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NON-EDIBLE OIL LIKE MAHUA, JATROPHA AND NEEM USED AS THE BIODIESEL BLENDS AS AN ALTERNATIVE FUEL IN C.I. ENGINE -A REVIEW

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ABSTRACT

As we know by day to day increase in fuel like gasoline, diesel, petrol with day by day increasing the demand of vehicles we have to choose an alternative option for fulfil the demand of people. From about 100 varieties of oil seeds only , 10-12 varieties have been tapped so far . the main non -edible oil is Karanja, neem, mahua, olive etc.

when we use non edible oil like mahua, neem, jatropha, olive etc by mixing with diesel an experimental results will found. when we mixed jatropha, mahua, neem as 20% with 80% diesel and 40% and 60% diesel. An experimental results will found with help of RK software. The emission like Cox, Sox , NOx is also less in these type of biodiesel fuel .If such type of process will be scaled at commercial level then a suitable business will be formed and beneficial income for farmers.

Keywords : Mahua oil, Non edible oils, neem oil, Jatropha oil, Bio diesel.

1 INTRODUCTION

Biofuels are a renewable energy sources made from organic matters or waste that can play a valuable role in reducing carbon dioxide emission. The two most common type of biofuels are bioethanol and biodiesel.

The various raw materials that can be used to produce biofuels are primarily divided into three categories: sugar and starchy crops, oil producing trees and cellulosic biomass. First category of raw materials is cultivated with sugar and starch. These are plants such as starchy crops and sugar cane which can be processed by using photosynthesis to turn energy from the sun into simple sugars. These products are used to produce biofuels because of the necessity to discover alternative energy sources, particularly ethanol as blended fuels or substitutes. The second category is biomass which is cellulosic. In solid form, cellulosic biomass contains large quantities of heterogeneous matter.

2 Types of alternative fuels:

The day-to-day progress in engine fuel economy and tremendous rise in vehicle numbers have increased demand for gasoline, and in the near future the petroleum-based fuels will become the most expensive and very scarce. Increased use and depletion of fossil fuel creates a research interest in the field of alternative fuel technologies. Alternative fuels, which are often divided into three classes, viz. Solid, gaseous and liquid.

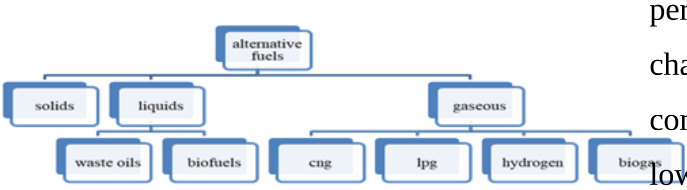

Fig. 1 Types of alternative fuels

3 Types of engine:

In internal combustion engines two primary cycles are used: Otto cycle and Diesel cycle. The Otto cycle takes its name from Nikolaus Otto (1832 – 1891), who in 1876 invented a four-stroke engine. It is also known as Spark ignition (SI) engine, because the fuel-air mixture requires a spark to ignite. The diesel engine is also called a compression ignition (CI) engine, as when pumped into the combustion chamber, the fuel would auto-ignitise . The cycles Otto and Diesel work on either a four- or two-stroke cycle. Generally four stroke are more efficient than two stroke due to the process of scavenging.

4. LITERATURE REVIEW:

N Acharya ,P Nanda ,S Panda, S Acharya,[2019] Nowadays biodiesel is gaining attention for its positive impact on the environment .The vegetables oils are the major sources of biodiesels.

Sharma *et al.*, 2020)[6]Biodiesel derived from biomass is a sustainable source of fuel, and over the last decade , global use of biodiesel has grown rapidly in the transport sector. However, attempts have been made to resolve its key shortcomings in unmodified diesel engines, i.e., performance and exhaust emission characteristics (NOx emissions). The combustion of biodiesel usually results in lower exhaust emissions of unburned hydrocarbons (HC), carbon monoxide (CO), and particulate matter (PM), relative to fossil diesel. In this research , different biodiesel blends (Chlorella vulgaris, Jatrophacurcas, and Calophylluminophyllum) were investigated for fuel characteristics and exhaust emission engine output compared to diesel. Jatropha Curcas, Chlorella vulgaris and Calophylluminophyllum biodiesel were extracted in a microwave reactor by the acid – base transesterification method and combined with traditional diesel fuel by volume. The fuel blends were known as MB10 (90 percent diesel + 10 percent biodiesel microalgae), MB20 (80 percent diesel + 20 percent biodiesel microalgae), JB10 (90 percent diesel + 10 percent biodiesel jatropha), JB20 (80 percent diesel + 20 percent biodiesel jatropha), PB10 (90 percent diesel + 10 percent biodiesel polanga), and PB20 (80 percent diesel + 20 percent biodiesel polanga).Experiments were performed using these fuel blends with a single-cylinder four-stroke diesel engine at different loads Results showed that the engine's thermal efficiency at the rated load fell from 34.6 percent with diesel to 34.1 percent, 33.7 percent, 34.1 percent, 34.0 percent, 33.9 percent, and 33.5 percent respectively with MB10, MB20, JB10, JB20, PB10, and PB20 fuels. Emissions of unburned hydrocarbons, carbon monoxide and smoke increased with third-generation fuels (MB10, MB20) relative to diesel base and second-generation fuels (JB10, JB20, PB10 and PB20). In both third- and second-generation fuels, oxides of nitrogen emissions were significantly increased compared in diesel base. Microalgae biodiesel's combustion activity was likewise very similar to diesel fuels. Especially in comparison with Jatropha and Polanga biodiesel fuels, microalgae biodiesel may have great potential as a next-generation sustainable fuel in compression engine (CI) engines in the sense of comparable engine efficiency, emissions, and combustion characteristics, along with biofuel production yield (per year per acre).

