International Journal for Modern Trends in Science and Technology
Volume: 03, Issue No: 07, July 2017
ISSN: 2455-3778
http://www.ijmtst.com

Performance & Evaluation of Diesel Engine (4-stroke 1-cylinder) using Jatropha Oil Blends with Super Charging Method

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To Cite this Article
G.Purna Chandra Rao, Sk.Abdul Azeez, R.Vijaya Krishna and Ch.Naveen Kumar, "Performance & Evaluation of Diesel Engine (4-stroke 1-cylinder) using Jatropha Oil Blends with Super Charging Method", *International Journal for Modern Trends in Science and Technology*, Vol. 03, Issue 07, July 2017, pp. 50-59.

ABSTRACT

The energy consumption is growing or increase at an enormous rate of demand and rapid uses of alternative fuels or renewable sources of energy and environmental threat, a number of non-conventional energy sources of energy generation varieties have been studied worldwide. An attempt is made to access the suitability of Jatropha oil (Bio-Fuel for diesel engine operation) without any changes in its existing construction. Bio Fuel can be prepared from Jatropha seeds, etc.

In the present investigation work of Jatropha oil has been performed on 4-Stroke 1- Cylinder Diesel engine and this bio fuel is prepared through Transesterification process which is one of the easiest and cheapest ways of producing bio-fuel through different vegetables and seeds like jatropha seeds etc.,

The main need and objective of the study is to investigate the performance and evaluation of diesel engine using Jatropha oil blends with super charging Method. Engine performance, combustion and exhaust emission characteristics were investigated by using computerized system of diesel engine. Engine tests were conducted at variable engine speed (rpm) and four different engine loads, the effect of performance of diesel engine and characteristics of jatropha oil has been calculated. The experimentation is conducted on the different loads of diesel engine with supercharging method. The fuel composition was changed by each sample and comparison improved with & without super charger results.

According to brake specific emission results, biodiesels emitted lower carbon monoxide (CO) emissions but they emit higher carbon dioxide (CO2) and oxides of nitrogen (NOx) emissions as compared to diesel fuel. THC emissions increased and CO2 emissions reduced slightly for the blends containing biodiesel compared with B20 (20% jatropha, 80% diesel fuel) on average and supercharging method gives the high performance and more economical. The performance results of diesel engine and characteristics/properties of jatropha results were presented tables & graphically.

KEYWORDS: *Jatropha oil, Transesterification, Bio-diesel, Air-preheating, Supercharging, Properties.*

I. INTRODUCTION

1.1 Diesel Engine:

The diesel engine (also known as a compression-ignition engine) is an internal combustion engine that uses the heat of compression to initiate ignition and burn the chemical fuel that has been injected into the combustion chamber like inside the cylinder. An IC Engine is the engine in which the combustion takes place inside the engine. Besides all the other operations of the cycle i.e. work done, compression and heat rejection takes place insides the engine, hence an IC engine (piston-cylinder arrangement) is a complete plant by itself.

The diesel engine has the highest thermal efficiency of any standard internal or external combustion engine [1] due to its very high compression ratio. Low-speed diesel engines (as used in ships and other applications where overall engine weight is relatively unimportant) can have a thermal efficiency that exceeds up to 50%

Diesel engines are manufactured in two-stroke and four-stroke versions. They were originally used as a more efficient replacement for stationary steam engines. Since the 1910s they have been used in submarines and ships, etc., Use in locomotives, trucks, heavy equipment and electric generating plants followed later. In the 1930s, they slowly began to be used in a few automobiles.

1.2 Working of Four Stroke Single Cylinder Diesel Engine:

The working cycle of the engine is completed in four- strokes and diesel oil is used as fuel, therefore, it is known as four stroke diesel engines. The working of the engine is described below.

1. Suction stroke: The suction is similar, to that in petrol engine except that only air is taken into the cylinder.

2. Compression stroke: compression is also similar, but near the end of compression, pressure and temperature of the air is about 60 bars and 600°c respectively.

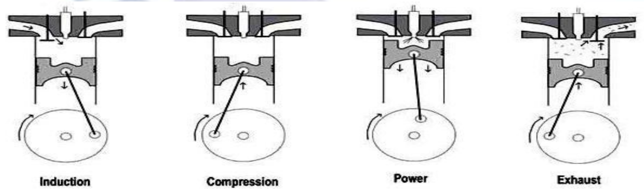

Fig 1.1 Working of 4-Stroke Single Cylinder Diesel Engine

3. Expansion stroke: during this stroke, the inlet and exhaust valves are closed and fuel valve opens just before the beginning of the third stroke. The supply of fuel is continued during a small part of the expansion stroke. The high pressure and high temperature gases push the piston down even after the valve is closed.

