ISSN 2348-313X (Print)
International Journal of Life Sciences Research ISSN 2348-3148 (online)
Vol. 4, Issue 4, pp: (68-71), Month: October - December 2016, Available at: www.researchpublish.com

Studies on Extraction and Physico-Chemical Analysis of Micro Algal Oil

[1]Chavan Dhanpal, [2]C.N Khobragade

[1]ACS college Gangakhed, Dept of Microbiology Maharashtra
[2]School of Life Science, S.R.T.M. University, Nanded Maharashtra

Abstract: **Microalgae are fast growing aquatic photosynthetic organism, microalgae have many economic value in human life. As with any biological lipid, algal lipid is a potential feed stock for making the renewable fuel biodiesel. The present investigation was carried out to detect lipid by FTIR and extracting algal oil by soxhlet apparatus using hexane solvent, this oil was subjected to analysis for physiochemical property. The density, viscosity, moisture, flash point, acid value, calorific value were recorded as 0.85gm/cc,4.2mm^2,1.8 % 210^{0}C,54,0.5 mg of KoH/gm,9110 kal/kg. the fatty acid profile carried out with FAME and showed palmitic acid,5.81% steric acid 1.86%,olic acid 65.83% ,linoleic acid 20.10% ,linoleic acid 0.52%,Ecosenoic acid 1.22%,this analysis showed that algae oil can be raw material for biodiesel as well as can be used as food because it contain olic acid, algal biodiesel will be eco- friendly and about 50% of algal oil trans esterified in to biodiesel, algal biodiesel can be used to run the vehicle like truck, public transport**

Keywords: **microalgae, microalgae oil, solvent extraction, fatty acid.**

1. INTRODUCTION

Microalgae are fast growing acquit microorganism. Their multiplication rate is 10 to 50 times greater than that of terrestrial plants. Microalgae produce large amount of biomass as compare to energy crops (Wag et.al 2008). Microalgae can be prokaryotic or eukaryotic in nature. In evolutionary term, they can be better ancient species or recent one. Algae using by human in many ways, for example as a fertilizer, soil conditioner and live feed stock.

Escalating fuel prices, the emerging concern about global warming that is associated with burning fossil fuel, quest of economic growth, fighting poverty and the growing demand for petroleum product have spurred new interest in the search for alternate source of natural oil for fuel (Shale A. stanely et.al)

In the united state biodiesel is produced from soybeans, canola oil, animal fat, palm oil, corn oil, cooking oil, jatropha oil[3]. In the recent year microalgae have gained attention as a possible solution to chemical petro-diesel. Basic concept behind algal bio fuel and store lipid similar is to those found in the most vegetables oil[4]. Microalgae naturally stored lipid up to 40% in their cell. The key challenge is the selecting most suitable strain, if scientist create recombinant oil producer strain, then it would be more efficient artificial strain for biodiesel production.

The present research work was designed to extract oil and study different physico chemical parameter, so as to explore a source for biodiesel in India. The newly isolated *scenedesmus sp* biomass was used for oil extraction by soxhlet apparatus using hexane solvent and oil was analyzed for its fatty acid content and physiochemical parameter was determined. Godavari River at Gangakhed .Algae oil can be used as raw material for biodiesel and feed stock also.

ISSN 2348-313X (Print)
International Journal of Life Sciences Research ISSN 2348-3148 (online)
Vol. 4, Issue 4, pp: (68-71), Month: October - December 2016, Available at: www.researchpublish.com

2. MATERIALS AND METHODS

A) Isolation and identification of algal culture:

Algae sample were collected from the Godavari river water at Gangakhed. 1 ml water sample was added to BG11 growth medium for enrichment at 25°C(+-1) under 1.2 to 0.2 klux- light irradiated for 16: hr light and dark cycle for 11 days. From this enriched culture pure culture isolated by pour plate method (R.C, Dubey2004).microalgae culture was identified with zeal biological research laboratory using 18S r RNA sequencing and identified as *scenedesmus spp.*

b) Detection of lipid:

Algae biomass was subjected to FTIR analysis at North Maharashtra University Jalgoan research laboratory and peak of lipid detected and it conform lipids.

c) Oil extraction:

100 gm of algae powder were transfer in to soxhlet apparatus, and then 100ml of hexane was added to rupture cell wall of algae, after some time algae oil will be collected from the collecting flask and it is considered as crude algal oil

d) Physico-chemical analysis of crude algae oil:

The physico chemical parameter such as density, moisture, flash point, acid value, calorific value determined by standard method of analysis (AoAC, 1995) and was FAME of oil done at envirocare laboratory Mumbai conform fatty acid profile.

3. RESULT AND DISCUSSION

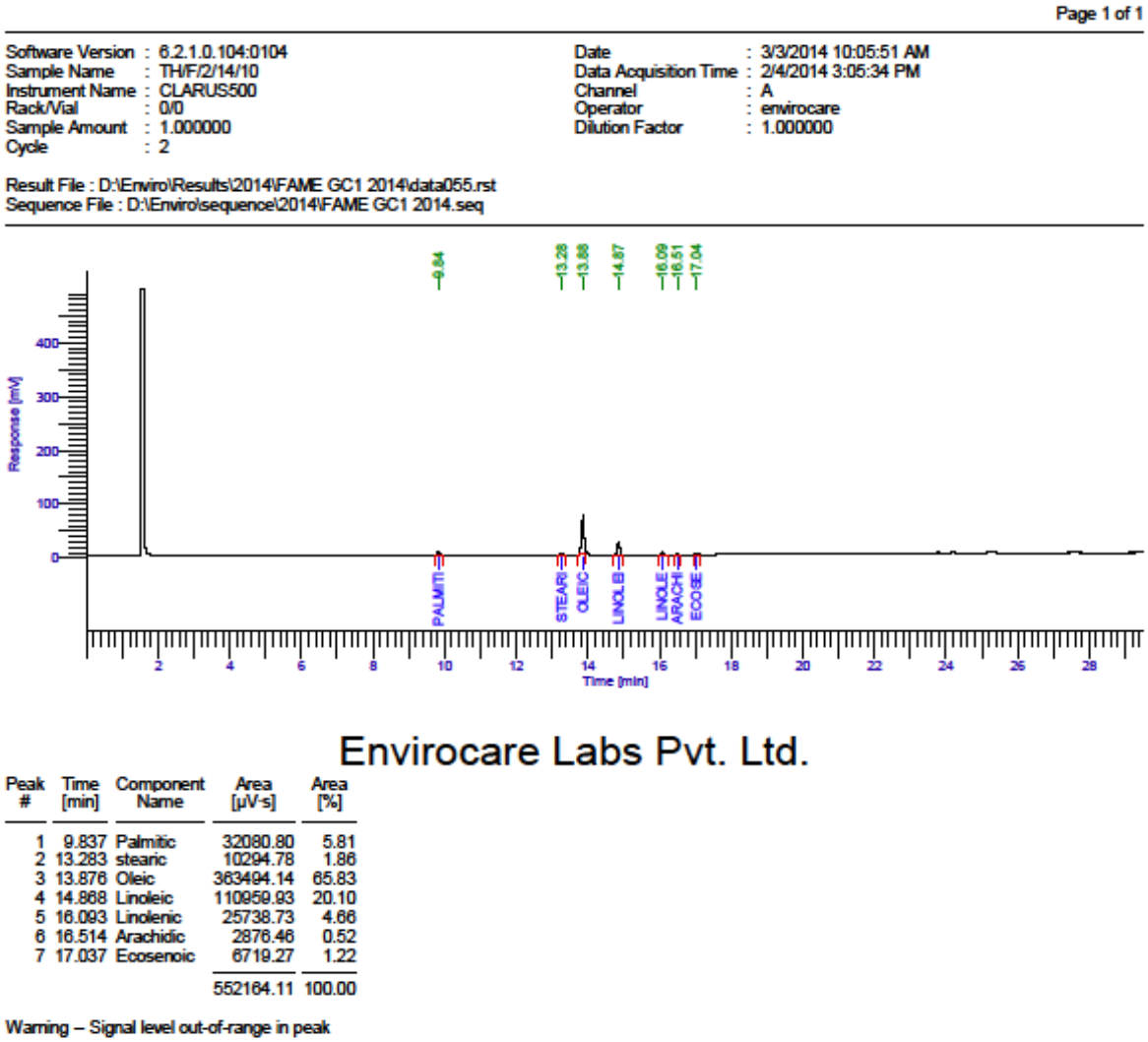
From the *scenedesmus* species about 26.23% of lipid was extracted using soxhlet apparatus. This oil was subjected to physico-chemical analytical parameter such as density, viscosity, moisture, flash point, acid value, calorific value, were recorded as0.85gm/cc,4.2mm^2,1.8 % 210^{0}C, 54, 0.5 mg of KoH/gm, 9110 kal/kg.Table 1

