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EXPERIMENTAL INVESTIGATION ON TWIN CYLINDER FOUR STROKE C.I ENGINE WITH HONGE OIL BIO-DIESEL AS FUEL

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Abstract **- There has been a noticeable increase in the demand for petroleum products all across the world. Vehicle traffic continues to increase daily. As the global population has increased in recent years, so too has the number of cars on the road. Increases in the number of cars on the road have coincided with a corresponding increase in demand for fossil fuels like petrol and diesel. Because of this, vegetable oil has the potential to be a convenient replacement fuel for already-existing diesel automobiles. Therefore, in order to fill these needs, individuals will have to research alternatives to traditional fossil fuels such as petrol and diesel. Non-edible oils, such as honge oil blend, were the only focus of this article because they can be used as fuel for C.I. engines.**
The main purpose of this study is to compare the efficiency and pollution levels of a multi-cylinder, constant-speed diesel engine running on an honge oil blend and a diesel fuel. There was only a quick inspection of the tools and materials before we got started with the experiment. All of the measured data has been analysed and calculated.
The thermal efficiency, specific fuel consumption, and emissions of a diesel and honge oil brake system were measured from no load to full load using a four stroke multicylinder diesel engine.

Keywords— Diesel, Honge oil blend, Performance, Exhaust emissions, Alternative fuels.

I. INTRODUCTION

Energy consumption is increasing globally in various forms for various purposes. The intensity of consumption is directly proportional to a society's development. Today, more developing countries are prospering through economic reforms and are becoming industrially advanced. Fuel is critical to any strategic plan for economic development and national security. In developing countries like India, the fuel has assumed serious economic consequences in the forms of budget deficits caused by oil imports and ecological degradation caused pollution.

The possibility of substituting cleaner-burning alternatives for gasoline and diesel has drawn the attention of the automobile industry over the past decade. Previously vegetable oils were not acceptable because they were more expensive than petroleum fuels but due to the recent increase in petroleum prices and uncertainties concerning petroleum availability renewed the interest in non edible vegetable oil fuels for diesel engines. There are about 340 oil-bearing crops like cotton seeds, sunflower, soybean, rapeseed; Jatropha, honge, rubber seed, pine oils etc are identified as potential replacement for diesel fuel.

II. LITERATURE SURVEY

S.D.RahulBharadwaj et.al [1] had conducted experiments on the utilization of honge oil on a single cylinder four-stroke, water-cooled compression ignition engine connected to an eddy current dynamometer with different percentage ethanol and methanol in honge bio-diesel blended with diesel. The results showed that Acceptable gives increased Indicated thermal efficiency and Mechanical Efficiency with blends containing up to 80% honge.

JagadeeshAlku et.al [2] had conducted experiments on the utilization of honge oil on a single cylinder, four stroke, water cooled diesel engine at a rated speed of 1500 rpm. From investigation it was stated that up to 25% blend of honge biodiesel can be

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substituted for diesel engine without any modification and with modification we can blend up to 25% we can get better performance and combustion characteristics than normal engine. It was observe that 25% blend of honge biodiesel in diesel fuel has almost same mechanical efficiency; same specific fuel consumption and same indicated thermal efficiency .we can also see that there is slight increase in brake thermal efficiency which is a positive sign with this blend.

Ganapathi. P [3] et.al described an experimental study of using honge,pinnata oil as a fuel in diesel engine.In this study the effect of using hongepinnata oil-diesel fuel blends (B10 B20) on the engine performance, exhaust emission have been experimentally investigated.Honge biodiesel shows lower heat release rate during premixed burning phase compared to diesel. The experimental result showed that the carbon monoxide, hydrocarbons and decrease in specific fuel consumption, volumetric efficiency and fuel consumption.

GauravDwivedi (4) et.al conducted a test with the aim to focus on the work done in the area of production of biodiesel from honge and the characterization of properties of various blends of honge biodiesel. The fuel properties like density, flash point, viscosity and calorific value of B10, B20 are very similar to diesel and therefore diesel may be well replaced by biodiesel in near future.

III. Objective Of The Project

- To study the performance and emissions characteristics twin cylinder diesel engine with Honge oil blendas fuel and it is compared withdiesel.
- To measure the level of CO, HC and smoke in the exhaust emissions in the above said engine.
- To reduce the CO, HC and smoke level in the exhaust emissions.
- To analyze the exhaust emission.

