

MANUAL
OF
JATROPHA CURCAS:
A Greengold Plant



Edited By:
Prof. J.A. Obaleye
Prof. S.O. Bada
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BIODIESEL PRODUCTION FROM *JATROPHA CURCAS*

Ameen O.M., Okeola F.O. and Adebayo G.B.

Biodiesel refers to a non-petroleum based diesel fuel consisting of long-chain alkyl (methyl, ethyl or propyl) esters. Biodiesel is made by chemically reacting lipids, typically vegetable oil or animal fat (tallow), and alcohol. It is a clean burning renewable fuel made through a chemical process which converts oils and fat of natural origin into Fatty Acid and Methyl Esters (FAME). Biodiesel is a renewable, clean-burning diesel replacement that can reduce dependence on petroleum, creating and improving the environment. Around 350 oil bearing crops rapeseed, coconut, soybean, sunflower, linseed and *Jatropha* are the main sources of biodiesel. However, *Jatropha curcas* has been found to be the most suitable or most appropriate renewable alternative source of biodiesel.

EXTRACTION OF OIL

Materials needed

1. Hydraulic press for mechanical extraction
2. N-hexane for chemical extraction
3. Distillation set

Procedure (Mechanical extraction)

- Rupture the capsules containing the seeds to release the seeds
- Grind the seed with mortar and pestle to increase the surface area
- Transfer the milled seed into a sack
- Place under hydraulic press machine
- Operate the hydraulic press as instructed and collect the oil.

Procedure (Chemical extraction)

- Carry out operations 1 and 2 above
- Transfer the milled seed into a jar
- Pour n-hexane into the jar containing the milled seed
- Cover the jar adequately to prevent the escape of n-hexane
- Leave the mixture for three days (72 hours)
- Filter the extracted oil
- Concentrate it by simple distillation.

PRODUCTION OF BIODIESEL

Materials Needed

1. *Jatropha* oil
2. Methanol/Ethanol
3. Reactor
4. NaOH/KOH
5. Acetic acid
6. Water

Procedure

- Dissolve the required amount of catalyst (NaOH or KOH) with required amount of alcohol (Methanol/Ethanol).
- Fill the reactor with required amount of oil
- Heat the oil to about 45 degree to improve the oil mixture with alcohol.
- Add the mixture (i.e. alcohol and catalyst mixture) to the pre-heated oil.
- Raise the temperature to 60 degree with continuous stirring
- Terminate the reaction after one hour.
- Allow the product to separate into phases by standing for eight hours.
- Collect the lower phase which is glycerol by-product separately
- Collect the upper phase which is the biodiesel also separately
- Add required amount of acetic acid to the collected biodiesel
- Wash the mixture with amount of water three times
- Dry the biodiesel in an oven at 100 degree celsius for one hour