

Design, development and testing of bio-diesel processor

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ABSTRACT

Bio diesel processor is designed and developed at College of Agril. Engineering and Technology, MAU, Parbhani for the processing of non edible oils of Jatropha and Karanja. The bio-diesel processor was found suitable for producing bio-diesel from edible and non-edible oil by adopting process of base catalized transesterification. The bio-diesel properties was found within the limit of BIS standard. The operational efficiency of diesel pump for various blends of bio-diesel were found nearer to the expected efficiency of 20%.

Key words : Jatropha, Karanja, Bio-diesel

INTRODUCTION

Fast depletion of the fossil fuels and some times shortage during crisis period direct us to search for some alternative fuel which can reduce our dependence on fossil fuels. The agriculture sector of the country is completely dependant on diesel for its motive power and to some extent for stationary power application. Increased farm mechanization in agriculture thus, further increase requirement of this depleting fuel source. Many alternative fuels like bio-gas, methanol, ethanol and vegetable oils have been evaluated as a partial or complete substitute to diesel fuel. The vegetable oil can be used directly in diesel engine as a fuel, because their calorific value is almost 90-95 per cent of the diesel. The technology of production, the collection, extraction of vegetable oil from oil seed crop and oil seed bearing trees is well known and very simple. The development in this respect also provides much ecological balance. Due to pressure on edible oils like groundnut, rapeseed, muster and soyabean etc. non-edible oil of Jatropha curcas and Karanja (*Pongamia pinnata*) are evaluated as diesel fuel extender (Racheman *et al.*, 2003, Patil *et al.*, 1991, Verma *et al.*, 1994). The oil is extracted from the seeds and converted into methyl esters by the transesterification process. The methyl ester obtained from this process is known as bio-diesel. Bio-diesel is renewable source of energy which can be produced locally by our farmers by growing oil seed producing plants on their waste lands, barren land which is also eco friendly. In order to propogate and promote the use of bio-diesel as an alternate source of energy in rural sector the present investigation was undertaken. The

bio-diesel was produced from non-edible oils by using bio-diesel processor and the diesel engine performance for water lifting was tested on bio-diesel and bio-diesel blended with diesel.

MATERIALS AND METHODS

Considering the availability of Karanja, Jathropha and other vegetable oils in the local areas, bio-diesel processor based on the trans-esterification process was designed and fabricated at College of Agricultural Engineering & Technology, MAU, Parbhani.

Process requirements are :

1. Revolutions of stirrer	—	500-700 rpm
2. Temperature of reaction	—	55-60°C
3. Oil sample	—	15 Kg
4. Methanol used	—	200 ml/Kg. of veg.oil
5. KOH / NaOH	—	0.5 to 1 gms/kg. of veg. oil
6. Time required	—	1 to 1.5 hours
7. sulphuric acid	—	1 ml / lit of veg.oil (pre-treatment)

Design and development of bio-diesel processor :

Considering the requirement and need to produce vegetable oil methyl ester, biodiesel processor was designed and fabricated locally.

Bio-diesel processor mainly consists of :

- Transestrification vessel
- Sodium/potassiummethoxide mixing pot

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