sal forest which covers about 10% of the total forest land of Bangladesh. In this study, fuel properties of the seeds obtained from Sal tree were assessed from its proximate and ultimate analysis. Oil from Sal seed was extracted via solvent extraction process using n-hexane as solvent. The oil content in the seed was found 15.39% (when the coat and kernel of the seeds extracted together) and 20.16% (when only Kernel of the seeds was extracted), respectively. GC-FID analysis of the oil detected the presence of stearic acid (49.38%), oleic acid (34.69%), arachidic acid (8.56%), and palmitic acid (7.35%). The elemental composition of the oil was found C = 75.9%, H = 13.5%, N = 3.6%, S = 0.06%. Different physico-chemical parameters e.g., acid value, iodine value, saponification value, peroxide value, refractive index, and viscosity of the oil were also determined. The higher heating value of the Sal seed and its oil were found 17.99 MJ/kg and 41.61 MJ/kg, respectively. The pyrolysis and the combustion characteristics of the seed and extracted oil were evaluated via Thermogravimetric Analysis. The Sal seed and its oil would be a promising feedstock for commercial biodiesel, pyro-oil, and soap production in Bangladesh.

Keywords: Sal seed, Solvent Extraction, Proximate and ultimate analysis, Biodiesel, Fatty acid

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