

Performance evaluation of unmodified 3.74 Kw diesel engine using pongamia biodiesel (*Pongamia pinnata* L.) and its blends with petro diesel

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Received : 01.09.2012; Revised : 25.11.2012; Accepted : 20.01.2013

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■ **ABSTRACT** : Import of petroleum products constitutes a major drain on our foreign exchange reserves (Rs.90, 000 crores / annum). The acid rain, global warming and health hazards are ill effects of increased polluted gases like SO_x, CO and particulate matter in the atmosphere due to use of fossil fuels. Among the various alternative sources to petroleum products, oil from tree seed/crops has a potential for meeting the increasing requirements of diesel. The study indicated that use of biodiesel blends will not effect the performance of the engine. It can be recommended that addition of 20 to 40 per cent biodiesel to the petro diesel (B20 and B40) can conveniently used for the engine which in turn increases the brake power of the engine and increases the efficiency of the engine.

■ **KEY WORDS** : Biodiesel, Engine testing, Pump performance, Petro diesel

■ **HOW TO CITE THIS PAPER** : Desai, Satish R. and Venkatachalam, P. (2013). Performance evaluation of unmodified 3.74 Kw diesel engine using pongamia biodiesel (*Pongamia pinnata* L.) and its blends with petro diesel . *Internat. J. Agric. Engg.*, 6(1) : 44-50.

India is the world's sixth largest consumer of energy and fifth largest in diesel consumption (Joshi, 2005). In India, the high-speed diesel is used up to 56.75 and 18.86 per cent for transport and agricultural sector, respectively. In India consumption of diesel is about five times more than gasoline. The energy demand for both industry and agricultural sectors is enormously increasing every year. The increase in energy demand for agricultural sector is mainly due to introduction of the machineries like tractors, power tillers, combine harvesters, power sprayers, irrigation pumps and other power operated machineries. The share of mechanical and electrical power has increased from 40 per cent in 1971 to 84 per cent in 2004 (Economic survey, 2005). The agriculture sector of the country is completely dependent on diesel for its motive power and to some extent for stationary power applications. Thus the increased farm mechanization in agriculture has further increased the requirement of this depleting fuel sources.

The alternative fuel technology usage will become more common in the coming decades for both automobile and stationery motive power applications in agriculture. The promising alternative is the usage of vegetable oils instead of fossile fuels. The esters produced from esterification process of vegetable oil present a very promising alternative to diesel fuel since they are renewable, non volatile and safer due to increased flash point, biodegradability, contain little or no

sulphur. The main advantage of using of biodiesel is that its properties are similar to diesel fuel. Biodiesel being a superior fuel than diesel fuel from environment point of view. The use of diesel makes net addition of carbon to the atmosphere when burnt. The use of biodiesel also reduces dependence on crude of imports. As the flash point of the biodiesel is higher than diesel it has no storage problems. Biodiesel does not contain volatile organic compounds that give rise to poisonous and noxious fumes. It has no lead or sulphur to react and release of any harmful gases. Hence, an attempt has been made to study the performance of 3.73 Kw engine using biodiesel and it's blends with petro diesel under under different load conditions in the laboratory and also during water lifting using a centrifugal pump.

■ METHODOLOGY

The behaviour of high compression engine under different blend level is the objective of the present study. Biodiesel has higher cetane number, which results in higher combustion efficiency. Higher compression ratio engines increases fuel conversion efficiency (Ganesan, 2004). To study the performance of biodiesel and it's blends with petro diesel a vertical four stroke, single cylinder diesel engine was selected for the study. The specification of the engine are given in Table A.