PERFORMANCE ANALYSIS OF 4-STROKE DIESEL ENGINE USING BIO-DIESEL PRODUCED FROM ZIZPHUS AND JULIFLORA SEEDS

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In recent years, there has been a steadily increasing in the amount of solid wastes because of the increasing human population and urbanization. Solids are includes industrial waste, agricultural waste, forest waste and waste bio-products. Bio-energy has been produced total 10% participation of energy of global energy production, energy produced from the source of biomass: plants, animal, and organic waste.In some seed like Juliflora seed, Ziziphus Seed oil prepared and blended with together to produce the biodiesel and to check the performance of the biodiesel.The study also includes examination of physical and chemical properties such as pH value, viscosity, density, flash point, fire point and acid values on the produced biodiesel as well as on the conventional diesel for comparison. The study revealed that the properties of the bio-diesel are very close to the conventional diesel.

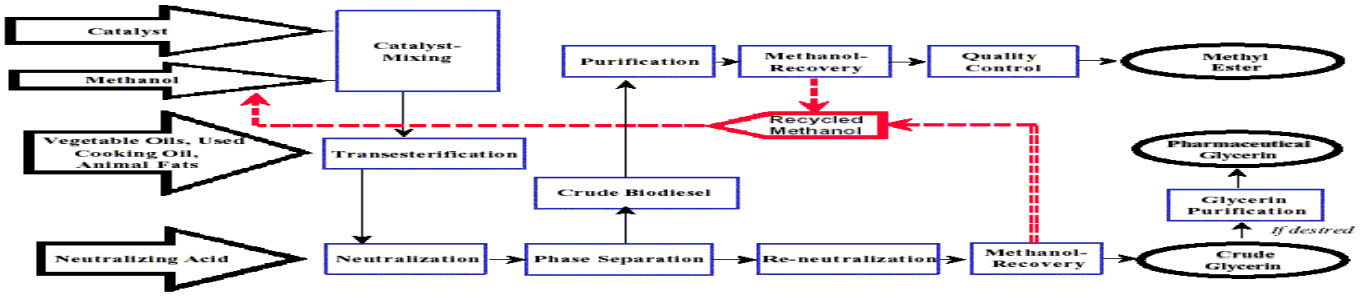
Keywords: *pH value, viscosity, density, flash point, fire point*

I.INTRODUCTION

Biodiesel, a diesel fuel substitute that can be made from a variety of oils, fats, and greases, is of interest to farmers for a number of reasons: It can provide an additional market for vegetable oils and animal fats; it can allow farmers to grow the fuel they need for farm machinery; and it can decrease other countries dependence on imported oil since fuel feedstock's can be grown domestically it can decrease other countries dependence on imported oil since fuel feedstock's can be grown domestically.Biodiesel is a renewable source of energy that can help reduce greenhouse gas emission and minimize the "carbon footprint" of agriculture. A study to found that using pure biodiesel in urban buses "results in substantial reductions in life cycle emissions of total particulate matter, carbon monoxide and sulphur oxides

The chemical reaction that occurs through this process breaks down the oil into a layer of biodiesel which rises to the top of the reactor, and a layer of Glycerine which falls to the bottom. The Glycerine is drained is drained off and used for other purposes, composted or otherwise disposed off. The biodiesel is then washed, dried and filtered to remove any extra impurities and its ready to be used as a fuel in diesel engines without any modifications to the engine.Many researchers conducted experimental investigation on compression ignition engine by using bio fuel prepared from Jatropha, Mahua, Pinnai oil, Cotton seed oil, Soybean oil, Rubber seed oil, Karanj oil and Putranjivaafter esterification processSupporting the efficiency & productivity of the economy. The raw materials for biodiesel production are non edible oils, animal fats and short chain alcohols. The oils most used for worldwide biodiesel production are rapeseed (mainly in the European Union countries), soybean (Argentina and the United States of America), palm (Asian and Central American countries) and non edible oils are also usedand also animal fats. Methanol is the most frequently used alcohol although ethanol can also be used. Since cost is the main concern in biodiesel production and trading (mainly due to oil prices), the use of non-edible non edible oils has been studied for several years with good results

.III.METHODOLOGY



The Transesterification process is the reaction of a triglyceride (fat/oil) with an alcohol to form esters and glycerol. The figure below shows the chemical process for methyl ester biodiesel. The reaction between the oil and the alcohol is a reversible reaction and so the alcohol must be added in excess to drive the reaction towards the right and ensure complete conversion.Biodiesel is produced from non edible oils or animal fats and an alcohol, through a transesterification reaction this chemical reaction converts an ester (non edible oil or animal fat) into a mixture of esters of the fatty acids that makes up the oil (or fat). Biodiesel is obtained from the purification of the mixture of fatty acid methyl esters (FAME). A catalyst is used to accelerate the reaction. According to the catalyst used, transesterification can be basic, acidic or enzymatic, the former being the most frequently used, as indicated.

