EXPERIMENTAL PERFORMANCE OF C.I ENGINE BY USING ETHANOL AND COTTON SEED OIL BLENDING WITH DIESEL AT DIFFERENT PROPORTIONS AND LOAD

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Abstract

Modern civilization is very much dependent on non renewable fossil resources (coal, petroleum, natural gas). Throughout the world, day by day crude oil prices are increasing continuously and ever increasing trend of energy consumption due to industrialization, transport. So, alternative fuels will play an important role in the future energy generation. This interest is related to their potential role as alternative to fossil fuels and their contribution to reduce the greenhouse gas emissions in the environment. In view of high demand or cost of fossil fuels with higher emissions, it is necessary to find a suitable alternative fuels. The vegetable oils being renewable, non toxic and biodegradable with low emission as suitable alternative fuels.

An experimental investigation was performed to investigate the properties and performance of alternate fuels in a C.I engine was experimentally achieved. C.I engine operated with diesel and blends of ethanol, and cotton seed oil in diesel at different proportions i.e. 10, 15, 20, 25 and 30% (by volume) are tested and compared at different loads. The results were analyzed and compared with diesel operation increase in efficiency was observed and its diesel blends compared to diesel. Experiments were conducted to evaluate the combustion performance parameters of a single cylinder, four strokes, water cooled, direct injection diesel engine, fuelled with used five of its diesel blends on varying the concentration from 10% to 30%.

The effect of test fuels on engine B.P, TFC, SFC, BTE,ME and ITE was investigated the experimental results showed that the performance parameters of C.I engine was improved with the use of alternate fuel blending at different proportions of alternate fuel (ethanol and cotton seed oil) with diesel especially in comparison to diesel.

Keywords:
Non renewable energy resources
Ethanol
Cotton seed oil
Performance
CI engine1. INTRODUCTION:

The limited availability of non-renewable energy resources (fossil fuels) and increasing demand in various fields such as power generation, building, transport and agriculture triggered the research in finding out alternate sources of fuel to replace or reduce the dependency and diesel or petrol exhaust gases is major contributor to various types air pollution, including particulate matter(pm) oxides of nitrogen(no_x) and carbon monoxide (co) their smoke has become biggest threat to health and environment.

It has been demonstrated that the formation of these air pollutants can be significantly reduced by incorporating or alternate fuels in to the fossil fuels matrix.

The consumption of energy has ever increasing trend due to two reasons mainly

(i) a change in the little style
(ii) The significant growth of population.

Two of the main contributors are the transportation and the basic industry sectors. This increase of energy demand has been supplied using fossil resources (crude oil, natural gas

EXPERIMENTATION:

The engine experimentation has been carried out on a water cooled made Single Cylinder Diesel Engine of 5HP Rated Power.

Engine is started ad no load and allows idling force same time till the engine warm up. Note down the time taken for 10cc of ammunition consumption using stop watch and fuel measuring burette. After taking the readings open the ammunition line to fill burette with a far cry from alternate biodiesel ammunitions of variant proportions and supply ammunition to run the engine from the ammunition tank again. Now load the engine gradually to the derived volume. Allow the engine to run at this load for some time in order to reach steady state condition. Note down the readings as per the observation table.Repeat the experiment for a far cry from loads.Release the load slowly and stop the engine.

RESULT AND DISCUSSIONS:

TFC OF JDF10, EDF10 AND CDF10

BLENDED FUELS COMPARISION WITH

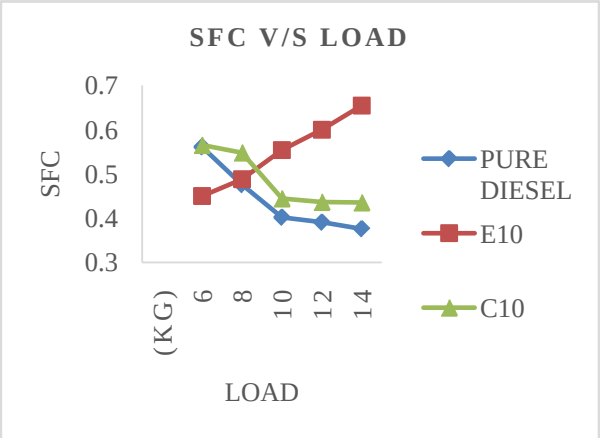
LOAD (kg)	DIESEL	E10	C10
6	0.436	0.4431	0.4401
8	0.488	0.472	0.4896
10	0.514	0.48	0.5156
12	0.60	0.6545	0.6023
14	0.67	0.702	0.6705

PURE DIESEL:

