CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)

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Project Number

S1727

Project Title

Algae in Waste: Creating Profit from Waste by Growing Algae in Reclaimed Waste Water

Abstract

Objectives/Goals

An experiment was conducted to identify if algae grown in waste water could be an economically viable way to grow algae. For this experiment, six tubes of Nannochloris oculata were grown in two tubes filled with one of three treatments.

The first of these was filtered sea water which was pumped from the Scripps pier in San Diego. This was used as the control for the experiment. The next solution is called f/2. This is a commonly used general enriched medium designed for growing coastal marine algae. It is commonly used in laboratories working with algae to maintain a healthy, steady colony. The third media was an experimental treatment of waste water matched to the nitrate, salinity, and pH of f/2. Optical density was measured as a proxy for growth at 24 hour intervals. These ODs measured the absorbance of light at 750 nm.

Hypothesis: The algae species Nannochloris oculata, when grown in a solution of waste water and sea water, will produce more biomass than if grown in filtered sea water or f/2 alone.

Results

This experiment found that the experimental treatment of waste water grew the algae at a faster rate compared to the sea water and f/2 media and ultimately produced a greater amount of biomass. This experimental treatment would be a good use of multiple forms of waste. The algae could use waste water from a municipal waste treatment center, waste CO2 from a power plant, and sunlight to create biomass. In the near future, this treatment of algae may have a number of practical applications and profitable uses.

Conclusions/Discussion

This experiment supported the hypothesis. This can be explained by the excess nutrients available in the waste water. Growing algae in wastewater could be a potentially useful way to reduce waste and, using sunlight, turn it into a beneficial product. If algae becomes a commercial industry, this experiment could be a preliminary test to see if waste water grows algae well. The biomass has many potential uses, which include bio-fuel, fish feed, and ethanol. This will help contribute to the fight against the effects of global warming. The algae can help scrub harmful chemicals out of the wastewater and produce clean drinking water. This system could potentially use the waste water that is being pumped into the ocean every day. The algae will ultimately reduce waste and create viable products.

Summary Statement

This experiment tested growing algae in a wastewater solution to identify if growing algae in waste would be an acceptable way to reduce waste and create a product with commercial potential.

Help Received

I used the Scripps Institution of Oceanography Photobiology Group's lab under the supervision of Greg Mitchell and my mentor Ben Neal.