The Effects of Serratia marcescens Algicidal Production of Prodigiosin on the Growth of Microcystis aeruginosa: An Environmentally-Preventative Approach

Morris, Emerson (School: St. Patrick Catholic High School)

The 2019 Microcystis aeruginosa bloom instilled economic and environmental disaster along the Mississippi and Louisiana Gulf Coasts due to the creation of eutrophic freshwater zones in natural saltwater environments. A public health and wellness concern, cyanobacterial production of neurotoxins and hepatotoxins alongside the cultivation of Vibrio vulnificus lead to the closure of beaches and a complete loss of maritime industry for six months. This experiment approaches a solution to M. aeruginosa's invasive growth: the algicidal biomolecule, prodigiosin, developed by microbial fermentation using Serratia marcescens as a model organism due to accessibility. In a BSL-1 lab, ten plates of M. aeruginosa were tested, and S. marcescens was added to five; the plates were incubated for a period of 96 hours at 47 degrees celsius. On the plates containing S. marcescens, the alkaloid red bio-dye characteristic of prodigiosin came into view after 24 hours of incubation. Complete inhibition of M. aeruginosa growth was observed on the five plates with S. marcescens, proving the inhibitive qualities of prodigiosin. Using prodigiosin and its results within this experimentation, an algicidal treatment of the biomolecule can be administered to regulated industrial dumping to prevent a large-scale Microcystis aeruginosa bloom. Alongside the use of an algicide, further disaster mitigation policy by the federal government, regulations on industrial pollutants, wire filtration, and Crassostrea virginica beds are viable measures to prevent this large-scale of a disaster from occuring again.