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PERFORMANCE AND EMISSION ANALYSIS OF VARIABLE COMPRESSION RATIO DIESEL ENGINE FULLED WITH BIO-DIESEL

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ABSTRACT

Research on bio-diesel is the of the major research areas that is going in this world at present as the people and governments are becoming more and more environmentally concern because the natural diesel or petroleum oils contain hydrocarbons which are very dangerous to the earth. As we the man-kind I tending towards more and more green technologies this one of the area in which we can do a lot of research and develop more efficient bio-diesels. The present investigation used the performance and emission of a diesel and diesel additive blended with palm kernel oil is studied and the best performances of oil blends were identified.

INTRODUCTION

Biodiesel is the name of clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications. Most of the alternative fuels identified today are bio-fuels and are having one or few undesirable fuel characteristics which are not permitting them to replace the existing petrol fuel completely. However, the various admission techniques experimented by the researchers are giving good solutions to apply larger fraction of replacing fuel in the existing engine and run accurately. Periodic petroleum shortages spurred reaches into vegetable oil as a diesel substitute during 30s and 40s and again in the 70s and early 80s when straight vegetable oil enjoyed its highest level of scientific interest. The 1970s also saw the formation of the first commercial enterprise to allow consumers to run straight vegetable oil in their automobiles, Elsbett of Germany. In the 1990s Bougainville conflict, islander cut off from oil supplies due to a blocked use coconut oil to fuel their vehicles.

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The present investigation used the performance and emission of a diesel and diesel additive blended with palm kernel oil is studied and the best performances of oil blende's were identified. The blend from palm kernel oil and diesel does not require any engine modification. Hence, the investigation mainly focused on the performance and emission of diesel and diesel additive blended with palm kernel oil in the proportions ratios.

Biodiesel

Biodiesel refers to an non-petroleum-based diesel fuel consisting of long chain alkyl (methyl, propyl or ethyl) esters,made by trans esterification of vegetable oil or animal fat (tallow), which can be used (alone, or blended with conventional petro diesel) in unmodified diesel-engine vehicles. Biodiesel is distinguished from the straight vegetable oil (SVO) (sometimes referred to as "waste vegetable oil", "WVO", "used vegetable oil" , "UVO", "pure plant oil", "PPO") used (alone, or blended) as fuel in some converted diesel vehicles.

- Bio diesel is renewable fuels; it can be used without changes in existing engine.
- Bio diesel reduces the exhaust emission thus helps in reducing pollution.
- Bio diesel increases rural income; provide employment and leads towards economic growth of india.

ADVENTAGES OF BIO DIESEL

The following are some of the best advantages of Bio-diesel:

- Bio-diesel is the most valuable form of renewable energy that can be used by blending in any existing, unmodified diesel engine.
- Biodiesel is environmental friendly and ideal for heavily polluted cities.
- Biodiesel is as biodegradable as salt.
- Biodiesel produces very less carbon dioxide and absolutely zero sulphur dioxide emissions. It provides a greater reduction in cancer risks.
- Biodiesel can be used alone or mixed in any ratio with diesel fuel. The preferred ratio rangesbetween 5 and 30% (BS-B30).
- Biodiesel extends the life of diesel engines.
- Biodiesel is cheaper than diesel oil.
- Biodiesel is conserving natural resources; hence there will be no fuel crisis.

DISADVANTAGES OF BIODIESEL

- There is a need in older engines to replace rubber fuel hoses and gaskets with synthetics because of bio-diesel's tendency to deteriorate rubber.
- Possible concerns with engine warranties
- Special measures that must be taken to use bio-diesel , particularly B 100 , in cold climates
- Limited commercial available of fuel if you are not going to process it yourself.

Problem Statement

In this work, the palm kernel oil is vegetable oil mixed with diesel at different blends are further tested by adding diesel additive. The performance emissions of bio fuel blends were evaluated using a naturally aspirated direct injection diesel engine and these were plotted on graphs.

Materials

The palm kernel oil used in the present study was supplied by jocill limited perecharla, Guntur (dt).

