CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
J0506

Project Title
Abating Acid Rain

Abstract

Objectives/Goals
Objective: My project was to test what types of soils can best buffer acid rain. I made a hypothesis that sandy soils would buffer the acid the best due to their texture. My next question was if soils can effectively buffer acid rain, are plants still at risk due to foliage exposure.

Methods/Materials
Methods/Materials: I collected 5 soil samples. #1 clay, #2 and #3 sandy, and #4 and #5 loam. I placed 2 cups of one soil in a coffee filter, placed in a funnel on a cup. I poured distilled water (pH 7) into the soil then tested the pH of the water that percolated through. I repeated this procedure with distilled water + white vinegar (pH 4). All soil samples were tested. I used a #rapitest# garden soil test on all the soils. Then I tested the mineral calcium carbonate content of the soil by dropping 1 teaspoon of soil into 1 cup of white vinegar and recorded the fizzing of Co2 gas. I sprayed 5 daisy plants foliage with 4 acid solutions and distilled water for 2 weeks. #1-pH 2, #2-pH 3, #3-pH 4, #4-pH 5, #5-pH 7

Results
Results: Soil samples #1 and #2 buffered the acid solution to pH 5, #3 and #4 stayed at pH 4 and #5 neutralized the acid to pH 7 in the percolation test. This didn#t prove my hypothesis. I tested the pH of each soil; #1 and #2 were pH 8, #3 and #4 were pH 6, and #5 was pH 10. I saw a pattern. After the calcium carbonate test the pattern continued. Soils #1 and #2 had a little fizzing, #3 and #4 had no fizzing, and #5 had lots of fizzing of Co2 gas. The plant foliage test showed plant #1- completely dead, #2 -19 dead leaves, #3-6 dead leaves, #4 and #5 undamaged.

Conclusions/Discussion
Conclusions: After testing I concluded that the texture of the soil was not a factor in the soils ability to buffer the acid solution. It was the mineral content (calcium carbonate) of the soil that buffered the acid. I also concluded that even though some soils can buffer the acid rain the plants still may be at risk due to the exposure of the plant foliage. Very high levels of acid (pH 2) may kill the plant but lower levels (pH 3+) can weaken the plant foliage leaving it at risk. Acid rain should be eliminated at the source of the problem not just by correcting the pH balance of the environment.

Summary Statement
My project was to test different soil samples to find which soil can best buffer acid rain.

Help Received
Mother drove to get soil samples, took pictures.