

Rapidly decreasing fossil based primary energy resources and ever rising environmental pollution has generated a need to find alternative solutions. Compression ignition (CI) engines are one of the major contributors to ambient air pollution. Therefore, many alternative fuels for CI engines are being explored, which reduce emissions without compromising engine performance. Oxygenated biofuels are one of the most sought-after choices as they not only reduce the pollution but also reduce dependence on fossil-based resources. Among all available options, ethers are excellent choice for utilization in CI engines due to their superior auto-ignition properties. Diethyl ether (DEE) has been used as a cold starting aid for CI engines since long time. It can be easily produced by dehydration of ethanol, which can be produced using biomass on a large scale. However, full potential of DEE as a CI engine fuel still remains unexploited. This study investigates combustion, performance and emission characteristics of a three cylinder naturally aspirated water-cooled tractor engine fueled with different blends of DEE with mineral diesel ranging from 15% v/v to 45% v/v. The test engine prototype was developed and operated at different loads at a constant speed without any significant structural modifications for DEE blend adaptation. Engine combustion and performance characteristics for test fuel blends were found to be comparable to that of mineral diesel, however due to lower calorific value of the test fuel, engine could not be operated on full load condition. A significant reduction in NO<sub>x</sub> and particulate emissions was observed while there was a slight increase in HC emissions. With addition of DEE fraction beyond 45% v/v in the test fuel, a stable engine operation could not be achieved due to higher volatility and lower lubricity of DEE compared to diesel

Keywords: Diethyl ether (DEE); Alternative Fuel; Compression Ignition (CI) Engine