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Emission characteristics of variable injection pressure engine with pungai oil and ethanol as a additive

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Abstract- Biodiesel is a well recognized choice for diesel and has an benefit over the later because of it is renewable, biodegradable, sulphur free and non-less poisonous in nature, better lubricity and can considerably reduce exhaust emissions from the engine. This study investigates the use of ethanol as an additive with 20% pungai oil diesel blend (B20). The transesterification process is used to reduce the viscosity of the pungai oil. The main aim of this paper is to examine the emission parameters of variable injection pressure diesel engine runes with pungai oil 20% (B20) and ethanol as a additive by adding 5% and 10% at steady speed of 1500 rpm with variable loads and changeable injection pressure (180,210&240). The outcomes of these blends are to be compared with normal diesel. The fitness of pungai oil with ethanol is established as a bio fuel in this study. The impact of pressure injection on exhaust gas emissions has been investigated and offered. The exhaust emissions Hydrocarbons, Carbon monoxide and carbon dioxide are are almost reduced compared to diesel. Brake power, indicated power, brake thermal efficiency, mechanical efficiency, mechanical efficiency, brake mean effective pressure, are investigated on performance characteristics.

Index words – *Transesterification, Pressure ratio, pungai oil, Ethanol.*

I.INTRODUCTION

A. BIODIESEL

Biodiesel refers to a vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters. Biodiesel is typically made by chemically reacting lipids (e.g., vegetable oil, soybean oil, animal oil fat with an alcohol. Biodiesel is meant to be used in standard diesel engines and is thus from the vegetable and waste oils used to fuel converted diesel engines. Biodiesel can be used alone, or blended with petro diesel in any proportions. Biodiesel blends can also be used be used as heating oil. The use of biodiesel resulted in lower emissions of Unburned hydrocarbons, carbon monoxide and particular matter. Biodiesel also increased catalytic converter efficiency in reducing particulate emissions. Chemical characterizations also revealed lower levels of some toxic and reactive hydrocarbon species when biodiesel fuels were used the fuel consumption in the world particularly in developing countries has been growing at alarming rate. Petroleum prices approaching record highs and they will deplete within few decades, it is clear that more can be done to utilize domestic non-edible oils while enhancing our energy security. The economic benefits include support to the agriculture sector, tremendous employment opportunities in plantation and processing.

B. PREPARATION OF BIODIESEL BLENDS

Biodiesel blend is nothing but mixing of pungai oil or bio diesel with standard diesel at some amount of Percentage. Now in this experiment we are using Biodiesel blend called B20 (20% of biodiesel and 80 % of standard diesel) is used to run the engine. Then ethanol (additive) is added. Ethanol is added with biodiesel blend (B20) in the percentage of 5%, 10%. The various blend proportions are Diesel, B20D80E0, B20D80E5 and B20D80E10.

TABLE 1: Fuel Nomenclature

B20D80	20% Biodiesel + 80% Diesel
B20D80E5	20% Biodiesel + 80% Diesel + 5% Ethanol

B20D80E10	20% Biodiesel + 80% Diesel + 10% Ethanol

C. VCR Engine

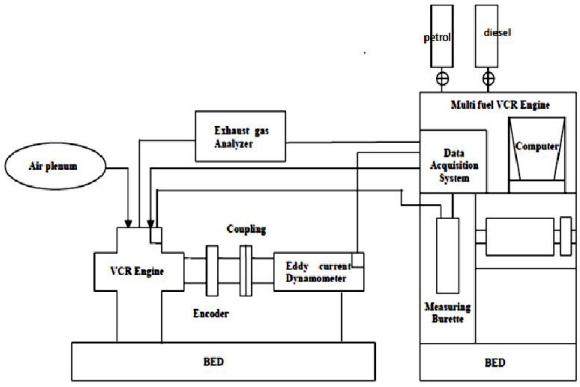

Fig 1, VCR engine

Experimental setup of the VCR diesel engine consists of a four stroke single cylinder, at 1500 rpm. Eddy current Dynamometer is fitted to a diesel engine to calculate Performance parameters observed by computerized mode at different compression ratio from17 to18 at different load conditions (0%, 25%, 50%, 75%, 100%) using various blends of pungai oil and diesel. The Engine performance analysis software package "ICEngineSoft_9.0" was used for performance Analysis and thermo couples are used to measure gas temperature at the engine exhaust, calorimeter exhaust, water inlet of calorimeter and water outlet of calorimeter, engine cooling water outlet and ambient temperature. The 50ml burette and stopwatch with level sensors are fitted to the setup to measure the fuel flow rate.

