

Experimental Study on Mauha Oil and Performance Test on Diesel Engine

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Abstract- Energy requirement in day-to-day life is increasing. Proportion of demand and that of supply is not matching due to rapid increasing population. As a result, it is necessary to derive various energy sources which can fulfil the need for energy. Conventional fuels like petrol, diesel etc., are depleting which necessitates the development of a technology which is renewable one and also eco-friendly. Biodiesel is one such alternative. Even though extensive knowledge with regard this fuel technology is developed. There is a need to resolve the problems associated with it. This is necessary to make it a sustainable one and a preferred choice for the future. Oxidation Stability is one of the issue with regard to biodiesel which is a subject of interest for research.

Keywords- Biodiesel, performance, Mahua oil,compression ratio

I. INTRODUCTION

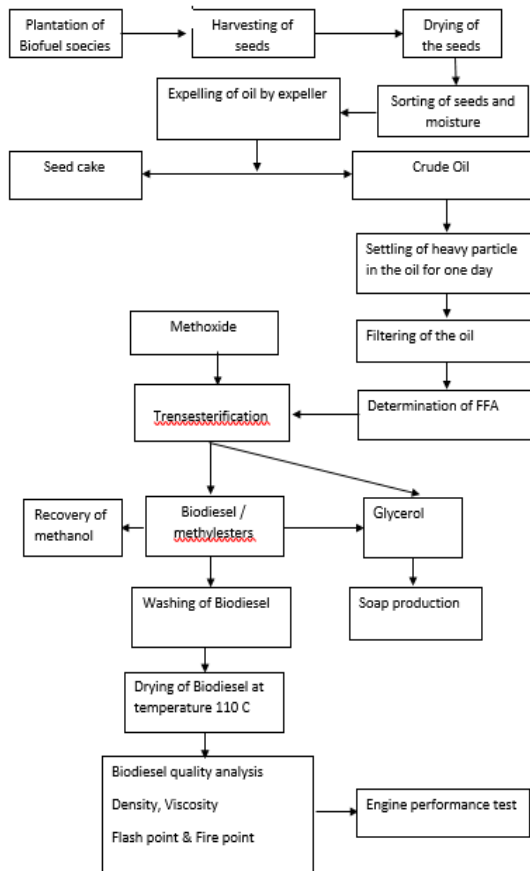
The demand of the fuel in the transportation sector has increased rapidly with the population growth. This rapid growth in population and change in lifestyle of the human being results in increased demand on the fossil fuels and hence this demand is to be reached. The high usage of the fuel in diesel engine leads to environmental pollution with emission of unburnt hydrocarbons, carbon monoxide, carbon dioxide and nitrogen oxide etc. These factors make significant effect on the environment as global warming, smog, deforestation, ozone layer depletion, acid rain etc. These environmental effects as encouraged the researchers to develop an alternative source for the energy for the combustion engines. Over a period many researchers have been trying to find a new alternative fuel that is feasible, economical, environmental friendly and simple in design. Among all the alternative fuels like hydrogen, biogas, biomass, methanol, ethanol etc. Biodiesel is considered as potential alternative fuel for the future. After many research works it is concluded that biodiesel is the most promising alternative fuel for the combustion engines which is applicable in fields like agriculture, transportation and industries and it is a fastest growing alternative fuel in India due to availability of resources in large scale.

Biodiesel is a renewable and non-toxic and biodegradable fuel, Biodiesel is environmental friendly, cost effective and can give good efficiency without altering fuel properties. Biodiesel has a critical problem, on storing for longer period and in contact with metals it starts oxidizing which results in formation of the oxides and also results in poor fuel quality. Hence some of the anti-oxidants and Nano-additives are added to improve stability. Biodiesel is not only in complete line with conventional diesel and its several blends can give good and compatible, these additives also improve the quality of the fuel and give better efficiency in combustion chamber with reduced emission levels of NO_x, CO₂ etc...

