

“Effect of Straight Vegetable Oils, Biodiesel and Its Blends on Fuel Injection Equipment (FIE) Components”

By

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Due to the depletion of fossil fuels and global warming, researchers are looking for alternate fuels. Biofuels have the potential to partially replace the fossil fuels. If diesel is replaced by any alternate fuel in existing engines, the compatibility of the fuel injection system with these new fuels needs to be thoroughly investigated because engine's performance and emission and combustion characteristics are greatly affected by FIE. However FIE components face problems such as injector deposits, injector blockage and pump plunger wear by fuel properties. To experimentally investigate the compatibility of FIE, fuel injection simulator has been developed to simulate the engine conditions as closely as possible. Simulator was run for 250 hours with different fuels (SVO's, biodiesel and their blends with mineral diesel) using new fuel pumps and injectors. After 250 hours, fuel injector and fuel pump were dismantled to assess the deposits, wear and surface texture of different parts. Wear is measured by weight loss and dimensional loss and surface texture images were taken by optical microscopy. These results were compared with baseline data of mineral diesel.

Injector deposits are found to be higher for Karanja oil blends. For K100, test failed to achieve the 250 test hours due to injector blockage after 185 hours. FIE subcomponents wear is less with biodiesel blends compared to mineral diesel. Dimensional loss of the plunger is higher with K100 than other fuel blends and diesel. Karanja oil, Jatropha oil and biodiesel at lower blends provided better lubricity than mineral diesel.