EXPERIMENTAL INVESTIGATION OF PERFORMANCE AND EMISSION TESTS USING BIODIESEL FROM CUSTARD APPLE SEEDS OIL IN CI ENGINE

Project Reference No.: *48S_BE_0016*

College : Rural Engineering College Hulkoti, Gadag
Branch : Department of Mechanical Engineering.
Guide : Asst. Prof. Siddesh N. Bevinahalli.
Student(s): Mr. Abhishek P Bendre
Ms. Supriya Godi
Ms. Shweta Talawar

Keywords:

Diesel, Biodiesel, Custard apple seeds oil biodiesel (CASOME), Transesterification, Performance, Emission Characteristics.

Introduction:

India's biofuel production accounted for only 1 percent of global production in 2012. Bio-ethanol and bio-diesel are the two biofuels that are commercially produced. Currently, first generation feedstocks such as sugarcane, maize, sugar beet and cassava are commonly exploited forbio-ethanol along with palm oil, jatropha oil and other edible oils from various oilseed crops for the production of bio-diesel. But since the production of these fuels compete with food crops, questions regarding food security and sustainability issues arise. Thus, there is tremendous potential for second generation biofuels in India, especially for cellulosic and agricultural crop residues. The Custard Apple Seeds Oil biodiesel having high oil content(60 to70%) with compare to all other biodiesel seeds which are available now. We are using different quantity of biodiesel blend with diesel (B10, B20, B30, B40), and we get the properties of biodiesel blends which very near to the pure diesel. We are conducting the experiments on diesel engine using these blends in different parameters like performance, combustion, emission etc.

Objectives:

- To produce a bio-diesel from Custard apple seeds oil as Alternative Fuel.
- To determine the properties of bio-diesel from Custard apple seeds oil.
- To Compare the properties of bio-diesel from Custard apple seeds oil with ASTM standards.
- To determine the performance test on bio-diesel from Custard apple seeds oil in CI engine.
- To determine the emission test on bio-diesel from Custard apple seeds oil in CI engine.

Methodology:

✓ **Equipments of Custard Apple Seeds oil**

- Seeds From Fruits Sheller
- Screw Oil Press Machine
- Oil Filter Machine
- Refinery Line or mini oil

Fig 1: Custard Apple Seeds

✓ **Experimental procedure for production of Biodiesel from Custard Apple Seeds oil :**

1. Pretreatment
2. Free fatty acid test
3. Esterification
4. Transesterification

Properties of biodiesel blends					
Properties	**Diesel**	**CASOME B10**	**CASOME B20**	**CASOME B30**	**CASOME B40**
Flash point (^{0}C)	55	65	68	70	73
Fire point (^{0}C)	62	72	74	76	80

Density (Kg/m^3)	860	865	870	875	880
Viscosity (80^oc)					
Kinematic (cst)	2.54	2.85	3.24	3.70	4.40
CV (KJ/Kg)	42500	41200	40276	39800	38600

Table-1: Properties of Custard Apple Seeds Oil biodiesel blends

Result and Conclusion:

The main objective of the work is to investigate the performance and emission characteristics of diesel engine using custard apple seed oil methyl ester (CASOME), its blends and diesel. After studying the Properties of bio diesel blends then compared to the diesel, B10 and B20 are very near to diesel fuel. This reason we have to take only the results of B10 and B20 only obtained from the test are compared with the diesel fuel.

1, LOAD V/S BTE

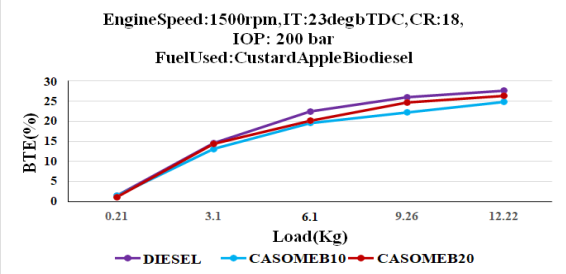

Fig 2. Load v/s BTE

2. LOAD V/S HC

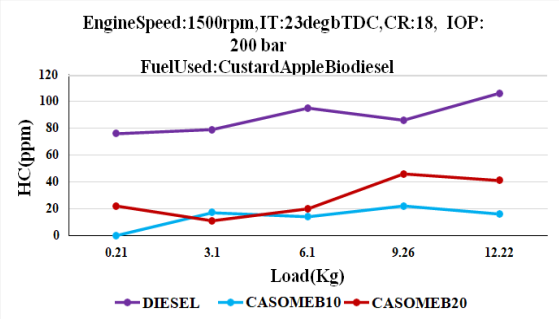

Fig 3. LOAD V/S HC

Conclusion,

- By observing all results of biodiesel from custard apple seed oil, custard apple seeds can be used as biodiesel.
- The brake thermal efficiency of the CASOME B20 blend was better than other blends, which is very close to diesel.
- The highest UHC reduction was found for CASOME.
- The test results of biodiesel are closer to the diesel.

Project:

Clearly state that the project is Based on theoretical study Only.

Project Outcomes and Learnings:

- To get bio-diesel from custard apple seeds oil as alternating fuel.
- To obtain the bio-diesel from custard apple seeds oil with almost same properties of diesel.
- To get good performance with bio-diesel from custard apple seeds oil in CI engine.
- To reduce emission with bio-diesel from custard apple seeds oil in CI engine.

Future Scope:

The future scope of this project, focusing on biodiesel from custard apple seeds oil in CI engines, lies in its potential for sustainable and renewable energy solutions, offering a promising alternative to conventional diesel fuels with reduced emissions and improved engine performance. Biodiesel from custard apple seeds can be used as a direct alternative or blended with diesel fuel in CI engines, offering flexibility in fuel choices. Biodiesel production from custard apple seeds can create local jobs and stimulate economic activity in regions where the fruit is cultivated.