IV.EXPERIMENTAL SETUP

A diesel engine was developed by Rudolf Diesel in 1893 The diesel engine has the highest thermal efficiency of any regular internal or external combustion engine 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 50 percent. In the true diesel engine, only air is initially introduced into the combustion chamber. The air is then compressed with a compression ratio typically between 15:1 and 22:1 resulting in 40-bar (4.0 MPa; 580 psi) pressure compared to 8 to 14 bars (0.80 to 1.4 MPa) (about 200 psi) in the petrol engine.

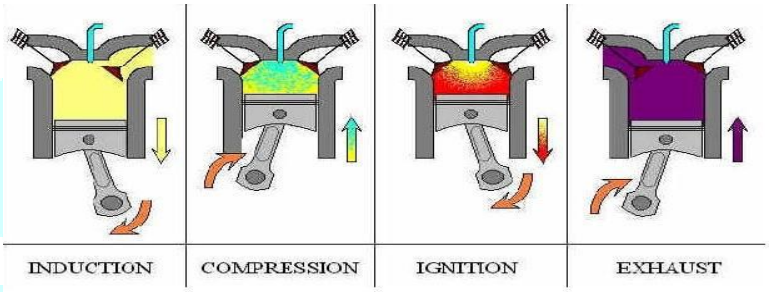


Fig 1: Working of Diesel Engine

This high compression heats the air to 550 °C (1,022 °F). 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 vaporise from their surfaces and burn, getting smaller. The start of vaporisation 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. Engines for scale-model aeroplanes use a variant of the Diesel principle but premix fuel and air via a carburation system external to the combustion chambers.

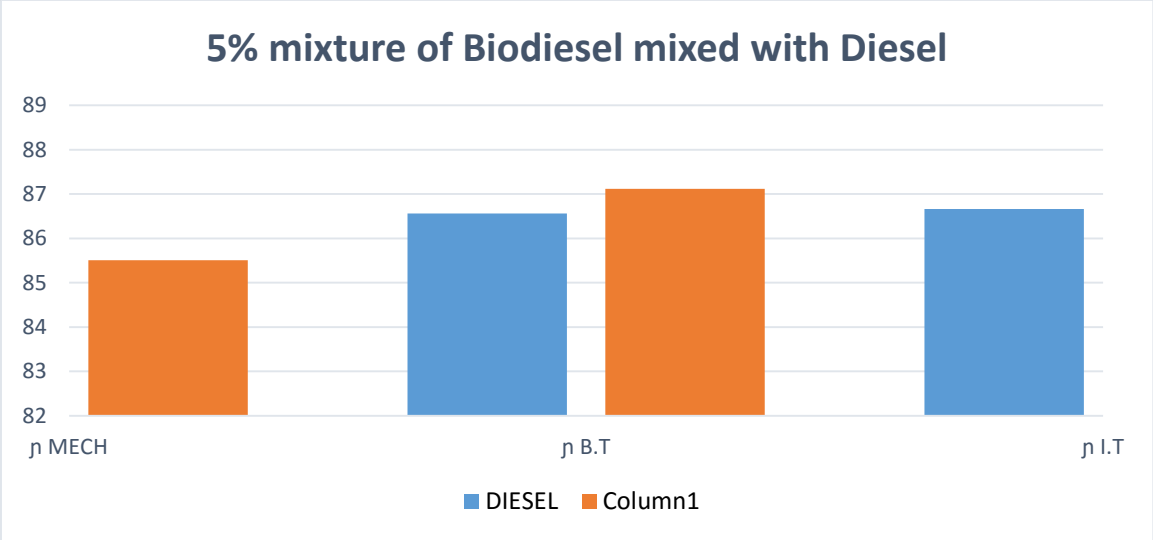
V.RESULTS:

5.3.1 Engine performance reading diesel

Load in (kg)	W1	W2	NET LOAD W	SPEED IN (rpm)	ɲ MECH	ɲ B.T	ɲ I.T
1	7	3	39.24	1405	84.50	7.52	8.80
2	12	4	78.48	1360	86.56	11.27	12.94
3	16	5	107.91	1210	86.66	11.92	13.70

