



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Brayden Stark	Project Number S0922
Project Title A Systematic Method to Reduce the Biomass of a Harmful Algal Bloom (HAB)	
<p style="text-align: center;">Abstract</p> <p>Objectives The purpose of my research is to examine methods to economically and safely reduce the density of cyanobacteria within mimicked oceanic Harmful Algal Blooms. Once the cyanobacteria cell colonies become visible the next step is to identify the most effective method to inhibit nitrogen-fixation in order to reduce the biomass of the cyanobacteria bloom.</p> <p>Methods The cyanobacteria strains of Gloeocapsa, Gloeotrichia, Nostoc, Oscillatoria, and Anabaena were acquired from Ward s Science. Bold s Basal Medium was prepared through six stock salt solutions of NaNO₂, MgSO₄X7H₂O, K₂HPO₄, KH₂PO₄, CaCl₂, and NaCl. Allens Blue-Green Medium was created and consisted of 1.59g of NaNO₃, .039g of K₂HPO₄, .075 MgSo₄, .02g Na₂Co₃, .058g NaSio₃, .001g EDTA, and .006g citric acid. A solidified modification of Bold s Basal Medium was purchased from Phytotech Labs and 50g was mixed with 40 mL of distilled water and 1 mL of 1% Sulfuric Acid. The solidified Bold s Basal Medium had a pH of 2.98 and was adjusted to 6.68 pH using a 6 molar concentration of sodium hydroxide and hydrochloric acid.</p> <p>Results The three mediums were compared to determine the optimal pH, salinity, temperature, and lighting environment to mimic an oceanic Harmful Algal Bloom. 2 mL of solidified Bold s Basal Medium was added to 10 mL of Oscillatoria and 10 mL of Anabaena, which proved to be the optimal growth medium. Samples were placed in indirect sunlight at 22 degrees Celsius and were adjusted to 6.68 pH. The growth of the cyanobacteria was measured every day for two weeks using a spectrophotometer, and the results indicate that transparency decreased and absorption rates increased for all samples during the testing period. Measurements were taken at 400 nm and 750 nm to ensure that data was consistent along various wavelengths of the light spectrum.</p> <p>Conclusions Through various trials and experiments I was able to start the process of determining the optimal conditions for rapid cyanobacteria growth within a controlled environment. The addition of 2 mL of Bold s Basal Medium and adjusted pH of 6.68 will allow for optimal growth conditions of Anabaena. Additionally, indirect sunlight and a temperature of 22 degrees Celsius have yielded the best results. This means that that rapid growth of cyanobacteria can occur within the test tubes and form visible cell colonies, thus mimicking an oceanic Harmful Algal Bloom.</p>	
Summary Statement I am in the process of mimicking a Harmful Algal Bloom to study methods to systematically reduce the biomass of cyanobacteria within a bloom.	
Help Received I designed the experiments myself after reading scientific journal articles about growth of cyanobacteria. My project advisor and former Biology teacher Dr. Gonzalez supervised me while I created the culture mediums.	