Experimental Analysis on Operational Performance to Diesel Blends Fuel Mixture Such as Methanol, Petrol and Karanja Oil in Ci Engines

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Abstract— As per threat of globally for emission of pollution by engine but here concentrated by CI engine fuel as blend fuel of diesel with karanja oil and with some organic compound so improve combustion properties so control emission to control pollution and greenhouse gasses as well depict of ozone layer apart from that it has improvement of atomization properties, mixing properties, stachometric properties to improve its performance. The aim is to do experimental analysis for performance of a diesel engine fuel with blend of karanja oil ;as composition of percentage tested in the form of blends with methanol , petrol ,observational table given and to improve it chemical behavior so that both the agents taken as equally proportions in karanja oil make as fuel. Therefore we see improve in calorific value for high performance of methanol, petrol and karanja oil blend of diesel engine. We see in result of better engine performance as in term of Indicated power more efficient as earlier as 15% of engine performance as calorific value so improved in brake power that's what engine get excellent efficiency as in Mechanical, volumetric and thermal.

Key words: alternative fuel performance, Ic engine with blend fuel

I. INTRODUCTION

Thetrans - esterification is well accepted and best method of utilizing vegetable oils in CI engine without any long-term operational and durability problems. However, this adds to the cost of production because of the chemical process involved. In rural and remote areas of developing countries. Where grid power is not available, vegetable oils can play a vital role in decentralized power generation for irrigation and electrification purposes. In these remote areas, different types of vegetable oils are available locally but it may not be possible to chemically process them due to logistics problems. Hence, using blended vegetable oils is an attractive alternative.

II. EXPERIMENTAL PARAMETER

The experimental set up consists of a four cylinder four-stroke, air-cooled and constant-speed (2500 rpm) compression ignition engine. The detailed specification of the engine is given below.

Name of manufacturer	Kirlosker
Rated speed	2500 rpm
Brake power	25 KW
Fuel Used	Diesel
Stroke Length	92 mm
Diameter of cylinder	78 mm
Compression Ratio	18
Anemometer Diameter in mm	68 mm
No. of cylinder	Four
No. of stroke	Four Stroke
Dynamometer	Hydraulic

Table 1: Specification of Diesel Engine

A separate fuel tank of capacity 5 liter was fitted with the diesel engine for the diesel and its blends.

A series of experience were carried out using diesel, karanja oil and the various blends with petrol and Methanol. All the blends were tested under varying load conditions. During each trial, the engine was started and after it attains stable conditions.

III. TEST FUEL BLENDS PREPARATION

Since most vegetable oils and diesel oil are miscible in all proportion, possible solution is to use mixture of vegetable oils and diesel oil. However problem of carbon deposition occur in case of long operating period.

Four blends of diesel were prepared for testing the karanja oil with petrol and Methanol engine:

1) BPMKD 2.0 - Contains 2.0% Petrol, 2.0 %Methanol, 2.0 % Karanja Oil and 94% Diesel
2) BPMKD 6.0 - Contains 6% Petrol, 6%Methanol, 6% Karanja Oil and 82% Diesel
3) BPMKD 8.0 - Contains 8.0% Petrol, 8.0%Methanol, 8.0% Karanja Oil and76 % Diesel
4) BPMKD12 - Contains 12% Petrol, 12%Methanol, 12% Karanja Oil and 64% Diesel

Where, B=Blends (composition); P=Petrol; K=Karanja oil; D=diesel oil; M=methanol

IV. ENGINE PARAMETER & FORMULA USED:

1) Brake Power (kW) = {W*N}/ 2000
2) Indicated Power (kW) = $(k*P_m*L*A*N*n)/60$
3) Mechanical Efficiency (%) = B.P./I.P.
4) Volumetric Efficiency (%) = $m_a/(\rho_a*V_d)$
5) Indicated Thermal Efficiency (%) = $I.P./(m_f*C.V.)$
6) Brake Thermal Efficiency (%) = $B.P./(m_f*C.V.)$
7) Indicated specific Fuel Consumption (kg/Kwh) = $m_f/I.P.$
8) Brake Specific Fuel Consumption (kg/Kwh) = $m_f/B.P.$
9) Displace Volume (V_d in m^3/s) = $k*n*\pi/4*D^2*L*N/60$
10) Mass flow rate of Air (m_a in kg/s) = P_a*v*a

