Microscopic Menace: What Are the Effects of Cyanobacteria Blooms on Primary Productivity, Toxicity, and Microorganisms?

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Cyanobacteria blooms in rivers have grown in intensity due to climate change and water pollution. During these blooms, microcystis, a type of cyanobacteria, releases toxins called microcystins. These toxins harm organisms and, in high concentrations, can cause kidney failure in humans. Over two years, we studied how the cyanobacteria bloom from the Willamette River's Ross Island Lagoon influenced microscopic communities by researching two sites — one unaffected control site upstream of the bloom and one downstream. We focused on microorganisms because they indicate overall ecosystem health. In 2022, we studied the cyanobacteria bloom from late July to late August. We did so by testing water quality and taking plankton samples, from which we cataloged the microorganism population through microscope analysis. We also studied chlorophyll density and microcystin content. We found that the diatom genus melosira directly correlated with cyanobacteria levels, so melosira could potentially indicate blooms. We also discovered microcystin levels peaked two weeks after cyanobacteria, signifying that toxins are likely released during cell death. The microcystin peak also occurred during the lowest temperatures at both sites, which suggests that the low temperatures could have stressed the bacteria and possibly prompted toxin release. Continued studies of this relationship could allow for toxicity modeling. By demonstrating the impact and potential mechanisms of these blooms, our data highlight the need for further research on the ecological effects of cyanobacteria blooms. Shifts in microorganism compositions have implications for the entire food web and sound the alarm for better environmental practices.

Awards Won:
Second Award of $2,000