Make	Kirloskar
General details	4- Stroke, water cooled, variable compression ratio Engine
Rated power	3.5Kw at 1500rpm
Speed	1500 rpm (constant)
No of cylinder	Single cylinder
Compression ratio	12:1 to 18:1
Bore	87.5 mm
Stroke	110 mm
Ignition	Compression ignition

TABLE 2: Specification of the VCR Engine

Fig 2, Gas analyser

II. RESULTS AND DISCUSSION

The Carbon monoxide emission values for Diesel, B20D80, B20D80E5, B20D80E10 are evaluated with help of various loads like 0%, 25%, 50%, 75% and 100%. The result concluded from this Fig.2 is carbon monoxide decreases 5% with help of increase in loads when B20D80E5 is used as biofuel in the engine.

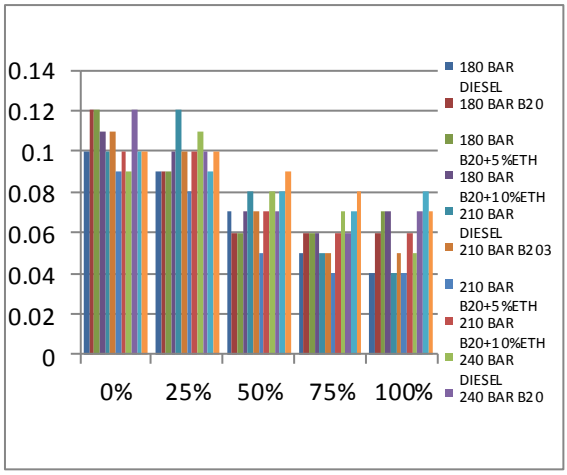

Fig.3: Variation of CO with load

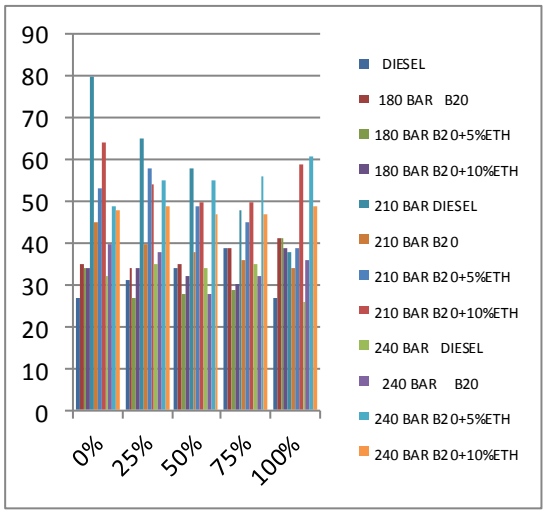

Fig 4: Variation of HC with load

The Hydro carbon emission values for Diesel, B20D80, B20D80E5, B20D80E10 are evaluated with help of various loads like 0%, 25%, 50%, 75% and 100%. The result concluded from this Fig.3 is hydro-carbon decreases 3% with help of increase in loads when B20D80E5 is used as a biofuel in the engine.

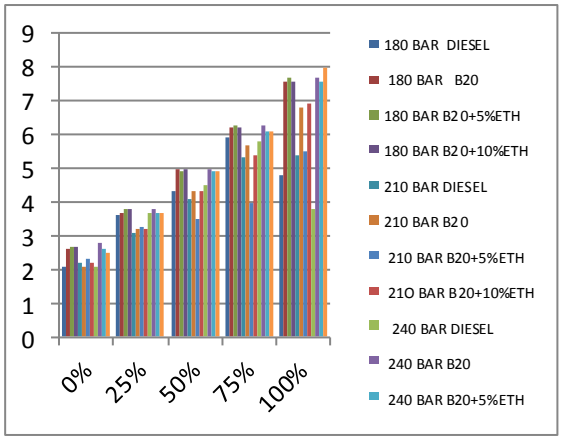

Fig.5: Variation of NOX with load

The NOX emission values for Diesel, B20D80, B20D80E5, and B20D80E10 are evaluated with help of various loads like 0%, 25%, 50%, 75% and 100.

