

## ABSTRACT

The present scenario in India involves energy crisis, environmental pollution, instability of oil prices. Because of huge pollution in India a transport sector is demanding large number of automobiles causing environmental pollution and ultimately global warming. Through the modern vehicles running on gasoline and diesel fuel are equipped with catalytic converter to produce less emission but in India facing sources of petroleum fuels as per the demand in future the alternative fuels have to be supplemented to satisfy the heavy crisis of environmental pollutions.

As India is vegetable based country I will be ideal to select non-edible vegetable oils as alternative fuels to protect energy crisis as well as environmental pollution of global warming. The above mentioned thought has inspired the author to take up his research on the use of non-edible oils such as jatropha, karanja and putranjiva as alternative fuels in diesel engine. Environmental problem is not only in India but it is a global issue. As per the out come of the research of non-edible vegetable oils have a great potential not only in energy crisis but also environmental pollution

India is facing energy crisis due to gradual depletion of petroleum based conventional fuels that causes a lot of foreign exchange for meeting our demand. This energy crisis has inspired the scientists to search for alternative fuel (biodiesel). Among the edible and non-edible vegetable oils, non-edible oils are economical for the production of alternative diesel fuel. This research embodies modification of three non-edible oils such as jatropha, karanja and putranjiva (new source) to alternative diesel fuel.

The fatty acid composition and fuel properties such as viscosity, cetane number, calorific value, flash point, pour point, specific gravity carbon residue of three oils are measured.

Ricardo variable compression diesel engine is used to modify that is compatible with non-edible vegetable oils. At 45° bTDC timing the non-edible oils karanja, jatropha and putranjiva give highest yield where as at 40° bTDC timing diesel fuel gives highest.

Degumming is an economical chemical process by which the gummy materials are removed. These three oils are degummed by acid treatment to improve cetane number and viscosity. Diesel engine can be run very satisfactorily using 20% blend of degummed vegetable oil with diesel fuel at 45° timing bTDC, 1200 rpm and 20 compression ratio.

In transesterification reaction, jatropha oil gives maximum conversion than karanja and putranjiva oils in acid catalysis whereas putranjiva gives maximum conversion in base catalysis. Base catalyst (sodium methoxide) gives more efficient conversion over acid (sulphuric) and enzyme (lipase) catalyst. Transesterified jatropha oil (biodiesel) shows better in performance and emission than putranjiva and karanja oils. Biodiesel can be used 100% without any substantial modification of engine.

*Key Words:* Alternative diesel fuel, Biodiesel, Catalyst, Degumming, Enzyme, Injection timing, Kirloskar Engine, Non-edible oil, *Putranjiva Roxburghii* oil, Performance and Emissions, Renewable source, Ricardo variable compression engine, Straight vegetable oil, Transesterification.