4. Exhaust stroke: During this stroke, the inlet and fuel valves remain closed and exhaust valve remains open. The piston moves up in the cylinder and pushes out the burnt gases. The piston reaches the TDC completing the exhaust and is ready for the next cycle

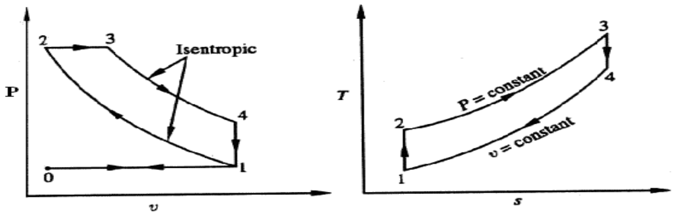

Fig: 1.2 Representation of Diesel cycle on P-v and T-s diagrams

1.3 Engine Test Setup (computerized):

The setup consists of single cylinder, four stroke, diesel engine connected to eddy current type dynamometer for loading. The set up has stand alone panel box consisting of air box, fuel tank, manometer, fuel measuring unit, transmitters for air and fuel flow measurements, process indicator and engine indicator. Rota meters are provided for cooling water and calorimeter water flow measurement [2]

Fig 1.3 Four Stroke Single Cylinder Diesel Engine

The setup enables study of engine performance for brake power, indicated power, frictional power, BMEP, IMEP, brake thermal efficiency, indicated thermal efficiency, Mechanical efficiency, volumetric efficiency, specific fuel consumption, A/F ratio and heat balance. Lab view based Engine Performance Analysis software package “Engine soft” is provided for on line performance evaluation.

1.3.1 Utilities Required Electric supply: 230 +/- 10 VAC, 50 Hz, 1 phase

1.3.2 Computer Configuration: IBM compatible with standard configuration.

Engine Soft is Lab view based software package developed by Apex Innovations Pvt. Ltd. for engine performance monitoring system. Engine Soft can serve most of the engine testing application needs including monitoring, reporting, data entry, data logging. The software evaluates power, efficiencies, fuel consumption and heat release. It is configurable as per engine set up. Various graphs are obtained at different operating condition. The data in excel format can be used for further analysis [3]

1.3.3 Water supply: Continuous, clean and soft water supply @ 1000 LPH, at 10 m. head. Provide tap with 1" BSP size connection.

1.4 Engine Specification:

Table: 1.1 Engine Specifications

Product of Engine Set up	Four stroke single cylinder
Make	Kirloskar
Model	TV1
Power rate	5.2 kW
BHP	5hp
RPM	1500
Fuel	Diesel
Cylinder bore	87.5 mm
Stroke length	110 mm
Connecting rod length	234 mm
Starting	Cranking
Working cycle	Four stroke
Method of cooling	water cooled
Method of ignition	Compression ignition
Dynamometer Type	Eddy current
Fuel tank Capacity	15 lit
Temperature sensor Type	RTD
Software	"Engine soft" Engine performance analysis

1.5 Combustion Parameters:

Table: 1.2 Combustion Parameters

Specific Gas Const (kJ/kg K)	1.00
Air Density (kg/m^3)	1.17
Adiabatic Index	1.41
Polytrophic Index	1.26
Number of Cycles	5
Cylinder Pressure Reference	7
TDC Reference	0
Compression ratio	17.5
Rota meter Engine cooling	40-400 LPH
Swept volume	661.45 (cc)

1.6 Performance Parameters:

Table: 1.3 Performance Parameters

Orifice Diameter (mm)	20.00
Orifice Coeff. Of Discharge	0.60
Dynamometer Arm Length (mm)	185
Fuel Pipe dia (mm)	12.40
Ambient Temp. (Deg C)	27
Pulses Per revolution	360
Fuel Type	Biodiesel
Fuel Density (Kg/m^3)	880
Calorific Value of Fuel (MJ/kg)	38.5-43

1.7 Operating principle:

The diesel internal combustion engine differs from the gasoline powered Otto cycle by using highly compressed hot air to ignite the fuel rather than using a spark plug (compression ignition rather than spark ignition [4]

Fuel is injected directly into the compressed air in the combustion chamber. This may be into a (typically toroidal) void in the top of the piston or a pre-chamber depending upon the design of the engine. The fuel injector ensures that the fuel is broken down into small droplets, and that the fuel is distributed evenly. The heat of the compressed air vaporizes fuel from the surface of the droplets. The vapour is then ignited by the heat from the compressed air in the combustion chamber, the droplets continue to vaporize from their surfaces and burn, getting smaller, until all the fuel in the droplets has been burnt. The start of vaporization causes a delay period during ignition and the characteristic diesel knocking sound as the vapour reaches ignition temperature and causes an abrupt increase in pressure above the piston. The rapid expansion of combustion gases then drives the piston downward, supplying power to the crankshaft by the arrangement of system in an order.