Fatty acid profile by FAME showed that iol contain palmitic acid,(5.81).strric acid (1.86%) oleic acid (65.83%) linoleic acid (20.10%) linolenic(4.66%) Arachidic (0.52%)Ecosenic (1.22) fig 1

Physiochemical characteristic of microalgal oil, table 1

Sr.no	parameter	values
1	Density	0.85gm/cc
2	viscosity	4.2mm^2
3	moisture	1.8%
4	Flash point	210
5	Acid value	54
6	Calorific value	9110

ISSN 2348-313X (Print)
International Journal of Life Sciences Research ISSN 2348-3148 (online)
Vol. 4, Issue 4, pp: (68-71), Month: October - December 2016, Available at: www.researchpublish.com



Peak #	Time [min]	Component Name	Area [µV·s]	Area [%]
1	9.837	Palmitic	32080.80	5.81
2	13.283	stearic	10294.78	1.86
3	13.876	Oleic	363494.14	65.83
4	14.868	Linoleic	110959.93	20.10
5	16.093	Linolenic	25738.73	4.66
6	16.514	Arachidic	2876.46	0.52
7	17.037	Ecosenoic	6719.27	1.22
			552164.11	100.00

Warning – Signal level out-of-range in peak

Fig. GC chromatogram of algae oil

4. CONCLUSION

Oil extracted from scenedesmus sp and was studied for various physiochemical parameters such as FAME, AOAC standards. This Result shows that algae oil was mixture of saturated and unsaturated fatty acid and fatty acid profile was studied. Algae oil can be used for production of biodiesel using transesterification reaction. This oil also has the nutrition value. In the light of above research microalgae scenedesmus sp could be efficiently used for the production of bioethanol, biodiesel and oil production. It can be cultivated all over India; hence it is future energy crop for Indian former.

REFERENCES

[1] Shaleesha A.Stanley[1] Ananadhi Padmanabhan M.R.[2] and Anitha A.S.[3]*N* S Studies on the extraction and characterization of microalgal oil. National Journal on ChemBiosis, Vol. 1, No.2, October 2010

[2] Pankaj Kumar, M.R. Suseela* and Kiran Toppo Physico-Chemical Characterization of Algal oil: a Potential Biofuel ,Asian J Exp.Biol.sci.vol2(3)2011

[3] Paula Mercer and Roberto E. Armenta Developments in oil extraction from microalgae Eur. J. Lipid Sci. Technol. 2011, 000, 0000–0000

[4] Rajiv Chandra Dev Goswami1 Growth and lipid productivity of Scenedesmus spp under different concentrations of urea J. Algal Biomass Utln. 2011, 2 (4): 42– 49

[5] Shah GC, Yadav M, Tiwari A (2012) Analysis and Characterization of Algal Oil by using Different Chromatographic Techniques for the HigherProduction of Biodiesel from *Scenedesmus Dimorphus* Algal Species. 1:350. doi:10.4172/scientificreports.350

[6] Ananadhi et.al ,microalgae as an oil producer for biofuel application,research journel of recent science Vol1(3)57-621012

[7] Dildar Ahmed1* and Shahid Rehman Khan2et.al Physicochemical, thin layer and gas-liquid chromatographic analysis of ungrafted desi mango flower oil and mineral estimation in its flowers African Journal of Biotechnology Vol. 11(41), pp. 9844-9848, 22 May, 2012

[8] AAbubakar ,L.U,MutieA.M Kenya S Journal of Applied Phytotechnology in Environmental Sanitation, 1 (4): 147-153.

