

ENGINE PERFORMANCE PARAMETERS OF KARANJ OIL AND ITS BLENDS

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ABSTRACT

At 0.5 kW load the BSFC for diesel and karanj oil was 889.41 and 1037.28 g/kW.h respectively. While at full load (3.7 kW), the BSFC was 320.50 g/kW.h and 648.01 g/kW.h for diesel and karanj oil respectively. The BSFC of the blends varied in between, depending upon the percentage of diesel in blend. The BSFC for karanj oil and its blends was greater due to the fact that it has lower heating value than diesel. To generate the same amount of power, more quantity was required. The BSFC of all the test fuels was least near full load.

Keywords: BSFC, Karanj Oil, Fuel Consumption, Blends, EGT, Power Output.

Introduction

On part loads, the brake specific fuel consumption (BSFC) was greater for all fuels (Fig. 1). The effect of load on BSEC is shown in Fig. 2. The BSEC was observed to be lowest for diesel at all loads when compared to karanj oil and its blends. At part load (0.5 kW), BSEC for all the fuels was observed to be more or less same. BSEC for K50 blend was comparable to diesel at all loads.

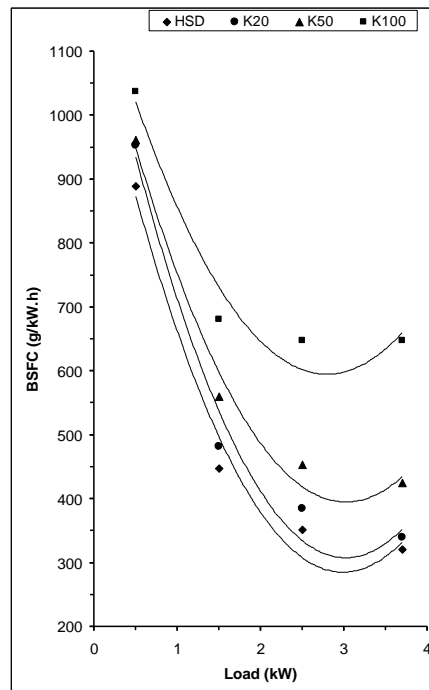


Fig. 1: Effect of Load on BSFC for Karanj Oil and its Blends

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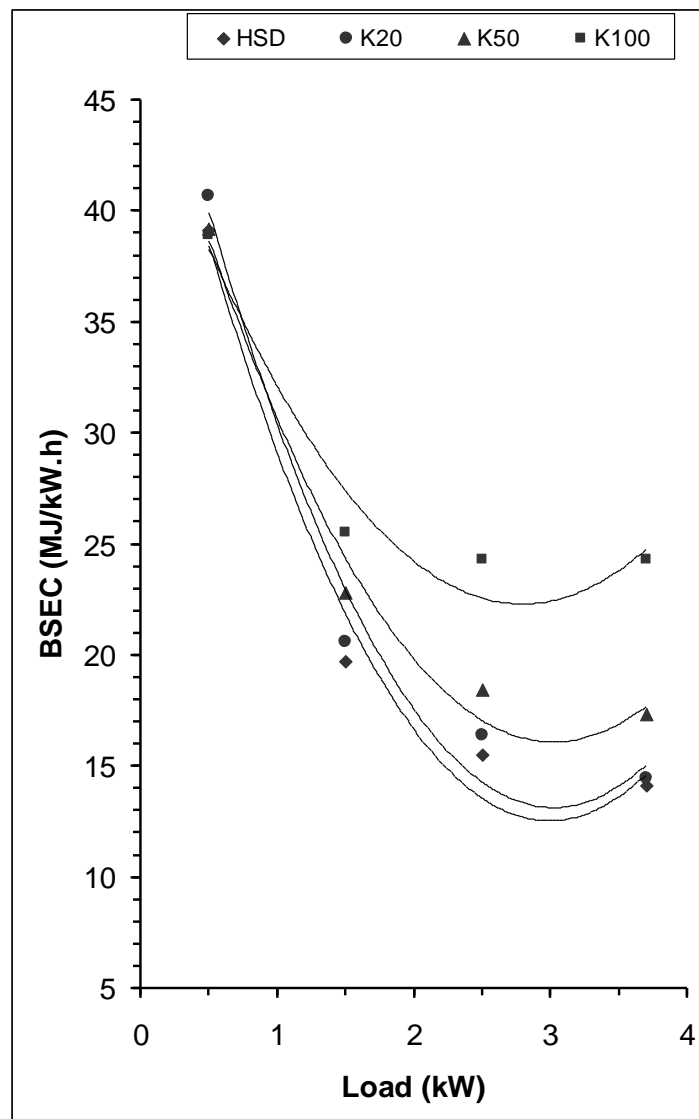


Fig. 2: Effect of Load on BSEC for Karanj Oil and its Blends

Effect of Load on Brake Thermal Efficiency

It was observed that as load increased the difference between the Brake Thermal Efficiency (BTE) of diesel and karanj oil also increased (Fig. 3).

