"Study of Biofuel Generation"

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***Abstract*–The potential for production of large quantities of bio mass of aquatic floating species especially water hyacinth, during the aquatic phase of the flood-pulse characteristics for this ecosystem. Such bio mass could be wisely managed for the production of bio fuels.Positive energy balance white minimal interference in the environment. Currently biodiesel is becoming popular as an environmental friendly fuel. It has been used as in the automotive industry. A major source of energy for our dynamic society is the burning of fossil fuels such as coal petroleum and natural gas this sources are found out to be in the limited amounts of available, those are depleting resources. Thus the study has demonstrated systematic approach to disposal of water weeds in solid waste management system. Biodiesel and bio-ethanol production is a alternative approach to fossil fuel.**

***Keywords*–Biofuel, Waterweeds, Biomass, Trans esterification**

I. INTRODUCTION

One of the main goals of developing the biofuels sector is sustainability. The sustainability driver is based on the three pillars of economic, social and environmental sustainability. In economic terms, biofuels production has to be cost effective and competitive. In social terms, biofuels development can create a massive new demand in the agricultural economy. As biofuels production is an agricultural process, the same elements and inputs contribute to its overall efficiency as for existing agricultural production systems.

Global depletion of energy supply due to continuing over-utilization is a major problem of the present and future world community. The continuous depletion of fossil fuel reserves and consequent escalation in their price has stimulated interest in development of alternative technologies and substrates to meet the global energy demand.

An important reason for interest in renewable energy sources is the concern about greenhouse effect. Ethanol has attracted worldwide attention because of its potential use as an alternative automotive fuel. It has immense importance for countries such as India which depends heavily on import of crude oil, spending a huge sum of its annual budget. Ethanol also has value as oxygenate in clean-burning gasoline to reduce vehicle exhaust emissions.

II. BACKGROUND

Decomposition is the process whereby organic material is broken down into its smaller molecules. The primary producer's plants can then use these molecules again. Decomposition is one step in the food chain. And thus the nutrient cycle of an ecosystem. Most plant matter, over 90% in terrestrial ecosystems, is not used by herbivores but is broken down by decomposer in the litter and soil.

Table 1 Overview of Conversion Routes From Crops To Biofuels

Fuel		Technical description
Methanol[a]	Now	Atmospheric indirect gasifier, wet gas cleaning, steam reforming (partly fed by off gas), shift reactor, low-pressure gas phase methanol reactor with recycle, and a steam turbine
	Future	Atmospheric indirect gasifier, wet gas cleaning, steam reforming (partly fed by off gas), a liquid phase methanol reactor with steam addition and recycle, and a steam turbine
Ethanol[b]	Now	Dilute acid pre-treatment, on-site enzyme production, enzymatic cellulose hydrolysis, SSF configuration(cellulose hydrolysis and C6 fermentation integrated in one reactor vessel), boiler and steam turbine
	Future	Liquid hot water pre-treatment, CBP configuration (enzyme production, enzymatic cellulose hydrolysisand co-fermentation in one reactor vessel), boiler and steam turbine
Hydrogen[c]	Now	Atmospheric indirect gasifier, wet gas cleaning, shift reactor, pressure swing adsorption for H_2 separation,
	Future	Pressurised direct oxygen fired gasifier, hot gas cleaning, ceramic membrane with (internal) shift, and acombined cycle
FT diesel[d]	Now	Direct 25 bar oxygen fired gasifier, tar cracker, wet gas cleaning, no reforming, and once-through FTsynthesis at 60 bar with 90% conversion
	Future	Direct 25 bar oxygen fired gasifier, tar cracker, wet gas cleaning, no reforming, and once-through FTsynthesis at 60 bar with 90% conversion

III. PROPERTIES OF BIODIESELS

The table presents the different properties of biodiesel considered in this paper

TABLE 2 Properties of Bio-Diesel

Properties	Limits
Calcium & Magnesium	5 maximum ppm (µg/g)
Flash Point (closed cup)	93 minimum °C
Methanol Content	0.2 maximum mass %
Water & Sediment	0.05 maximum % vol
Kinematic Viscosity	1.9 – 6.0 mm ^{2}/se
Cetane	47 minimum
Cloud Point	°C
Acid Number	0.5 maximum mg KOH/g
Free Glycerin	0.020 maximum % mass
Total Glycerin	0.240 maximum % mass
Phosphorus Content	0.001 maximum % mass
Sulfur	0.0015 max. (15)
S 15 Grade	0.05 max. (500)
S 500 Grade	% mass (ppm)
Distillation	360 ximum °C

IV. TECHNIQUES

1. Use of Solvent Mixtures

As mentioned before, solvents still play a main role in both extraction and recovery of microalga lipids. Suitable solvents should be chosen as per target compound polarity. The main micro algal lipid material for biodiesel production are TAGs, which are non-polar solvents.

2. Microwave Assisted Extraction.

Microwave assisted extraction (MAE) were first established in, mid 1980's as means to obtain lipid and pesticides from seeds, foods, feeds and soil. When applied to micro algal cultures, microwave technology has been proven to be not only relatively safe, rapid and economical but also reduced cost associated with dewatering and extracting of dry algal biomass.

3. Ultrasound-Assisted Extraction [UAE]

UAE eliminates the issues associated with conventional mechanical disruption and is advantages due to low set up costs.Fast operational time and high purity of final product.In the presence of liquid cultures, UAE can rupture the cells via cavitation which produces micro bubbles around tu cell as a result of an ultrasonic wave.

4. Supercritical Carbon Dioxide Extraction

The traditional use of organic solvents for lipid extraction could be displaced by super critical carbon dioxide (SCCO2) as an alternative solvent SSCO2 is green technology which is also efficient at extracting TAG and other lipids components.While it has a lower toxicity and produces an organic solvent free extract in a shorter extraction time compared with use of organic solvents.

5. Trans-Esterification

It is a chemical reaction used for the conversion of vegetable oil biodiesel.In this process vegetable oil is chemically reacted with an alcohol like methanol or ethanol in presence of a catalyst like lye.After chemical reaction various component vegetable oil breaks down to from new compounds.The triglycerides are converted into alkyl esters, which is chemical name biodiesel.If methanol used in reaction the methanol esters formed.If ethanol is used ethyl esters are formed.In this chemical reaction alcohol replaces glycerin.Glycerin separated by trans-esterification process is released as by product of chemical reaction.

V. CONCLUSION

From the study of above five techniques, Trans-Esterification is most accurate, fast and simple method for generation of biofuel by using waterweeds.

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REFERENCES

[1] Bhakta J.N. (2015) Bio fuel potential of aquatic weeds, Int J Env Tech Sci1: page 15–20
[2] Bentley RW. (2002) Global oil and gas depletion: an overview. Energy Policy; 30:189–205.
[3] Fagan J.M Converting Problematic Aquatic Plants to Biofuel
[4] Cavallo A.J. (2002) Predicting the peak in world oil production. Nat Resour Res; 11:187–95
[5] Bhattachary A Electronic journal of Environmental
[6] Bergier.I. Biofuel production from water hyacinth in the Pantanal wetland
[7] Biofuel potential of waterweeds by Bhakta J.N. in Int J Env Tech Sci 1:15
[8] Studies of ethanol production from water Hycinth by A Ganguly @2011
[9] Sustainable Biofuel Production From Water Hyacinth by Ch.Vidya Sagar1 vol issue 10 oct -13
[10] Experimental Analysis on Performance Improvement of Diesel Engine Utilizing Alternate Fuels by K.Simhadri
[11] Carlo N Hamelinck (2005), Outlook for advanced biofuel,Energy Policy 34(2006)368-3283