Where,
W = Load in kg
N = Revolution per minute (RPM)
K = No. of cylinder
P_m = mean effective pressure in bar(MEP)
L = Length of stroke in m
A = Area of Cylinder in m^2
D = Diameter of Cylinder in m
N = 1/2for four stroke engine
n= 1 for two stroke engine
B.P. = Brake power in KW

I.P. = Indicated Power in KW
m_a = Mass flow rate of Air in kg/s
m_f = Fuel consumption in kg/s
p_a = Density of Air in kg/m^3
V_d = Displace Volume in m^3/s
v = Velocity of Air in m/s
a = Area of Anemometer in (m2= $\pi/4*d^2$)
d = Diameter of Anemometer in m

V. EXPERIMENTAL ANALYSIS

First of all we make different blend for testing. Initially we run the engine on pure diesel and various parameter to be note for the engine like load, RPM, break mean effective pressure etc. After that we run the engine on different blends and similarly differently parameter to be note down with corresponding observation tables, it's given below:-

A. Observation:

S.NO.	LOAD	RPM	FUEL kg/sec	MEP (bar)	AIR (kg/sec)	C.V. MJ/kg
1	6	2238	0.00191	4.1	0.033	41
2	9	2200	0.00201	5.1	0.033	41
3	16	2160	0.00223	6.1	0.033	41
4	22	1980	0.00251	7.2	0.033	41

S.NO	IP kW	BP kW	η_m	η_v	η_{ith}	η_{bth}	ISFC Kg/kw-hr	BSFC Kg/kw-hr	A/F
1	14.12	6.598	41.65	85.43	16.36	5.30	0.618	1.24	14.7
2	17.12	12.00	67.24	87.65	19.60	12.75	0.537	0.550	15.2
3	21.62	17.20	83.44	86.60	21.61	16.24	0.499	0.393	13.6
4	25.43	21.80	93.31	94.50	22.94	18.80	0.310	0.354	11.7

Table 2: Diesel

S.NO.	LOAD	RPM	FUEL Kg/sec	MEP (bar)	AIR (kg/sec)	C.V. MJ/kg
1	6	2131	0.00297	5.5	0.033	41
2	9	2317	0.00316	4.2	0.033	41
3	16	2451	0.00245	5.5	0.033	41
4	22	2082	0.00312	6.0	0.033	41

S.NO	IP kW	BP kW	η_m	η_v	η_{ith}	η_{bth}	ISFC Kg/kw-hr	BSFC Kg/kw-hr	A/F
1	15.61	6.57	47.61	84.8	19.24	8.2	0.462	1.36	14.7
2	17.66	12.06	60.46	85.3	20.80	12.3	0.446	0.778	15.2
3	19.74	17.12	92.30	87.9	17.80	16.69	0.622	0.550	13.6
4	20.88	21.88	95.23	90.4	18.14	18.23	0.484	0.534	11.7

Table 3: 2.0%Karanja Oil +2.0% Methanol +2.0% Petrol+94.0% Diesel.

VI. RESULT & DISCUSSION

By taking observation of diesel fuel with various diesel fuel blends, compared with results of various efficiency and powers such as Indicated brake, brake and fuels lower calorific values with various loads, we got best result comparatively diesel fuel with above observation such as Table no. 2and3 respectively.

VII. CONCLUSION

The blends of different properties of Karanja oil diesel were prepared and tested on diesel engine. The Kinematic viscosity of Karanja oil decreases also with rise in temperature during combustion. The calorific value of Karanja oil is found 8% less than the diesel. The different of calorific value of Diesel and Karanja oil is due to the different in their chemical composition which is due to different in carbon and hydrogen content in molecular structure of diesel and bio- diesel.

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