II. LITERATURE REVIEW

This chapter presents the detailed literature review on the jatropha bio-diesel and their derivatives as its blend mixture with diesel fuel for compression ignition engines. A brief historical background is followed by the properties and characteristics of jatropha oil and its blends are determined. Performance, evaluation and exhaust emission parameters of jatropha and its blends bio-diesel with super charger are explained. Performance and emission parameters of bio diesel and its blends are described neatly with mathematical valves, tabular forms and graphically. Finally, this chapter concludes with the scope of the present work.

III. MATERIALS & METHODS

Materials and apparatus used in the production of the biodiesel are as follows: thermometer, retort stand, pipette, measuring cylinder, separating funnel, magnetic stirrer, oven, water bath, hydrometer, conical flask, digital weighing balance, stop watch, hot plate, distilled water, methanol, and jatropha oil.

3.1 Bio-Fuel Production:

3.1.1 Bio-diesel: Biodiesel is an alternative fuel similar to conventional or 'fossil' diesel. Biodiesel can be produced from straight vegetable oil, animal oil/fats, [6] tallow and waste cooking oil. The process used to convert these oils to biodiesel is called Transesterification. Bio fuel is a natural alternative from other fossil fuels. A bio-fuel is a fuel that contains energy from geologically recent carbon fixation. These fuels are produced from living organisms.

3.1.2 Production process:

Biodiesel is commonly produced by the transesterification of the vegetable oil or animal fat feedstock. There are several methods for carrying out this transesterification reaction including the common batch process, supercritical processes, ultrasonic methods, and even microwave methods.

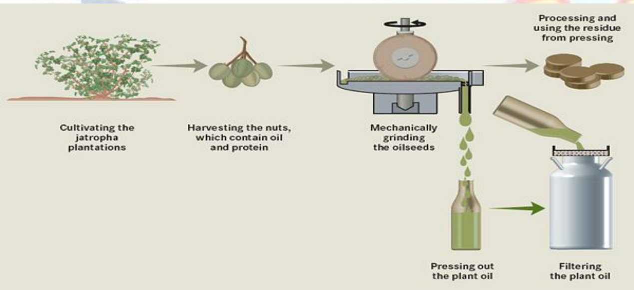

Fig 3.1 Processing of Biodiesel using Jatropha seeds

3.2 Experimental & Methodology:

3.2.1 Method & Steps in biodiesel production:

Two steps are used in the production of the biodiesel as shown in Figure below.

(i) Reduction of the fatty acid contained in the Jatropha oil.

(ii) Transesterification.

(i) Reduction of the Fatty Acid:

As obtained in the test carried out on the jatropha oil, it was discovered that the free fatty acid (FFA) contents of oil are high (21.6%). Hence, it became necessary to reduce it.

Procedure: Crude jatropha oil was poured into a conical flask and heated to a temperature of 60^{0}C. A mixture of concentrated H_2SO_4 (1% w/w) with methanol (30% v/v) was heated separately at (50^{0}C) and then added to the heated oil in the flask. The mixture was stirred for 1 hour and allowed to settle for 2 hours.

(ii) Transesterification step by step procedure:

The Transesterification process are step by step approach used in the production of the biodiesel is given below:

(i) 10.5 ml of jatropha oil was measured and poured into 250ml conical flask and heated to a temperature of 50^{0}C.

(ii) A quantity of methanol was poured in a round bottom flask and soxhlet apparatus, and the heater was turned on. This was done to purify the methanol. The sodium hydroxide pellet was placed in the weighing balance to get exactly 0.25 gm.

(iii) A solution of potassium methoxide was prepared in a 250 ml beaker using 0.25 gm (i.e., catalyst concentration of 0.5%) of Sodium hydroxide pellet and 63 ml (i.e., mole ratio of oil to methanol of 1:6) of methanol. The solution was properly stirred until Potassium hydroxide pellet was completely dissolved.

(v) The potassium methoxide solution was placed in the oven to bring its temperature 60^{0}C.

(vi) The potassium methoxide solution was then poured into the warm jatropha oil and stirred vigorously for 50 minutes using a magnetic stirrer; the mixture was then allowed to settle for 24 hours in a separating funnel.

(vii) The biodiesel was then poured into a separate beaker, while the lower layer (which comprises of glycerol and soap) was collected from the bottom of the separating funnel.

