

# Comparative Analysis of Combustion and Heat Release Characteristics of Alexandrian Laurel Methyl Ester Fueled VCR DI Diesel Engine †

Anant G. Nagpure <sup>1,\*</sup>, Walmik S. Rathod <sup>1</sup>

<sup>1</sup> Research Scholar, Department of Mechanical Engineering, Veermata Jijabai Technological Institute (VJTI), Matunga, Mumbai, Maharashtra, 400 019, India; nagpureag77@gmail.com (A.G.N.); wsrathod@me.vjti.ac.in (W.S.R.);

\* Correspondence: e-mail@e-mail.com; if there are multiple corresponding authors, add author initials (F.L.);

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**Abstract:** This work explores the comparative analysis of combustion and heat release characteristics of a four-stroke, variable compression ratio, direct injection diesel engine to determine the suitability of a methyl ester produced from the seeds of Alexandrian Laurel for engine use. The methyl ester was mixed with diesel in the volume ratio of 05:95, 10:90, 15:85, 20:80, 25:75, 30:70 and designated as AL05, AL10, AL15, AL20, AL25, and AL30, respectively. Under steady-state conditions, the experimentation was carried out at constant speed. Combustion characteristics such as cylinder pressure, rate of pressure rise, mass fraction burned, and heat release characteristics such as rate of heat release, cumulative heat release, and mean gas temperature of methyl ester blends were compared with diesel. Higher maximum cylinder pressures were observed for methyl ester blends; the mass fraction burned was better for the AL20 blend, but with an increase in methyl ester concentration, mass fraction burned decreased. The heat release rate of diesel at all compression ratios was found to be the maximum compared to methyl ester blends. The combustion and heat release characteristics indicated that Alexandrian Laurel methyl ester has the properties which make it an attainable additive to conventional fossil diesel.

**Keywords:** diesel-methyl ester blends; diesel engine; combustion; heat release rate.

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## Conflicts of Interest

The authors declare no conflict of interest.