	Pure Diesel	Neem		Mahua		Jatropha	
		20	40	20	40	20	40
Piston Engine Power, kW	5.4975	4.2694	4.2702	5.7736	5.7650	6.1221	6.1219
Brake Torque, N m	35.001	27.182	27.179	36.758	36.704	38.977	38.976
Maximum Cylinder Pressure, bar	90.586	81.161	81.069	91.093	90.672	92.774	92.432
Maximum Cylinder Temperature, K	1883.5	1613.3	1611.2	1870.4	1865.0	1943.6	1941.0
Mechanical efficiency	0.86089	0.83412	0.83404	0.86572	0.86549	0.8703	0.8697
CO_2	770.48	981.45	981.74	725.84	727.45	681.68	681.76

(Raj, Dugala and Goindi, 2020)[8]Through use of biodiesel has started to deplete fossil fuels and increase greenhouse emissions. Biodiesel is a green fuel from vegetable oils and from animal fats. The objective of this research is to study all aspects relating to the development of biodiesel and to investigate its fuel properties. Neem seeds typically contain between 30-40 percent oil. For the production of raw Neem oil biodiesel a two-stage transesterification process is used. Motor performance and emission testing was carried out with many biodiesel blends .

Material Property used in analysis

	Pure Diesel	NEEM 20	MAHUA20	JAT 20	NEEM 40	MAHUA40	JAT 40
C	0.87	0.7664	.918	0.771	0.7664	0.766	0.771
H	0.126	0.1199	0.121	0.1193	0.1199	0.121	0.1193
O	0.004	0.1137	0.113	0.1097	0.1137	0.113	0.1097

Sulfur Fraction	0.002	0.0023	0.0024	0.005	0.0023	0.0024	0.005
Low Heating Value.	42.5	42.13	30.5	39.7	42.13	30.5	39.7
Cetane Number	48	54	45	49	54.5	51	50.5
Density	830	838.6	918	839.8	847.2	928	849.6
Dynamic Viscocity	0.003	0.00466	0.00373	0.00634	0.00421	0.0061	0.00438

Result of diesel blends

The table clearly show that Jatropha oil shows better effect in parameter.

CONCLUSION

Particulate matter is some what less in the case of jatropha oil than that of diesel which is observed by keeping a tissue paper at the outlet of the exhaust pipe.Among all the three blends the efficiency of jatropha oil is maximum 87.5 percent and Cox, Sox, NOx emission from jatropha is also less as compared to all three blends.

SCOPE FOR FUTURE WORK:

- Attempts are to be made to extract more pure esterified oil during esterification.
- Attempts are to be made to extract pure bio diesel of esterified mahua oil by using distillation process.
- Increase in production of jatropha oil reduces the cost of fuel.

REFERENCE

[1] V. Ganesan,compression ignition engine;

[2] C. N. Grimaldi and F. Millo, *Internal Combustion Engine (ICE) Fundamentals*. 2015.

[3] D. Ken, T. Rick, J. Wang, and A. Hampson, “Catalog of CHP Technologies. Section 2 . Technology Characterization – Reciprocating Internal Combustion Engines,” *Cat. Chp Technol.*, no. March, 2017.

[4] J. Huxster, M. Hopkins, J. Bresticker, J. Leddington, and M. Slater, “Attempts to prime intellectual virtues for understanding of science: Failures to inspire intellectual effort,” *Philos. Psychol.*, vol. 30, no. 8, pp. 1141–1158, 2017, doi: 10.1080/09515089.2017.1359245.

[5] U. Rajak, P. Nashine, and T. N. Verma, “Effect of spirulina microalgae biodiesel enriched with diesel fuel on performance and emission

characteristics of CI engine," *Fuel*, vol. 268, no. January, p. 117305, 2020, doi: 10.1016/j.fuel.2020.117305.

[6] A. K. Sharma, P. K. Sharma, V. Chintala, N. Khatri, and A. Patel, "the pollutants like cox,nox,sox emitted from transportation fleets," *Int. J. Environ. Res. Public Health*, vol. 17, no. 11, 2020, doi: 10.3390/ijerph17113896.

[7] A. Pugazhendhi, "An experimental investigation on C.I engine parts , cost and power analysis of CI engine fuelled with neem, jatropha biodiesel and its blends," *Fuel*, vol. 275, no. April, p. 117891, 2020, doi: 10.1016/j.fuel.2020.117891.