JOURNAL OF INFORMATION, KNOWLEDGE AND RESEARCH IN MECHANICAL ENGINEERING

# EVALUATION OF ENGINE PERFORMENCE BY USING SESAME OIL, DEE AND IT'S BLEND WITH DIESEL ON FOUR STROK FOUR CYLINDER DI DIESEL ENGINE.

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***ABSTRACT*:** *Producing and using renewable fuels for transportation is one approach for sustainable energy future for the India, as well as the rest of the world. Renewable fuels may also substantially reduce contribution to global climate change. There are various techniques and methods are used to solve the problems resulting from high viscosity. One of the techniques is fuel blending .Also day by day the fuel consumption increased as well as the luxuries life style and population also increased. In this study blend of Diesel, Sesame oil and Diethyl ether at various proportion is used as a fuel in a direct injection diesel engine. Hence, it is seen that blend of sesame oil, diethyl ether and diesel fuel can be used as an alternative fuel successfully in diesel engine without any modification. Also by using this blend the fuel consumption is reduced at a full load condition also thermal efficiency increased as a compared to the diesel fuel.the fuel consumption of blend* D69S25DEE6 is less as compared to the diesel fuel *It is concluded that it is possible to use Sesame oil in diesel engines as an alternate fuel in the future.*

***Keywords—Sesame oil, DEE, diesel, blended fuel ,diesel engine***

## Introduction

Recently, the use of diesel engine has increased by virtue of their low fuel consumption and high efficiencies. Now-a-days, Diesel engines are used transportation, electric power generation, farming, construction and in many industrial activities.[1] Vegetable oils are alternatives fuels and many researches are carried out on development of these fuel. Now-a-days, vegetable oils are alternative fuels to those derived from petroleum oils and can be used instead of ordinary diesel fuel as fuel in diesel engine.[3] Here to determine diethyl ether (DEE) for use as a transportation fuel, it is necessary to understand its engine performance characteristics, as well as what it might cost.[4] Although DEE has long been known as a cold-start for engine, knowledge about using DEE for other applications, such as significant component of blend, or as a complete replacement for diesel fuel, is limited. To evaluate the potential of DEE as a transportation fuel , we conducted a literature survey .The main problem of using neat vegetable oils as fuel in diesel engine is related to their high viscosity .[2]The high viscosity leads to the following problems in diesel engine ; the blockage of fuel lines and filters, poor atomization of fuel, incomplete combustion, severe engine deposits, injector coking with trumpet formation and piston ring sticking , gum formation and thickening of the lubricating oil. To solve these problems caused by the very high viscosity of neat vegetable oils, the following usual method are adopted blending in small blend ratio with normal diesel fuel. [5]

## 2. PROPERTY TABLE:

*Table: 1 Comparison of sesame oil with diesel.[1]*

| Property | Diesel | Sesame oil | DEE |
|---|---|---|---|
| Heating value(KJ/Kg) | 42900 | 39349 | 33900 |
| Viscosity($mm^2/s$) | 4.3(at 27 °C) | 35.5 (at 38 °C) | 0.23 |
| Density (kg/l) | 0.815 | 0.913 | 071 |
| Cetane number | 47 | 40.2 | >125 |
| Flash point | 58 | 260 | -45C |
| Sulfar | < 0.01 | 0.01 | --- |
| Carbon residue(% by weight) | < 0.35 | 0.25 | ---- |

## 3. EXPERIMENTAL SETUP

### 3.1 Engine set up

The schematic layout of the experimental set up is shown in Fig. 1, and the specifications of the engine are shown in Table 2. The test engine used was a four cylinder, water cooled, direct injection stationary diesel engine. A Rope brake dynamometer was used to provide the engine load. A chromel alumel thermocouple, in conjunction with a digital

temperature indicator, was used to measure the exhaust gas temperature. An air box and inlet manifold were fitted to the engine, and an air flow meter was used for airflow measurement. The fuel was passed from the fuel tank to the engine via the fuel injection pump and the fuel injector, and the fuel flow was measured on volumetric basis using a burette and a stopwatch. Initially, experiments were carried out using base diesel fuel. All the experiments were conducted at the rated engine speed of 2500 rpm.

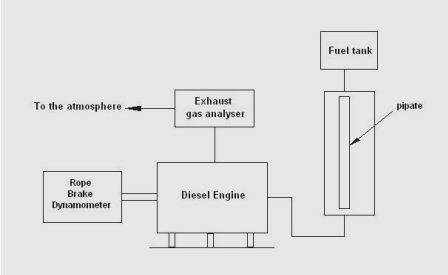


Fig 1

Table: 2 Engine specifications:

| Parameter | Details |
|---|---|
| Engine | Four Cylinder four stroke Diesel Engine |
| Cooling | Water cooled |
| Bore × Stroke | 80 mm × 110 mm |
| Compression ration | 16 : 1 |
| Maximum Power | 10 BHP |
| Rated speed | 2500 rpm |

### 3.2 Test Procedure:

In this experiments we use the diesel engine and it is connected with the rope break dynamometer with the help of dynamometer, varies the load on the engine or load remain constant . The reading takes by constant load or by varying the load on the engine using the dynamometer. Engine performance such as

break power, indicated power, break specific fuel consumption etc find from the experiments .First only diesel fuel is used and engine performance is find .Then the blending of diesel and sesame oil and DEE at different proportion concentration in the diesel fuel takes and find the engine performance . since this practical was performed on four cylinder four stroke diesel engine without modification in the diesel engine.