(viii) Warm water was then used to wash the biodiesel to remove any excess glycerol and soap that remain in the funnel; this was done until the clear water was seen below the biodiesel in the separating funnel.

(ix) The washed sample was dried by placing it on a hot plate and excess water still in the biodiesel was removed.

(x) The quantity of biodiesel collected was measured and recorded.

(xi) The above procedures were repeated by varying the mole ratio of jatropha and methanol, while keeping catalyst concentration, stirring time, and temperature constant.

In this project the bio-fuel is made with Jatropha oil through Transesterification process.

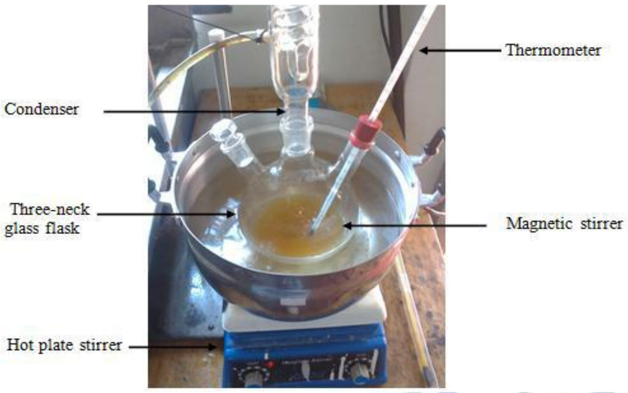

Fig 3.2 Apparatus of transesterification process

3.2.2 Chain reaction of Transesterification:

The figure below shows the chemical process for methyl ester biodiesel.

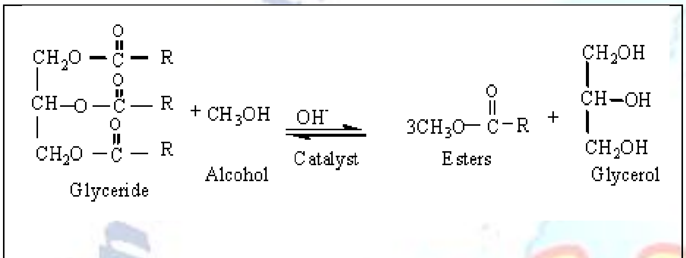

Fig 3.4 the products of the reaction are the biodiesel itself and glycerol

A successful Transesterification reaction is signified by the separation of the methyl ester (biodiesel) and glycerol layers after the reaction time. The heavier co-product, glycerol, settles out and may be sold as is or purified for use in other industries, e.g. pharmaceutical, cosmetics, and detergents.

3.3 Advantages of Bio-fuels:

- Biodiesel fuel is a renewable energy source unlike petroleum-based diesel.
- An excessive production of soybeans in the world makes it an economic way to utilize this surplus for manufacturing the Biodiesel fuel.
- One of the main biodiesel fuel advantages is that it is less polluting than petroleum diesel.
- The lack of sulfur in 100% biodiesel extends the life of catalytic converters.
- Another of the advantages of biodiesel fuel is that it can also be blended with other energy resources and oil.
- Biodiesel fuel can also be used in existing oil heating systems and diesel engines without making any alterations.
- It can also be distributed through existing diesel fuel pumps, which is another biodiesel fuel advantage over other alternative fuels.
- The lubricating property of the biodiesel may lengthen the lifetime of engines.

3.4 Disadvantages of Bio-Fuel:

- At present, Bio fuel is bout one and a half times more expensive than petroleum diesel fuel.
- It requires energy to produce biodiesel fuel from soy crops; plaus there is the energy of sowing, fertilizing and harvesting.
- Another biodiesel fuel disadvantage is that it can harm rubber hoses in some engines.
- As Biodiesel cleans the dirt from the engine, this dirt can then get collected in the fuel filter, thus clogging it. So, filters have to be changed after the first several hours of biodiesel use.
- Biodiesel fuel distribution infrastructure needs improvement, which is another of the biodiesel fuel disadvantages.

3.5Remedies:

- Blending of oils(jatropha) with diesel.
- Heating of oils before injecting at 90^0c.
- Heating of air before inside of cylinder at 45^0c.
- Arrangement of air-preheater and super charger methods.

IV. RESULTS & DISCUSSIONS

4.1 Properties of Bio-fuel:

The extraction of oil from jatropha seeds were done by Mechanical expelling method, yield obtained 22%.The result of all testing done each of biodiesel samples with different loads of Super charger are tabulated. The result included the kinematic viscosity, density, yield of biodiesel, flash point and acid value. The results of all testing for each biodiesel samples are shown in Table 4.1(A) and (B).

