Evaluating the Effects of Ash Contamination on Diatom Photosynthesis

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Over 75,000 wildfires occurred in North America in 2025. Smoke and ash from these fires contribute to both air and water pollution. Over 5,000 of these wildfires impacted the Great Lakes as ash has been found to impact the amount of primary productivity in aquatic systems. The two goals of this project were 1) to investigate the effects of ash on the photosynthesis of two groups of diatoms (Navicula and Synedra); and 2) to study the effects of a natural flocculant as a remediation agent. Phase I of this experiment investigated the impact on different concentrations of black spruce ash on both Navicula and Synedra. Phase II of this experiment investigated the impact of light color and ash concentration on both groups of diatoms. Phase III of this experiment investigated the use of barley extract, a natural flocculant, as a possible remediation agent to the ash. As ash concentration increased, the levels of dissolved oxygen significantly decreased ($p < 0.05$). In ash concentrations below 0.5 g/L, red light produced significantly less dissolved oxygen in comparison to white light. At concentrations at and above 0.5 g/L the addition of a barley flocculant significantly increased the dissolved oxygen production. Barley extract, a natural flocculant, has been found to have remediation properties to aquatic ecosystems exposed to ash.

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