II. REVIEW OF LITERATURE

1. Mr. Vinod R et al; A critical review on the performance and emission characteristics of simarouba biodiesel as an alternate fuel in variable compression ignition engine 2015 issue 04 volume 3/ international journal for scientific research and development. They concluded that the performance and emission characteristics of Simarouba biodiesel are better than diesel except NO_x emission.
2. Prafulla D.Patel et al; optimization of biodiesel production from edible and non edible vegetable oils. They concluded that production of fuel quality biodiesel from low cost high FFA oils were investigated. A two-step transesterification was carried out to convert high FFA to its esters. It is found for high FFA oil two-step transesterification methods are best suitable for non-edible oils.
3. M. Canakci.H.Sanli et al; biodiesel production from various feedstocks and their effects on the fuel properties. Their studies concluded the biodiesel production from various feedstocks and their effects on the fuel properties. The studies focused on improvement of flow properties of biodiesel produced from low cost feedstocks.

III. RESEARCH METHODOLOGY



IV. LIMITATIONS OF THE STUDY

From the literature review it is observed that biodiesel are viable alternative to mineral diesel as fuel in compression ignition engine. Mahua oil methyl ester satisfies the important fuel properties such as density, calorific value, flash point, cloud point, and free point as per ASTM specification of biodiesel. Many of the researchers used so many blends such as M20, M40, M60, M80 and M100 which gave better results than diesel.

V. DATA TABLES AND RESULTS

These are the tables and graphs of blend B20 of BP(Break Power), BSFC(Break Specific Fuel consumption), BTE(Break Thermal Efficiency),

TABLES:

| LOAD | BP |
|------|--------|
| 0 | 0 |
| 5 | 0.719 |
| 10 | 1.4226 |
| 15 | 3.365 |
| 18 | 3.99 |

GRAPHS:

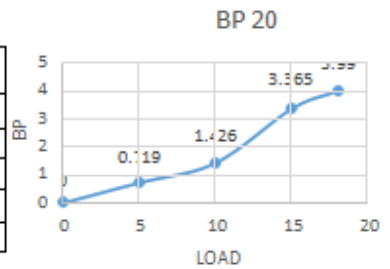


TABLE: 2

| LOAD | BSFC |
|------|-------|
| 0 | 0 |
| 5 | 0.943 |
| 10 | 0.585 |
| 15 | 0.339 |
| 18 | 0.370 |

GRAPHS: 2

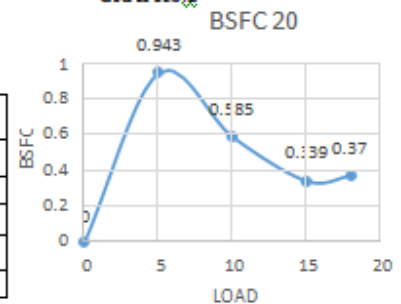
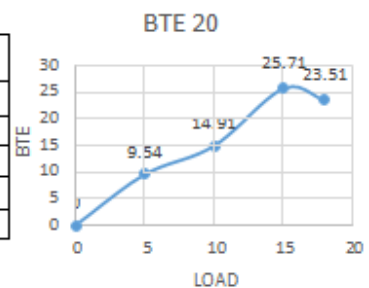


TABLE: 3

| LOAD | BTH |
|------|-------|
| 0 | 0 |
| 5 | 9.54 |
| 10 | 14.91 |
| 15 | 25.71 |
| 18 | 23.51 |

GRAPHS: 3



VI. CONCLUSION

The performance parameters of a single cylinder 4-stroke diesel engine (Kirloskar AVI) fueled with biodiesel blends of Mahua oil have been investigated. The experimental results showed that the performance parameters like BP, BSFC, and BTE were varied with respect to blending, from the experimental results the following conclusions were made:

- The properties of Mahua oil and their blends are found nearer to that of diesel.
- The direct injection Diesel engine runs smoothly for all the Mahua biodiesel blends used in the experiment
- The brake power output for all the biodiesel blends used in the experiment is nearer to that of pure diesel.
- BSFC decreases with increasing load.
- BTE is very higher than any other fuels.
- The performance of all the biodiesel blends are acceptable.

- It can be concluded that the Mahua biodiesel could replace the Diesel in order to help in controlling air pollution, encouraging the seeds collections and reduce the dependency on fossil fuels response to some extent without sacrificing engine performance.
- Finally it can be concluded that it is possible to run Diesel engine with biodiesel blends of Mahua used above without any engine modification and performance loss.

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