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Research Article

ENGINE PERFORMANCE AND EMISSION ANALYSIS USING OXIDATIVELY STABILIZED COTTON SEED OIL BLENDED WITH METHANOL

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ABSTRACT

All over the world the use of petroleum products has been increased tremendously. As we know that the diesel vehicle population is growing at an alarming rate. The emission caused by these fossils combustion in IC engines has been led to air pollution, greenhouse effect and also ozone layer thinning. The search for reduction of exhaust emissions from the exhaust gases of IC engines has been underway for the past three decades.The exhaust emissions will irritate skin, eyes, nose, and throat and also leads to bronchitis asthma with continuous expose with this atmosphere in the long run. It is a serious concern with the pollution point of view. In view of existing fissile fuel deposit may come another 40 years, Costs of Fissile Fuels are day by day increasing, Emissions caused by these fissile fuels on Environment, As the population increase the vehicle population also increases, the existing deposits may not come even 40 years, Developing Countries like India depends on its fissile fuel requirement on foreign countries for which spars huge forging currency in purchasing the crude oil, thus the inflation rate increases, rupees valve decreases hence the country economy and development decrease.

The present investigation evaluates Cotton seed oil blended with Methanol in Diesel Engine**.** A Twin cylinder Diesel Engine adapted to study the Brake thermal efficiency, Brake specific energy consumption, and emissions in Low Cetane fuels. In this study, the diesel engine was tested using Diesel and Low Cetane Fuels. From this study the emissions like HC and CO has been reduced and Low Cetane Fuels are substitute to diesel fuel.

INTRODUCTION

Rising petroleum prices, increasing threat to the environment from vehicle exhaust emissions and fastly depleting stock of fossil fuels have generated an intense international interest in developing alternative renewable fuels for IC engines. Bio fuel is an oxygenated fuel which increases the combustion and makes reduce exhaust emission. It can be produced from crops with high sugar or starch content.

Some of these crops include sugarcane, sorghum, corn, barley, cassava, linseedplants, sugar beets etc. Besides being a biomass based renewable fuel, Biofuel has cleaner burning and higher octane rating than the various vegetable oils [1-5]. Jason and Marc (2002) presented the exegetic environmental assessment of lifecycle emissions from M-85, E-85 (used for the gasoline engine) and other alternative fuels [6]. Diesel exhaust is a major contributor to various types of air pollution, including particulate matter (PM), oxides of nitrogen (NOx), and carbon monoxide (CO) [7]. It has been demonstrated that the formation of these air pollutants can be significantly reduced by incorporating or blending oxygenates into the fossil fuels matrix [8]. Diesel engines are an important part of the public and private transportation sector and their use will continue and grow into the future. But their smoke has become biggest threat to health and environment [9]. Keeping in mind the higher octane number of the ethanol, variable compression ratio engine is a good option in this direction using the ethanol diesel blend as fuel; Shaik *et al*. (2007) demonstrated VCR engine has great potential for improving part-load thermal efficiency and reducing greenhouse gas emissions [10].

There were many attempts made to use Biofuel in compression ignition (CI) engine. Huang *et al*. (2008) carried out tests to study the performance and emissions of the engine fuelled with the ethanol diesel blends [11]. They found it feasible and applicable for the blends with n-butanol to replace pure diesel as the fuel for diesel engine. Bhattacharya and Mishra (2002) evaluated the feasibility of preparing diesel-ethanol blends using 200° (anhydrous ethanol) and ethanol lower proof [12].

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They found that ethanol blends indicated power producing capability of the engine similar to that of diesel. Hansen *et al*. (2001) found that the properties of ethanol-diesel blends have a significant effect on safety, engine performance, durability and emissions [13]. Wang *et al*. (2003) analyzed that the most noteworthy benefits of E-diesel use lie with petroleum fuel reductions and reductions in urban PM_{10} and CO emissions by heavy vehicle operations [11]. Ajav and Akingbehin (2002) experimentally determined some fuel properties of local ethanol blended with diesel to establish their suitability for use in compression ignition engines [14]. Eckland *et al*. (1984) presented, State-of-the-Art Report on the Use of Alcohols in Diesel Engines [15].

Techniques that have been evaluated for concurrent use of diesel and alcohols in a compression-ignition engine include (1) alcohol fumigation, (2) dual injection (3) alcohol/diesel fuel emulsions, and (4) alcohol/diesel fuel solutions. Heisey and Lestz (1981) reported significant reductions in particulate generation; however, NOx generation increases [16]. Likos *et al*. (1982) reported increased NOx and hydrocarbon emissions for diesel-ethanol emulsions [17]. Khan and Gollahalli (1981) reported decreased NOx and hydrocarbon emissions with increased particulate emissions for diesel-ethanol emulsions [18]. Lawson *et al*. (1981) reported increased NOx and decreased particulate emissions with diesel methanol emulsions [19].