5.3.2 Engine performance reading juliflora 5% Ziziphus 5%

Load in (kg)	W1	W2	W3	NET LOAD W	SPEED IN (rpm)	ɲ MECH	ɲ B.T	ɲ I.T
1	7	3	4	39.24	1420	85.51	8.39	9.93
2	12	4	8	78.48	1369	87.12	12.77	14.75
3	16	5	11	107.91	1225	88.01	13.41	15.48

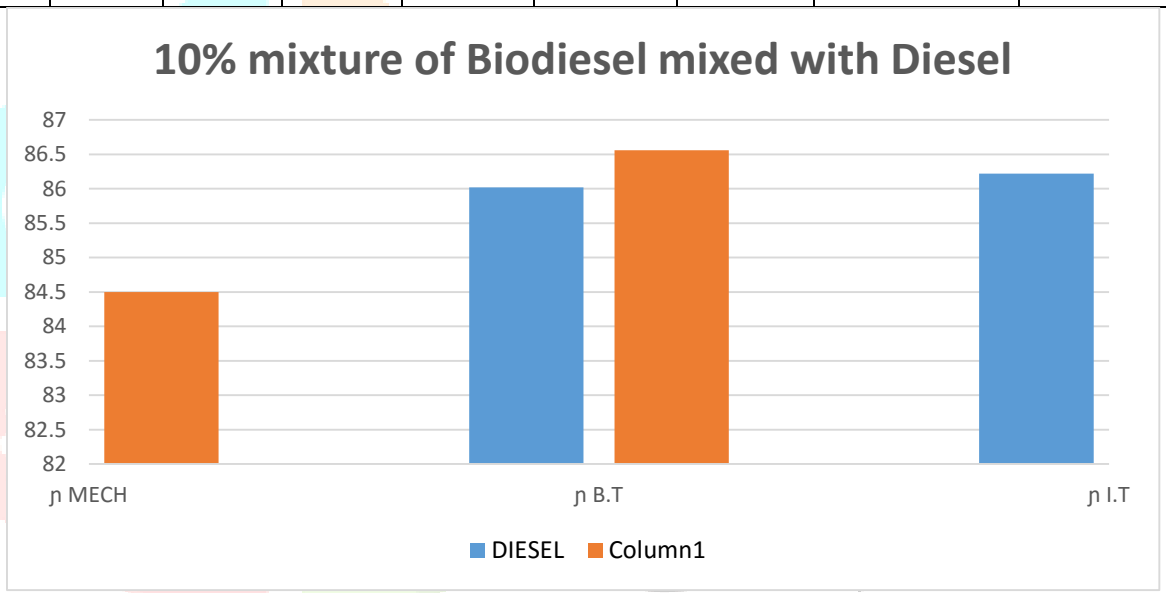


RESULT:

The biodiesel performance result is more than Pure diesel.

5.3.3 Engine performance reading juliflora 10% Ziziphus 10%

Load in (kg)	W1	W2	W3	NET LOAD W	SPEED IN (rpm)	ɲ MECH	ɲ B.T	ɲ I.T
1	7	3	4	39.24	1432	83.56	9.16	10.96
2	12	4	8	78.48	1376	86.02	13.48	15.67
3	16	5	11	107.91	1238	86.22	14.24	16.53

