Name(s)

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Project Number

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Project Title

Iron: A Solution to the Negative Effects of Increased Temperature on the Photosynthesis of Spirulina major

Abstract

Objectives

The purpose of this project is to use iron as a possible solution to the effects of an enduring problem, increasing temperatures in ocean waters, and its negative effects on the photosynthesis of cyanobacteria (Spirulina Major). The hypothesis for this project is if increased temperatures affect the photosynthesis and behavior of Spirulina Major, then iron will counteract these effects and produce more oxygen. It was decided to use iron because iron has proven effective in the past for Iron Fertilization.

Methods

The main materials used for this project was Spirulina major (30 milliliters), a microscope, a dissolved oxygen water test kit, and 2 portable heaters. Along with this, a portable milligram scale was used to measure various minerals. Most of the materials used came from Carolina.com, an online source to buy scientific equipment. For this experiment, the testing was done in two sets, Set 1 and Set 2 with an interval of five days each. Spirulina major samples (Sample A and Sample B) were set in three locations with three different temperatures (20?, 22.5?, 25?). The Sample A solution was made up of Spirulina major without iron and Sample B with iron. Each day, 25 milliliters of the solution was taken from each of the 6 samples using a pipette to a petri dish and was observed with a microscope. The dissolved oxygen was then tested using the dissolved oxygen test kit.

Results

After testing, it was found that there was less oxygen in the samples without iron at higher temperatures. It was also seen that there was a gradual increment of dissolved oxygen in the samples with iron at increased temperature locations. Another observation made was that the cyanobacteria in Sample B had more mobility than Sample A. Finally, it was seen that the color of the cyanobacteria changed greatly, especially in Location 3. While in Location 1 and Location 2, the color went from a dark green to almost a light green, the cyanobacteria at Location 3 changed from a dark green to transparent.

Conclusions

With the results from testing, it was found that there was a negative effect of increased temperature on the photosynthesis of Spirulina major. The results also showed that the iron did counteract this effect and helped the Spirulina major go back to its regular rate of photosynthesis. This could have been because of the chloroplasts in the cyanobacteria. Chloroplasts are small organelles in a cell that aid in the process of photosynthesis. Iron is a nutrient that is necessary for chloroplasts, and because chloroplasts are important to photosynthesis, the iron could have countered any effects that the increased temperature had on the

Summary Statement

This project addresses the issue of the effects of increased temperature on the photosynthesis of cyanobacteria and how iron can be applied to counter the negative effects.

Help Received

Dr. Arlene Haffa, a microbiologist at the California State University, Monterey Bay, gave us resources to help with the procedure and research of our project. Mr. Alex Hofsteen, our advisor led us through the process of the science fair. Our parents supported us and gave us guidance when needed.