

“Review Paper on Mitigation of Harmful Impacts of Fossil Fuel with Application of Terminallia Methyl Ester Blends in CI Engine”

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Abstract – Demand for the problems is increasing exponentially due to rapidly increasing population growth. Biodiesel is a clean and Sustainable fuel which can be used in transportation and power generation. The article on Terminallia methyl oil is important in biodiesel fuel. Petroleum products are responsible for increase in pollution and environment effects like acid rain, global warming etc. Also petroleum products are non-renewable energy sources hence it is necessary to use them wisely. This review aims at diesel fuel and alternative fuels which can be used instead of it. Alternative fuels up to certain extent can be blended in diesel fuel so that modification in current engine is not needed. Also additives in diesel fuels show increase in performance parameter and reduction in emission.



Fig. Plant terminalia seeds

Key Words: Biodiesel, Terminallia Oil, and Fuel quality parameter.

1. INTRODUCTION

As per the current scenario, diesel engines are commonly used for tractors, buses, Lorries and trucks etc because of their good performance parameter such as thermal efficiency, fuel economy, high compression ratio, good reliability higher performance as compared to petrol engine. Energy efficiency and energy conservation are the optical parameter that have been challenging of the engineers concerned with IC engines. Petroleum resources are finite and almost 90% of the world energy demands are fulfilled by petroleum products which are replacing very rapidly. Number of automobiles is increasing in pollution due to exhaust emission. This emission of CO₂, NO_x, HC and CO is increasing rapidly and causing effect of global warming. Emission of CO causes breathing problem, HC causes respiratory irritation and NO_x Causes irritation to the eyes, nose, throat, damage to lungs. Hence there is need of alternative fuels to reduce emissions also increase in performance so that consumption of fuel is decreased. Bio-fuels possess a great alternative to the conventional products. They can be blended in the diesel so that need of diesel can be minimized.

This article has been concentrated on study of forest based plant, Terminallia belerica roxb know as bahera as raw material used in biodiesel production. This article has been very less work available on the research paper in biodiesel production.

2. Literature on Biodiesel Blends

Bobade S. N. et al they study on the properties of Pongamia Pinnata (Karanja) for the Production of Biofuel. The Important fatty acids in Pongamia pinnata crude oil were palmitic acid, stearic acid, linoleic acid, eicosanoic acid observed. The oil extracts exhibited very good physical properties and chemical properties used as a biodiesel feedstock and many more sectors such as industrial application etc. The reducing the biodiesel production costs are to use less expensive feedstock containing fatty acids. Such as non edible oils, waste vegetable oils, animal fats and by products of refining oil. With no competing food uses, this characteristic turns attention to Pongamia pinnata which grows in tropical and subtropical climates across the world. The productions of biodiesel from these oils provide a valuable local, regional and national benefit. To develop biodiesel into an economically major option in India. It is required to work on biological innovations to increase the yield and minimize the gestation period of pongamia pinnata tree. [1]

Santosh Kumar dash et al they study on an experimental investigation on the application potential of heterogeneous catalyzed Nahar biodiesel and its diesel blends as diesel engine fuels. Raw material of oil has been reduced to Nahar biodiesel by using methanol as alcohol and calcium oxide (CaO) as a heterogeneous catalyst. The Nahar oil quality of the used biodiesel is seen to be comparable with conventional diesel fuel and fell within the American Standard Testing and Materials specified limits. From the extensive engine trial, it is concluded that up to 40%

blending of Nahar Biodiesel with Diesel Fuel can be used to power diesel engines to reduce pollutant emissions such as HC, CO, CO₂, NO_x and saving fossil diesel fuel. Not only transportation sector but also many rural and remote regions of India, where grid-based electricity supply is absent can be benefited from this feedstock by opting for decentralized Power generation. The scope of this research paper, however, is not only limited to India but also many countries. [2]

Md. Saiful Islam et al they Study on Emission and Performance of Diesel Engine Using Castor Biodiesel This paper shows the result of investigations carried out in studying the emission and performance of diesel engine using the castor biodiesel and its blend with diesel from 0% to 40% by volume. Biodiesel has been successfully produced from the crude castor oil. Biodiesel Blends are tested such as B00, B10, B20, B30, B40 etc. Biodiesel yield of 93.3% was achieved using two step transesterification and esterification process. The engine power output is the same as conventional diesel for the B20 blend. Thus, B20 can be selected due to its good combustion with low avg. percentage of change in PM, CO, and HC emissions compared to other conventional diesel. [3]

