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CONTENTS OF ENGLISH PART - VII

1. Biodiesel Production from Cyanobacterial Species Isolated from Bhokar Dam

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Abstract

In the present investigation, Bhokar dam was preferred to isolate the cyanobacterial species for comparative study of biodiesel production from Spirogyra and Oscillatoria sp. The pH of the water sample was 7.5 to 8.0. The obtained results showed that, used Cyanobacterial species for biodiesel production through transesterification process of algal lipids with the help of sodium hydroxide as a catalyst. It reveals that Oscillatoria species synthesize more biodiesel than Spirogyra species.

Key words: Solvents, Cyanobacerial species, transesterification.

Introduction

Recently environment protection is the major aspects towards the scientists. The excessive use and combustion of a petroleum diesel releases greenhouse gas, nitrous oxide, carbon monoxide volatile organic compounds particulate matter in the air (2,3). The need of energy is increasing continuously, because of increases in industrialization and population. Hence bioenergy (Biodiesel) is one of the most important components to overcome greenhouse gas emissions and substitute of fossil fuels also fulfill the requirement of increasing population (1,7). The microalgae are used for production of biodiesel such as Spirogyra, Oedogonium, diatoms, Oscillatoria etc (6,9,11). Microalgae majorly includes Cyanobacteria can provide several different types of renewable biofuels. These include methane produced by anaerobic digestion of the algal biomass biodiesel derived from microalgal oil and photobiologically produced biohydrogen. Renewable energy from algae could play an important role to replace natural petroleum fuels and will be reduce the CO_2 emission, if environmental and economic sustainability are considered carefully they can be direct and immediate replacements for the liquid fuels used for transport and can be easily integrated to the logistic systems that are operating today (4). In recent years, the use of liquid

biofuels in the transport sectors has shown rapid global growth, driven mostly by policies focused on achievement of energy security, and mitigation of GHG emission (5,8).

Materials and Methods

Collection of Sample: The cyanobacterial species were isolated from Bhokar (Narvat) Dam such as Oscillatoria & Spirogyra, both the species were identified by microscopically in the laboratory. Approximate 30 gms of both the species were taken in separate petriplates. The biomass was collected after filtration and weighted on weighing balance.

Extraction of Oil: Algae were pulverized with motor and pestle as much as possible. The processed algae were dried for 20 min at 80°C in a hot air oven for dehydration. The 20 ml hexane and 20 ml ether solution were added in crushed algae to extract oil. The mixture was allowed to settle for 24 h (7,10).

Evaporation: The extracted oil was evaporated in vaccum to release hexane and ether solutions using rotary evaporator (7).

Mixing of catalyst and methanol: The 0.25 g NaOH & KOH was mixed with 24 ml methanol and stirred properly for 20 min (7).

Biodiesel production: The mixture of catalyst and methanol was poured into the algal oil in a conical flask. The reaction process is called transesterification. The conical flask containing solution was shaken for 3 h by electric shaker at 300rpm. After shaking the solution was kept for 16 h to settle the biodiesel and sediment layers clearly (7, 11).

Separation of biodiesel: The biodiesel was separated from sedimentation by flask separator carefully. Quantity sedimeant (glycerine, pigments, etc.) was measured (4,5,7).

Washing: Biodiesel was washed by 5% water until it was become clean (7).

Drying: Biodiesel was dried by using dryer and finally kept under the running fan for 12 h (7).

Storage: Biodiesel production was measured by using measuring cylinder, pH was measured and stored for analysis (7).

Results and Discussion

The tentatively identified algal species were showed its potential to produce the biofuels. In the present research two catalysts such as NaOH and KOH were used with solvent methanol in transesterification process to observe the best among both catalysts for biodiesel production. The enhancement of the biofuels production catalyst i.e. NaOH plays an important role in both

the species. The comparative study reveals that spirogyra comparatively low molecular weight in gm than Oscillatoria species it confirms by its dry weight (Table 1). The extraction of oil was higher in spirogyra species i.e 1.04 gm by using NaOH as a catalyst (Table 1).

Table 1: Comparative analysis of algal species (NaOH Catalyst).

Algal species	Fresh Weight (gm)	Dry Weight (gm)	Percentage species (%)	Extracted oil (gm)	Sediment (gm)
Spirogyra sp.	28.5	11.2	39.29	1.04	16.5
Oscillatoria sp.	29.3	12.5	43.66	0.91	17.1

Whereas 0.71 gm oil was extracted from Spirogyra species using KOH as a catalyst (Table 2). Comparatively NaOH acts as an enhancer for the biodiesel production. The recent investigation done by Niranjan Dev Bharadwaj et.al (2016) on biodiesel production and they observed the Spirogyra and Oedogonium to along with catalyst like NaOH and KOH in transesterification process to compare the amount of biodiesel produced by the use of solvents Hexane and Ethane .The results indicated that biodiesel can be produced from both species and also in the produced biodiesel of both species ,there is no significant difference in pH.

