

MICROALGAE FOR RENEWABLE ENERGY: BIODIESEL PRODUCTION AND OTHER PRACTICES

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ABSTRACT

Sustainable production of renewable energy is being frequently debated globally since it is increasingly understood that first generation biofuels, primarily produced from food crops and mostly oil seeds are limited in their ability to achieve targets for biofuel production, climate change mitigation and economic growth. Currently, biodiesel is made from a variety of feedstocks, including pure vegetable oils, waste cooking oils, and animal fat; however, the limited supply of these feedstocks impedes the further expansion of biodiesel production.

Microalgae have been recognized as potentially good sources for biofuel production because of their high oil content and rapid biomass production. In recent years, use of microalgae as an alternative biodiesel feedstock has gained renewed interest from researchers, entrepreneurs, and the general public. Food sourced feedstocks biodiesel concerns have increased the interest in developing second generation biofuels produced from non-food feedstocks such as microalgae, which potentially offer greatest opportunities in the longer term. Using algae as a feedstock for biodiesel has been considered for a number of years, but it has always had limitations, due mainly to the production methods used to grow and harvest the algae.

This paper reviews the current status of microalgae use for biodiesel production, including their cultivation, harvesting, and processing. The microalgae species most used for biodiesel production are presented and their main advantages described in comparison with other available biodiesel feedstocks. The various aspects associated with the design of microalgae production units are described, giving an overview of the current state of development of algae cultivation systems (photo-bioreactors and open ponds). Other potential applications and products from microalgae are also presented such as for biological sequestration of CO₂, wastewater treatment, in human health, as food additive, and for aquaculture.