Table 4.1(A) Result of Jatropha oil Sample:

Feedstock	Viscosity at 40 ⁰C (mm^2/s)	Density at 40 ⁰C (kg/m^3)	Flash point ⁰C	Cetane number	Calorific value (MJ/kg)	Cloud point ⁰C	Pour point ⁰C	Iodine No
J	3.7–5.8	880	184	38	38.5 – 43	6	3	94

Table 4.1(B) Chemical contents in jatropha oil:

Saponification value	*Sulfur (%) by Wt*	*Oxygen (%w/w)*	*Carbon (%,w/w)*	*Hydrogen (%w/w)*	*Ash Content (% w/w)*
198	*0.0.13*	*11.06*	*76.11*	*10.52*	*0.03+0.0*

From the above table 4.1(A) and (B), Density, cloud point and pour point of Jatropha oil are found to be higher than diesel. Higher cloud and pour point reflect unsuitability of Jatropha oil as diesel fuel in cold climatic condition but the flash and fire points of Jatropha oil is very high compared to mineral diesel. Hence Jatropha oil is extremely safe to handle higher carbon residue from Jatropha oil may possibly lead to higher carbon deposits in combustion chamber of the CI engine. Low sulphur content in Jatropha oil result in lower Sox emissions. Presence of Oxygen in fuel improves combustion properties and emission but reduces the calorific value of the fuel. Jatropha oil has approximately 90% calorific value compared to diesel. Nitrogen content of the fuel also affects the NOx emissions. It is observed that viscosity of Jatropha oil decreases remarkably with increasing temperature and it becomes close to diesel at temperature above 900C[6].

4.2 Procedure:

1. Fill up the diesel into the fuel tank mounted on the panel frame.
2. Connect the instrumentation power input plug to a 230V, single phase power source. Now the digital meters namely, RPM and Temperature indicators display the respective readings.
3. Connect the water line to the engine jacket and brake drum.
4. Check the lubricating oil in the oil sump.
5. Open the fuel valve and ensure no air trapped in the fuel line.
6. Start the engine and allow it to stabilize rated speed (1500 rpm).
7. Now load the engine in steps of ¼, 1/2, 3/4, full load and allow the engine to stabilize at each load.
8. Record all the required parameters indicated on the digital indicators which are mounted on the panel board like,
   a. Speed of the engine from digital RPM indicator
   b. Load from the spring balance.
   c. Fuel consumption from burette.
   d. Quantity of airflow from manometer.
   e. Different temperatures from Temperature indicator.
9. Load the engine step by step.
10. Record the all corresponding parameters.
11. Turn off the fuel knob provided on the panel after the test.

4.3 Testing the engine filled with Bio-fuel:

The result of biodiesel sample J20%+80% with supercharger with different loads are tabulated. The result included the Brake power, Indicate power, Friction power, fmep, bmep, air-fuel flow. Indicated & brake thermal efficiency, mean effective pressure, Torque, Mechanical efficiency, volumetric efficiency values at different kind of loads. The results of all testing for each biodiesel samples are shown in Tables.

4.3.1 Fuel composition samples:

Table: 4.2 Fuel composition samples

Samples	***Fuel Name***	***Compositions***
1	*J5*	*5% Jatropha oil bio-diesel + 95% Diesel*
2	*J10*	*10% Jatropha oil bio-diesel + 90% Diesel*
3	*J15*	*15% Jatropha oil bio-diesel + 85% Diesel*
4	*J20*	*20% Jatropha oil bio-diesel + 80% Diesel*

In this Fuel composition we get better result at J20%+D80% and at this composition we are arranged super charger. By using this method we get better performance and emission products reduction of 4-stroke, 1-cylinder Diesel engine

Compositions: 20% Jatropha oil bio-diesel + 80% Diesel+ Supercharger

4.4 Supercharging Method of Diesel Engine: Testing on the engine fueled using Bio-fuel with Supercharging Method:

In the first step on testing the engine has to be fueled with bio-fuel taking out the entire diesel. Then by starting the engine the readings of speed, Manometer readings and fuel consumed and load has to be taken, again taking the reading at various loads. The readings of Jatropha biodiesel (J20%+B80%).

After taking the reading of engine running on bio-fuel with Jatropha biodiesel (J20%+B80%) with supercharger, the efficiency's has to be calculated. Here we calculate the specific fuel consumption, indicated power, brake thermal efficiency, frictional power, imep, bmep, fmep, air/fuel flow, indicated & brake thermal efficiency, torque, volumetric efficiency, mechanical efficiency, HBP, HJW, H gas, H rad.

The emission parameters of CO_2, CO, HC, and smoke opacity were higher for Jatropha oil compared to that of bio-diesel of jatropha along supercharging and tabulated below and comparison of Jatropha blend mixture with other parameters of supercharging of Jatropha blend mixture.