Table 2: Comparative analysis of algal species (KOH Catalyst).

Algal species	Fresh Weight (gm)	Dry Weight (gm)	Percentage species (%)	Extracted oil (gm)	Sediment (gm)
Spirogyra sp.	28.5	11.2	39.29	0.71	21.5
Oscillatoria sp.	29.3	12.5	43.66	0.53	23.6

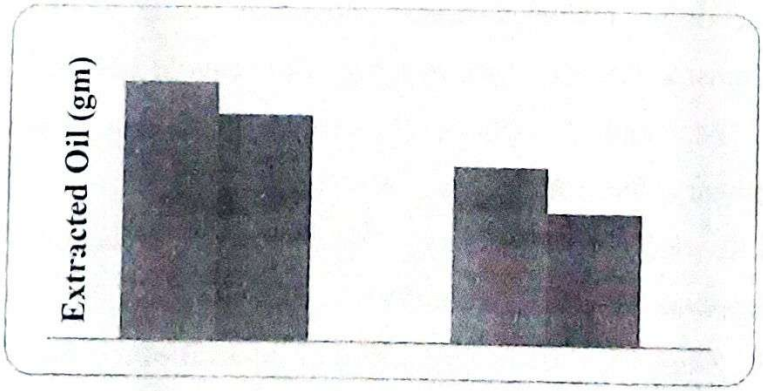

Fig 1: Extraction of oil by using catalyst NaOH & KOH.

The sediment (glycerin, pigment) were higher in Oscillatoria species as a NaOH catalyst where as Spirogyra species showed maximum sediment in KOH as a catalyst. The comparative statement of extraction of oil by using catalyst NaOH & KOH showed in fig 1. From result we strongly recommended that the sediment is not related to the production of the oil it confirms in the given experiment (Table 1 & 2). When the pH of the medium was checked, there is no major difference in it. According to Sijtsma and Swaaf reported that biodiesel can be produced from macro algae because of lipid contents. it has a docosahexaenoic acid (DHA) was a polyunsaturated fatty acid composed of 22 carbon atoms and double bonds (10). Both the used species are relatively biodiesel producing species requires an inducer for the higher productivity.

Conclusion

The biodiesel production from cyanobacterial species is a feasible by transesterification process. The present study indicates that, biodiesel production from algae is an economical choice and low cost also it reduces the environmental contaminants.

References

1. Banerjee, A., R.S. harma, Y. Chisti and U.C. Banerjee, 2002. *Botryococcus braunii:* A renewable source of hydrocarbons and other chemicals. *Crit. Rev. Biotechnol.*, 22: 245-279.
2. Escobar, J.C., Lora, E.S., Venturini, O.J., Yanez, E.F., Almazan, O., Biofuels: environment, technology and food security. *Renew. Sustain. (2009). Energy Rev.* 13, 1275- 1287.
3. Fedorov, A.S., S. Kosourov, M.L. Ghirardi and M. Seibert, 2005. Continuous H_2 photo production by *Chlamydomonas reinhardtii* using a novel two stage, sulfate-limited chemostat system. *Appl. Biochem. Biotechnol.*, 124: 403-12.
4. Gavrilescu, M. and Y. Chisti, 2005. Biotechnology-a sustainable alternative for chemical industry. *Biotechnol. Adv.*, 23: 471-99.
5. Kapdan, I.K. and F. Kargi, 2006. Bio-hydrogen production from waste materials. *Enzyme Microbiol. Technol.*, 38: 569-82.
6. Nigam, P.S., Singh, A. (2010). Production of liquid Biofuels from renewable resources. *Progress Energ. Combust. Sci. doi*:10.1016/j.pecs.2010.01.003.

7. Niranjan Dev Bharadwaj, Govind Vajpayee, Rajesh Jain, Arwind Sharma, 2016. Production of biodiesel (Biofuel) from Algae, *International journal of Engineering trends and technology (IJETT), Vol. 3, Number 3*: 118-122.
8. Roessler, P.G., L.M. Brown, T.G. Dunahay, D.A. Heacox, E.E. Jarvis and J.C. Schneider, 1994.Genetic-engineering approaches for enhanced production of biodiesel fuel from microalgae. *ACS Symp Ser.* 566: 255-270.
9. Sawayama, S., S.Inoue, Y. Dote and S.Y. Yokoyama, 1995. CO_2 fixation and oil production through microalga. *Energy Convers Manage.*, 36: 729-31.
10. Sijtsma, L. and M.E. Swaaf, 2004.Biotechnological production and applications of the w-3-polyunsaturated fatty acid docosahexaenoic acid. *Applied Microbiol. Biotechnol.*, 64: 146-153.
11. Thomas, F.R., 2006. Algae for liquid fuel production Oakhaven Permaculture center. Retrieved on 2006-12-18. *Permaculture Activist,* 59: 1-2.