

The Emission Analysis and Comparison of Mahua Oil and Neem Oil Are Blends with Diesel Fueled In CI Engine

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ABSTRACT: In the present paper, the emission characteristics of Mahua oil and Neem oil have been tested. Naturally available source can be used in this work. The blends of varying proportions of Mahua oil are B10, B25, B50, B75, B100 with diesel were prepared analysed and their emission compared with emission of diesel fuel. In same way the blends of Neem oil are B10, B20, B40, B60, B80, B100 with Diesel were prepared analysed and their emission compared with emission of diesel fuel. After this we compared the emission characteristics of Mahua oil and Neem oil in this paper. The basic engine emissions are CO, CO₂, HC, and NO_x have been obtained from different blends and results are compared with pure diesel.

KEYWORDS: Neem oil, Neem bio-diesel, Diesel oil, Mahua oil, Mahua bio-diesel, emissions

I. INTRODUCTION

Now a day the fuel requirements are increasing day by days so cost is also more and it produces more emissions to environment. For that we need alternative fuel sources like bio-diesel is substitute for diesel. Bio-diesel has more attention as an alternative fuel for diesel because of renewable source and it can reduce the emissions. In this paper by using bio-diesel in diesel engines reduces HC, CO, CO₂, and NO_x without any change in engine design. The blends of varying proportions of Mahua oil are B10, B25, B50, B75, B100 with diesel were prepared analysed and their emission compared with emission of diesel fuel. In same way the blends of Neem oil are B10, B20, B40, B60, B80, B100 with Diesel were prepared analysed and their emission compared with emission of diesel fuel. Finally we compared the emissions analysis of Mahua and Neem oils.

Table 1.1 Engine specification

The experimental set up consists of stationary engine of following specifications:	
Made	Kirloskar
Cycle's used	Diesel
Number of strokes	4
Number of cylinder	1
Bore diameter	80 mm
Stroke	100 mm
Cooling system	Water cooled

Lubrication	Forced method
Output	3.675 kW at 1500 rpm
Dynamometer	D.C Generator
Armature	Shunt
Voltage	220 V
Rated BP	3.675 kW
Air box orifice diameter	25 mm
Current	13 A

II. LITERATURE SURVEY

Vegetable oil was one of the first fuels to be used in the IC engine. Rudolph Diesel was worked on diesel engine in 1895 with the goal of running it on a multiplicity of fuels. The use of neat oil as fuel for diesel engine is reported in the study papers even if the availability of the fossil fuel was abundance and the price was cheaper at that time.

L N Rao G et al. [1] have explored technical feasibility of Jatropha oil in direct injection CI engine without any modifications performance parameters like BTE, sfc, BP were determined and exhaust emissions like CO₂, CO, NO_x and smoke have been evaluated.

R K Pandey et al. [2] study on methyl ester is containing about 10 to 15% oxygen by weight. Using methyl ester can help to reduce the dependence on fuels and has important environmental benefits. It reduces the emission like CO₂, PM, CO, sulphur oxides, and HC significantly.

Bora et al. [3] have analyzed performance and emission characteristic of single cylinder diesel engine using Karabi seed bio-diesel and its blends with diesel. Smoke level, unburned hydrocarbons and CO in exhaust emissions is less. NO_x increased with increase in % of bio-diesel blends.

III. RESULTS AND DISCUSSION

The basic engine emissions are CO, CO₂, HC, and NO_x have been obtained from different blends and results are compared with pure diesel. The results are compared with the emission parameters of the engine with different blends of Mahua and Neem oil using diesel as the fuel.