4.4.1 Observation Data J20%+D80% with supercharging method:

Table: 4.17 Performance of Diesel Engine at J20%+D80% with Supercharging

Torque	Speed (rpm)	Load (kg)	BP (kw)	FP (kw)	IP (kw)	BMEP (bar)	IMEP (bar)	FMEP (bar)	ηBthe	ηIthe	η Mech	ηVol	Air Flow (mmWC)	Fuel Flow (cc/min)
0.01	1577	0.022	0.00	2.4	3.27	0.00	3.72	3.75	0.2	75.6	0.2	85.52	89.79	7.00
6.71	1566	4.74	1.53	2.2	4.62	1.36	5.92	3.74	21.5	61.9	34.8	84.32	86.92	11.00
13.32	1538	9.89	3.01	2.1	6.18	2.99	6.96	3.78	30.7	57.2	51.6	84.64	84.58	15.00
24.51	1525	14.12	4.09	1.9	7.25	4.74	8.64	3.61	33.6	55.4	61.5	83.91	83.75	20.00
28.71	1509	18.49	5.53	1.8	8.1	6.25	9.69	3.22	35.4	53.7	68.1	83.70	81.17	25.00

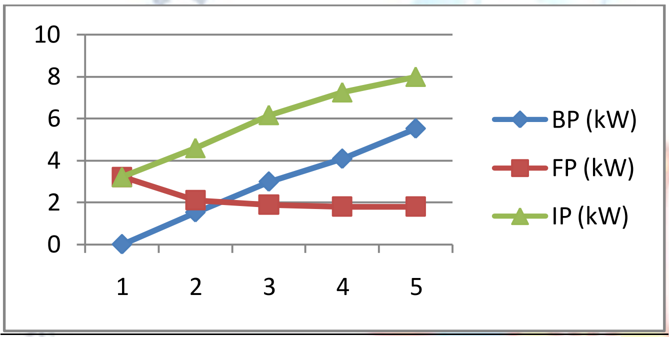

Fig: 4.11 Comparing the IP, BP & FP at J20%+D80% with Supercharging

Graph comparing the IP, BP & FP at J20%+D80% with supercharging bio fuel at different loads.

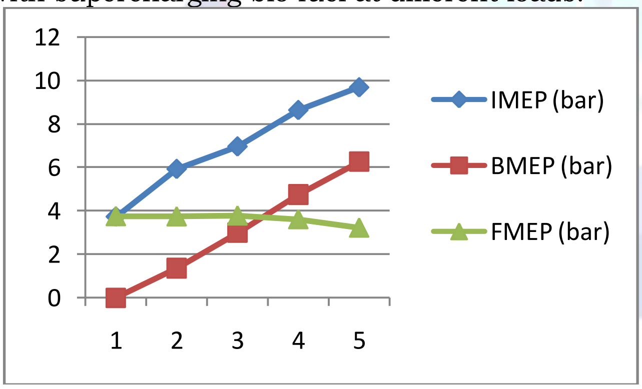

Fig: 4.12 IMEP, BMEP & FMEP at J20%+D80% with Supercharging

Graph comparing the IMEP, BMEP & FMEP at J20%+D80%with supercharging bio fuel at different loads

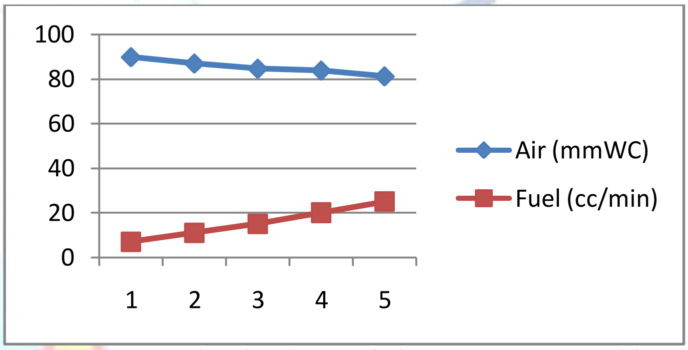

Fig: 4.13 Comparing the Air & Fuel Flow at J20%+D80% with Supercharging

Graph comparing the Air & Fuel Flow at J20%+D80% with supercharging bio fuel at different loads

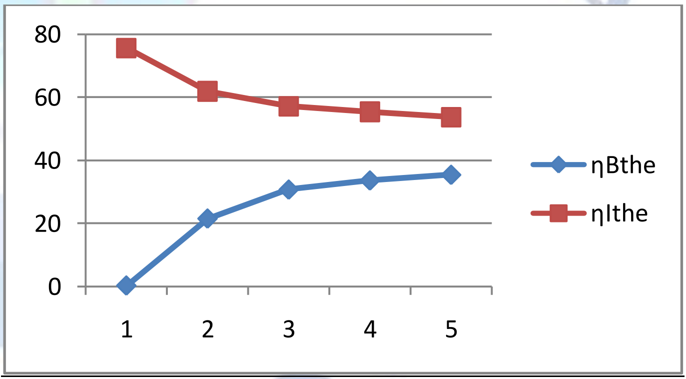

Fig: 4.14 Indicated & Brake Thermal Efficiency at J20%+D80% with Supercharging

Graph comparing the Indicated & Brake Thermal Efficiency at J20%+D80% with supercharging bio fuel at different loads.

