"Synthesis Of Biofuel From Non-Edible Deoiled Cakes"

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INTRODUCTION :

The rapidly depleting fossil fuels and constant rising crude oil prices all over the world has increased interest in alternative sources of energy. Bio-Ethanol is one source of alternative energy which can be efficiently used to combat fuel crisis. Bio ethanol can be produced by the action of microorganisms and other pathways. Micro organisms can be used as agents of bioconversion for the production of bio-ethanol. Since cellulose is the most abundant renewable biological resource, the bioconversion of agricultural waste at economic rate will lead to the development of large scale processes beneficial to mankind. The Government of India has made it mandatory for all petroleum refineries to blend 10% ethanol with refined petroleum products out of which 5% with immediate effect. To fulfill this requirement it is an uphill task for the government to provide and supply bulk ethanol to petroleum industries at affordable rates. At present bio-ethanol is being produced in India only by converting sugar molasses to ethanol at industrial level, which is not even sufficient to cope up with the demands of chemical industries and breweries .At the same time large quanteties of nonedible oil seeds like Jatropha, Karanja, Castor are processed to manufacture biodiesel and other chemical derivatives leaving behind deoiled cake as waste.

FEEDSTOCK FOR INDIAN BIODIESEL

• Difficult to Divert Edible Oils • Indian Government identified Jatropha and KaranjaPlants for exploitation to Produce the Respective Seeds for Biodiesel Production

• Two tonnes of Oilseed Cake will be Produced for Every tonne of Biodiesel Produced

• Huge Quantities of Oilseed Cakes will be available if both Jatropha and Karanja Plantations Succeed…

• We should look for Optimum Utilization of Oilseed Cakes

PRESENT INDIAN SCENARIO OF OILSEED CAKES

• Producing about 34 million metric tones of oilseeds

• Annual Production of Oil is about 7.7 million metric tonnes

• Annual Production of Oilseed Cakes is about 18million metric tones and Exporting about 5.2 million metric tonnes of Oilseed Cakes

• Quantity of Non-edible Oilseed Cakes –Presently about 2.812 million metric tonnes.

BIOETHANOL FROM CAKES

• Currently, Ethanol is made from Corn Grain Starch /Sugarcane Molasses
• Newer Feed stocks Required to Meet the Future Demands
• Oilseed Cakes / Hulls – Potential Feedstock as they are Made up of Cellulosic Materials
• Efficiency of the Pre-treatment and Fermentation Process has to be Optimized based on the Yield of Free Sugars and Ethanol .

2) REVIEW OF LITERATURE:

India has a lot of potential of non-edible oil tree born seeds. The country is endowed with more than 100 species of tree born noedible oil seeds occurring in wild or cultivated sporadically, to yield oil in considerable quantities. Table 1. indicates the potential availability of some non-edible tree borne oil seed in the country [4]. Most tree borne oil seeds yield about 25 % oil and 70 % oil cake considering 5 % losses in the oil extraction process using mechanical expeller.

In India, attempts are being made for using non-edible and under-exploited oils for production of esters. The non-traditional seed oils available in the country, which can be exploited for this purpose, are *Madhuca indica, Shorea robusta, Pongamia glabra, Mesua ferra* (Linn), *Mallotus philippines, Garcinia indica, Jatropha curcas* and *Salvadora.* In this regards a National Mission on Biodiesel has been launched in year 2003 under demonstration phase with the objective of producing biodiesel by the year 2011-12 enough tomeet 20% blending with high speed diesel of total diesel requirement [5].

One hectare of *Jatropha curcas* plantation on an average will produce 3.75 metric tonnes of seed yielding 1.2 metric tonnes of oil.At the end of two years *Jatropha curcas* plant will give seed to its full potential. Hence four lakh hectares will produce 0.48 million metric tonnes of oil and 1.02 million metric tonnes of oil cakes [5].

Considering the future scenario of non-edible oil seeds utilization for biodiesel production in the country from *Jatropha curcas* and *Pongamia pinnata* (Karanja) there is need for efficient utilization of their cakes. The current production of karanja seed is around 0.056 million tonnes per annum against potential of 0.20 million tonnes per year. Similarly, the production of *Jatropha curcas* seed would be very large in comparison to karanja seed by the introduction of National Biodiesel Mission started in year 2003 in the country. These two crops in India have been selected as major source of non-edible oil for production of biodiesel. One of the major problems arising in the coming years is disposal of cake after expelling oil from seed. The cake neither can be used for animal feeding or directly can be used in agricultural farming due to its toxic nature. The generation of biogas from these cakes would be a best solution for its efficient utilization. Biogas from cake provides energy for heating, cooking, lighting and engine operation and digested cake slurry can be directly put for agricultural farming.

The castor seed production in india is maximum as compared to other countries hence the availability of nonedible deoiled cakes of Castor seeds is in vast quantity as shown in table 1. utilization export of availability. It also have the good potential for producing biofuel..

The direct utilization of cake is also not recommended for use as organic manure. The present and forthcoming use of non-edible oil seeds in India is production of biodiesel due to massive plantation of *Jatropha curcas* and karanja on waste lands in the Biodiesel Mission Project.

