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"PERFORMANCE AND STUDY OF NON- REGULAR EMISSION OF BLENDING FUEL IN ENGINE"

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ABSTRACT

The study aims to examine the effects of palm biodiesel blended with additives in the compression ignition (CI) engine. Biodiesel as fuel was limited by challenges such as lower calorific value (CV) and higher viscosity while increasing brake specific fuel consumption (BSFC) and nitrogen oxides (NO_x) emissions. Nanoparticles and antioxidant additives added to biodiesel play an essential role in avoiding the hindrances of biodiesel. Resource depletion is the consumption of a resource faster than it can be replenished. Natural resources are commonly divided between renewable energy and non- renewable resources (see also mineral resource classification). Use of either of these forms of resources beyond their rate of replacement is considered to be resource depletion. Resource depletion is most commonly used in reference to farming, fishing, mining, water usage, and consumption of fossil fuels.

Key Words: *: Fossil fuels, calorific value, biodiesel, compression ignition.*

I. INTRODUCTION

Fossil fuels have a vital role in the evolution of industrial growth, transport sector, agriculture, and many individual needs. The reserves of petroleum fuel decrease every day in the world. Thus, most of the researchers are looking for alternative fuels. Renewable fuels are more attractive to the reserves of fossil fuels. These are facing many challenges, including environmental issues, feedstock, product commercialization, waste glycerol glut problem, and society's acceptance. Biodiesel will be used as a substitute for diesel to face present and future energy demand. Biodiesel is produced from edible and non-edible oils, which are eco-friendly, reliable, non-toxic, and biodegradable. Biodiesel emits low carbon and smoke emissions compared to diesel, which reduces global warming. Biodiesel has a higher density, pour point, viscosity, and molecular weight than diesel. Major biodiesel problems were low fuel atomization, low volatility, injector coking, and piston ring trapping, leading to incomplete combustion due to its viscosity and molecular weight. Biodiesel comprises a long chain of fatty acids containing 10–14 percent oxygen by weight and does not contain sulfur and aromatics. Because of this reason, biodiesel is essential for enhancing complete combustion, decreasing PM, CO, HC, but increasing nitrogen oxide (NO_x) emissions when contrasted with diesel. In comparison, it has a lower calorific value (CV) when contrasted with diesel [1–9].

According to Mahmud et al. [10], palm oil is a potential biofuel source to be used as a fuel in compression ignition (CI) engine. It is the most efficient oil-bearing crop in efficiency, productivity, availability, and land utilization. It produces a higher yield than all other vegetable oils, so it is available at a competitive price. Because of these parameters, palm biodiesel as fuel has been selected in the current research work. The major biodiesel issues were low heating value, low oxidation stability, high brake specific fuel consumption (BSFC), and high NO_x emissions compared to diesel; to avoid these problems different additives were used. Nano-additives consist of high surface to volume ratio, high calorific value, and high thermal conductivity, So it enhances the performance and emissions of diesel engines. Antioxidant

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additives in biodiesel effectively reduce the free radicals formation and improve the oxidation stability of the fuel. The TiO_2 nano-additive is eco-friendly, low cost, and non-toxic compared to other nano-additives found in the literature. From the literature review, N-phenyl-1,4-phenylenediamine (NPPD) antioxidant additive appears to effectively reduce the NO_x emissions and enhance the diesel engine's performance compared to other antioxidants.

II. Objective of Current Study

The past studies reported that biodiesel's major problems as fuel on diesel engines were low CV and increased NO_x emissions. Previous literature said that nanoparticles added to biodiesel as fuel on diesel engines would improve engine performance and decrease exhaust emissions expect carbon dioxide. The literature review reported that antioxidants added to biodiesel as fuel on diesel engines would slightly improve performance and reduce NO_x emissions but slightly increase other emissions. The past studies reported some of the disadvantages of biodiesel blended with antioxidants and nanoparticles individually. A few studies discussed the effects of multiple additives blended with biodiesel on a diesel engine. The current investigation compares the impact on a diesel engine using both NPPD antioxidant and TiO_2 nanoparticles blended with Palm biodiesel blends contrasted with diesel.

III. Procedures, Preparation of biodiesel From Karanja Oil

Biodiesel Production

The production of biodiesel, alkyl ester is well known. There are three basic routes to ester production from oils and fats:

- Based catalyzed transesterification of the oil with alcohol
- Direct acid catalyzed etherification of the oil with methanol
- Conversion of oil to fatty acids, and then to alkyl ester with acid catalysis

IV. Experimental Setup

Four cylinder 4-stroke diesel engine was used for the study; is given below.

