

BIOFUEL FROM MICROALGAE: THE THIRD GENERATION OF RENEWABLE FUEL

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Abstract

Biofuel research and development has been progressed in last decade as an emerging technology for the renewable energy sources. Microalgae is one of the most promising feedstock to obtain biodiesel. Microalgae are the most suitable source for biofuel production due to their high lipid content, greenhouse gas fixation, rapid growth rate and ease of cultivation. The main advantage of biofuel production from microalgae is that can produce 15 upto 300 times more energy than traditional diesel production methods. The oil content of microalgae has reached up to 80% of their dry body weight; moreover, some microalgae can duplicate their biomasses within 24 hours which turn microalgae as an excellent renewable source for energy and biofuel production. Researches indicate that municipal, industrial and animal wastewaters are great potential sources for biofuel production by the aid of microalgae. Somehow, there are many drawbacks and challenges of algal cultivation including: composition variation, weather condition, pre-treatment methods, unsuitable nutrient ratio (C/N, P/N), high turbidity, suspended solid particles and existence of other toxic and inhibiting compounds. These challenges would be resolve by designing a suitable and desired technological production processes. There are many alternatives to produce biofuel from microalgae feedstock such as: biochemical conversion, chemical reaction, direct combust, and thermochemically convert raw wastes to useful products. Microalgae generally produce carbon neutral biofuel; by burning this kind of biofuel, CO₂ is produced which is then consumed by microalgae biomass. Though, the process is considered as carbon-neutral and would be a viable alternative to fossil fuels. Recent researched on biofuel production from microalgae is turning towards the most promising species that can produce more biomass. Two common biomass production, photobioreactor systems and open air (pond) systems are used. There are several algae harvesting process such as biological, electrical, chemical flocculation and centrifugation methods which are needs further development for producing commercially viable biofuel. In addition to biofuel production, many other valuable compounds such as vitamins and food additives were produced with valuable food and pharmaceutical applications.

Keywords: Biodiesel, Biofuel, CO₂ biofixation, Microalgae, Photobioreactor, Vitamin B12