2.1 EFFECT OF BP ON CO EMISSION

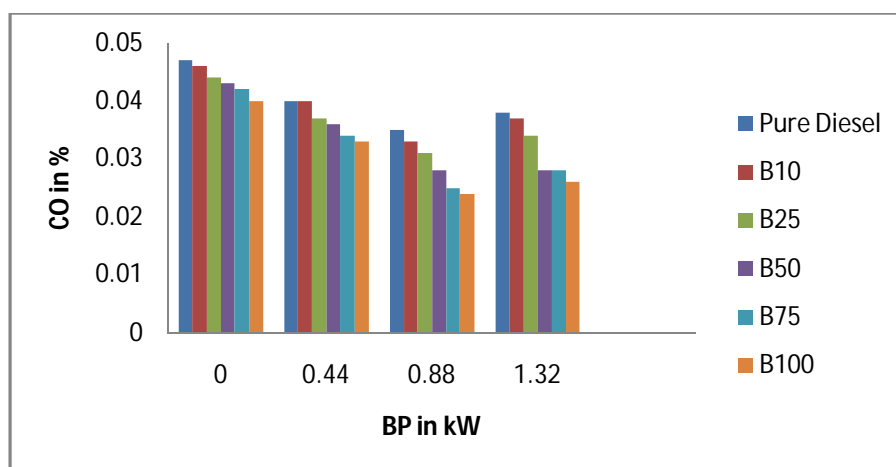


Figure 2.1 Effect of BP on CO emission when diesel engine has run on B10, B25, B50, B75, B100 and Diesel.

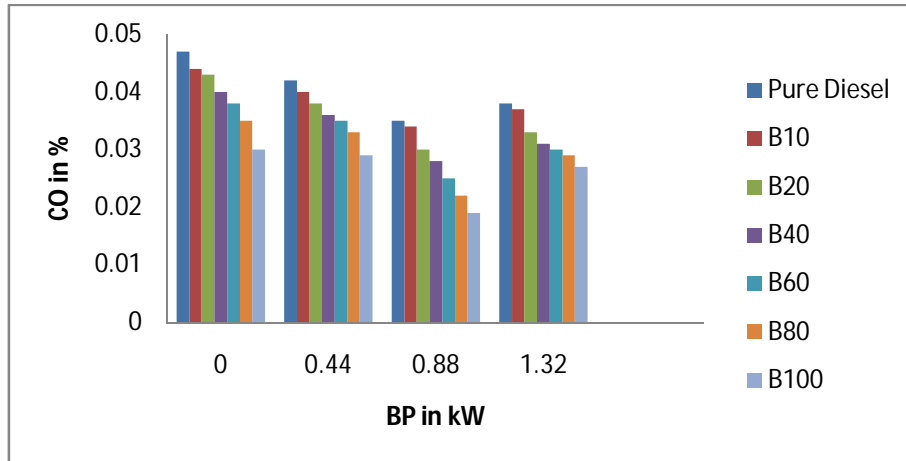


Figure 2.2 Effect of Load on CO emission when diesel engine has run on B10, B20, B40, B60, B80, B100 and Diesel.

2.2 Effect of Load on CO₂ Emission

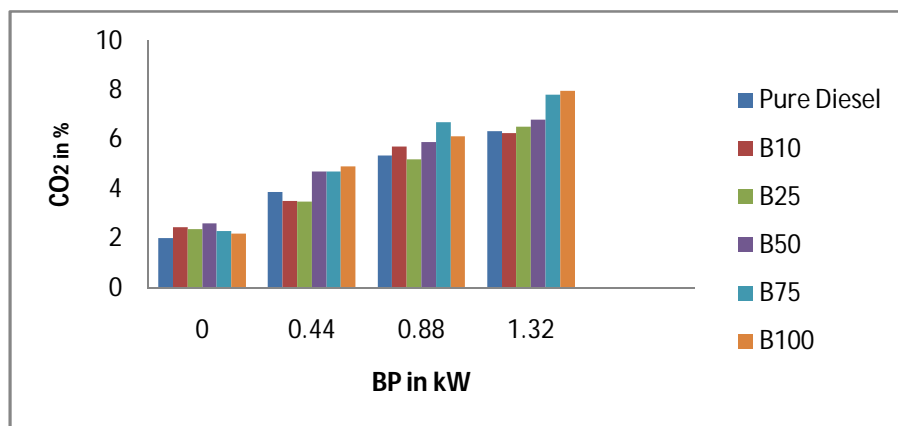


Figure 2.3 Effect of BP on CO₂ emission when diesel engine has run on B10, B25, B50, B75, B100 and Diesel.

