Analyzing In-situ Environmental Impacts on Long Term Durability, Cohesivity, and Viability Sodium Alginate Immobilized Chlorella vulgaris Bioremediation Units (A Novel Third Year Study)

Barnes, Morgan (School: Canterbury School)

Florida’s waters have recently been plagued by Harmful algal blooms. Although a variety of factors may act as contributors, nutrient loading is often cited as a major factor. Previous research determined that using Chlorella Vulgaris infused Sodium Alginate beads was an effective strategy to return hypereutrophic systems to natural nutrient levels. Determining if these bio-active bioremediation units (BABU) would be able to function in actual open water systems was explored. The BABU were distributed in various locations in the school's freshwater retention pond. The viability and cohesivity were measured for two months to determine durability. The in-situ data was compared to in-vitro measurements to determine if environmental variables impact the long-term application of this bioremediation strategy. The BABU remediated 80% of the nutrients in both in-vitro and in-situ environments. An ANOVA test analyzing the difference in viability between the groups generated a p-value of 0.227966 for nitrate and 0.468 for the orthophosphate depletion. A penetrometer was used to determine if the BABU maintained its cohesivity over time by measuring the Pa withstood till structural collapse. An ANOVA was used to compare the cohesivity in in-situ and in-vitro conditions generating a p-value of 0.1740. As all p- values exceeded the alpha value of 0.05, we failed to reject the null hypothesis, "Environmental impacts will not decrease the effectivity of immobilized bio remediable organisms." Since there was no statistically significant difference in the viability and cohesivity of the BABU in in-vitro compared to in-situ conditions, the data suggests that the introduced environmental variables did not impact the viability or cohesivity of the BABU over two months.

Awards Won:

Fourth Award of $500