Laureano Canoira et al they can study Fatty acid methyl esters (FAMES) from castor oil: Production process assessment and synergistic effects in its properties. Castor oil have been synthesized by methanolysis catalyzed by sodium methoxide and the optimal transesterification conditions have been found. However, some properties of the castor FAME render it unsuitable in pure state for its direct use as fuel in internal combustion engines. Thus, blends with reference diesel have been prepared and their properties have been evaluated. Among these properties, the oxidative stability of the blends shows a negative antisnergistic effect, that is, all the blends have an induction period lower than the pure reference diesel and the pure castor FAME. On the contrary, the lubricity shows a positive synergistic effect, the wear scar of the blends being always lower than those of the pure components. The cold-filter plugging point of the blends shows also a singular effect, since the filterability remains identical to that of the reference diesel until around 50 volume of castor FAME has been blended with it. The blends of castor FAME and reference diesel until approximately 40 volume of castor FAME meet most of the specifications of the EN 590 standard. [4]

Wail M. Adaileh et al they can study Performance of Diesel Engine Fuelled by a Biodiesel Extracted from a waste Coking Oil. Waste vegetable oil was found to be safe and useful alternative fuel and has a lower impact on the Environment and biodiesel engine. Biodiesel is an alternative fuel that is cleaner than petrol and diesel. Biodiesel can be used directly as fuel for a diesel engine with no any changes in the engine system. It has important advantages of having higher biodegradability, better lubricity and no sulfur

content. As the blends B20 produced significant reductions in the emissions such as CO, HC, and smoke emissions compared with pure diesel and blend B5. [5]

Pankaj Shrivastava et al they can study an experimental evaluation of engine performance and emission characteristics of CI engine operated with Roselle and Karanja biodiesel. The technical feasibility of using Roselle and Karanja biodiesels as alternative biodiesel fuels for running a CI engine with different engine load conditions. The result show that BSFC increased with increasing the percentage of biodiesel in the blends. Smoke emission was reduced by 15.78% for LA100 compared to diesel and it increased with the increase in engine load. The heat release rates and cylinder peak pressure were found to be lower for biodiesel compared to diesel. It was observed that NO_x emissions increased with the increase in engine load. Indicated thermal efficiencies lower but volumetric efficiency was higher for biodiesel and their blends than diesel at full load condition. [6]

M.S. Gad et al they can study Performance and emissions characteristics of C.I. engine fueled with palm oil/palm oil methyl ester blended with diesel fuel. A single cylinder diesel engine is run by using palm oil and palm oil methyl ester blends B20, B100 and PO20. Performance and exhaust emissions are measured at engine loads such as 1, 2, 3 and 4 kW and a constant speed of engine is 1500 rpm. Specific fuel consumption, thermal efficiency, exhausts gas temperature and air fuel ratio is measured. CO, NO_x and HC emissions are collected and compared with pure diesel fuel. Thermal efficiency of palm biodiesel and oil blends with diesel fuel is low compared to diesel fuel and specific fuel consumptions are found to be higher. Exhaust emissions of CO and HC are reduced relative to conventional diesel fuel. NO_x emissions increased relative to conventional diesel. The NO_x emission for diesel, B20, B100 and PO20 are 174, 190, 285 and 301 ppm respectively, at full load condition. [7]

H. M. Dharmadhikari et al they can study performance and emissions of CI engine using blends of biodiesel and diesel at different injection pressures. Reducing the output pollutants and fuel consumption in addition to increasing the efficiency of the diesel engines are the goals of today's engine researchers. In this regards, the usage of diesel, biodiesel, water, and cerium oxide nano-particles as the fuel is an efficient solution. In this study, experimental tests are performed to measure the appropriateness of the suggested solution. The results verified that biodiesel would improve the combustion with the main drawback of increasing NO_x emission. However, water would resolve this deficiency by increasing the HC and CO emissions. Nano-particles would also reduce the amount of HC and CO emissions with improving the combustion. [8]

3. CONCLUSIONS

Above literature survey concludes that there are various biodiesel blends available such as Castor, Palm oil, Karnja, Jatropha Oil, waste cooking oil etc. Also there is calculate performance parameter such as brake thermal efficiency, brake Specific fuel consumption and emission parameter such as CO, HC, CO₂, NO_x etc. These all the parameters are calculated vs. load with respect to speed. The availability of abundant resources and environmental friendly emissions are recognized as strength of biodiesels leading them to potential candidates as alternative fuels.

4. REFERENCES

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