An Investigation of Methanol-Coconut Oil Fuel Blends in Diesel Engines for Caribbean Power Generation Using Biodiesel as a Co-solvent

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ABSTRACT

The development of alternative fuel sources is a crucial area of research today, in light of diminishing global crude oil reserves and increasing prices of fossil fuels. This is a critical issue for the countries of the Caribbean, as the small and delicate economies of the region are unable to treat with these price increases indefinitely. Two potential alternative fuel sources for the region, which can utilise diesel engines for power generation, are methanol and coconut oil. However, neither of these achieves optimum performance individually, without engine modification. This work investigates the performance of methanol-coconut oil blends in diesel engines, using coconut oil biodiesel (CME) as a co-solvent. It was found that CME does serve as an effective co-solvent, allowing for the formation of stable blends of up to approximately 30% methanol content by volume. Consequently, six fuels were tested in a diesel engine test unit; diesel, neat CME, neat coconut oil, a coconut oil-CME blend, a blend containing 10% methanol by volume and another containing 30% methanol by volume. It was found that the methanol blends had better engine performance, when compared to neat coconut oil operation. Further, it was found that the methanol blends exhibited similar and even better engine performance than diesel operation, with a BTE of 28.6% for the 30% methanol blend as compared to 22.9% for diesel operation. Consequently, this work proposes that methanol-coconut oil blends using CME as a co-solvent, can serve as potential fuel replacements for diesel in the countries of the Caribbean.

Keywords: Methanol, biodiesel, coconut oil, diesel engine