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INVESTIGATING THE IMPACT OF GASEOUS FUEL PRODUCED FROM BAMBOO LEAVES ON PERFORMANCE, EMISSIONS, AND COMBUSTION CHARACTERISTICS OF A DUAL-FUEL DIESEL ENGINE USING POST-MIXED BIODIESEL BLENDS

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Abstract

The manuscript provides a concise overview of a four-stroke compression ignition engine, which is powered by blends of waste palm oil and waste sunflower oil methyl ester diesel. This engine operates in a dual-fuel mode with the utilization of inducted producer gas generated from bamboo leaves. This study presents a comprehensive summary of the performance, combustion, and emission characteristics of post-mixed fuels, investigated using a Kirloskar TAF1 diesel engine operating in dual-fuel mode.
The primary research focus spun around the dual-fuel operation of diesel and post-mixed oils across various load conditions while maintaining a consistent gas flow rate. The findings of the study highlighted interesting trends. Particularly, the post-mixed oil methyl ester (PMOME 20+ BLP.gas) exhibited a 5.26% increase in brake-specific fuel consumption and a 4.66% reduction in brake thermal efficiency under heavy load conditions when compared to pure diesel operation. Notably, the post-mixed blend showcased improvements in smoke opacity, carbon monoxide, and unburnt hydrocarbon emissions, registering reductions of 11.22%, 20.44%, and 10.36%, respectively.
Conversely, oxides of nitrogen witnessed a reduction of 19.17% during peak load conditions for the PMOME 20+ BLP gas blend, a noteworthy improvement in comparison to emissions of petroleum diesel. Based on these observations, the current research suggests that integrating renewable fuels into dual-fuel engines holds promise as a viable approach for both economic advancement and the essential addressing of the looming scarcity of conventional petroleum diesel.

Key words: biodiesel, combustion analysis, emission characteristics, engine performance, producer gas

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