

STUDIES ON EXHAUST EMISSIONS AND COMBUSTION CHARACTERISTICS OF TOBACCO SEED OIL IN CRUDE FORM AND BIODIESEL FROM A HIGH GRADE LOW HEAT REJECTION DIESEL ENGINE

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ABSTRACT

Experiments were carried out to study the exhaust emissions from a high grade low heat rejection (LHR) diesel engine consisting of air gap insulated piston with 3-mm air gap, with superni (an alloy of nickel) crown, air gap insulated liner with superni insert and ceramic coated cylinder head with different operating conditions of crude tobacco seed oil in crude form and in biodiesel form with varied injection timing and injection pressure. Exhaust emissions were determined at various values of brake mean effective pressure (BMEP) with different versions of the engine of conventional engine (CE) and LHR engine with tobacco seed oil in crude form and in biodiesel form with varied injection timing and injection pressure. Exhaust emissions of smoke and oxides of nitrogen (NO_x) were measured with AVL Smoke meter and Netel Chromatograph NO_x analyzer respectively at various values of BMEP. Combustion characteristics were determined at peak load operation of the engine with special software package. Smoke levels decreased by 31% and NO_x levels increased by 41% with vegetable oil operation on LHR engine at its optimum injection timing, when compared with pure diesel operation on CE at manufacturer's recommended injection timing. Biodiesel operation decreased smoke levels and increased NO_x levels in comparison with crude vegetable oil operation on both versions of the engine.

KEYWORDS: Crude Tobacco Seed Oil, Biodiesel, CE, LHR Engine, Exhaust Emissions, Combustion Characteristics