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JATROPHA CURCAS AS AN ALTERNATIVE ENERGY OPTION FOR COMPRESSION IGNITION ENGINE

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ABSTRACT - In this era where the rate of diesel consumption is high, considering the amount of revenue required to impact these fuels are having a serious problem on the environmental pollution and also looking at the prospect of achieving energy independency. It is necessary to look for alternate fuels and hence jatropha based biodiesel is an apt substitute as an alternative fuel.

Jatropha oil is has very high viscosity ,the effects of its direct usage in a C.I Engine is discussed in this project .Also trans-esterification is used to reduce the viscosity resulting in a product called" fatty acid methyl ester also termed as biodiesel in the chemical process, it has similar characteristics of a bio-diesel .This esterified oil is blended with conventional diesel fuel and used in its pure form is tested in a C.I engine at different speeds and loads ,thus studying its performance characteristics. It is derived from results that the bio-diesel in its pure form and the blends has found to have the similar characteristics as that of conventional diesel fuel. Thus bio-diesel can be considered as suitable substitute for diesel.

Keywords— **Jatropha, Biodiesel ,Alternate Fuel Resources e.t.c**

I. INTRODUCTION

Biodiesel is methyl or ethyl ester of fatty acid made form virgin or used vegetable oils (both edible& non-edible) and animal fats. The main commodity sources for bio-diesel in Indian can be non-edible oils obtained from plant species such as Jatropha curcas (Ratanjyot), pongamia pinnata (karanj), calophyllum inophyllum (nagchampa),Hevca brasiliensis(rubber)etc. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a bio-diesel blend or can be used in its pure form. Just like petroleum diesel, bio-diesel operates in compression ignition (diesel) engine, which essentially require very little or no engine modifications because bio-diesel has properties similar to petroleum diesel fuels. It can be stored just like the petroleum diesel fuel and hence does not require separate infrastructure.

The use of bio-diesel in conventional diesel engines results in substantial reduction of unburned hydrocarbons, carbon monoxide and particulate matter.bi o-diesel is considered clean fuel since it has no sulphur, no aromatics and has about 10% built-in oxygen, which helps it to burn fully. Its higher cetane number improves the ignition quality even when blended in the petroleum diesel. B20 (a blend of 20 percent by volume bio-diesel with 80 present by volume petroleum diesel) has demonstrated significant environmental benefits. Studies conducted with bio-diesel on engines have shown substantial reduction in particulate matter (25-50%). HC and OC emissions were also reported to be lower.

Fig:1

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II. EXPERIMENTAL SET UP

Table-1 **B5 Constant speed N=1600 rpm**

SN	BP (Kw)	SFC Kg/ Kw hr	Thermal Efficiency %	Mechanical Efficiency %
1	0.1	1.6	5.0	26.4
2	0.8	0.5	16.0	60.7
3	1.0	0.4	16.6	64.5
4	1.0	0.4	16.7	66.2

Table-2 **B10 Constant speed N=1600 rpm**

SN	BP (Kw)	SFC Kg/Kwhr	Thermal Efficiency %	Mechanical Efficiency %
1	0.181	1.73	4.95	27.8
2	0.7	0.569	15.04	59.8
3	0.96	0.465	16.4	67.1
4	1.035	0.46	18.6	68.8

Table-3 **J5 at constant speed N-1600 rpm**

SN	BP (Kw)	SFC Kg/Kwhr	Thermal Efficiency %	Mech Efficiency %
1	0.21	1.71	4.89	21.87
2	0.7	0.65	12.7	48.27
3	1.06	0.52	15.8	58.56
4	1.15	0.46	18	60.52

Table-4 **J10 CONSTANT SPEED N=1600 rpm**

SN		SN	SFC KG/K whr	Thermal Efficiency %	Mech Efficiency %	BP(KW)
1		1	2.06	4.04	22.3	0.17
2		2	0.574	14.58	57.75	0.7
3		3	0.489	17.13	64.02	1.1
4		4	0.509	16.63	65.62	1.1

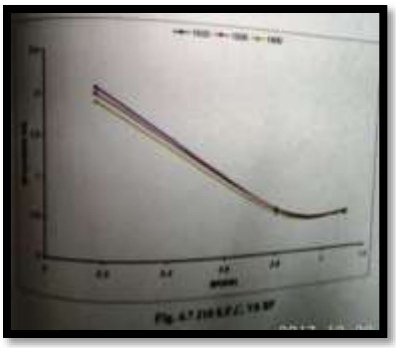

Fig-1

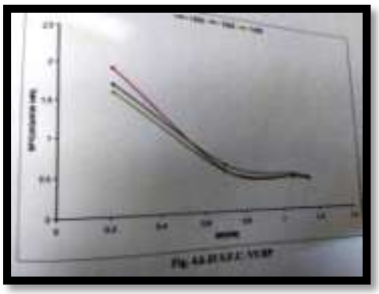

Fig-2

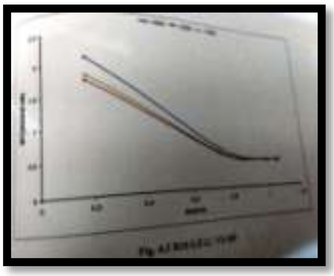

Fig-3

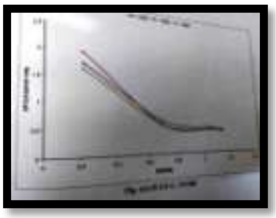

Fig-4

Graphs SFC VS BP For B10, B5, J5, J10 Blends Of Biodiesel

III. CONCLUSION

It is observed from the graphs that the fuel consumption in case of different bio-diesel blends is same to that of conventional fuel.SFC is observed to be almost similar.

Brake Power was also observed to be similar to biodiesel and its blends when compared to diesel fuel. This is due to presence of bonded oxygen which helps in complete combustion of fuel.

In case of mechanical efficiency it is found to be more in case of bio-diesel blends due to the lubricating properties exhibited by biodiesel.

IV. RESULTS AND DISCUSSIONS

From the graph it is clear that as BP increase SFC decreases up to a certain point and then decreases. This is due to fact as BP increase, results in increase in speed, so more amount of fuel is consumed on the other hand SFC drops.

This is due to the fact that the rate of increase in B.P is more than FP with increase in fuel consumption after which that at higher speeds the increase in F.P is more than BP. So the lowest point on the graph suggests that after which the increase in FP is more than BP. The blends B10, B5, J5, and J10 follow the same pattern, which suggests that biodiesel blends are compatible to that of diesel fuel.

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