Table 1.1 .: Feature of the 4 stroke, 4 Cylinder Diesel Engine

Make	Force motors
Bore (mm)	78
Stroke (mm)	95
Compression ratio	18.65:1
Rated power (H.P.)	27
Rated speed (rpm)	2200
Cylinder number and type	Four and four stroke

Figure 1.2 Experiments setup

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Four cylinder 4 Stroke diesel engine (also known as a compression-ignition or 'CI' engine) is an internal combustion engine in which ignition of the fuel that has been injected into the combustion chamber is initiated by the high temperature which a gas achieves when greatly compressed (adiabatic compression). The diesel engine is more thermal efficiency of any standard internal or external; combustion engine due to its very high compression ratio and inherent lean burn which enables heat dissipation by the excess air. A small efficiency loss is avoided compared to two-stroke non-direct-injection gasoline engines since un-burnt fuel is not present at valve overlap and therefore no fuel goes directly from the intake/injection to the exhaust. Can have a thermal efficiency that exceeds 50%. Diesel engines are manufactured in two stroke and four stroke versions. They were originally used as a more efficient replacement for stationary steam engines. Diesel engines in large on road and off road vehicles in the world increased. The world largest diesel engine is currently common Rail marine diesel, which produce a peak power output of 84.42MW at 102 rpm.

V. RESULT

Brake Specific Fuel Consumption

It was resulted that the brake specific fuel consumption (BSFC) is higher than that of diesel when the B20 and B100 blends were used in diesel engine. The BSFC of diesel engine was slightly decreased as the engine brake load increased. The brake specific fuel consumption is an essential parameter by which compare the engines and determine the fuel efficiency of engines.

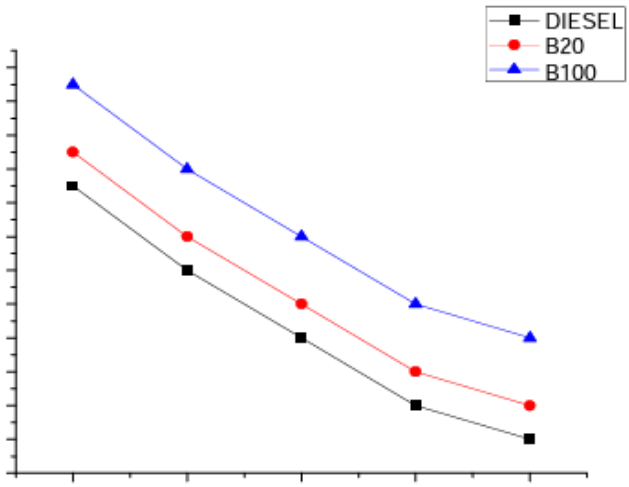

Figure 1.3- Variation in Brake Specific Energy Consumption with Varying Load for Diesel, B20, B100 blends

Brake Specific Energy Consumption Figure 1.4 shows variation in brake specific energy consumption (BSEC) with varying load for diesel, B20 and B100 blends. It was resulted that the BSEC of diesel engine has higher energy consumption that of diesel when the blends were used 20% and 100%. The BSEC of diesel engine was slightly decreased as the engine brake loads were increased. The BSEC of B20 and B100 blends were increased and consumed more energy as compared to diesel fuel when engine runs at constant speed of 1500 rpm.

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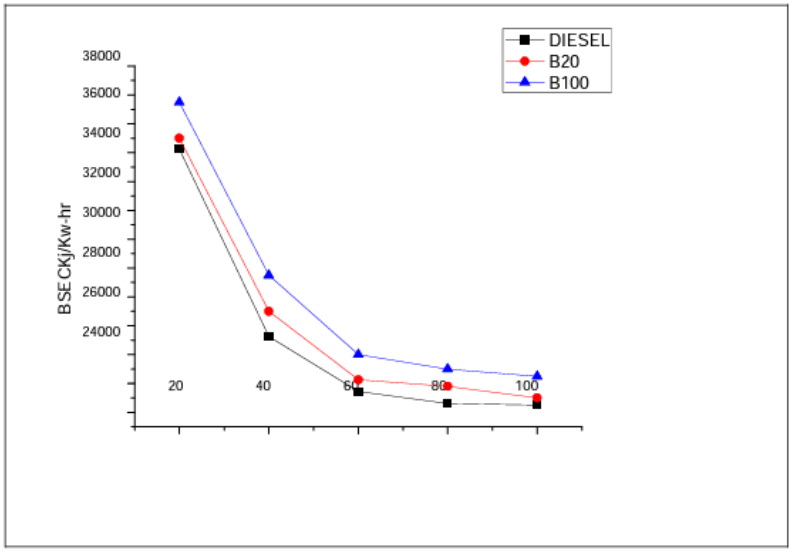

Figure 1.4: Variation in Brake Specific Energy Consumption with Varying Load for Diesel, B20& B100 blends

VI. CONCLUSION

In this study, experiments were conducted with a direct injection, naturally aspirated diesel engine to investigate the performance and emission of the biodiesel and its blends prepared from Karanja oil. This chapter describes the conclusions for Performance and unregulated emission of diesel and biodiesel fuelled engine. So finally biodiesel blends few increase to for It is concluded that the use of biodiesel blends slightly increases the Brake Specific Fuel Consumption in comparison to use of fuel of diesel as same loading condition. The BTE of biodiesel fuel were finding out to be comparable as that of diesel fuel when the blends were 20 %. The emissions of biodiesel fuel is better compare to diesel.

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