The utilization of generated cakes (70 % yield of total non-edible oil seeds) in a environment friendly manner can not be ignored, because its disposal as waste would create environmental problems. A possible way of utilization of non-edible oil seed is presented in Figure 1. Figure shows route of appropriate utilization as oil

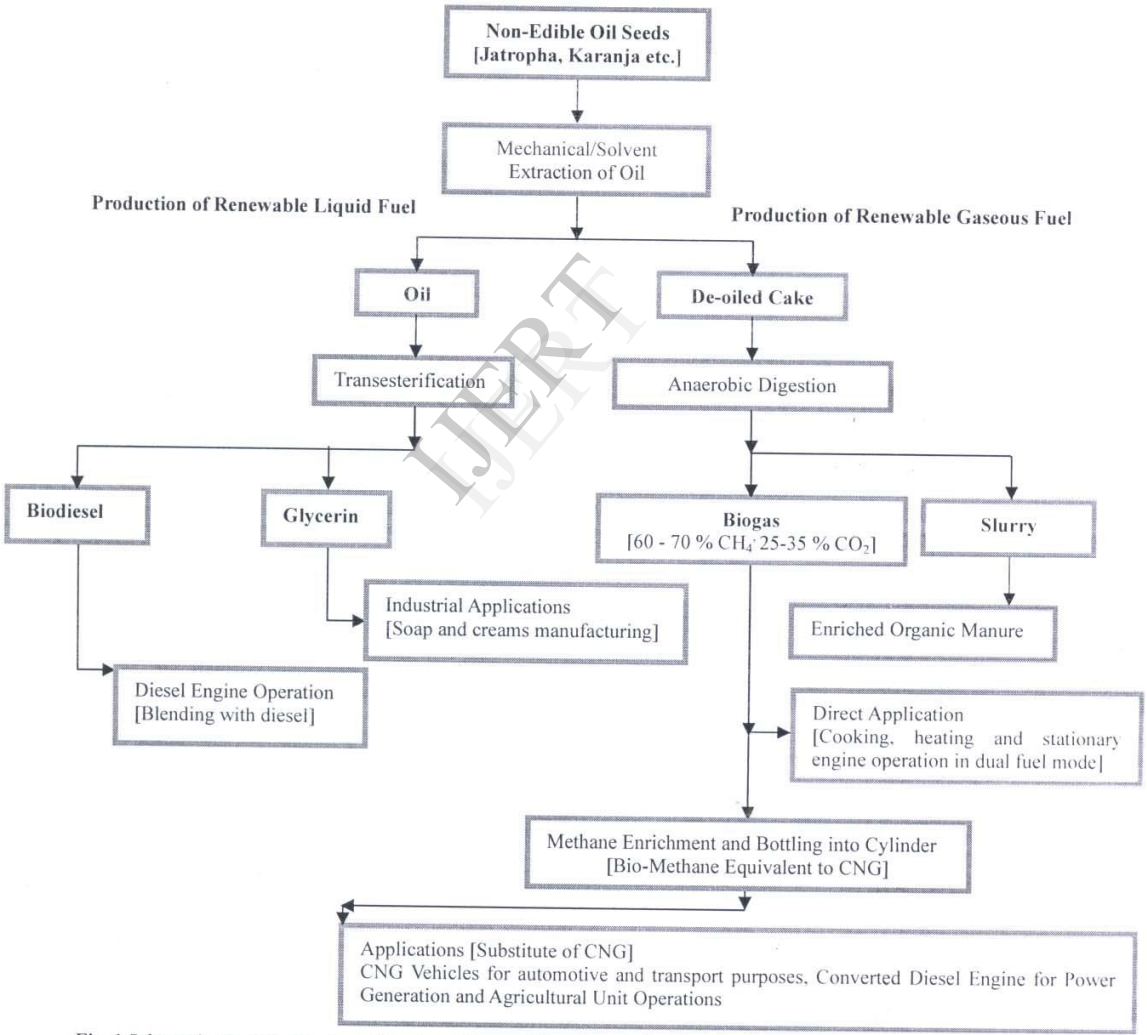

Fig. 1 Schematic diagram showing utilization of non-edible oil seeds for production of renewable liquid (biodiesel) and gaseous (biogas) fuels

Biotechnological applications of oil cake

Oil cakes have been widely used for the production ofindustrial enzymes, antibiotics, biopesticides, vitamins and other biochemical. They have also been commonly used as feed supplement.

3) METHODOLOGY

A study will be carried to explore the potential of bioethanol generation from nonedible deoiled cakes of *Jatropha* and Karanja ,Castor Seeds. The aim of the investigation is to evaluate various operating parameter of bioethanol generation under anaerobic condition from non-edible oil seed cakes. Anaerobic digestions of *Jatropha / Karanja* non-edible oil seed cakes will be carried out under messophilic range in the laboratory conditions using 5 litre glass fermentors. The feed materials will *Jatropha / Kranja* various combination of cake. [1, 2, 3, 6 and 7].

3.1) Materials and Equipments would be required

Enzymes-Saccromysse. Cervisae, Cellulase,Amylase,Pectinase.

1) Chemicals- Thionyl chloride.
2) Waste Nonedible Deoiled cakes of Karanja/ Jatrpha seed cakes.
3) Equipments-Autoclave, water heating mental, Spectrophotometer,Fermenter Gas chromatography, Tray dryer.

3.2) Estimation of moisture content in deoiled cakes

3.3) Estimation of total solids

3.4) Chemical Treatments

3.5) Enzymatic Treatment

3.6) Process of Fermentation

The nonedible deoiled cakes of castor/jatropha seeds will convert to glucose by enzyme hydrolysis.

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