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The intensive drive towards “energy independence” has led the world to consider plant oils as extenders or replacements for Diesel fuel. Interest in the use of plant oils has continued because they are domestically producable and are a renewable energy source. The satisfactory use of plant oils as substitutes for Diesel fuel in their unmodified from for short-term operation is proven. Serious injector deposits, engine contamination and engine wear problems experienced with unmodified plant oils fuels have been partially overcome by plant oil modifications resulting in satisfactory medium-term operations on some fuels.

Engine performance, combustion characteristics, exhaust emissions and engine durability of pre-chamber, swirl-chamber, direct-injection compression ignition engines operated by ordinary Diesel oil, neat Canola oil and their emulsions were investigated experimentally. There are small differences of the experimental results between ordinary Diesel oil and Canola oil; however, the general tendencies of the engine performances and exhaust gas characteristics operated by Canola oil and its emulsions are as follows:

As calorific value of Canola oil is 7% lower than that of Diesel fuel, a corresponding reduction of torque and power output (only 2%) was observed. The reason for this small difference is a higher quantity of injected Canola oil than of Diesel fuel due to the higher viscosity of the oil.

Carbon monoxide (CO) emissions are higher with Canola oil compared to Diesel oil within the whole operating range. Further with Canola oil, an increase in hydrocarbon (HC) emissions (ppm) has been measured for most of the tested engines. Due to slower combustion and lower maximum temperatures in the combustion chamber emissions of nitrogen oxides (No_x) ere up to 25% lower with the oil. Soot emissions were lower in the whole operating range with the oil.