IV. Methodology

- The engine used for the experiment is started using diesel fuel and then its performance and emission readings are observed under various load condition.
- Selecting suitable Honge oil blend for double cylinder diesel engine and development of an experimental set-up with necessary instruments to study the performance and emission characteristics.
- The admission of Honge oil blend along with diesel fuel makes the engine run under dual fuel Mode.
- Conducting same trail for Honge oil blend and diesel fuel from zero to full load condition.
- Compare the performance and emission parameters for diesel and Honge oil blend for engine.

V.Properties OfDieselAnd Honge Oil

Sl. No	Properties	Diesel	Honge oil
1	Density(kg/m^3)	832	924
2	Calorific value (kJ/kg)	43200	38892
3	Kinematic viscosity @ 40^{0}C(mm^2/s)	2.78	4.8
4	Cetane number	56	42
5	Flash point ºC	50	225
6	Specific gravity	0.86	0.925

Table-1Properties

VI. Experimental Setup And Engine Specification

The experimental test set up as shown in fig 1 and 2 consists of four stroke, constant speed and multi cylinder diesel engine. The engine is water cooled. The injection timing given by the manufacturer is 27º BTDC and the engine speed is 1500rpm. Here the experiment is conducting on the basis of varying the load conditions against constant speed of the twin cylinder diesel engine. The exhaust emissions are calculated by Exhaust gas analyzeras shown in fig 3. Engine specifications as shown in table 2.

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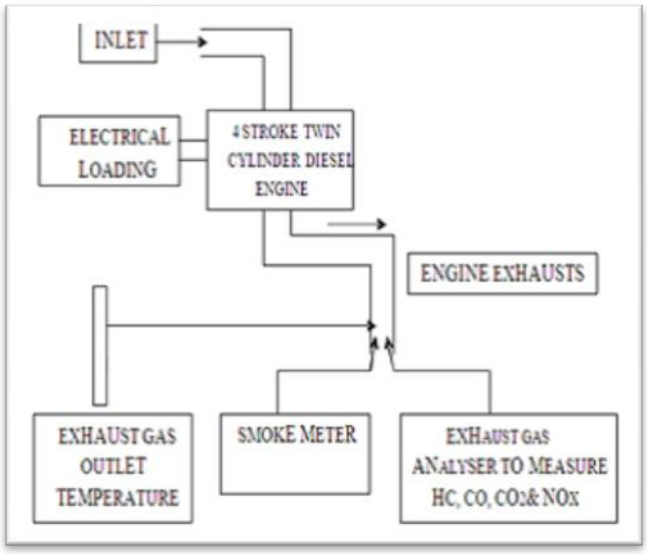

Figure- 1: Schematic arrangement of Experimental Set-up

Figure -2: Test engine

Figure- 3. Exhaust gas analyzer to measure CO, HC& smoke

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Engine Type	Four StrokeTwin CylinderDieselEngine
No. of cylinders	02
Stroke	100 mm
Bore diameter	87 mm
Compression ratio	16.5:1
RPM	1500
Type of starting	Crank starting

Table.2 Test Engine Specification

VII. EXPERIMENTAL PROCEDURE

- Experiments were initially carried out on the engine using diesel as fuel in order to provide base line data.
- Initially the engine was started using diesel fuel and allowed to run for few minutes until to reach steady state; the base line data were taken. Load was varied from zero loads to full load condition using the water loading and Emissions, smoke and fuel consumption reading were recorded.
- The engine was started on duel fuel mode, when engine became sufficiently heated; the supply of diesel was slowly substituted by 20 % Honge oil blend for which a two way valve was used. Once the engine reaches steady state, the emission, fuel consumption and smoke reading were taken. The same procedure is carried from zero to full load condition.

VIII. RESULTS AND DISCUSSION

a) Carbon Monoxide

Figure 4 shows the difference in CO emissions between a diesel and Honge oil blend-powered twin-cylinder engine operating under different loads. The graph shows that between 25% and 50% load, the Honge oilblend-powered engine emits less CO than the diesel-powered engine.

