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The effects of the fuel injection pressure on the performance and emission characteristics of a diesel engine fuelled with waste cooking oil biodiesel-diesel blends

Murat Kadir Yesilyurt

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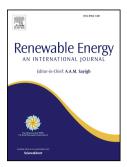
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# ACCEPTED MANUSCRIPT The effects of the fuel injection pressure on the performance and emission

## characteristics of a diesel engine fuelled with waste cooking oil biodiesel-diesel

3 blends

Murat Kadir YESILYURT<sup>1,\*</sup>

<sup>1</sup>Department of Mechanical Engineering, Faculty of Engineering-Architecture, Yozgat Bozok

University, 66200, Yozgat, Turkey

\*Corresponding author

E-mail address: kadir.yesilyurt@bozok.edu.tr (M.K. Yesilyurt)

Tel.: +90 354 242 10 01

10 Abstract

In this study, the effect of fuel injection pressure on the performance and emission characteristics of a diesel engine fuelled with waste cooking oil biodiesel (WCOB) and its 5-30% (v/v) blends with diesel fuel were investigated and compared with diesel fuel. The engine experiments were conducted under six different fuel injection pressures (170-220 bars), eleven different engine speeds (1000-3000 rpm), and full load to find the optimum pressure which gives best results is identified for each fuel. The results compared with diesel fuel showed that biodiesel fuels confirmed that the reductions in the engine torque, brake power, CO, UHC, and smoke opacity; however brake specific fuel consumption, exhaust gas temperature,  $NO_X$  and  $CO_2$  emissions increased. On the other hand, the increased injection pressure caused to increase in the engine torques, brake powers, and brake thermal efficiencies up to 210 bar. Moreover, the increased injection pressure caused to decrease in UHC, and smoke opacity, while the increase  $NO_X$  and  $CO_2$  emissions. The results indicated that fuel blends can be used in the diesel engine without any modification. When over all the results were evaluated, the optimum fuel injection pressure was found to be at 210 bar for WCOB and fuel blends.

**Keywords:** Waste cooking oil, biodiesel, engine performance, exhaust emission, fuel injection

26 pressure

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