EFFECT OF MOISTURE CONTENT ON PROPERTIES OF JATROPHA SEED OIL

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ABSTRACT

Jatropha curcas seed oil was extracted employing solvent extraction technique at five moisture content levels. The properties of the extracted oil were analysed. The parameters analysed were yield of oil, acid value, moisture content, peroxide value, saponification value and specific gravity. Results obtained showed that there was an inverse relationship in the yield of oil and moisture content of the seed with the lowest value of 32.3% at 25.85 % w.b seed moisture content to 38.5% at 5.85% w.b. seed moisture content. Moisture content of the oil also increased from 16.3% to 32.5%. The acid value increased from 5.8 to 12.5. Saponification value increased from 175 to 182 as the seed moisture content also increased from 5.85% to 25.85% w.b. Specific gravity of oil witnessed a slight rise from 0.9637 to 0.9660 as the seed moisture content also increased from 5.85% to 25.85% w.b.

Keywords: Solvent extraction, saponification value, peroxide value, specific gravity.

INTRODUCTION

Jatropha from the *Euphorbiaceae* family has over a genus of over 170 plants, indigenous to the Central America but usually planted and exploited across majority of tropical and subtropical countries of the world. It produces four times yields of soybean per hectare and ten times yields of corn per hectares (Nobrega and Sinha, 2008). Out of many varieties of Jatropha, *Jatropha curcas* has a broad sphere of applications and assures different important advantages to man and industry. The concoction from this variety has been reported to possess anti-tumor property (Lin et al., 2003); the leaves can be utilized as treatment for malaria and high fever (Gübitz et al., 1999; Henning, 1997) the seeds can be employed as medication for constipation and the sap has been known to be potent for speeding up wound healing operation (Gübitz et al., 1999). Furthermore, the plant is used for ornamental purposes, dye and pesticides raw material, soil manure/fertility enrichment and more essentially as a promising feedstock for biodiesel production (Tiwari et al., 2007; Vasudevan and Briggs, 2008). Diesel is the principal fuel consumed in the transport sector particularly for vehicles such as trains and trucks. There is an increasing charge for fuel in transportation sectors of majority of countries with the demonstration of the prevailing world energy dilemma. Hence, it is necessary to probe into the workability of having a substitute to diesel fuel which could be produced on an industrial proportion for commercial usage. The *Jatropha curcas* oil which happens to be non-edible assures an economically feasible substitute to diesel because it possess desirable physiochemical properties and performance qualities proportionate to diesel to expedite steady operation devoid of major alterations in the engine design.

Solid liquid extraction is a typical and dynamic method of oil extraction for production of biodiesel (Forson et al. 2004). Solid liquid extraction, otherwise known as leaching, includes conveyance of a dissolvable portion (the solute or leachant) from a solid substance to a liquid solvent. The dissolvable fraction disperses from the solid towards the encircling solvent. Usually, solid liquid extraction relies on the nature of the solvent and oil, reaction time between solvent and materials, temperature of the process, particle size of the material and the ratio of solvent to the material. There is a wide changeability in diverse affirmations of *Jatropha curcas* from different agro climatic zones (Kaushik et al., 2007). Augustus et al. (2002) reported that oil content of *Jatropha curcas* seeds is about 20-40%. According to the report, the oil fraction contains 14.1% palmitic acid, 6.7% stearic acid and saturated fatty acid, 47% oleic acid and 31.6 of linoleic acid and unsaturated fatty acid. In the recent past, Martinez-Herrera et al. (2006) disclosed that the leading fatty acids present in the *jatropha curcas* oil samples were oleic (41.5-48.8%), linoleic (34.6-44.4%), palmitic (10.5- 13.0%), and stearic (2.3-2.8%) acids. Considering the compelling challenge of utilization of vegetable oil to meet human demand and as raw material for soap factory, it is therefore necessary that other alternative sources of production of non-edible vegetable oil are investigated. *Jatropha curcas* oil falls into this category of non-edible vegetable oil.

Oil extraction includes diverse preceeding processes which involves dehulling, cleansing, drying and milling; although the entire quantity of oil extracted rely solely on the temperature, extraction time, particle size and moisture content of the oil-bearing substance (Gutiérrez et al., 2008). Shankar et al. (1997) reported that the enzymatic hydrolysis of oil seeds precedent to extraction improves the extractability and recoverability of oil in oil seeds. There are majorly two methods of oil extraction from oil seeds. One method is mechanical expression employing a machine to apply