A Review in Performance Measurement of Diesel Fired Boiler Using Coconut Oil

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ABSTRACT
Major problem like short supply and emission of diesel fuel demands for alternative fuel which have same performance and better emission characteristics biodiesel made from non-edible oil had shown good potential and equivalent performance. Bio-diesel is widely accepted as comparable fuel to diesel in compression ignition engines. It offers many advantages including; higher certain number, reduced emissions of particulates, CO, NOX, and hydrocarbons, reduced toxicity, improved safety and lower lifecycle CO2 emissions.

Keyword: *Oil Fired Boiler, Bio-Diesel.*

1. INTRODUCTION
Biodiesel is a liquid bio-fuel obtained by chemical processes from vegetable oils or animal fats and an alcohol that can be used in diesel engines, alone or blended with diesel oil. One of the most promising alternatives fuel is the vegetable oils and their derivatives. The first use of vegetable oil in a compression ignition engine was first demonstrated through Rudolph Diesel who used peanut oil in his diesel engine. The use of oils from coconut, soy bean, Sunflower, peanut, linseed and palm oil amongst others have been attempted. The long term use of vegetable oils led to injector coking and the thickening of crankcase oil which resulted in piston ring sticking. Therefore, vegetable oils are not used in diesel engines because of endurance issues. To overcome this problem, various modifications of vegetable oils have been employed such as trans etherification, micro-emulsion formation and the use of viscosity reducers.

2. LITERATURE REVIEW
Herschel Machacon et al[1] studied objective of the present study is to reveal the effects of pure coconut oil and coconut oil diesel fuel blends on performance and emissions of a direct injection diesel engine. Operation of the test engine with pure coconut oil and coconut oil diesel fuel blends for a wide range of engine load conditions was shown to be successful even without engine modifications. It was also shown that increasing the amount of coconut oil in the coconut oil diesel fuel blend resulted in lower smoke and NOx emissions. However, this resulted in an increase in the BSFC. This was attributed to the lower heating value of neat coconut oil fuel compared to diesel fuel.

M.H. Jayedetal[2] studied the Environmental concerns and regulations to reduce greenhouse gas emission and fluctuation of fossil fuel price have stimulated research on alternative fuels. Moreover, use of unproductive land to produce vegetable oil which is a potential biodiesel source has opened up a way to reduce oil bill. Biodiesel does not need major modification in engine, even though it causes some engine problems in long term use. This paper presents experimental results that evaluates the performance and exhaust emissions of a diesel engine operated on " Diesel" which consists of 5% palm diesel and 95% ordinary diesel fuel (also termed as P5) and C5 (5% coconut biodiesel and 95% ordinary diesel fuel. Experimental results. Showed that P5 and C5 reduced brake power compared to diesel fuel by 1.2% and 0.7% respectively. Emissions such as HC, smoke, CO and NOx concentration were lesser for P5 and C5. The results of this investigation will be used to partial replacement of diesel fuel using low percentage of methyl ester (maximum 5%) obtained from waste vegetable oils.

B. Durga Prasad et al[3] studied discusses the experimental study on the reduction of energy utilization and thereby abiding an indirect control on the emission strategies for a CI engine. Three different methods for the control of emission were carried out and the results were compared. The first method was to improve the combustion by incorporating a copper per-forted medium beneath the atomized fuel spray and thereby improve the combustion through vaporisation. The second method was to use coconut oil directly as an additive to diesel. The last method was to preheat the coconut oil blended diesel. The analysis showed that of all the coconut blends, namely, 10% to 50%, 20% blended ratio found a good place in both fuel efficiency and reduced emissions. Similarly, the preheated blends showed still drastic reductions in emissions even for higher proportions of coconut oil.

P. Venkateswara Raoetal[4] studied the biodiesel from edible oils is non-toxic, biodegradable and renewable alternate fuel that can be used as a substitute for diesel in diesel engines. The objective of present work is to study the performance and emission characteristics of single cylinder, direct injection diesel engine with coconut oil methyl ester (COME) and blends with diesel in varying proportions. Experiments were conducted when the engine fuelled with pure diesel and the blends of diesel - COME by volume for full load range. The exhaust conditions were measured using exhaust gas analyser similarly AVL smoke meter for measuring smoke density. Results were compared graphically in performance of the engine for specific fuel consumption, brake thermal efficiency, exhaust temperatures and in exhaust emissions for concentrations of NO and smoke density.

