

# **Combustion, performances, and emissions characteristics of *Hermetia illucens* larvae oil in a direct injection compression ignition engine**

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## **ABSTRACT**

*Hermetia illucens* larvae oil (HILO) is among biofuel feedstock from insects that has high potential to reduce dependency on petroleum resources. The present paper is motivated by the need to critically examine the effect of HILO mixed with diesel fuel (DF) on combustion, engine performance, and emission characteristics of a single cylinder direct injection (DI) compression ignition (CI) engine. The experiment was performed at a constant speed of 1500 rpm under various engine loads. The results revealed that the in-cylinder pressure, heat release rate (HRR), and the ignition delay (ID) were reduced by an average of 3.32%, 12.89%, and 4.36%, respectively. The brake specific fuel consumption (BSFC) and exhaust gas temperature (EGT) increased considerably at all engine loads. The brake thermal efficiency (BTE) was discovered to be lower by 11.47% compared to DF. The finding also shows that carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and unburned hydrocarbon (UHC) emissions increased with the addition of HILO. The nitrogen oxides (NO<sub>x</sub>) emission reduced by 19.80% compared to DF at all the engine loads. Overall, this study concluded the potential of HILO in CI engine as a promising renewable and environmentally friendly resource for the better earth.

**Keywords:** Engine performance; exhaust emission; biofuel; insect oil; combustion; diesel engine