[9] Felizardo P., Correia M.J.N., Raposo I., Mendes J.F., Berkemeier R.,Bordado J.M., 2006. Production of biodiesel from wastefrying oil. Waste Management 26(5):487-494.

[10] Kulkarni M.G. and Dalai A.K., 2006. Waste cooking oil- an economical source of biodiesel: A review. Ind. Eng.Chem Res 45:2901-13

[11] Barnwal B. K. and Sharma M.P., 2005. Prospects of biodiesel production from vegetable oils from India. Renew Sustain Energy Rev 9: 363-378.

[12] UNEP, OCA/PAC, 1989. A Coast in Common by Bery Kendall Eds

[13] Metzger P. and Largeau C., 2005. *Botryococcus braunii*: a rich source for hydrocarbons and related ether lipids. Appl. Microbiol. Biotechnol 66:486-496

[14] Spolaore P., Joannis-Cassan C., Duran E., Isambert A., 2006. Commercial application of microalgae. *J. Biosci Bioeng* 101:87-96

[15] Chisti Y., 2007. Biodiesel from microalgae. ScienceDirect, *Biotechnology Advances* 25:294-306

[16] Huber-Pestalozzi G., 1968. Cryptophyceae, Chloromonadophyceae, Dinophyceae. Das Phytoplankton des Susswassers, 1. Teil (ed. G. Huber-Pestalozzi), 2. Aufl., pp.I-IX + 1-322.

[17] Bourrelly P., 1970 Les alques Deau douce. Tome III: Les algues bleues at rounges, Les Eugleniens, Peridiniens at Cryptomonadines. Ed. Boubee, Paris, 512pp

[18] Bligh E.G. and Dyer W.J., 1959. A rapid method of total lipid extraction and purification. Can. J. Biochem. Physiol. 37. 911–917.

[19] Benemann J. and Tillett D., 1987. Effects of Fluctuating Environments on the Selection of High Yielding Microalgae. Solar Energy Research Institute Report, February 27, 1987.

[20] Mbatia B., Aldlercreutz D., Aldlercreutz P., Mahadhy A., Mulaa F., and Mattiasson B., 2010. Enzymatic oil extractionand positional analysis of ω-3 fatty acids in Nile perch and Salmon heads. *Process Biochemistry* 45:815-819.

[21] Xiufeng L., Han Xu and Qingyu W., 2007. Large-scale production from microalgae *Chlorella protothecoides* through heterotrophic cultivation in bioreactors. Biotechnology and Bioengeneering 98 (4): 764-771

[22] Rodolfi L., Zitelli G.C. Bassi N., Padovani G., Bonini G., Biondi N. And Tredici M.R., 2009. Lipid production from microalgae: Strain selection, induction of lipid synthesis and outdoor cultivation in pilot photobioreactors. Biotechnology and Bioengineering 102 (1): 100-112

[23] Mulbry W., Konrad S. and Buyer J., 2008. Treatment of dairy and swine manure effluents using freshwater algae: fatty acid content and composition of algal biomass at different manure loading rates" Journal of Applied Phycology, 9314-9318

[24] Thompson GA., 1996. Lipids and membrane function in green algae. *Biochemica et Biophysica* 1306:17-45

[25] Van Gerpen J., 2005. Biodiesel Processing and Production. Fuel Processing Technology, 86 (1) *AN J. EXP. BIOL. SCI. VOL 2(3) 2011: 493-497*