Oguntola J Alamu[5] many researchers have successfully worked on generating energy from different alternative sources including solar and biological sources such as the conversion of trapped energy from sunlight to electricity and conversion of some renewable agricultural products to fuel. This work considers the use of coconut oil for the production of alternative renewable and environmental friendly biodiesel fuel as an alternative to conventional diesel fuel. The potential for use of coconut oil for the production of alternative renewable and environmental friendly diesel fuel (biodiesel) was investigated. Test quantities of coconut oil biodiesel were produced through Trans esterification reaction using 100g coconut oil, 20.0% ethanol (wt% coconut oil), 0.8% potassium hydroxide (KOH) catalyst at 65°C reaction temperature and 120 min. reaction time. The process yielded 10.4% biodiesel. The coconut oil biodiesel produced was subsequently blended with petroleum diesel and characterized as alternative diesel fuel through some ASTM standard fuel tests.

B.K.Venkanna[6] Triglycerides and their derivatives are considered as viable alternatives for diesel fuels. The present research is aimed to investigate experimentally the performance, exhaust emission and combustion characteristics of a direct injection (DI) diesel engine, typically used in agricultural sector, over the entire load range when fuelled with rice bran oil and diesel fuel blends, RB10 (10% rice bran oil + 90% diesel fuel) to RB50. The performance, emission and combustion parameters of RB20 were found to be very close to neat diesel fuel (ND). The injector opening pressure (IOP) undoubtedly is of prime importance in diesel engine operation. Performance, emission and combustion characteristics with RB30 at enhanced IOPs are better than ND. Improved premixed heat release rate were noticed with RB30 when the IOP is enhanced. Based on the experimental results of this work, No problem was faced at the time of starting the engine and ran smoothly over the range of rice bran oil percent in fuel blend. Bsfc and emission parameters such as smoke opacity, CO, HC and NOx up to of RB20 is close to that of diesel fuel. There after increased compared to diesel fuel. For short term applications, this work establishes that 20% rice bran oil in the fuel blend can be used on direct injection diesel engine without any modification. Improved premixed heat release rate were noticed with RB30 when IOP is enhanced. Performance and emissions of RB30 were improved at IOP 225 bars.

Ramchandra S. Jahagidar[7] Continuous increase in fuel prices and fast depletion of the available petroleum reservoirs has renewed an interest in the field of biodiesel. In this contest an experimental investigation has been conducted on single cylinder diesel engine fuelled with the blends of Karanja and Diesel. Experimental test have been carried out for performance characterization of water cooled DI diesel engine. 20% biodiesel fuel and 80% diesel fuel is called as a BK20 and 80% biodiesel and 20% diesel fuel is called as a BK80. The effect of these fuel blends is studied experimentally using 3.75 kW DI diesel engine. Test where conducted on water cooled 3.75 kW diesel engine. Different fuel blends of Karanja biodiesel, diesel and Karanja biodiesel only where tested. However break thermal efficiency of the Karanja biodiesel where improved by 3 to 8%, Volumetric efficiency is also improved with reduction in exhaust gas temperature. It is also observed that the blends of BK40 and BK 60 will have the optimum performance for the given conditions as explained earlier.

Jayant Singh[8] the emission characteristics of methyl ester of refined rice bran oil – diesel blend mixed in the proportion of 10:90, 20:80, 30:70, 50:50 and 10:0 (v/v) were studied. The emission of carbon monoxide, unburnt

hydrocarbons, nitric oxide and nitrogen di oxide by different fuels at various load on 3.73 kW C.I. engine were compared with respect to diesel. The exhaust gas temperature of the engine on all the blends of methyl ester of rice bran oil-diesel was found to be lower than that of diesel at rated load. The emission of carbon monoxide from the engine was found to be lower on all the blends of methyl ester of rice bran oil-diesel compared to diesel at rated load. The emission of unburnt hydrocarbon from the engine at higher loads was found to be more on all the fuel blends as compared to diesel. The emission of NOx from the engine found to be higher on the all fuel blends as compared to diesel.

3. CONCLUSION

The vast potential and comparative performance in diesel engine makes biodiesel made from non-edible oil as a good alternative fuel in India. When it seems too difficult and costly to replace current combustion technology in boiler with new suitable technology, the blending of biodiesel with diesel provides a mid-way approach to counteract major problems. However, the performance of pure biodiesel in boiler without any modification is far from the diesel and not satisfactory. Further, biodiesel percentage in diesel can be extended by optimizing the injection pressure, Air fuel ratio preheating the fuel to overcome problem of higher viscosity and lower volatility associated with biodiesel. Performance measurement of coconut oil and their esters on CI engine is done by many researchers from the literature review, it is concluded that, there is a vast potential for coconut oil production in India. Contrarily, few research work with using coconut oil.

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