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EXTRACTION OF BIOFUEL FROM ALGAE

Dr. Deo Raj Tiwari[1], Saswat Kumar Das[2], Sakib Zaidi[3],

Sachin Pratap[4], Zeeshan Ul Islam[5], Sandeep Yadav[6]

[1, 2, 3, 4, 5]*Department of Mechanical Engineering, IIMT College of Engineering, Greater Noida, U. P., India*

ABSTRACT

It is third generation fuel. It is generated by the help of algae. Several varieties of algae are developed in freshwater and saltwater. We are going to use that type of algae which is easily available in India and it is also suitable for all weather conditions in India. According to study we are going to use "chlorella" algae which are suitable for all weather conditions in India. Its grown best between the temperature limit 25-30°C.its converts 50% of its biomass into oil. The lipid content of these algae is 50%.which is very good for oil extraction. The technology used to extract oil from it is oil press method.

***Key Word**: Bio Fuel, Algae, Global Warming, IC Engines*

1. INTRODUCTION

We know there is problem; all of us who drive know that the price of fossil fuels keeps rising. Crude oil which is in its most basic form minerals deposits formed deep in earth or under the sea bed has been discovered and exploited all around the world for just over 150 years. It is transformed into oil, which is then refined into petrol, diesel, kerosene oil and many burning fuels.it is produced at the rate of several million barrels a day. This is often described as the energy of the world.no doubt despite obfuscation by several countries oil production the world over now is peaking, as such oil field has been mined and depleted simply we are running out of oil supplies.

And the another big cause is harmful gases generates after burning the oils like carbon die oxide and other green house gases, which cause global warming, so we required an alternate of fossil fuel which is easily available in future and eco friendly also.

According to research alternate fuels are green fuels which are eco-friendly and easily available in future are required.so there is different types of fuels are available like biodiesel, CNG, biogas etc.

So our main motive is to generate this type of fuel which is easily available and eco friendly, so we are going to make bio fuel with the help of algae. It's a third generation biofuel which is made by the algae. We are used chlorella algae to make the bio fuel. algae bio fuel is very promising candidate to replace fossil fuels.it produces over 20 times the oil production of any food crop-an acre of algae can produce almost 5000 gallons of biodiesel. For algae to be truly competitive, it should receive its own share of the subsidies currently only allocated to feed

stock. a highly feasible way to continued bio fuel development while remaining commercially competitive is to produce algal fuel as a co product to morevlucrative products such as animal feed and nutraceuticals product[1].

2. LITERATURE REVIEW

2.1. According to "DEMIRBAS"(2011) studied the production of biodiesel from two algae samples(cladophorafracta and chlorella protothecoid).he stated that microalgae can be converted into biodiesel, bio ethanol, biooil, biohydrogen and bio methane via thermo chemical and bio chemical methods. In this study the yield of hydrogen fuel by pyrolysis and steam gasification with temperature variation were investigated. It resulted in 54.7% and 57.65 increased by volume[2].

2.2 According to "ARAIYO"(2011) evaluated ten micro algal strains on its oil producing capability.in this study ten species of microalgae were used to analyze their oil production suitability: chactocerrousgracilic, chactocerosmulleri, chlorella vulgaris, dunalliella, isochyrisis, nanochloropsis, tetraselmis, tetraselmis chui, tetraselmistertrathele and thalassiosiraweissflogii.Bligh and dyer meyhods was used for oil extraction and concluded that chlorella vulgaris has the highest content of oil[3].

2.3 According "MOROWVAT"(2010) produced biodiesel from a naturally iscolated strain of chlamydomonas from paddy field.After the growth phase,the lipid content was seprated,esterfied and characterized through TLC and GC/MS analysis .The result revealed that there are 25% .of fatty acid content with Docosanoic acid methyl ester,tetradecanoic acid methyl ester,hexadecanoic acid methyl ester,tetradecanoic acid methyl ester,hexadecanoic acid methyl ester and nonanoic acid methyl ester as their main constituent.[4]

2.4 According to "HAIK"(2011) experimentally studied the use of algal oil(raw and diesel blends) in indierect injection diesel engine.They have used Ankistrodesmusbraunii and Nannachlorpsisfor algal oil production and modified bold 3n medium used for primary algal growth. Open pond method system was employed to cultivate the microalgae. Ultrasonicextraction methods were used to extract algal oil. They have converted the algal oil into fatty acid methyl ester by transesterification process using 3.5 gms of sodium hydroxide and 20% by volume of methanol. The chemical analysis of algal oil showed the presence of Myristic acid, Palmitic acid, Stearic acid, Oleic acid, Linoleic acid, Linolenic acid, Archidic acid and Behenic acid .In this study Ricardo E6 IDI engine was used and effect of engine speed, load, injection timing, output torque, combustion noise, maximum pressure rise and maximum heat release was studied. Finally it has been shown that the properties of algal oil methyl ester were similar to diesel fuel and its use has been successful in running the diesel engine smoothly[5].

