ABSTRACT

Indian economy is on its boom, is growing with a rapid pace in par with other economies in the world. Energy is one such crucial factor that decides economic growth and social development of a country. Fossil fuels as a major energy contributor are playing a vital role in the energy scenario but these fuels are limited, polluting, non-renewable so they have to be utilised prudently. To overcome these constraints there is a need for virtually inexhaustible, non-polluting and renewable energy sources. Biodiesel is such promising, reliable and environment friendly fuel and their usage would address global concern of curtailing carbon emissions. It helps in catering India's energy needs, reduces dependency on imports of crude oil, saving lot of foreign currency and enhances our national energy security. Present vehicle emission norms as a part of corrective measures to curb pollutants from automobiles are compelling to shift focus towards usage of alternate fuel biodiesel.

It is a non-petroleum based fuel derived from plant material using different processing techniques. Conventional method of producing biodiesel is transesterification process, requires a lot of water to separate biodiesel from glycerol. Recently there has been lot of interest on alternate vegetable oil processing technique called catalytic cracking process. This process breaks up complex hydrocarbons into simpler high value hydrocarbons by rearranging molecular structure of hydrocarbons. Compared to conventional method it produces a better quality and quantity biodiesel from vegetable oil with its compatibility to present infrastructure, fuel standards and engines with added advantage of feedstock flexibility.

Present work is about investigation of diesel engine performance, emission and combustion characteristics fuelled with biodiesel produced from vegetable oils extracted from grape seeds and mango seeds implementing conventional transesterification process and the alternative process called catalytic cracking with three different catalysts alumina, zeolite and zirconia.

Biodiesel thus obtained is a quality fuel that can be used in the existing diesel engines without modifications. Experimental work was carried on a Kirloskar TV-1, four-stroke, single cylinder ( Direct Injection, Water Cooled ) diesel engine with
diesel and also with biodiesel blended with diesel in various proportions at different loads. Analysis show that there is a minimal deviation of characteristics of biodiesel with that of diesel. This gives scope for further research work that would make biodiesel production process more economical by the utilisation of cheaper and abundantly available catalysts to crack down wide variety of high free fatty acid content feed stocks into lighter hydrocarbons.