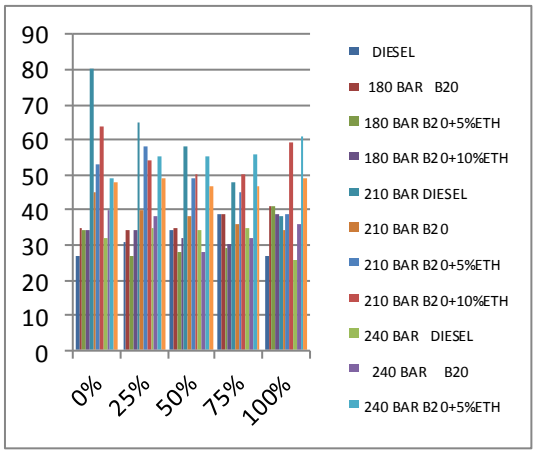

Fig 6: Variation of CO2 with load

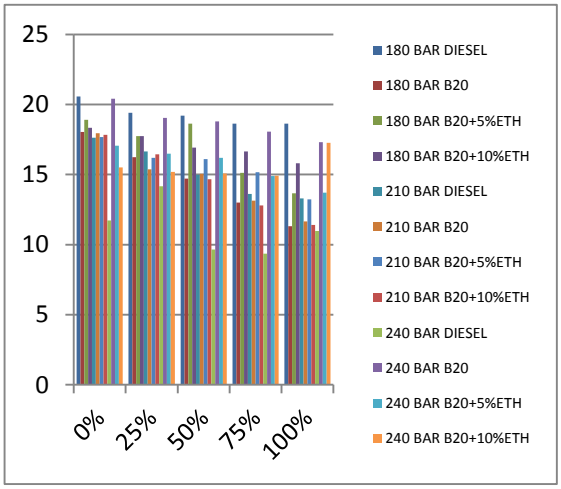

Fig 7: Variation of O2 with load

III. CONCLUSION

The performance and emission characteristics of a variable compression ratio engine fueled with Biodiesel blends have been investigated and compared with the standard diesel. The following conclusions are drawn from this investigation: Carbon - monoxide emissions decreases 5% when the blend B20D80E5 is used as a fuel invariable compression ratio engine with varying loads. Hydrocarbon emissions decrease 3% when the blend B20D80E5 is used as a fuel in variable compression ratio engine with varying loads. Break power increases (0.3 kW) when the blend B20D80E5 is used as a fuel in variable compression ratio engine with varying loads. SFC decreases (0.05 kg/kWh) when the blend B20D80E10 is used as a fuel in variable compression ratio engine with varying loads. Mechanical efficiency increases 5% when the blend B20D80E5 is used as a fuel in variable compression ratio engine with varying loads.

IV. REFERENCES

1. Agarwal D, Kumar L and Agarwal AK (2008), "Performance Evaluation of a Vegetable oil fuelled CI Engine", Renewable Energy, 33, pp.1147-1156.

2. Ali Y and Hanna M A (1994) Alternative Diesel Fuels from Vegetable oils. Biores, Technology, 50, pp153-163.

3. Altõn R (1998) "An experimental investigation on use of vegetable oils as diesel engine fuels", Ph.D Thesis, Gazi Univ. Institute of Science & Technology.

4. Barnwal BK and Sharma MP (2005), "Prospects of biodiesel production from vegetable oils in India", Renewable and Sustainable Energy Reviews. 9, pp.363–378

5. A. K. Agarwal and K. Rajamanoharanm,(2009) "Experimental investigations of performance and Emissions of pungai oil and its blends in a single cylinder agricultural diesel engine,"Applied Energy, Vol. 86,pp.106-112.