## 4. RESULTS:

### 4.1 Fuel consumption:

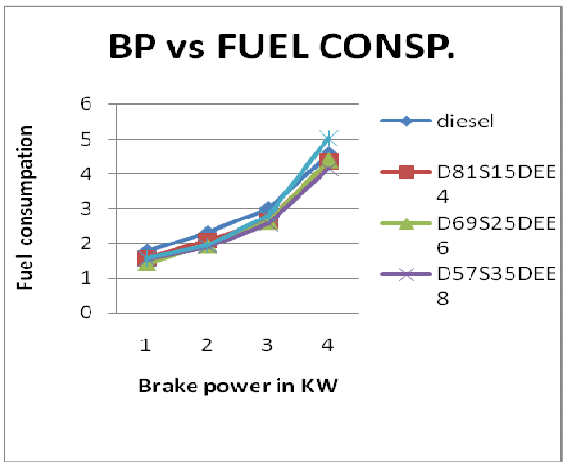


Fig.2

Fig.2 Shows the variation of fuel consumption with break power at various blend proportion in the diesel. From the above graph it show that at full load condition the fuel consumption is increased. since from thegraph it is concluded that the the fuel consumption of diesel fuel is more as compared to the blend D69S25DEE6.

### 4.2 Specific Fuel Consumption:

Shows the variation of specific fuel consumption with break power at various blend proportion in the diesel. The graph shows that the SFC of diesel fuel is more as compared to the all other blend. The blend D69S25DEE6 SFC is minimum for the entire blend.

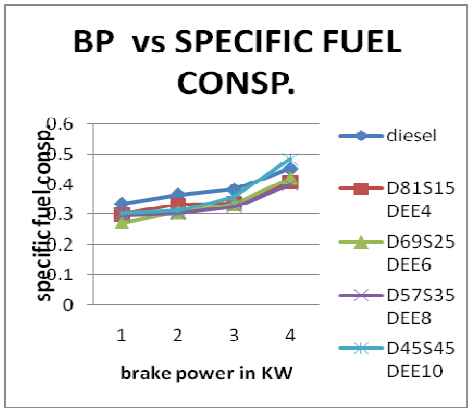


Fig.3

### 4.3 Brake thermal efficiency:

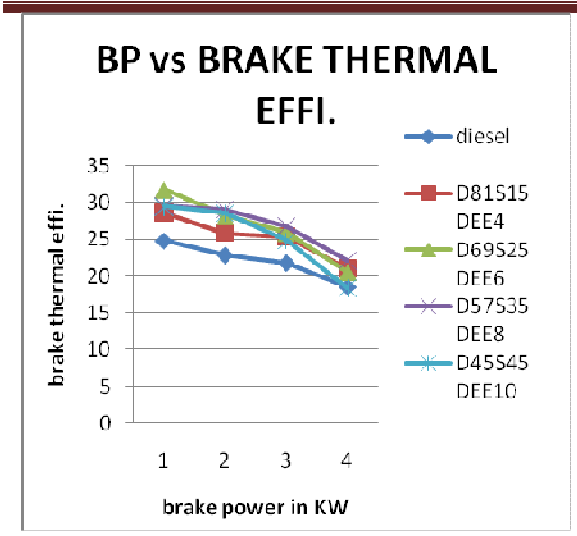


Fig.4

Form the above fig 4 it shows that the brake thermal efficiency is maximum at initial load but as the load increased the efficiency decreased. from the graph it is concluded that the diesel fuel brake thermal efficiency is minimum as compared to the all other blend. Also the blends D57S35DEE8 have maximum BTE.

**4.4 Indicated thermal efficiency:**

From the fig 5 it shows that the indicated thermal efficiency is minimum for the diesel fuel as compared to the all other blend .graph also shows that as the load increased the the indicated thermal efficiency is decreased and the indicated thermal efficiency of the blend D57S35DEE8 blend has maximum indicated thermal efficiency.

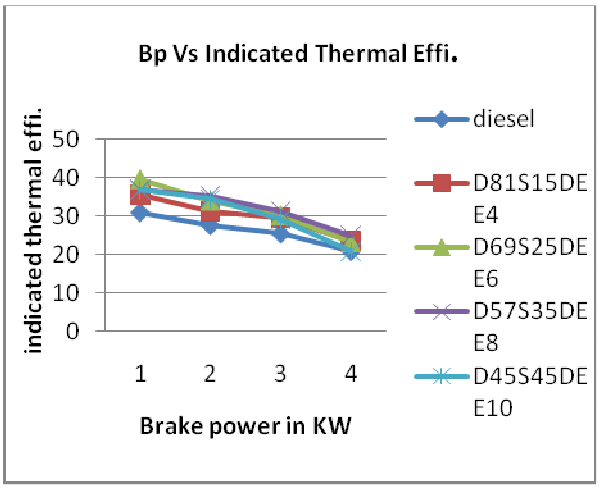


Fig.5

**5. CONCLUSION :**

- From the analysis, it concluded that D69S25DEE6 found best optimum blend compare to the other blend.
- This blend can directly used in the four cylinder 4-stroke diesel engine without modification of the engine.
- It is also concluded that the diesel fuel indicated thermal efficiency as well as the brake thermal efficiency is lower as compared to the other blend.

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**ACKNOWLEDGEMENT:**

Authors express their appreciation to Dr.Saurin Shah, Principal of Silver oak college of Engineering & Technology, Ahemdabad whom completed his M.Tech from IIT and Ph.D. from Nirma University, Ahemdabad, and Gujarat.