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INVESTIGATING THE GREENHOUSE GAS EMISSION CHARACTERISTICS OF A DIESEL ENGINE FUELLED WITH INJECTED KARANJA OIL AND MAHUA OIL METHYL ESTER ALONGSIDE INDUCTED PRODUCER GAS FROM WASTE COCONUT SHELL IN DUAL FUEL MODE

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Abstract

The current article concentrates on the preparation of methyl ester blends from both karanja and mahua oil as well as generation of producer gas via. waste coconut shell through gasification technique, followed by its implementation into a diesel engine in order to evaluate its emission parameters when utilized in conjunction with standard diesel. Tests have been carried out with different engine workloads alongside a uniform gas flow rate on a kirloskar TV1, 1-cylinder, 4-stroke, direct injection diesel engine, both for diesel and dual fuel operational categories. Considering diesel mode and dual fuel modes that utilize gaseous fuels, a comparison of exhaust emissions across different horsepower levels are demonstrated. The aim of the current investigation is to mitigate harmful emissions, for which waste coconut shell could be utilized effectively as that of gaseous fuel for turbocharged direct injection diesel engine. The test results depicted improved engine emissions for dual fuel mode in contrast to single fuel mode of operation operated in natural aspirated mode. Results depicted diminished nitric oxide (72.86%↓) and smoke opacity (35.14%↓) with slight increment in carbon monoxide (7.26%↑); carbon dioxide (3.52%↑) and unburnt hydrocarbon (6.96%↑) emissions at all loads for the prepared blends. Hence, authors finally concluded that non-edible oil methyl ester blended diesel with inducted gaseous fuel (KB20+P.gas) and (MB20+P.gas) can be considered as a suitable approach for partial substitution of conventional diesel in modern engines with little or no modifications, thereby ensuring environmental security and sustainable energy development.

Key words: dual fuel engine, emission control, non-edible oil, producer gas

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