Modeling in vitro Environmental Impacts on Nutrient Remediation in Immobilized Chlorella vulgaris (A Novel Second Year Study)

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Florida’s waters have been plagued by HAB’s (Harmful algal blooms). In the Caloosahatchee, Cyanobacteria are a concern because of their quick proliferation and release of cyanotoxins. One major contributor to algal blooms is excess nutrient loading from Okeechobee releases and stormwater runoff. The purpose of this project is to restore Florida's waters to natural nutrient levels. Research in using immobilized microbes suggests that they are effective at removing nutrients and easy to manage. A concern is they break down in high flow or high agitation conditions. A water sample contains 0.4 ppm Nitrate and 0.64 ppm orthophosphate was made, the lab supervisor immobilized Chlorella vulgaris in calcium alginate, and the beads created were used to remediate orthophosphate and nitrate from solution for 7 days. The beads were tested in high flow and agitation to determine if they were still effective. The beads were removed and the water samples tested for orthophosphate and nitrate. The beads with Chlorella Vulgaris removed the most nutrients, in the controlled environment. The different, synthetic environmental conditions affected the remediation process slightly, but the beads still removed a statistically significant concentration of the nutrients. An ANOVA test gave a p-value of 0.02 for nitrate between the groups and .000000001 for the orthophosphate groups which supports the hypothesis. A t-test in between Chlorella vulgaris and positive control, calcium Alginate bead, groups gave a p-value of 0 indicating that it is not likely that the differences between the groups was due to random chance. Therefore the data suggests that environmental impacts did not significantly impact the bioremediation of the nutrients.

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