Science Tech Entrepreneur
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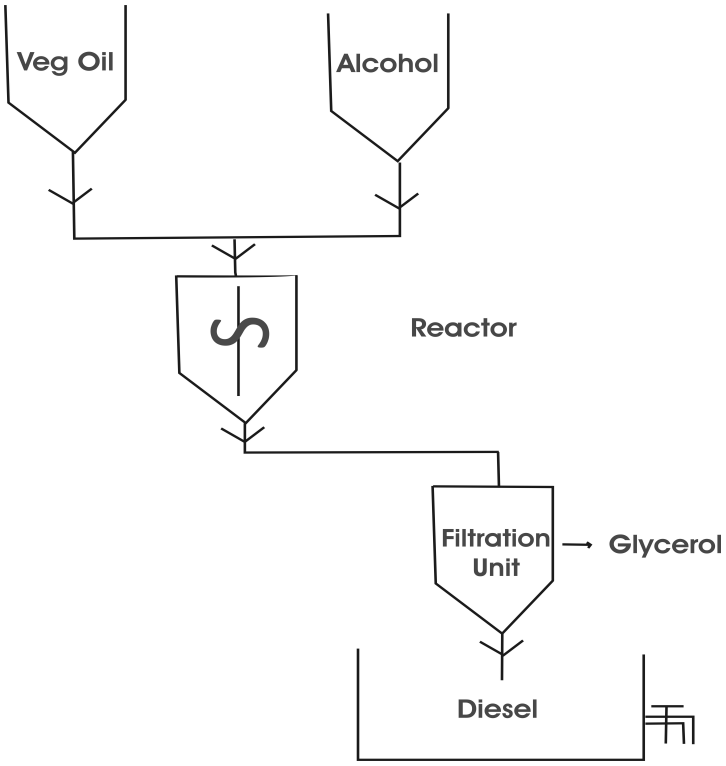
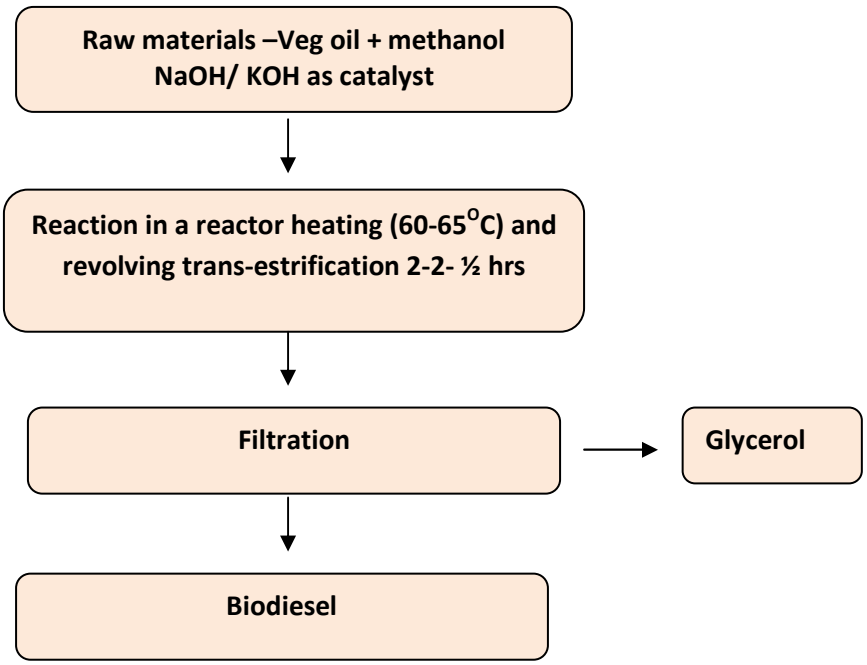
Bio-diesel from Jatropha

India has a landmass of 325 million hectares out of which 65 million is wasteland. These areas are scattered and fragile and suffer from prolonged droughts. Due to de-forestation soil becomes susceptible to erosion resulting in decreasing top soil and lowering of ground water level. These wastelands could be economically utilised by cultivating species like Jatropha, Curcus or Salvadora for bio-diesel production as an economic activity. The Jatropha Curcus (L) or physic nut is a drought resistant and multipurpose small free not grazed by animals. Althrough a native of tropical (South) America, it thrives well in Africa and Asia (India as well). It grows well in tropical and sub-tropical regions of the world having low rainfall and problematic soils. Being drought resistant it can help to reclaim crowded areas and could be grown as boundry fence/hedge to augment income.

Tribals of Baster have been using seeds of Jatropha as a torch by buring seeds. Due to their oil content, seeds are made to pass through a wire which continues to burn in the night. They are also using Jatropha oil in engines (primo movers) by the nozzle of the ejector to adjust the higher viscocity seeds of Jatropha. They contain 32.25 percent (by weight) viscous oil which can be used to manufacturer candles and soap in cosmetic industry, for cooking or as diesel paraffin substitute or extender in the paint industry.



Process flow chart



Equipments

i. Reactor with heating and revolving arrangement

ii. Filteration unit

iii. Pumps

Biodiesel is automotive fuel of future and it can best supplement the existing sources. The main oil seeds used for production of diesel includes Jatropha curcus (*Ratan Jot*), Madhuca latifora (*Mahua*), Salva dora pezsica (*Pilu*) and Pongamia pinnate (*Karauj*). These plant species are found in abundance in Gujrat, Andhra Pradesh and Madhya Pradesh. Some farmers and entrepreneurs have started cultivation of Jatropha curcus for employment generation and biofuel.

Process

Boidiesel is produced by chemically reacting vegetable oil/ animal fat with alcohol to produce a new compound called fatty acid alkyl ester by trans-estrification. A catalyst such as sodium/potassium hydroxide is used and glycerol is obtained as by-product.

$$\underset{\text{Oil}}{100\ \text{L}} + \underset{\text{Methanol}}{10\ \text{L}} \xrightarrow{\text{NaOH/ KOH}} \underset{\text{Biodiesel}}{90\ \text{L}} + \underset{\text{Glycerol}}{10\ \text{L}}$$

Methanol is recovered in the process.

Agro-technology

Soil: Wasteland unattractive for agriculture due to low fertility and alkaline soils are used.

Rainfall: 200- 1200mm in hot climatic conditions.

Planting: Seeds or rooted cuttings are planted at a distance of 2m x 1.5m. About 2000 plants/ ha or 400-500 plants/ Km are planted

Yield: 0.4T/ha/yr after 2-3 years and 2.5- 3T/ha/yr after 5 years. Plant life is about 25 years.

Return

3.00 T x Rs. 6/Kg = Rs. 18000/ha/yr or 25 years

Project cost

Rs. 6.00 lakhs

Capacity

400 L/ day

Production cost

Rs 30/- = Litre (one litre diesel from 3 Kg of seed)

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Note: The author may have used various references in the preparation of this article. For further details please contact him/her.