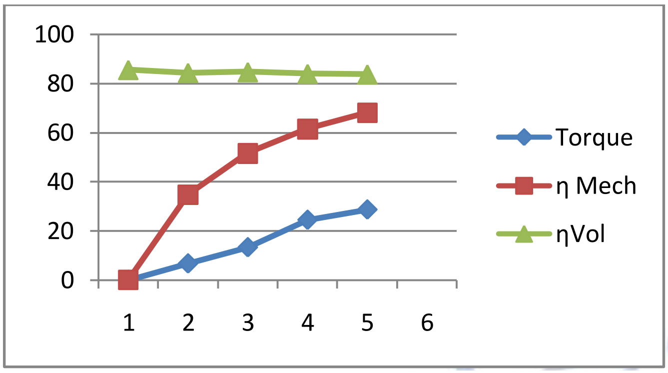

Fig: 4.15 Comparison Torque, Mechanical & Volumetric Efficiency at J20%+D80% with Supercharging

Graph comparing the Torque, Mechanical & Volumetric Efficiency at J20%+D80% with supercharging bio fuel at different loads.

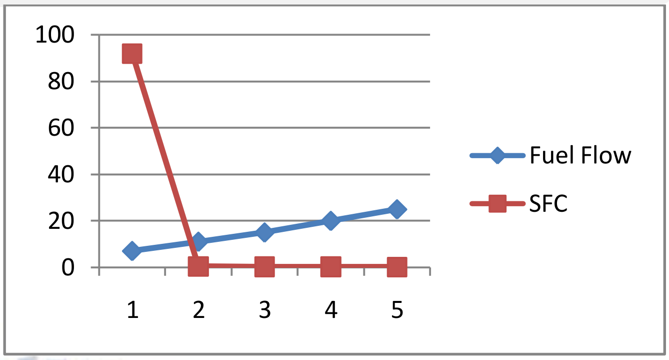

Fig: 4.16 Comparison Specific Fuel Consumption & Fuel Consumption at J20%+D80% with Supercharging

Graph comparing the Specific Fuel Consumption & Fuel Consumption at J20%+D80% with supercharging.

Table: 4.18 Emission and Exhaust gases Data of J20%+B80% Blend Mixture with Supercharging

S No	Test Date	Veh.ID No.	SFC	A/F Ratio	CO %	HC PPM	CO2 %	O2 %	NOX PPM	Lambda	HBP (%)	HJW (%)	HGas (%)	HRad (%)	Opacity %
1	13:05:17	13-05 J20% 00	91.6	66.13	0.11	58	2.3	19.40	57	8.19	0.19	4.73	24.94	75.70	5.4
2	13:05:17	13-05 J20% 25	0.48	49.00	0.09	49	3.5	18.63	152	4.35	21.94	10.65	22.11	53.63	14.9
3	13:05:17	13-05 J20% 50	0.31	37.25	0.09	48	4.9	17.60	348	2.94	28.64	12.84	21.53	45.68	28.1
4	13:05:17	13-05 J20% 75	0.26	28.83	0.06	49	7.4	16.08	655	2.12	33.47	13.52	20.77	37.19	41.4
5	13:05:17	13-05 J20% 100	0.18	23.87	0.05	47	9.6	14.63	939	1.63	34.21	16.55	20.19	32.72	64.3

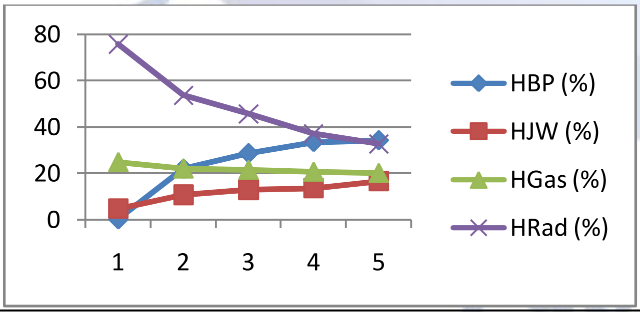

Fig: 4.17 Comparing the HBP, HJW, H Gas at J20%+D80% with supercharging.