Performance and Emission Characteristics of Twin Cylinder CI Engine Using Cottonseed Oil Blended With Methanol [20]. Ahmed (2001) found Diesel engines are major contributors of various types of air polluting exhaust gasses such as particulate matter (PM), carbon monoxide (CO), oxides of nitrogen (NOx), sulfur, and other harmful compounds [21]. Experimental Investigation of Twin Cylinder Diesel Engine Using Linseed oil blend with Ethanol [22]. Rao *et al*. (2008) carried out experiment in order to found out optimum compression ratio, experiments were carried out on a single cylinder four stroke variable compression ratio diesel engine [23].

Experimental Investigation of Twin Cylinder Diesel Engine Using Diesel & Methanol [24] Investigation of Methanol in Twin cylinder in line 4 Stroke liquid cooled Diesel Engine [25] Investigation of Alternative fuels in Diesel Engine [26-37] Magín Lapuerta, Monserrat Villajos, John R. Agudelo, André L. Boehman (4) Hydrotreating catalysis is becoming a promising alternative to transesterification for the production of biofuels derived from vegetable oils[38] Y.-H. Percival Zhang (5) Since biofuels is a hot topic, many researchers new to this field are eager to propose different solutions while they often seem not to have full understanding of the current status of technologies and numerous (hidden) constraints [39] Alexandre G.S. Prado, Igor C. Pescara, Sheila M. Evangelista, Matheus S. Holanda, Romulo D. Andrade, Paulo A.Z. Suarez, Luiz F. Zara (6) Biodiesel and diesel-like have been obtained from soybean oil by transesterification and thermal cracking process, respectively[40]

Experimental Setup

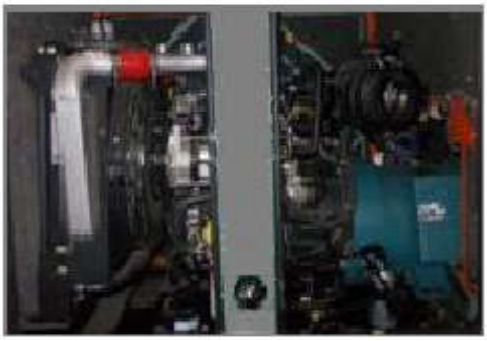

Fig 1 Test engine (Twin cylinder Diesel Engine)

Objective

Objective of the present study is to

- It is proposed to use Cotton seed oil blended with Methanol in the diesel engine.
- The emissions like HC, CO_2, NOx and Smoke in the exhaust gases are proposed to reduce during the combustion itself.
- To study the performance evaluation of the using Cotton seed oil blended with Methanol in the diesel engine.
- To analyse the exhaust emissions and measurement, reduction in the exhaust gas.

Properties of Bio Fuel Blended With Alcohol **Table-1**

Sl.No	Biofuel	CV KJ/Kg
1.	Diesel	44,800
2.	Cotton seed oil blended with Methanol	31,250

Engine Specification **Table-2**

Test Engine specification	
Injection Pressure	1800 bar
Engine type	Four stroke Twin cylinder diesel engine
No. of cylinders	02
Stroke	100 mm
Bore Diameter	87 mm
Engine Power	15KVA
Compression ratio	17.5:1
RPM	1500

RESULTS

Performance Graphs

Brake Specific Energy Consumption

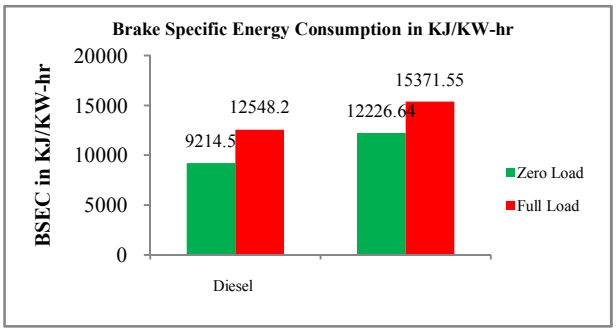

Fig-2 shows the variations of Brake Specific Energy Consumption for Diesel and Cotton seed oil blended with Methanol at Zero Load and Full Load