At 0.50 kW load the BTE of diesel and karanj was 9.19% and 9.25% respectively. And on full load it increased to 25.52% and 14.81% for diesel and karanj respectively. BTE for the blended test fuels was between that of diesel and karanj. Lower BTE obtained from karanj than diesel might be attributed to lower energy content of the fuel and higher fuel consumption for the same power output.

Effect of Load on Exhaust Gas Temperature

Variation of Exhaust Gas Temperature (EGT) with increase in load for diesel, karanj and their blends are depicted in Fig. 4. It can be seen that the EGT for all test fuels increased with increase in load. Among the test fuels, EGT for diesel was lowest for all loads (except at 0.50 kW load), and it generally increased with the increase in percentage of karanj oil in the blend. Higher EGT in case of karanj oil could be due to the incomplete combustion as a result of poor atomization of the fuel by nozzles. Higher viscosity prevented the karanj oil from being sprayed properly in the combustion chamber.

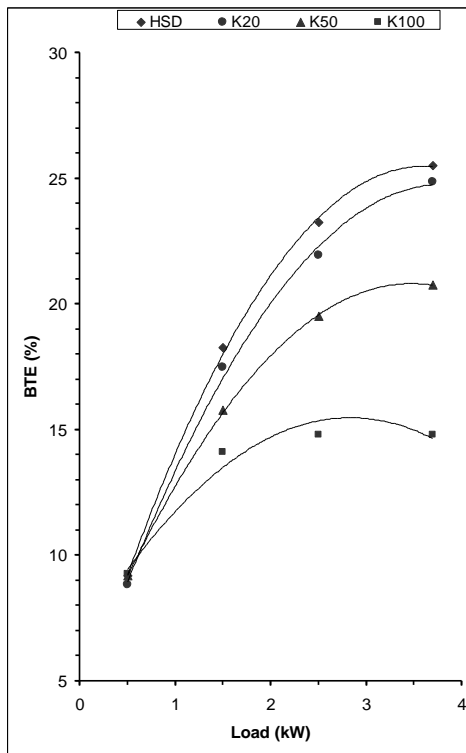


Fig. 3: Effect of Load on BTE for Karanj Oil and its Blends

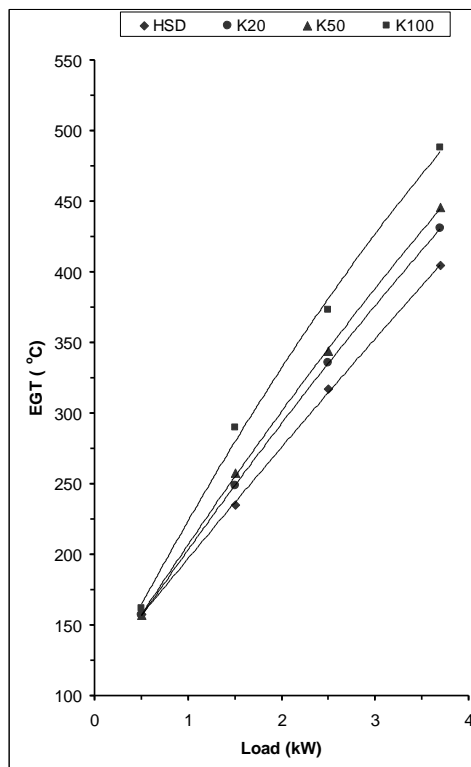


Fig. 4: Effect of Load on EGT for Karanj Oil and its Blends

Conclusion

On the basis of the experimental investigations carried out, following salient conclusions can be drawn;

- The properties of karanj oil-diesel and KME-diesel blends were comparable to that of neat diesel. Also, the viscosity of K20 and B20 blends met the BIS limit prescribed for Grade A diesel.
- Combustion characteristics of B20 fuel in both single fuel and dual fuel mode operations of engine are similar to that obtained with diesel fuel. Slightly lower values of peak cycle pressure indicate shorter delay period and higher cetane number.
- Smoke emission was higher in case of B20 and K20 fuels than that from HSD, at all loads. Also smoke emission of K20 fuel was higher than that of B20 fuel at all loads. But a reduction in smoke emission was obtained when the engine was subjected to dual fueling. Smoke density was observed to be least with B20+LPG fuel at all loads.
- Use of K20 and B20 fuels resulted in significant reduction in NO_x emissions as compared to diesel in single fuel mode. Similar results were obtained in dual fuel mode except that at higher loads the NO_x emissions increased.

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