Graph comparing the HBP, HJW & H Gas at J20%+D80% with supercharging method of bio fuel at different loads.

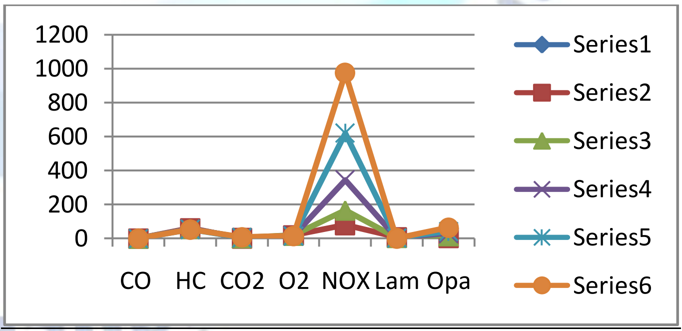

Fig: 4.18 Emission data of J20%+B80% with supercharge.

Graph comparing the CO, HC, CO_2, O_2, NO_x at J20%+D80% with supercharging method of bio fuel at different loads

V. SCOPE OF PRESENT WORK

From the above review of literature the following important conclusions are made. Non-availability of raw materials makes it difficult to meet the target of 2017, the government's national policy on bio fuels which aims to blend 20 per cent bio fuels by 2017 seems a farfetched dream, at least in the case of biodiesel in Andhra Pradesh and Telangana even though both states combined have about five biodiesel manufacturers, the highest number as compared to other states in the country. Last month both states consumed 5, 14,000 kilolitres of diesel. Presently not even 5 per cent blended biodiesel is available across all fuel outlets in the two states.

The past work reveals that vegetable oils like sunflower, safflower, soya bean, rapeseed oil, rice bran oil and their derivatives as un-conventional in place of diesel in C.I Engines were proved useful. India has great potential for the production of bio fuels from jatropha seeds, the previous studies reveal that jatropha oils and their derivatives are used in the field of diesel in C.I Engine with small or no modifications. The compositions of this fuel with diesel and Jatropha oil were tried successfully. Performance, evaluation and emissions of the engine with super heater were reported. In majority conditions the performance was found with some operating problems. The main cases we are found the engine starting problem and high amount of exhaust gases are delivered due to moisture content in air, improper mixing of air fuel ratio and etc., Engine produces the high amount of output at a comparable thermal efficiency, but these releases higher exhaustible parameters like smoke, CO, CO_2, Un-burnt Hydro carbons and Nitrogen oxides. Further emissions can be reduced by the use of esterifies jatropha oil, supercharger. So far a very few jatropha oil blends with pure diesel and with super charger has been tested on C.I Engines.

This investigation majorly focuses on study and conducted experimental setup of Jatropha Blends and new motivational things is supercharging method.

VI. SAUMMARY AND CONCLUSION

The experiment compares the performance and emission characteristics of diesel engine by using Jatropha oil and diesel which supercharger. It is observed that bio-fuel gives the higher break thermal efficiency and mechanical efficiency by using supercharger

By varying the Blend mixture ratio and find out the engine performance and its emission characteristics. In three cases we are consider to investigate the diesel engine performance, evaluation and emission characteristics, those are bio-diesel blend mixture ratios, super charger with bio-diesel blend mixture ratios.

As a result, the efficiencies of J20% + D80% which contain Super charger produced the best results for bio fuel blend ratios in diesel engine. The increase engine performance found to be more efficient primarily because of super changing method and its promotes effective combustion as well as less emission products but super charging method gives better result compare to air pre-heater.

VII. AKNOWLEDGEMENT

I am thankful to our Principal Dr C Naga Bhaskar, Professor for fostering an excellent environment in our college and helping us at all points for achieving our task.

I am also taking privilege to record our thanks to Head of the Department, Mech Mr. R Vijay Krishna, Assoc. Professor for his encouragement, co-operation and valuable suggestions to complete it in-time.

I am very much thankful to our M.Tech Coordinator Ch Naveen Kumar, Asst.Professor Mech for his valuable guidance, which helped me to bring out this project successfully.

It gives us immense pleasure to thank our guide SK Abdul Azeez, Asst.Professor, Mech for having been a source of constant inspiration, precious guidance and generous assistance during the project work. We deem it as privilege to have worked under his able guidance. Without his close monitoring and valuable suggestions this work wouldn't have taken this shape. We feel that his help is un-substitutable and unforgettable.

Finally, I thank all the faculty of Mechanical Engineering Department and Library of NRI Institute of Technology for imparting knowledge to me throughout my course.

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