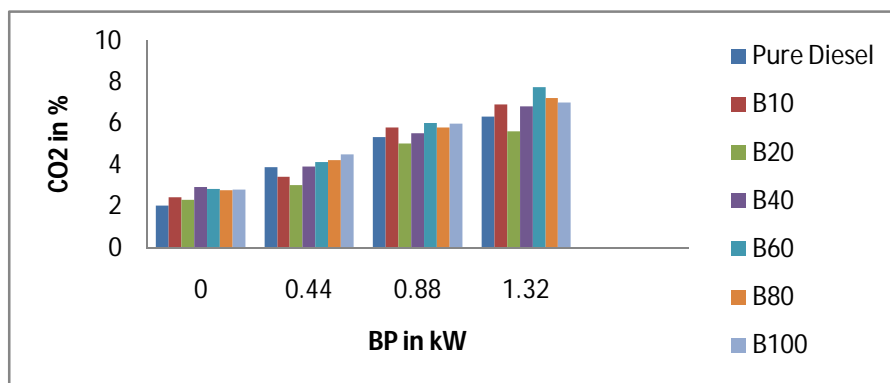


Figure 2.4 Effect of Load on CO₂ emission when diesel engine has run on B10, B20, B40, B60, B80, B100 and Diesel.

2.3 Effect of Load on HC Emission

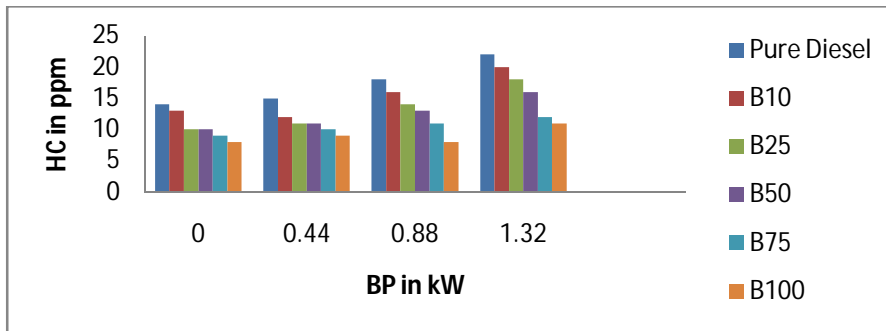


Figure 2.5 Effect of BP on HC emission when diesel engine has run on B10, B25, B50, B75, B100 and Diesel.

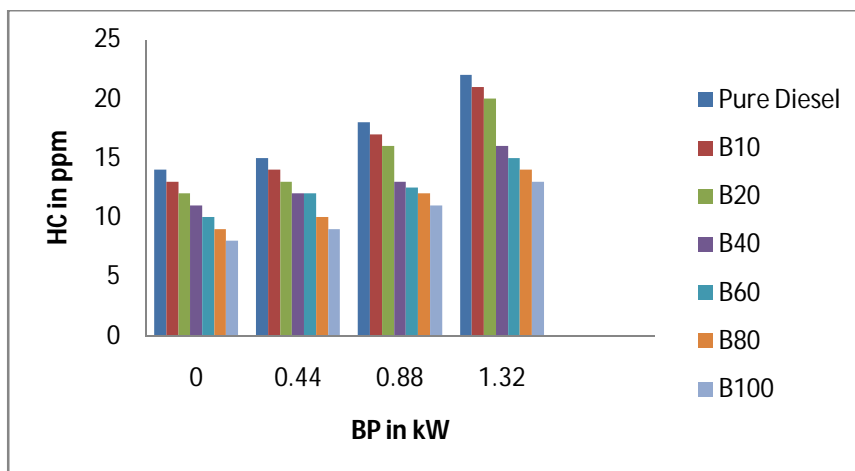


Figure 2.6 Effect of Load on HC emission when diesel engine has run on B10, B20, B40, B60, B80, B100 and Diesel.