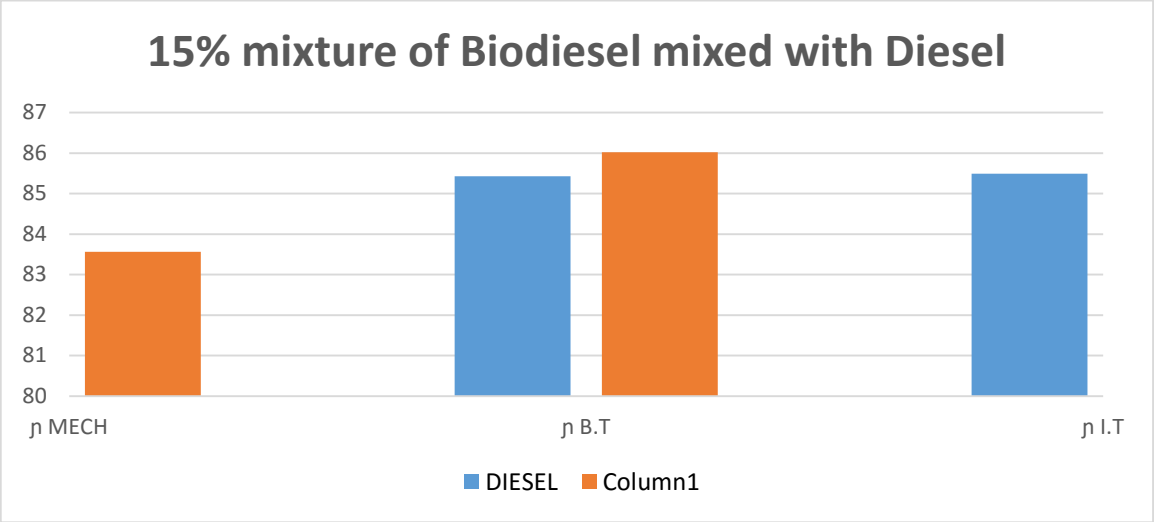


RESULT:

The biodiesel performance result is more than Pure diesel.

5.3.4 Engine performance reading juliflora 15% ziziphus 15%

Load in (kg)	W1	W2	W3	NET LOAD W	SPEED IN (rpm)	ɲ MECH	ɲ B.T	ɲ I.T
1	7	3	4	39.24	1445	82.52	10.44	12.65
2	12	4	8	78.48	1384	85.43	15.03	17.60
3	16	5	11	107.91	1247	85.79	16.44	19.16

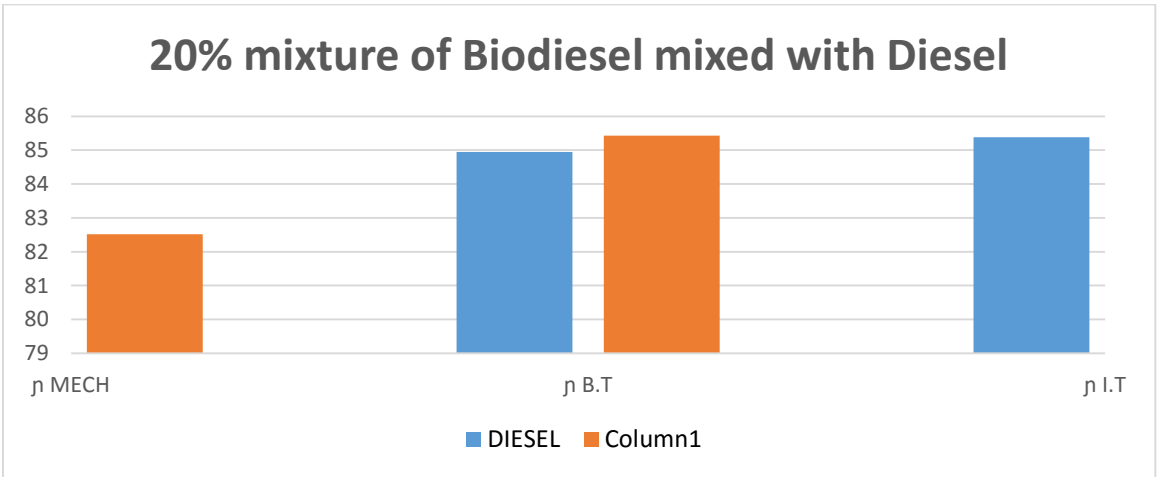


RESULT:

The biodiesel performance result is more than Pure diesel.

5.3.5 Engine performance reading juliflora 20% Ziziphus 20%

Load in (kg)	W1	W2	W3	NET LOAD W	SPEED IN (rpm)	ɲ MECH	ɲ B.T	ɲ I.T
1	7	3	4	39.24	1468	81.57	12.65	15.51
2	12	4	8	78.48	1402	84.95	17.85	21.01
3	16	5	11	107.91	1255	85.38	20.01	23.43



VI.CONCLUSION

During this study we find that use of Biodiesel in diesel engine reduces the percentage of emitted pollutants, hence with increasing quantity of biodiesel Emission of HC and CO decreases. In this experiment **JULIFLORA ANDZIZIPHUS** oil is taken as non edible oil and mixed with methanol makes Biodiesel and this biodiesel used in diesel engine instead of diesel to get the results about performance and emission of HC (hydrocarbons) & CO (carbon monoxide). So we find quantity of HC & CO reduced with increasing quantity of biodiesel. But this quantity of pollutants increases with load increasing**.**

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