Symbiotically Grown Algal-Fungal Cultures for Economically Feasible and Sustainable Biofuel Production

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The purpose of the project was to determine a growth method of Chlorella vulgaris that is economically feasible and sustainable for large-scale production. The fungal strain, Aspergillus niger, was investigated to improve the growth of algae by capitalizing on the symbiotic relationship between algae and fungus. Different growth mediums were tested and analyzed for economic feasibility and sustainability with algae and algae/fungus combinations. Optical density, cellular density, and final cell density were measured to calculate growth rates and final biomass concentrations for each of the ten variations tested. Turns out, the fungus is able to increase the algae concentration by 5 times due to the natural gas exchange between the two organisms. Additionally, no expensive gas exchange equipment is needed, which is 22% of the total cost of algae biofuels (currently at $20 per gallon according to the Department of Energy). These improvements are projected to lower the cost of algae biofuels to under $6/gallon. Additionally, if the fungus and algae are grown in worm casting medium from vermicomposting, the cost will decrease to under $3/gallon, thus making it competitive with current gasoline prices. In the future, the cost could decrease to $2/gallon by combining the method of fungal extraction with algal-fungal growth. Algal-Fungal biofuels are competitive with current gasoline prices, require low energy input, can grow on waste material, and are more durable than current algae biofuels. They are a sustainable fuel for the future. Results such as these have never been seen in the algae biofuels field and will no doubt provide endless benefits for the growing world.

Awards Won:

Second Award of $2,000