2.5 Effect of Load on NOx Emission

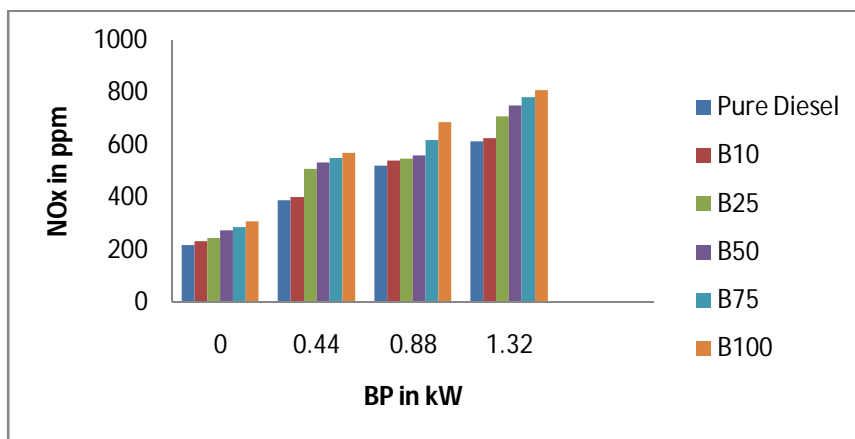


Figure 2.7 Effect of BP on NOx emission when diesel engine has run on B10, B25, B50, B75, B100 and Diesel.

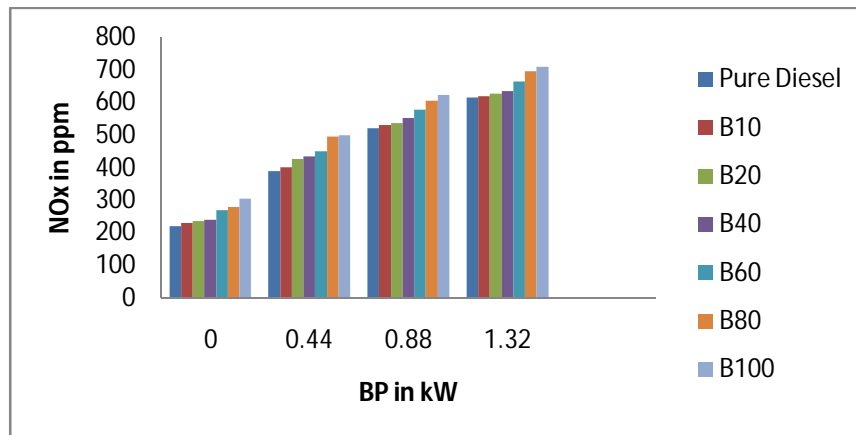


Figure 2.8 Effect of Load on NOx emission when diesel engine has run on B10, B20, B40, B60, B80, B100 and Diesel.

IV. CONCLUSION

- Minimum emission of CO with diesel B10 and B20.
- More HC emissions for diesel, B10, B20 at no load, while using increasing percentage of blend of Neem and Mahua oil with diesel the emission of HC reduces.
- From this study it is conclude that the B10, B25 gives optimum performance where B100 gives the lower emission of HC and CO.

REFERENCES

- [1] G Lakshmi Narayana Rao, Venkata Ramesh mammilla M.V.Mallikarjun 'performance and emission characteristics of CI engine fuelled with Jatropa Methyl ester/Diesel blends', International Journal of Mechanical & Automobile Engineering, Vol.05, No.7, 2010, pp.01-05.
- [2] Rajesh Kumar Pandey, A. Rehaman. R.M.Sarviya, Svita dixit, "Automobile emission reduction and environmental protection through use of green renewable fuel". Hydo Nepal issue no.7, 2010, 64-70.
- [3] Dilip Kumar Bora et al. 2009, Storage stability of Mahua oil methyl ester, Journal of Scientific & Industrial research, Vol. 68: pp. 149-152.
- [4] A. Siva Kumar, D. Maheswar and K. Vijay Kumar Reddy (2009), comparison of Diesel engine performance and Emissions from Neat and Transesterified Cotton Seed oil, Jordan Journal of Mechanical and Industrial Engineering. 3(3), pp. 190-197.
- [5] Ramesh, D., A. Samapathrajan, and P. Venkatachalam. 2006. "Production of Biodiesel from Jatropa curcas oil by using pilot Biodiesel plant". The Jatropa Journal 18-19: 1-6.18.
- [6] Parametric studies for improving the performance of a jatropa oil- fuelled compression ignition engine by j. Narayana Reddy , A. Ramesh_, Internal Combustion Engines Laboratory, Mechanical Engineering Department, Indian Institute of technology Madras, Chennai-600036, India.