A Survey of Lichen Diversity in Fulton County OH Cemeteries and Spectrophotometric Analysis for Use as Air Quality Indicators, Year Two

Hagans, Carsyn (School: Archbold High School)

The purpose of this project was to determine whether lichens could serve as viable bioindicators of the presence of metal pollutants. Lichens are known sulfur dioxide air quality indicators. The research goal was to compare whether a difference existed between common and rarely occurring lichens' sensitivity to four metal pollutants. The experimenter surveyed lichen distribution on cemetery headstones in Fulton County, Ohio. In the testing phase, 15 samples weighing .3 grams of four lichen species (total n=60) were placed in 1% methylene blue solution for 30 minutes. After rinsing with distilled water, they were soaked in .1M solutions of copper (II) chloride, iron (III) chloride, potassium chloride, and sodium chloride. The larger the metal ion exchange, the more methylene blue would be released from the lichen and darken the solution. A spectrophotometer set at 485 nm was used to analyze absorbance units of the solutions at 24, 48, 96 and 144 hours post exposure. T-tests were used to analyze the data. A total of 12 lichen species were recorded in the survey phase. Flavoparmelia caperata (7% occurrence) and Rusavskia elegans (3% occurrence) had higher absorbance levels than Xanthomendoza sp. (83% occurrence) and Physconia detersa (67% occurrence) at all tested time intervals. This difference was significant at 24 hours (p=.007), at 48 hours (p=.012), at 96 hours (p=.003), and at 144 hours (p=.002). These findings support the need for continued research as lichens may be used as bioindicators for environmental testing of metal pollutants.

Awards Won: