CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

S2114

Project Title

Effects of Inhibiting and Enhancing Water Pollutants on Microorganism Mortality at the Arcata Marsh

Abstract

Objectives/Goals

The objective of this project is to determine the effects of an enhancing water pollutant, fertilizer, and an inhibiting water pollutant, chlorine, on the mortality of freshwater microorganisms at one of the nation's most ecologically responsible water treatment facilities located in Arcata, California.

Methods/Materials

Materials: Water samples from the Arcata Marsh Log Pond, chlorinated tap water tested for residual free chlorine utilizing DPD free chlorine reagent, measurable fertilizer components: phosphorus, nitrogen and phosphate. Method: Utilizing a series of concentrations of chlorinated tap water and each of the three fertilizer components to pollute measured samples of Log Pond freshwater, mortality and health of populations of Euglena, Daphnia, Coleps, Rotifers, green algae, diatoms, and Cyclops were observed and recorded.

Results

After 72 hours, all of the freshwater microorganisms in all concentrations of chlorinated water died. Using similar concentrations of fertilizer to the concentrations of chlorine, the microorganism populations increased significantly, beginning with the green algae. Increasing fertilizer concentrations to that similar to the salinity concentrations used in the prior year's experiment led to the death of microorganism populations within 120 hours.

Conclusions/Discussion

Inhibiting pollutants such as chlorine will lead to the eradication of Euglena, Daphnia, Coleps, Rotifers, green algae, diatoms, and Cyclops in freshwater ponds at the Arcata Marsh. Enhancing pollutants such as fertilizer kept at low concentrations increases populations of green algae. This then leads to increased numbers of microorganisms that feed on green algae. Increasing the concentration of fertilizer to that which may be leaching into the soil from numerous illegal and unregulated cannabis grow sites in Humboldt County proved to be detrimental to the freshwater microorganisms at the Arcata Marsh.

Summary Statement

Chlorine water pollution, even at low concentrations, increases mortality of freshwater microorganisms while fertilizer enhances populations of microorganisms at low concentrations and becomes a detriment as concentrations increase.

Help Received

After researching the processes for cleaning waste water in an ecologically safe manner at the Arcata Marsh, I designed and performed this experiment myself.