Brake Thermal Efficiency

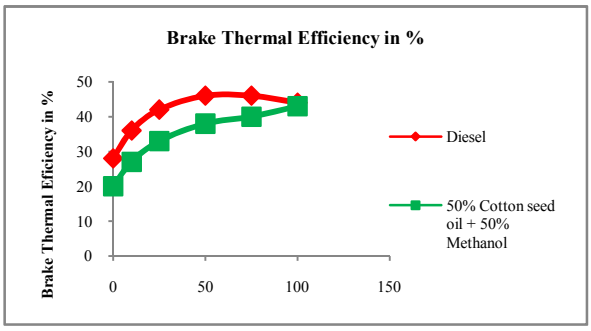

Fig-3 shows the variations of Brake Thermal Efficiency for Diesel and Cotton seed oil blended with Methanol at different Loads

Emission Graphs

Unburnt Hydro Carbon

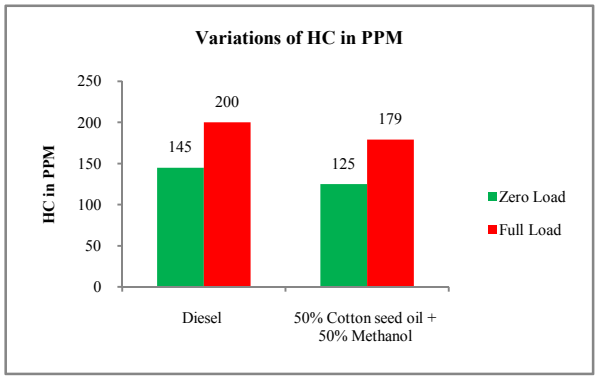

Fig-4 shows the variations of Unburnt Hydro Carbon for Diesel and Cotton seed oil blended with Methanol at Zero Load and Full Load

Nitrogen Dioxide

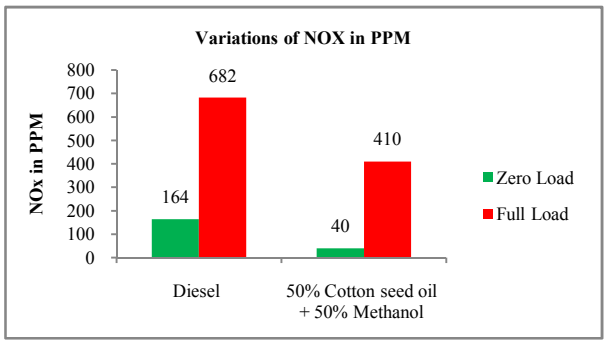

Fig-5 shows the variations of Nitrogen dioxide for Diesel and Cotton seed oil blended with Methanol at Zero Load and Full Load

Carbon Dioxide

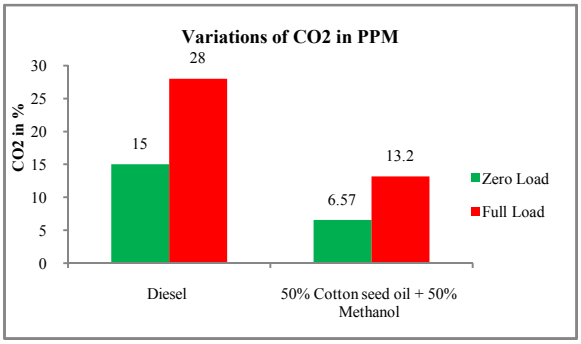

Fig-6 shows the variations of Carbon dioxide for Diesel and Cotton seed oil blended with Methanol at Zero Load and Full Load

Smoke

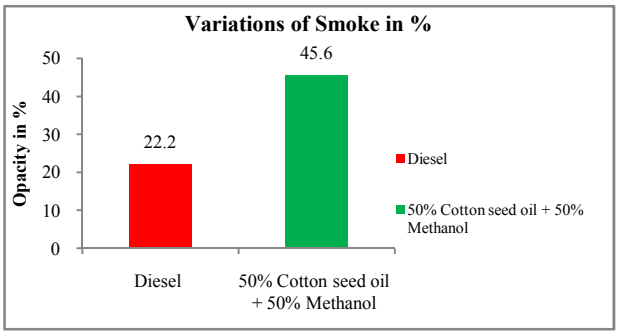

Fig-7 shows the variations of Smoke for Diesel and Cotton seed oil blended with Methanol at Zero Load and Full Load

CONCLUSION

Based on the experimental results the performance and emissions of Cotton seed oil blended with Methanol, it is Concluded that the Cotton seed oil blended with Methanol represents a good alternative fuel with closer performance and better emission characteristics in Diesel Engine, From the above experimental results the Cotton seed oil blended with Methanol shows better performance Diesel Engine, From the above experimental results the Cotton seed oil blended with Methanol shows performance characteristics like Brake thermal efficiency, Brake specific Energy consumption and decrease in the emission parameters like HC, CO_2, NOx, Smoke are lower Biofuel blended with Ethanol compared with Diesel, Hence the Cotton seed oil blended with Methanol can be used as a substitute for diesel effectively in diesel engines.

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