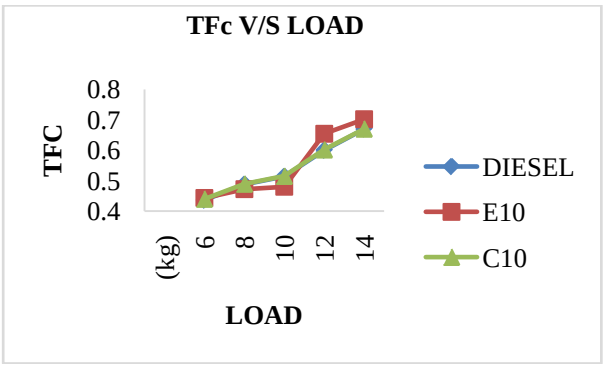
The diesel blend of cotton seed oil (C10), total fuel consumption (TFC) is gradually increases from load 6kg to 10kg than after decreases than the ethanol diesel blended fuel and diesel at part loads. But the diesel blended of cotton seed oil (C10) is closer to diesel. The all blend fuel at a far cry from segment, the total fuel consumption (TFC) is gently increasing with pretty increasing load

SFC OF EDF10 AND CDF10 BLENDED FUELS COMPARISION WITH PURE DIESEL

LOAD (kg)	PURE DIESEL	E10	C10
6	0.561	0.45	0.5652
8	0.476	0.488	0.5480
10	0.402	0.554	0.4444
12	0.391	0.60	0.4365
14	0.376	0.6545	0.4355



The diesel blend of ethanol diesel blend fuel specific fuel consumption (SFC) is pretty higher than cotton seed oil and diesel. The ethanol diesel blended fuel (E10) SFC is also higher than the diesel among the entire blend. But the diesel blended of cotton seed oil (C10) is closer to diesel. The all blended fuel at a far cry from segment, the specific fuel consumption is gently decreasing along with increasing load in cotton seed oil and diesel.



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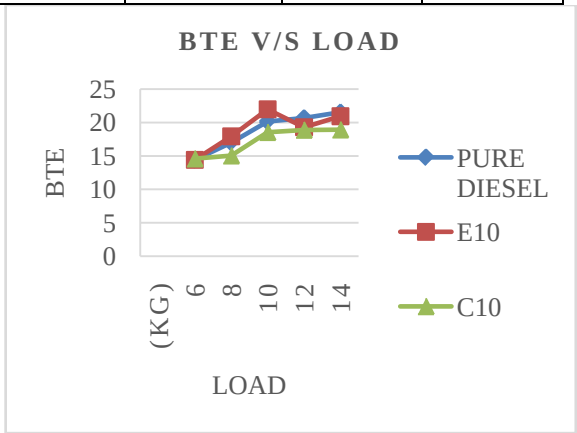
BTE OF JDF10, EDF10 AND CDF10 BLENDED FUELS COMPARISION WITH PURE DIESEL:

LOAD (kg)	PURE DIESEL	E10	C10
6	43.71	40.88	40.80
8	50.63	47.81	44.16
10	56.14	53.31	50.66
12	60.54	57.736	54.97
14	64.88	61.40	58.07

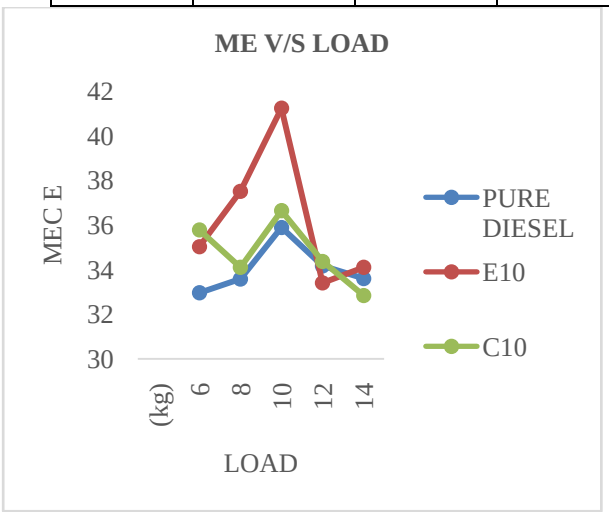
LOAD (kg)	PURE DIESEL	E10	C10
6	14.41	14.42	14.6
8	17	17.935	15.05
10	20.15	21.98	18.56
12	20.68	19.29	18.9
14	21.53	20.94	18.94



The ethanol diesel blended fuel BTE gradually increased from load 6kg to 10kg than the E10 and C10. After than it is decreased gradually. The all blended fuel at a far cry from segment, the brake thermal efficiency is gently increasing along with pretty increasing load.

