Experimental Investigation of Used Vegetable Oil-Diesel Blends as Alternative to Fossil Fuel in Compression Ignition Engine

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Waste to Biofuel Technology

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Abstract

Partial replacement of crude oil is required to solve the challenge of depletion of fossil fuel and climate change. Environmental problems occur from the increasing emissions of harmful pollutants and greenhouse gases from the combustion of fossil fuels. Hence, the use of clean energy sources including biodiesel is crucial in this century. In this study, the use of waste vegetable oil blends with diesel (D95B5, D90B10, D85B15, and D80B20) as a retrofit for pure Diesel (D100) was investigated experimentally in a single-cylinder two-stroke diesel engine. Engine performance indices such as engine torque, engine power, brake mean effective pressure (BMEP), exhaust gas temperature, volumetric efficiency, air mass flow, fuel mass flow, air/fuel flow ratio, and thermal efficiency were assessed for 8, 16, and 24 ml fuel blends. The volume of fuel blends in the test rig was investigated under constant temperature (34 °C) conditions. Experimental results revealed that the blended fuels worked effectively in the rig and D85B15 gave the best performance within the tested diesel engine. This study established the possibility of partial replacement of pure diesel with fuel blends of diesel and used vegetable oil in internal combustion engine.

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