

# Investigations to reduce CO<sub>2</sub> emission using low carbon biofuels in a CRDI engine

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## Abstract:

This research has been focused to quells the colossal demand of fossil fuels by extending the horizon towards the low carbon biofuels. This research uncovers the diesel engine performance, in-cylinder behaviour and emission aspects, when operated with four different low carbon biofuels, viz camphor oil (CMO), cedar wood oil (CWO), wintergreen oil (WGO) and lemon peel oil (LPO). These fuels are blended with diesel oil by 20% in volume and the respective blends are compared with the diesel oil's qualities. The test engine was enabled with common rail direct injection (CRDi) system, allowing it to control the injection timing and the quantity of the fuel to be injected. The study unveils that low carbon biofuels blended with the diesel oil forms an efficient substitute fuel; starting with the improvement in the brake thermal efficiency, reduced CO<sub>2</sub> emissions and reduction in other emissions. The NO<sub>x</sub> emission of the low carbon fuels seems predominately higher. Wintergreen oil as the one of the dense and comparatively less viscous fuel among the other chosen biofuels; exhibits 6% improvement in brake thermal efficiency, 3% hike in brake specific energy consumption, 7% increase in peak pressure of 59 bar at 7 ATDC, 20% reduction in CO<sub>2</sub> emissions, 17% in HC and 20% decrement in smoke has been observed in WGO20.

**Keywords:** CO<sub>2</sub> emission, CRDI engine, low carbon biofuel, performance

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