Algae....the Greener Fuel, Year Three

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Will a heterotrophic method for growing Chlorella vulgaris, when compared to autotrophic and mixotrophic methods, produce a high algal growth rate and lipid content, thereby reducing the energy input and expense of algae biofuel production? Algae biofuel, a renewable energy source, is biodegradable, and produces less air pollution. Algae also use wastes and power plant emissions as a source of organic nutrients. If heterotrophic, mixotrophic and autotrophic algae growth conditions are compared; then the heterotrophic method will produce greater algal growth leading to higher lipid content, thereby reducing the energy input and expense. The algae was grown in flasks using the three growth methods. Autotrophic used growth lights, mixotrophic used the growth lights, glucose and/or atrazine, and heterotrophic used glucose and/or atrazine. Temperature, pH and growth were measured daily and carbon dioxide was measured at the beginning and end of each of the four trials of fourteen days. The algae was dried and massed and lipids were extracted. The mixotrophic glucose algae produced the most dried algae, followed by the heterotrophic glucose atrazine and the mixotrophic glucose atrazine. The heterotrophic glucose atrazine produced the highest percent of lipids, followed by the mixotrophic glucose atrazine and mixotrophic atrazine. Statistical analysis did not reject the null hypothesis, showing that heterotrophic growth methods seems to be a viable means of growing algae and producing high levels of lipids in an energy efficient manner when compared with autotrophic and mixotrophic methods. Further study will examine which extraction methods are most effective and energy efficient.

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