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Original Research Article

LIPID CONTENT OF SOME GREEN ALGAE FOR BIODIESEL

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Abstract:
With increasing fuel prices, its transportation and environmental pollution, each country will have to think to cut down on petroleum based fuels while investing on various renewable energy sources. An attempt is made to examine lipid content of green algae for production of biodiesel. Some of the green algae have been taken into account to evaluate the lipid content as biodiesel. Among the green algae members of zygnemaceae may show encouraging result if it contain above 8 % lipid per gram of dry biomass.

Keyword: Green algae, lipid content, Biodiesel**,** algae.

Introduction:

The world is entering in a period of declining non-renewable energy resources, popularly known as 'Peak Oil', while energy demand is increasing. The world's oil production is expected to decline in between one and ten decades. As a result of this impending energy crisis, both governments and private industry are examining alternative sources of energy. Other non-renewable sources of energy exist, such as coal and uranium; however, these sources are limited and will also inevitably decline in availability (Matthu N. Campbell *et al*, 2008).

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In order to realize a stable energy alternative that will meet the world demand while mitigating climate change, it is necessary to develop renewable clean fuels (Matthu N. Campbell *et al*, 2008). Carbon neutral renewable liquid fuels are needed to eventually totally displace petroleum-derived transport fuels that contribute to global warming. Biodiesel from oil crops and bioethanol from sugarcane are being produced in increasing amounts as renewable biofuels, but their production in large quantities is not sustainable. An alternative is offered by microalgae (Yusuf Chisti et al., 2008). Algae were once considered to be aquatic plants, but now classified separately because they lack true roots, stems,

leaves, and embryos. The main advantage of biofuels from microalgae over boifuel from other crop plants are as follows.

Microalgae can be produced all year round and therefore, quantity of oil production exceeds the yield of the best oilseed crops, e.g.biodiesel yield of 58,700L/ha for microalgae containing only 30% oil by wt., compared with 1190L/ha for rapeseed or Canola,1892 L/ha for *Jatropha* and 2590 L/ha for karanj oil yields from various sources. The exponential growth rate also very high as compared to other crop plant. Algae can be grown in the brackish water which is not suitable for farming (Jasvinder Singh *et al*, 2010).

This paper examines feasibility in oil contents from fresh water algae in biodiesel production.

Materials and method

Sample collection: The fresh water green algae *Rizoclonium sp.*, *Cladophora sp.*, *Zygnema sp.*, *Spirogyra* sps. were collected from water bodies in and around of Nagpur (M.S.),and nearby Nagpur region. All the materials were washed with water and dried in sunlight for a few days. Dried algal Dry algal samples were crushed to a fine powder in order to obtain small solid particles (Venkataraman, 1969; Sharif Houssain *et. al*. 2008).

Oil extraction: Two hundred mL of petroleum ether for 15-20 g of dried algae were used for the oil extraction. The extraction was carried out in Soxhlet apparatus for at least 12-16 h and recorded algal oil content. Extraction was carried out in a 0.5 L round –bottomed glass flask. The resultant solution was separated from solvent by distillation. The same solvent was reused in the next batch of extraction. Finally, the sample was dried in an oven (100^0C) to get constant weight of oil (Rashmi Kumar et al,(2012),S.Sadasivam and A.Manickam, (2006), L. Govindarajan et al. (2009).

Oil content: Oil percent of algae (per gram of dry mass) = weight by difference in algae /original weight of Algae X 100

Results and Discusion:

The first step of this study is to characterize the material suitable for transesterification process.

Alga characterization: Seven types of algae were collected from water bodies of Nagpur and nearby Nagpur and analyzed to record the oil content from extraction of green algae (Table 1). Oil contents recorded in the range of 1% to 8.3 %

Table1: showing oil contents of algal materials

Samples	**%Oil content (per gram of dry mass)**	**S.D**	**S.E**
Rhizoclonium sp.	1	±0.12	0.053
Cladophora sp.	3.5	±0.59	0.295
Zygnema sp.	**8.3**	±0.62	0.439
Spirogyra Sp.	7.2	±0.17	0.057
Spirogyra Sp.	4.3	±0.03	0.014
Spirogyra Sp.	4.1	±0.10	0.050
Spirogyra Sp.	4.0	±0.30	0.173

S.D.-standard deviation S.E-standard error

Conclusion: Algal biodiesel has great potential; rather than its the high cost and limited supply of organic oils which prevent it from becoming competitor for petroleum fuels. In considering, the present petroleum fuel costs, it's supply and scarcity, an alternative fuels such as biodiesel which may attract an attention to future demand of fuel by producing high oil content in algal biomass. It is need to find new and innovative techniques for cultivation of algae may allow biodiesel production and to achieve the price and scale of production needed to compete with petroleum. Among the green algae members of Zygnemaceae may show encouraging result in future if it contain above 8 % lipid per gram of dry biomass.

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