Figure.4 COV/S B.P For Diesel And Honge Oil Blended With Diesel (B 20)

b) Brake thermal efficiency

The effect of the Honge oil blend and diesel on the thermal efficiency of the brakes under varying loads is depicted in Figure 5. The graph shows that for both the diesel and Honge oil blends, the brake thermal efficiency improves with increasing load, all the way up to 75% load.

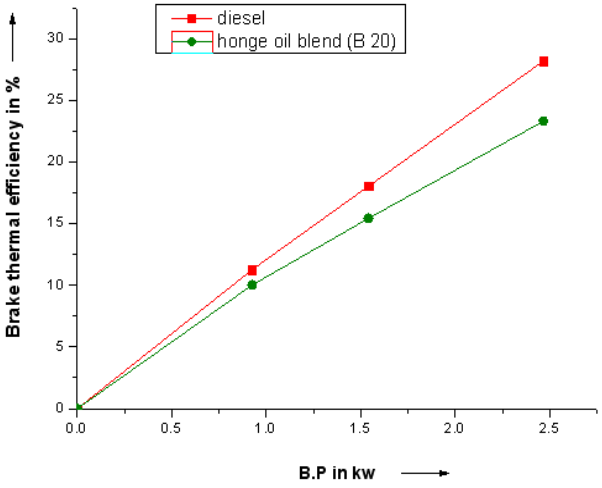

Figure .5 BrakeThermal Efficiency For Diesel And Honge Oil Blended With Diesel (B 20)

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c) Specific fuel consumption

As can be seen in Figure 6, the specific fuel consumption (SFC) decreases with increasing load up to 75%, and the SFC of the Honge oil blend is somewhat lower than that of diesel up to this load level.

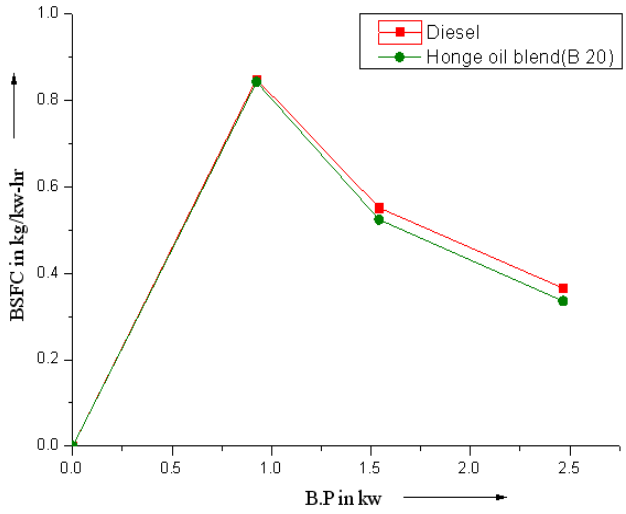

Figure.6 BSFC V/S B.P For Diesel And Honge Oil Blended With Diesel (B 20)

d) Hydrocarbon

Figure 7 depicts the shift in the engine's hydrocarbon content from a blend of diesel and Honge oil..

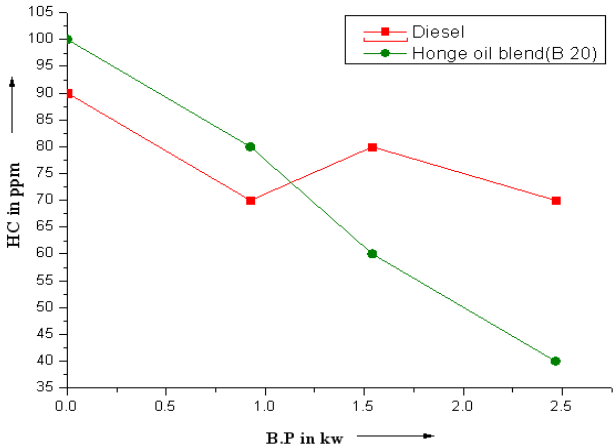

Figure .7 HCV/S B.P For Diesel And Honge Oil Blended With Diesel (B 20)

These results lead us to conclude that the Honge oil blend enhances other performance aspects, such as Brake thermal efficiency, while concurrently lowering emission parameters like CO and HC. Consequently, Honge oil blends of 20% can be used in place of diesel. Making adjustments to the motors frees the researchers to pursue novel lines of inquiry.

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