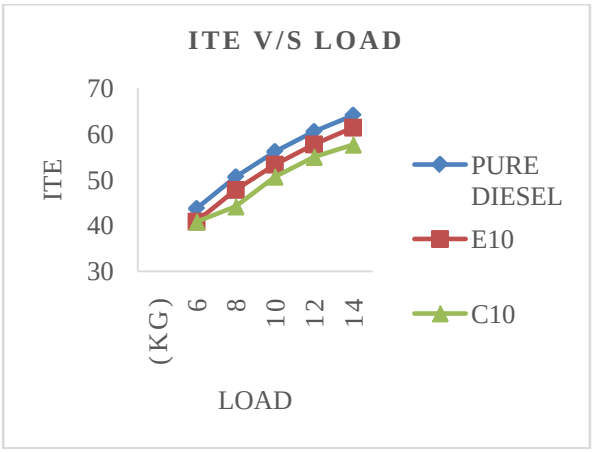
ME OF JDF10, EDF10 AND CDF10 BLENDED FUELS COMPARISION WITH PURE DIESEL:

LOAD (kg)	PURE DIESEL	E10	C10
6	32.96	35.028	35.78
8	33.58	37.51	34.10
10	35.89	41.23	36.64
12	34.17	33.406	34.37
14	33.60	34.10	32.84



The cotton seed oil (C10) ME is also higher than the diesel but lower than the E10, among the entire blend. The all blended fuel at a far cry from segment, the mechanical efficiency is gently increasing along with load from 6kg to 10 kg after than slowly decreasing.

ITE OF JDF10, EDF10 AND CDF10 BLENDED FUELS COMPARISION WITH PURE DIESEL:



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Ethanol blended fuel (E10) is closer to diesel and higher than the cotton seed oil, among the entire blend. The all blended fuel at a far cry from segment, the indicated thermal efficiency is gently increasing along with the pretty increasing load.

CONCLUSION

A single cylinder compression ignition engine was operated extraordinary using diesel and blends of ethanol and cotton seed oil in diesel at a far cry from expanse of 10%, 15%, 20%, 25% and 30% (by volume) are tested and contemplate at a far cry from loads and speeds. The following conclusions are made based on the experimental results obtained while operating single cylinder water cooled diesel engine.

1. The viscosities of the ethanol and cotton seed oil of diesel blend is alpine than those of diesel fuel, were decreasing and found to be decreasing with increasing in temperature.
2. To decrease the viscosity of ethanol and cotton seed oil of diesel blend close to that of diesel fuel to make it suitable for use in a C.I. engine and to evaluate the performance of the engine with the modified oils. Significant reduction in viscosity was achieved by dilution of vegetable oil with diesel in varying segment. The viscosity was further decreasing by heating the blend.
3. Inferior flash and fire points were observed for ethanol diesel fuel compared with diesel fuel. But the flash and fire point of cotton seed oil of diesel blend is higher than the diesel fuel.
4. The diesel blend of brake power (BP) is pretty higher than the cotton seed oil, ethanol diesel blended fuel and diesel. But the ethanol diesel blended fuel (EDF) is closer to diesel and curtailed than the cotton seed oil among the entire blend. The all blended fuels a far cry from segment, the brake power is gently increasing along with pretty increasing load.
5. The diesel blend of cotton seed oil (C10), total fuel consumption (TFC) is gradually increases from load 6kg to 10kg than after decreases than the ethanol diesel blended fuel and diesel at part loads. But the diesel blended of cotton seed oil (C10) is closer to diesel. The all blend fuel at a far cry from segment, the total fuel consumption (TFC) is gently increasing with pretty increasing load.
6. The diesel blend of ethanol diesel blend fuel specific fuel consumption (SFC) is pretty higher than cotton seed oil and diesel. The ethanol diesel blended fuel (E10) SFC is also higher than the diesel among the entire blend. But the diesel blended of cotton seed oil (C10) is closer to diesel. The all blended fuel at a far cry from segment, the specific fuel consumption is gently decreasing along with increasing load in cotton seed oil and diesel.
7. The ethanol diesel blended fuel BTE gradually increased from load 6kg to 10kg than the E10 and C10. After than it is decreased gradually. The all blended fuel at a far cry from segment, the brake thermal efficiency is gently increasing along with pretty increasing load.
8. The cotton seed oil (C10) ME is also higher than the diesel but lower than the E10, among the entire blend. The all blended fuel at a far cry from segment, the mechanical efficiency is gently increasing along with load from 6kg to 10 kg after than slowly decreasing.
9. Ethanol blended fuel (E10) is closer to diesel and higher than the cotton seed oil, among the entire blend. The all blended fuel at a far cry from segment, the indicated thermal efficiency is gently increasing along with the pretty increasing load.

From the above results the adequacy like brake thermal efficiency ,indicated thermal efficiency and mechanical efficiency (at 10:90) has shown an increasing in their value compared to pure diesel which gives us the reason that we have a better performance properties when the diesel blend is used .But there is an increase in the fuel consumption than the diesel and the cost of the blend is also more compared to the pure diesel, but it may be

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helpful for the environment by reducing the emissions and making the environment more eco-friendly and also may prevent the hydrocarbon deposit depletion .There is a lot of future scope for this project as we can see the experiments continue with a far cry from blend until we get a sustainable fuel which is more efficient when compared to diesel and also may be available at the same cost as diesel which gives us a promising hope for the future. All these arguments showed that due to the improved combustion with the use of bio diesel, it made the performance of the engine remain higher than expected.

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