CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Jasleen K. Bains

Project Number
S0803

Project Title
Investigating Arsenic Contamination in Older Cemetery Soils

Abstract

Objectives/Goals
Older cemetery soils were tested to see if there was any arsenic contamination in the soil. Older cemeteries were tested because arsenic was used as an embalming fluid, particularly in 1880s.

Methods/Materials
There were three main procedures: collection of soil, experiment for arsenic contamination, and test effect on daphnia. For collection of soil, 3 different cemeteries were tested, 2 graves per cemetery, and 3 distances (5 ft, 10 ft, 15 ft) from each grave and on all 4 sides of the grave, totaling 72 samples. A metal pipe was twisted 7 feet into the soil at the specified distance. The soil was mixed with water and filtered into a reaction bottle up to 50 ml. Next, the soil was tested for arsenic contamination. A test strip was inserted into the cap of the reaction bottle, two reagents were added to the sample. The test strip was removed 20 minutes later and compared with the arsenic level chart. To test effect on daphnia, the soil was mixed with water and 20 ml were filtered into a test tube. Five daphnia were added to the test tube and the death rate was timed. Note: All soil samples, even if no arsenic was present, were tested with the daphnia.

Results
Results indicate that the cemetery soils are more toxic than other soils (control). The higher the amount of arsenic, the more likely it was that the daphnia were killed. In some tests where there was not any arsenic present, the daphnia still died later, suggesting that other toxins were in the soil. The graphs also show a plume forming in which the arsenic levels crossed the daphnia death rate. This indicates that the ground water runs in the direction of the plume and thus the arsenic and any other toxins have moved in that direction.

Conclusions/Discussion
It appears that this study has brought a more precise understanding of older cemetery soils. They are more toxic than soils outside of the cemetery, because they have arsenic and other toxins which killed the daphnia. Thus, the objective was attained because toxins were found in the soil. Additionally, arsenic contamination in cemeteries has been unexplored and this investigation can lead to more experiments with the cemetery soils to clean the environment of arsenic contamination.

Summary Statement
My project seeks to investigate arsenic contamination in older cemetery soil, in addition to investigating their effect on daphnia.

Help Received
Mother paid for materials.