CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1704

Project Title
Micro-Algal Growth in Cow Manure

Abstract

Objectives/Goals
The objective of my project is to determine whether micro-algae grown with cow manure will grow at the same rate as micro-algae grown with commercial algae food.

Methods/Materials
First, I mixed distilled water and aquarium salt and then created two dilution series; one with five concentrations of commercial algae food (trademarked as "Algae Grow") and one with six concentrations of cow manure extract. I got the cow manure from the manure retention pond at a local dairy farm owned by Tim Jones in Humboldt County. This composted manure is used to fertilize fields in the late spring and summer. To process the cow manure, I strained it in a coffee strainer, put it in a table top centerfuge for 10 minutes at maximum speed and collected the clear supernatant. The manure extract was then frozen until needed. I next added 0.1ml of Nannochloropsis (a micro-algae) to each jar, then randomized the position of the jars on a Sunray Happy Lamp and the temperature was maintained at 24 degrees Celsius. The photoperiod was 12 hours light/12 hours dark. I let the algae grow for four days. On the fifth day, I counted the number of algae cells using a hemocytometer under a compound microscope at 100x magnification. I repeated my entire experiment again several weeks later.

Results
The micro-algae that were grown with the highest concentration of cow manure grew as well as the algae grown with the commercial food, Algae Grow. The results from the combined Algae Grow and cow manure extract suggest that adding cow manure extract to lower-than-recommended concentrations of Algae Grow helps to maintain higher growth rates.

Conclusions/Discussion
My conclusion is that you can grow micro-algae with cow manure as well as the commercial food, Algae Grow, but with a higher concentration of cow manure. Cow manure extract at a concentration of 100x was better than Algae Grow at a concentration of 1x. Micro-algae are a very good candidate for an alternative energy source because they have a rapid growth rate, are easy to grow, and have been shown to produce 1,850 gallons of oil/acre/year. Using cow manure to grow micro-algae instead of commercial algae food would reduce the cost of purchasing the more expensive commercial food by reducing the concentration needed. My results could help dairy farmers in Humboldt County by providing them with another way to recycle manure and another source of income.

Summary Statement
My project measured the growth rate differences of growing micro-algae with commercial algae food compared to cow manure.

Help Received
My dad helped me develop my hypothesis and methods. Tim Jones helped me get the cow manure. A marine lab technician provided me with the micro-algae, commercial media, and hemocytometer.