CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
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Project Number
J0804

Project Title
Slowing Global Warming by Nutrient and Iron Fertilization of Oceanic Phytoplankton

Abstract

Objectives/Goals
The purpose of my project was to test whether nutrient and iron fertilization of oceanic phytoplankton can reduce the amount of CO2 in the air thus slowing down global warming.
My hypothesis was that the iron and nutrient fertilization of oceanic phytoplankton will lead to a decrease in the amount of CO2 in the air.

Methods/Materials
Besides phytoplankton, nutrients and iron sulfate, I used bottles, tubes and air pumps to grow phytoplankton, distilled water, sea salt, blender and a measuring scale to simulate sea water, and a CO2 meter, sealed container and computer to measure CO2 changes.
For my 1st experiment I measured the increase in phytoplankton growth by varying nutrients between 0 (the control), 2, 4 and 8 ml and iron between 1.57 and 0.78 mg. I used 500 ml of sea water medium and 50 ml of phytoplankton for these experiments.
For my 2nd experiment I measured the change in absorption of CO2 by varying nutrients to phytoplankton selected from my first experiment mixed in sea water medium. I added 20 ml of phytoplankton from the control and the greenest bottle into 200 ml of medium.
For my 3rd experiment I measured the change in absorption of CO2 by using 200 ml of undiluted phytoplankton.

Results
In the 1st experiment I found that the best growth of phytoplankton was generated by adding 2 ml of nutrients added to 500 ml of medium and 50 ml of phytoplankton. The experiments using iron fertilization failed to produce results and the phytoplankton ended up dying.
In the 2nd experiment I found that using 0.8 ml nutrient for 200 ml of medium results in the most decrease of CO2. This combination resulted in a 16.3% average decrease in CO2 after 6 days.
In the 3rd experiment I found that using phytoplankton culture undiluted with medium results in a dramatic reduction of CO2 within the sealed container - an average of 55.8% reduction after 6 days.

Conclusions/Discussion
The hypothesis that the fertilization of oceanic phytoplankton will lead to a decrease in the amount of CO2 in the air was partly proven because adding the recommended amount of nutrients resulted in the growth of phytoplankton, which led to the reduction in CO2. However the iron experiments did not produce the expected results as the phytoplankton kept dying. Using undiluted cultured phytoplankton resulted in a dramatic CO2 reduction of 55%. These reductions in CO2 will lead to a slowing of global

Summary Statement
My project explores whether global warming can be slowed by the nutrient and iron fertilization of oceanic phytoplankton.

Help Received
Dr. Behrenfeld from Oregon State Univ, Dr. Matsumoto from MBARI, Jennifer Broughton, Anna McGaraghan, and Regina Radan from the Univ of California at Santa Cruz, and Rebecca Asch from Princeton Univ answered my questions; Parents helped set up board and tubing for the project.