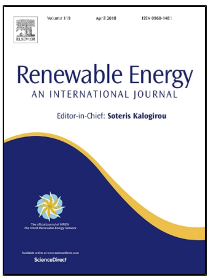
Accepted Manuscript



Water emulsified hybrid pongamia biodiesel as a modified fuel for the experimental analysis of performance, combustion and emission characteristics of a direct injection diesel engine

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PII:	S0960-1481(18)30066-1
DOI:	10.1016/j.renene.2018.01.060
Reference:	RENE 9665
To appear in:	*Renewable Energy*
Received Date:	25 May 2017
Revised Date:	28 December 2017
Accepted Date:	17 January 2018

Please cite this article as: Varatharaju Perumal, M. Ilangkumaran, Water emulsified hybrid pongamia biodiesel as a modified fuel for the experimental analysis of performance, combustion and emission characteristics of a direct injection diesel engine, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.01.060

Water emulsified hybrid pongamia biodiesel as a modified fuel for the experimental analysis of performance, combustion and emission characteristics of a direct injection diesel engine

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Abstract

Biodiesel is widely accepted as substitute fuel for diesel engine by scientist, engineers and researchers for its superior fuel quality compared to diesel in terms of emission. The environmental and social benefits got from biodiesel attract almost all section of people. The use of biodiesel in diesel engine reduces the green house gases like CO, HC and PM emission considerably, but the smoke and NO_x emissions are high compare to diesel. In order to reduce the smoke and NO_x emissions caused by biodiesel in diesel engine, an experimental study was conducted by using water emulsified pongamia biodiesel in a four stroke direct injection diesel engine. The result revealed 9% increase in BSFC and 5% decrease in BTE with a reduction of around 32% in NO_x emission. The smoke has been reduced to 7.4%, the emission of CO and HC has been reduced to a marginal value of 2.3% and 1% respectively compared with that of B20 blend.

Keywords: Emulsion fuel, water emulsified pongamia biodiesel, emulsion fuel stability, micro explosion, emission, NO_x reduction

1 Introduction

The demand for diesel engines is increasing day by day for the high output power and efficiency got from it. Among all the sectors employing diesel engine, the transport and power sectors are considered as the dominating sectors, due to their primary role in the developmental activities of a country. But these two sectors are highly vulnerable in degrading the atmosphere by polluting with Green House Gases (GHG) [1, 2]. By considering the cumulative pollution caused to the atmosphere by all sources, the contribution of pollution by these two sectors are around 54% [3].

The hypothesis about the existence of fossil fuel for the next couple of decades and the environmental degradation caused by them compelled the researchers to look for alternate energy sources. The new energy source should be environmental friendly, biodegradable, readily available and capable of produced by local people with the existing production method. The new energy source should be used in the existing engine without major modifications. In addition the new energy source should not cause socio-economic as well as geographical imbalances [4, 5].

Continuous research works has been carried out for finding and implementing the new energy source. In order to reduce the emission from diesel engine, different methods are experimented, either by improving the engine design or by fuel modifications for the existing