Algae....the Greener Fuel, Year Four

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Which harvest/extraction method will be most efficient for extracting lipids from Chlorella vulgaris grown heterotrophically? Will Chlorella vulgaris biodegrade atrazine that is used as a nutrient source? Algae biofuel is renewable energy, is biodegradable, and produces less air pollution and carbon dioxide, so finding the most efficient system for growing, harvesting and extracting oil from algae is important. If wet and dry harvest and extraction methods are compared, then wet methods that omit the dewatering phase will be most efficient in extracting lipids from Chlorella vulgaris. Additionally, Chlorella vulgaris will successfully degrade atrazine. Two strains of Chlorella vulgaris were grown in heterotrophic bioreactors until stationary phase. The algae was monitored daily and cells were counted with a hemocytometer. Cell density, growth rate and biovolume were determined. Atrazine was added to and the cultures was analyzed. No atrazine was found in either algae culture. Lipids were harvested and extracted by wet and dry methods and compared. The amount of oil produced between the two methods was not significantly different, but the cost and energy usage in the dry method was significantly higher. The fatty acids produced were short chain and most were saturated. A controlled heterotrophic environment for growing Chlorella, and energy efficient and cost effective extraction methods produce lipids that are feasible for biofuel. Also, Chlorella vulgaris may break down atrazine. Further study will examine the extraction of co-products along with oil to reduce cost. In addition, continued research is indicated on the breakdown of atrazine by Chlorella vulgaris.

Awards Won: