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## **Biodiesel from Algae**

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The progressive reduction of high-quality-easy-to-extract energy is a widely recognized and already ongoing process. Continued use of petroleum sourced fuels is now widely recognized as unsustainable because of depleting supplies and the contribution of these fuels to the accumulation of carbon dioxide in the environment. Renewable, carbon neutral, transport fuels are necessary for environmental and economic sustainability. Biodiesel produced either from living organism or from metabolic by- products (organic or food waste products) Unfortunately, biodiesel from oil crops, waste cooking oil and animal fat cannot realistically satisfy even a small fraction of the existing demand for transport fuels. As demonstrated here, microalgae appear to be the only source of renewable biodiesel that is capable of meeting the global demand for transport fuels. Like plants, microalgae use sunlight to produce oils but they do so more efficiently than crop plants. Oil productivity of many microalgae greatly exceeds the oil productivity of the best producing oil crops. Methods for making microalgal biodiesel economically competitive with petrodiesel are discussed.

## **Production of Biodiesel**

There are different varieties of microalgae which contain oil. Microalgae are chosen for the production of biofuel based on their oil content. The scientists that make the biodiesel try to identify the species of microalgae that have the most oil within their cells and also the microalgae that grows best within its environment. Some microalgae have lots of oil, but are very fragile and so will not grow well at large scales. Once grown, the oil is removed from the microalgae using chemicals or by squeezing oil out of the cells using scientific equipment. Then the oil is used as an ingredient in biodiesel. This oil is changed chemically from plant oil to biodiesel. The finished product can be used on its own as pure biodiesel but is normally mixed with ordinary diesel and used directly in cars.

## **Advantages of using algae as biofuel**

Biofuels have many advantages as sources of renewable energy. Algae occur naturally, grow quickly and produce oxygen by photosynthesis. Macroalgae don't grow on land and so do not compete with land based plants which are normally used for food. Biofuels reduce air pollution. They are described as "carbon neutral". This means that carbon dioxide is used by algae and plants from the atmosphere during photosynthesis to make their own food but the same amount of carbon dioxide is also returned to the atmosphere when used as a biofuel. This means that additional carbon dioxide is not being added to the atmosphere that is not 'fixed' again in the near future in macroalgae again. As we know that burning fossil fuels such as petrol or coal increase pollution and increases carbon dioxide. Carbon dioxide is a greenhouse gas and governments throughout the world would like us to reduce the amount of greenhouses gases and pollution. Using biofuels could help to reduce the amount carbon dioxide in the atmosphere.

## **Conclusion**

As demonstrated here, microalgal biodiesel is technically feasible. It is the only renewable biodiesel that can potentially completely displace liquid fuels derived from petroleum. Economics of producing microalgal biodiesel need to improve substantially to make it competitive with petrodiesel, but the level of improvement necessary appears to be attainable. Producing low-cost microalgal biodiesel requires primarily improvements to algal biology

through genetic and metabolic engineering. Use of the biorefinery concept and advances in photobioreactor engineering will further lower the cost of production. In view of their much greater productivity than raceways, tubular photobioreactors are likely to be used in producing much of the microalgal biomass required for making biodiesel. Photobioreactors provide a controlled environment that can be tailored to the specific demands of highly productive microalgae to attain a consistently good annual yield of oil.