

The Effects of Mississippi River Pollutants on the Growth of *Microcystis aeruginosa*

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In 2019, *Microcystis aeruginosa*, a cyanobacterium found in eutrophic environments, bloomed along the Mississippi Gulf Coast due to a sudden deluge of freshwater from the opening of the Bonnet Carre Spillway in St. Charles Parish, Louisiana. *M. aeruginosa* is an ecological and public health concern due to its production of neurotoxins (lipopolysaccharides) and hepatotoxins (microcystins), and ingestion causes vomiting, diarrhea, and lethargy. *Vibrio vulnificus*, a flesh eating, pathogenic bacteria, thrives from the availability of *M. aeruginosa* and its organic qualities. *V. vulnificus* infections have a 31% mortality rate from seafood exposure (i.e. raw shellfish, crab, and shrimp). This experiment measures the growth of *Microcystis aeruginosa* with the addition of common pollutants in the Mississippi River: calcium hydroxide Ca(OH)_2 , lead nitrate $\text{Pb(NO}_3)_2$, cow manure, nitrogenous soil, and iron metal. A solution of sodium chloride and water was created in a BSL-1 lab; this solution was combined with *M. aeruginosa* and each additive and was incubated for 96 hours. This experiment proves the presence of pollutants enhances the growth of *Microcystis aeruginosa*. Cultural eutrophication of the Mississippi River is caused by centuries of unmonitored dumping from industrial, agricultural, and wastewater industries. Eutrophication prevention can be implemented through *Crassostrea virginica* beds (non-edible), wire filtration devices, and more screening from the Environmental Protection Agency (EPA). An algorithm is being developed to alert engineers and policymakers when favored conditions arise for an *M. aeruginosa* bloom.

Awards Won:

Fourth Award of \$500