A Holistic Engineering Plan Incorporating Predictive Data Modeling into the Process of Remediating Cyanophyta Algae Blooms and Applying Photoautotrophic Prokaryotes Biomass to Improve Agricultural Outcomes

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This experiment can be defined as having two parts: the predictive model for blue-green (cyanobacteria) algae blooms and the tests for ecological damage due to these blooms. A computer program was created that can determine the location of a cyanobacteria algae bloom within the next 4 to 7 days using the nitrate, saline, and temperature levels from 10 sites in the Indian River Lagoon and St. Lucie Estuary from Harbor Branch's LOBO network and data thresholds from previous individual research. In addition to predicting cyanobacteria algae blooms in the IRL/SLE with 93% accuracy, the computer program also predicts the cause of the algae bloom and suggests preventive measures to limit the severity of these bloom. The computer program is a Node.JS application built on the Express framework using MySQL, Pusher, and EJS webpages An iOS application was built with the ability to send local notifications warning about possible blooms within 4 to 7 days. The second part of the experiment is to determine the effect of algae usage on the growth of radishes and tomatoes. These crops were grown for two weeks in trials exposed to three additives: fertilizer, algae, and fertilizer/algae mix. For both plants, algae usage limited plant growth. The data also suggests that the introduction of fertilizer to an algae bloom can cause plant biomass to decrease up to 88%. This project provides the mechanism for predicting cyanobacteria algae blooms in the IRL and SLE additionally demonstrating the ecological damage of algae blooms.

Awards Won:
Fourth Award of $500