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Biochemical analysis of extracts and oil of *Jatropha curcas* (L.) seeds

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SUMMARY

As a part of the systematic study of the development of a cost effective processing and utility of final product as a biodiesel, extracts (aqueous and organic) and oil from *Jatropha curcas* (L.) seeds were characterized for their biochemical properties quantitatively as well as qualitatively. Aqueous extract contained proteins (855 mg) and amino acids (3.52 mg) per gram of Jatropha seeds. Further, thin layer chromatogram detected oleic and stearic fatty acids in organic extract and oil (IIP) of Jatropha seeds.

Key words : Biodiesel, Seed extracts, *Jatropha curcas* (L.).

Dr. Rudolf Diesel developed a unique engine in 1895. This engine was design to operate on peanut oil or other vegetable based fuels. After his mysterious death in 1913, diesel's engine was adapted to use a by-product of the gasoline refining process. The petroleum industry called it diesel fuel. The use of vegetable oils as engine fuels may seem insignificant today but such oils may become, in the due course of time, as important as petroleum and the coal tar products of the present time (Ali and Hanna, 1994**)**.

Biofuels are liquid fuels made from esters, alcohols, ethers and other biomass chemicals and they can be produced in any climate, using already developed agricultural practices. Common biofuels include biodiesel and ethanol. Biofuels are renewable and hence, they can supplement hydrocarbon fuels, assist in their conversion, as well as mitigate their adverse effects on the climate. As such, these renewable fuels do not contribute significantly to the GHGs (Green House Gases), main cause behind global warming.

Since edible oils are in short supply, the main raw materials for manufacture of bio diesel in India can be non edible oils obtained from plant species such as *Jatropha curcas* L. (ratanjyot), *Pongamia pinnata (karanj), Calophyllum inophyllum (Nagchampa), Hevca brasiliensis (Rubber), Azadirachita indica (Neem)* etc. *Jatropha curcas*, hitherto, considered a wild oilseed plant of the tropics is now being regarded as a promising biofuel crop ideally suitable for growing in the waste lands of India. This crop is now in great demand even internationally.

Laboratory studies on transestrification of Jatropha, Pongamia, Madhuca, Salvadora and mixed oils homogenous alkaline catalyst have been completed at "Indian Institute of Petroleum", Dehradun. The bio diesel extract is being used with conventional diesel for test run in normal diesel engine. Further, scale-up of process engineering for homogenous catalyst process is under way. Glycerol as a by-product obtained in the process is being purified separately at a bench/pilot scale. Therefore, present studies were conducted in relation to the feasibility of Jatropha seeds extract as biodiesel feed stocks.

MATERIALS AND METHODS

Jatropha curcus seeds and oil were collected from Indian Institute of Petroleum (IIP), Dehradun. Aqueous and organic extracts were obtained through Sox-hlet assembly using water and petroleum either (60°-80°C) as respective extractants. Both extracts were evaluated for their biochemical constituents following standard protocols, qualitatively as well as quantitatively (Sawhney and Singh, 2007). Aqueous extract was evaluated for sugars using Anthrone, Molish's, Seliwanoff and Fehling qualitative assays. Protein and amino acids were detected qualitatively using Xanthoproteic, Sakaguchi's, Biuret, Ninhydrin assays and estimated quantitatively using (Lowry *et al*., 1951; Bates *et al*., 1973).

Organic extract and oil were evaluated for unsaturation by bromine water and thin layer chromotoraphic (TLC) separation of fatty acids using hexane : diethylether : acetic acid (80:20:1) as developing mixture and sulphuric acid (50%) spray as a visualizing agent.

RESULTS AND DISCUSSION

Seed extraction:

80g dry seeds of *J.curcas* resulted 0.450g aqueous (distilled water) and 7.221g organic (petroleum ether),

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