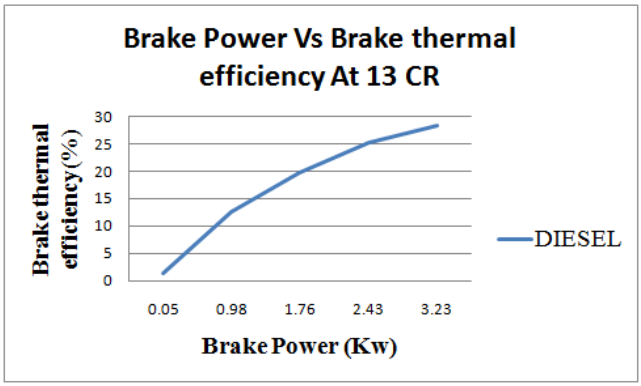

Fig. 1. Brake Power Vs Brake thermal efficiency for diesel

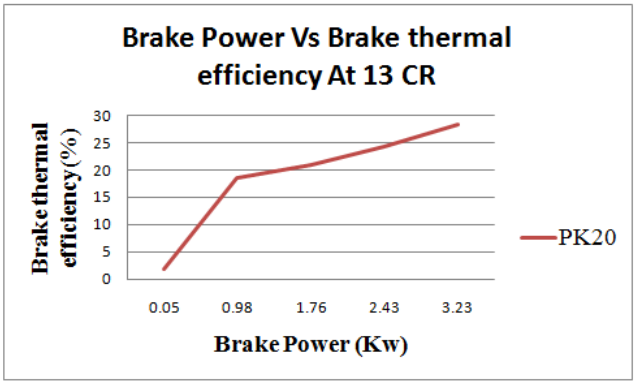

Fig. 2. Brake Power Vs Brake thermal efficiency for PK20

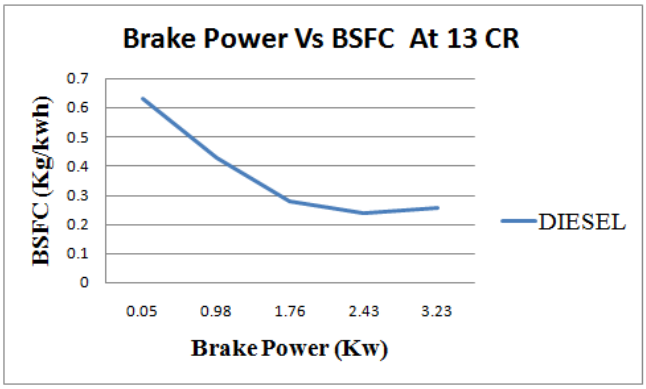

Fig. 3. Brake Power Vs BDFC for Diesel

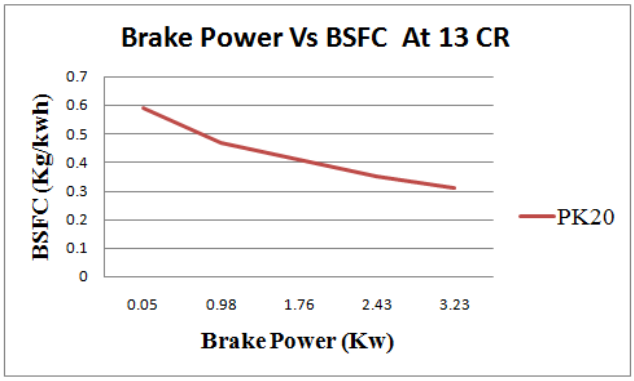

Fig. 4. Brake Power Vs BSFC for PK20

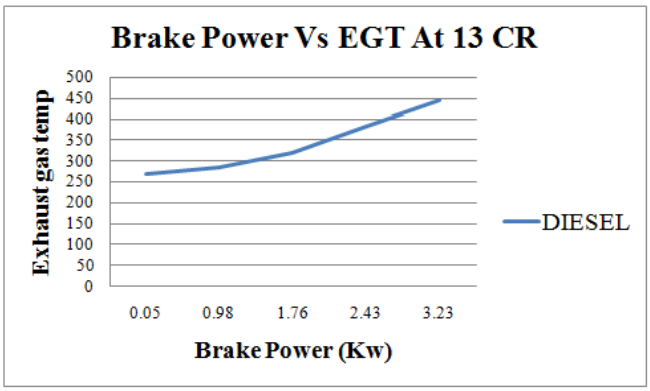

Fig. 5. Brake Power Vs EGT for Diesel

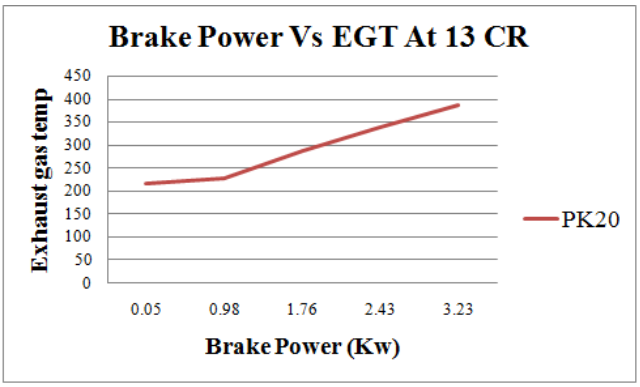

Fig. 6. Brake Power Vs EGT for PK20

The commercial diesel fuel was purchased from petrol pump. All chemicals (methanol, KOH catalyst and other instruments) were procured during experimentation from VR Siddhartha engineering college Vijayawada. All chemicals are brought locally and regents were analytical grade. The fuel properties have been determined by using equipment such as redwood viscometer, closed cup flash and fire apparatus, hydrometer, and bomb calorimeter.

Palm kernel oil

The oil of palm elaeisguineensis (guineensis referring to its country of origin) is native to west Africa. Mature trees are single-stemmed, and grow to 20m tall. The palm fruit takes five to six months to mature. Oil is extracted from both pulp of the fruit and the kernel. For every 100 kilograms of fruit bunches, typically 22 kilograms of palm oil and 1.6 kilograms of palm kernel oil can be extracted.

The nut inside the mesocarp is called kem. Palm oil extracted from mesocarp. The oil is extracted from kem is known as palm kernel oil. Figure shows the palm oil and palm kernel oil extraction from kernel and mosocarp. Figure shows the extracted palm kernel oil from kerns and nuts.

Experimentation

After creating the different Blends these blends were tested on a vSingle cylinder 4 stroke diesel engine test rig diff parameters of engine like brake power, break thermal efficiency and other parameters were tested out we put some of the graphs at particular blend and the procedure was done for all other blends.

Conclusion

Worldwide, biodiesel is largely produced by methyl Tran's esterification of edible and non-edible oils. The concept of methyl Trans Esterification is gaining attention as ethanol is derived from renewable biomass sources.

The studies were, conducted on standardizing methyl Trans Esterification process parameters for raw palm kernel oil, characteristic fuel properties of diesel, and methyl esters of palm kernel oil blends with diesel and it was successful work.

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