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| Title of the Thesis | : | Production of Bio-Diesel from non-edible oils and its performance and emission analysis on CI Engine. |


## ABSTRACT


In the present study, biodiesel from different non-edible (Yellow Oleander, Kusum, and bitter Ground nut) oils was produced using different production techniques (mechanical stirring, hydrodynamic cavitation and ultrasonic cavitation). Experimental results revealed that the yield obtained by hydrodynamic cavitation technique is higher as compared to the ultrasonic cavitation and mechanical stirring methods.

Out of the selected non-edible oils, Yellow Oleander found to be more promising with oil yield from seed about (60%) and biodiesel yield from oil (95.76%) in comparison to other feed stocks.

Further, the comprehensive experimental investigations on single cylinder Kirloskar engine as well as multi-cylinder Indica engine running on blends of different biodiesel with diesel fuels were carried out for its performance and emission study. The results were analyzed and compared with diesel operation of the same engine and presented in this thesis.

Initially, Oleander biodiesel-diesel blends (B10, B20 and B30) were tested to evaluate the engine performance and emission characteristics. The performance and emission of 20% Oleander biodiesel blend (B20) gave a satisfactory result in diesel

engines as the brake thermal efficiency increases 2.06 % and CO and HC emissions decrease 41.4% and 32.3% respectively, compared to mineral diesel.

Then, the same biodiesel blends were tested in Indica engine at various engine speeds. Test results revealed that biodiesel blends displayed higher brake thermal efficiency, specific fuel consumption and exhaust gas temperature than diesel fuel.

After that, experiments were conducted using various blends of Kusum biodiesel with diesel in a multi-cylinder diesel engine at different engine speeds. The test results showed that with the increase of biodiesel in the blends, all engine emissions (HC, CO and smoke opacity) reduces considerably except NOx emission. Brake thermal efficiency of engine increases and specific energy consumption decreases marginally when operating on 10% biodiesel than that operating on neat diesel.

Further, the Indica engine was operated with the biodiesel blends of bitter Ground nut oil. During engine performance tests, the biodiesel blends showed higher brake specific fuel consumption and exhaust gas temperature, while marginally lower brake power and brake thermal efficiency than the diesel fuel were noticed. Engine emissions showed higher nitrogen oxide releases but decreased the amount of carbon monoxide for biodiesel blends compared to the diesel fuel.

Finally, performance and emission characteristics of methyl esters of all selected oils in an Indica engine were compared. Experimental results revealed that the brake thermal efficiency of Oleander oil methyl ester is found marginally higher and brake specific fuel consumption a little bit lower as compared to Kusum oil methyl ester and bitter Ground nut oil methyl ester. These non-edible oils may become an alternative source of fossil fuel in the future enabling to control the harmful automotive exhaust emissions.