Evaluating Phosphorus Absorbing Materials for the Mitigation of Harmful Algal Blooms (HABs)

Le, Savio (School: Holy Rosary Academy)

Harmful algal blooms (HABs) have greatly devastated the world's aquatic ecosystems. Therefore, it is an objective to find a viable solution to a detrimental problem. The root of the problem lies within fertilizer which contains phosphates. The agriculture run-off soon becomes pollution as it enters wild ecosystems. The solution should be sustainable and environmentally safe to solve a problem rooted in pollution. This experiment evaluates phosphate absorbing materials (PAM) for the mitigation of algal blooms. Since phosphate is a limiting nutrient and an essential component of fertilizer, materials which remove phosphates are most conducive to mitigating algal blooms. In total, the experiment selected 11 materials known for their tendency to chemically bind with phosphorus. To test their efficiency in phosphate removal, the experiment designed three processes: Filtration, Enclosed Delivery, and Sedimentary Delivery. The Filtration involved water flowing through a filter containing the PAMs. While with Enclosed Delivery, packets containing the PAMs passively absorb phosphates in the water. Lastly, Sedimentary Delivery places the PAMs into the water, and the PAMs then settles at the bottom. Upon completion, the project determined that fly ash (FA) was the best candidate for mitigating algal blooms. FA is widely available and its absorption rate of phosphorus is the most favorable. With Enclosed Delivery, FA decreased a solution of 100 ppb to 27 ppb in phosphate levels. Overal, FA poses to be the best candidate. It is easily accessible and holds the most potential regarding phosphate removal.

Awards Won:

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