Crimson Publishers
Wings to the Research

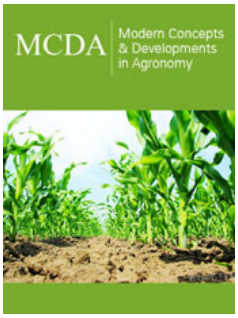
Opinion

Algal Biofuel: The Third Generation Energy Resources Need of Present Scenario

Neetu Jain*

Department of Botany, S.S Jain Subodh PG (Autonomous) College, Jaipur, India

ISSN: 2637-7659



***Corresponding author:** Neetu Jain, Department of Botany, S.S Jain Subodh PG(Autonomous) College, Jaipur, India

Submission: March 25, 2022

Published: April 06, 2022

Volume 10 - Issue 4

How to cite this article: Neetu Jain. Algal Biofuel: The Third Generation Energy Resources Need of Present Scenario. Mod Concep Dev Agrono. 10(4). MCDA. 000743. 2022. DOI: 10.31031/MCDA.2022.10.000743

Opinion

As the population increasing the requirement of energy for mankind is also increasing day by day but the major energy resources are limited. Shortage of these energy sources, increasing prices of petrol products, energy protection, global warning and also increasing awareness towards nature. Therefore, there are gradual revival of interest in renewable energy source like solar, biomass, tidal, hydropower, wind, nuclear energy in all over the world [1]. Biofuels are energy rich chemical compounds produced from chemical renovation of prior living organism biomass or derived through biological process. Biofuel mainly produced by autotropic organisms like micro and macro algae, photosynthetic bacteria, and plants. Biofuel initial raw materials may be the form of liquid, solid or in gas which is further change in primary and secondary biofuel product by physical, biochemical and thermochemical procedures. Through burning of cellulosic plant material, residual woody parts and dry animal waste primary biofuel produced. Secondary biofuel can be obtained indirectly from plant and animal materials which further divide into third generations. Bioethanol and biodiesel obtained from oil yielded plant crop like soyabean, and Jatropha is known as second generation biofuel. Algae can produce nearly 300 time more biofuel or oil as compared to plant biomass such as Jatropha, soyabean, palm etc. Biofuel generated from microalgae, cyanobacteria and other microbes are classified as third generation biofuel which is most auspicious method for overcoming the global energy demands.

During present scenario scientists are emphasizing for the production of biofuel from algal biomass as alternative feedstock due to excellent biofuel yields, recyclability, durability, crystallinity, economic benefits, high storage capacity, catalytic performance, and environment friendly nature. Biofuel is formed through modern technique using biomass of plants, animals and algae in place of time consuming very slow natural geological processes like fossil fuel.

These microalgae species are mainly unicellular have potential to produce high carbohydrate contents which is used for ethanol production, high lipid content suitable for biodiesel formation, high hydrocarbon contents can be utilized for production of renewable distillates. Most of the algae are aquatic organism and can grow wide range of aquatic condition like fresh water to marine or salty water. They can resourcefully exploited carbon dioxide and form carbohydrate in the presence of sunlight. Marine microalgae are responsible for 40% global CO_2 fixation. They require mainly carbon dioxide, light, some micro and macro nutrients for growth and produce huge quantity of carbohydrate and lipids. These compounds can be converted in different types of biofuels and other valuable by products [2]. Microalgae have faster growth and high lipids contents as compared to macroalgae [3]. Some species produce biomass very rapidly, some doubling within six hours, while some showing doubling per day.

Short reaping cycle, efficient utilization of CO_2, high production of carbohydrate contents are some important key factors for the use of microalgae in biofuel production industries as compared to conventional crop [4]. Some other advantage of microalgae selection as biofuel production are low consumption rate of water, high tolerance of CO_2, high growth potential, cultivation whole year, productive is high, no requirement of pesticide and herbicide, ability to grow harsh condition like brackish water, coastal seawater, saline water [5]. Chlorophyceae members like Botryococcus spp. and member of Scenedesmus genus has been identified for rapid growth, high lipid content and for potential oil producing specie [6]. Cyanobacteria which are mostly responsible of nitrogen fixation also found to be able for used to secrete biofuel molecules.

Biofuel production algal biomass can be produced in following three ways. Open Pond System: This is most simple method in which algae are grown under sunny and warm environment condition in open pond area. Closed-Loop System: In this technique, experimental algal species are taken in clean and transparent plastic bags. These bags protected from external environments condition through outer cover. These bags provide enough sunlight for photosynthesis. In this technique high yield of algal biomass and then high yield of oil will be produce. Photobioreactors: This is most advance technique in which borosilicate glass tubes are use for the growth and culture of algae. In these tubes algae can grow maximum and harvested daily. This is highly control but expensive system but provide high yield of oil for biofuels. In present scenario use of nano technology in different fields of microalgae cultivation to biofuel production and application in fuel engines are in demands [7]. This technique improved microalgae cultivation, enhance biofuel production as well as biofuel implication in diesel and petrol engines. Nanotubes, nanosheets, nanofibers like nano materials are applied for nano catalyst activities in the various direct and indirect biofuel yield enrichment procedure.

References

1. Rajkumar R, Yaakob Z, Takriff MS (2014) Potential of the micro and macro algae for biofuel production: a brief review. Bioresource 9(1): 1606-1633.
2. Nigam PS, Singh A (2011) Production of liquid biofuels from renewable resources. Progress in Energy and Combustion Science 37(1): 52-68.
3. Lee K, Eisterhold ML, Rindi F, Palanisami S, Nam PK (2014) Isolation and screening of microalgae from natural habitats in the Midwestern United States of America for biomass and biodiesel sources. Journal of natural science, biology and medicine 5(2): 333-339.
4. Chisti Y (2007) Biodiesel from microalgae. Biotechnology Advance 25(3): 294-306.
5. Behera S, Singh R, Arora R, Sharma NK, Shukla M, et al. (2015) Scope of algae as third generation biofuels. Frontiers in Bioeng Biotechnology 2: 90.
6. Xin L, Hong Ying H, Jia Y (2009) Lipid accumulation and nutrient removal properties of a newly isolated freshwater microalga, Scenedesmus sp. LX1, growing in secondary effluent. N Biotechnol 27(1): 59-63.
7. Safarik I, Prochazkova G, Pospiskova K, Branyik T (2016) Magnetically modified microalgae and their applications. Critical Reviews in Biotechnology 36(5): 931-41.