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2.5 According to "AHMAD" (2011)) compared microalgae and palm oil as biodiesel feed stocks and found that microalgae are more suitable source of biodiesel. He also stated that microalgae appears to be promising renewable energy because it can be directly converted into biodiesel [6],

2.6 According to "OCA" (2011) studied different methods of extracting lipid content from alga namely Chlorella pyrenoidosa with solvents like chloroform, methanol, ethanol and hexane. 2% of chloroform: methanol showed maximum extraction of lipids. Direct transesterification (in situ) process and acidic transesterification process were carried out for FAME production. He also stated that higher FAME's is yielded from algal oil using methanol than in direct transesterification process [7].

2.7 According to "SINGH"(2011)Singh et al. (2011) suggested that cultivation of algal biomass on the non-arable area could be the best solution to replace depleting fossil fuel. He also suggested that the process of algal cultivation could be improved by selection of better algal strains and good screening methodologies [8].

2.8 According to "GANPATHY"(2011)reported on the effect of injection timing on performance, combustion and emission parameters of compression ignition engine using Jatropha biodiesel as a fuel. He conducted the experiment with full factorial design runs for each fuel blend ratio. He noticed that on advancement of injection timing from the rated value, BSFC, CO, HC and smoke levels were reduced with increase of BTE, Pmax, HRRmax and NOx increase. At retardment of the injection timing, the effects were in the other way. The results concluded that advancement of injection timing from the rated value shows better combustion and performance with minimal emissions[9].

2.9 According to "Mandal and Mallick" (2009) analyzed the lipid accumulation (oil content) of Scenedesmusobliquus microalgae under various culture conditions. They identified that under nitrates deficiency condition, the lipid reached 43% of dry weight (against 12.7% normally) and phosphatedd eficiency with thio sulphate supplementation, the lipid content reached 30% of dry weight (against 22% normally). They also noticed that the lipid content was increased from 58.3% to 61.3% by combining response surface methodology with central composite rotary designin the oil extraction process [10].

2.10 Acccordingto"Sahoo and Das" (2009) studied the combustion characteristics of diesel engine with Jatropha, Karanja and Polanga biodiesels. The experiments were conducted with blends of biodiesel at 20% and 50% by volume with diesel. They analyzed the pressure data, occurrence of peak pressure, heat release rate and ignition timing, and concluded that with increase in biodiesel blends, the ignition delay gets shortened (i.e lower than diesel) which resulted in the increase of maximum peak cylinder pressure than diesel.[11]

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2.11 According to"Dr. Deo Raj Tiwari et. el." results and their analysis with respect to the experiments conduced on fuel mix used in a set up on CI engine. LPG air mixes have been used in the air intake manifold at different concentration level while the diesel injection through injector at the end of compression stroke has remained undisturbed at the original level. The experiments were conducted at different loads. The objective of the study has been to minimize the pollutant emission. Observations were also taken for the impact on thermal effiencey and the power developed. Results have shown an all round favourable impact of LPG injection.Further; prospects of optimisation have been indicated on which the experiments have been initiated.

3. RESEARCH METHODOLOGY

We are going to make third generation biofuel with the help of algae.The methodology we used to make this fuel is first we decide that kind of algae which is easily available in india and have favourable condition according to weather of india.so we will use micro algae named "chlorella".this type of algae is very common in india and easily available in all area of india.so first we cultivate this algae.and then we are going to crush it into crusher.then we will dry this algae with the help of sunshine or dryer.Then we extract oil with help of oil press method under favourable conditions.then we mix methanol which is easily available.methanol precipitate gryscrol and biofuel.

4.ADVANTAGES AND DISADVANTAGES & APPLICATIONS

4.1 ADVANTAGES

4.1.1 It promises high content of energy.

4.1.2 Its basic source grows fast.

4.1.3 its consume large amount of carbon die oxide.

4.1.4 Its produce numerous by products.

4.2 DISADVANTAGES

4.2.1risky and complicated process.

4.2.2 time taking process.

4.3 APPLICATIONS

4.3.1 It is alternate of fossil fuels

4.3.2 its biomass is used in different field like medical,cosmetics.

4.3.3 its is good for pollution control.[13]

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5. EXPECTED OUTCOMES

The global economy requires fossil hydrocarbons to function, from producing plastics and fertilizersto providing the energy required for lighting, heating and transportation. With our increasing population and expanding economy, there will be increased fossil fuel use. As countries improve their gross domestic product per capital, data suggest that their fossil fuel use will increase, and competition for these limited resources will increase. In addition, there comes increasing atmospheric CO_2 concentration, and the potential for significant greenhouse gas-mediated climate change , which now seems likely to affect all parts of the world. Finally, petroleum, which is partially derived from ancient algae deposits, is a limited resource that will eventually run out or become too expensive to recover . These factors are driving the development of renewable energy sources that can supplant fossil fuels, and allow greater access to fuel resources for all nations, while greatly reducing carbon emissions into the atmosphere. A number of technologies have been examined as renewable energy sources and, although no single strategy is likely to provide a total solution, it seems possible that a combination of strategies can be employed that will substantially decrease our dependence on fossil fuels . The challenge that remains is to develop renewable energy industries that operate sustainably and can be cost competitive with existing energy options.[14]

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