CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
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Project Number
J0930

Project Title
Fungus Is Your Friend

Abstract

Objectives/Goals
The purpose of this enviromnental science project is to demonstrate that lichens, which are a symbiotic union of fungus and algae, can be used as effective bioindicators. Since lichens act like sponges that draw all nutrients they require from the air and rainwater, people should be able to determine whether or not air is safe to breathe simply by identifying the types of lichens in an ecosystem and evaluating how those lichens react to acid rain air pollution.

Methods/Materials
Crustose, Foliose and Fruticose lichens were subjected to thrice-daily applications of solutions of varying levels of acidity. I sprayed a sample from each of three species of lichen with a mild acidic solution (with a pH of 6.0), a sample from each species with a strong acidic solution (with a pH of 5.4, which is the level of acid rain), and samples from each species with distilled water, which has a neutral pH of 7.0. The effects of each solution on each type of lichen were monitored to reveal whether lichen can serve as a simple, low-technology means of monitoring the safety of the air we breathe.

Results
This experiment's results were not entirely what I had expected, since certain of the lichen samples died earlier than predicted. Fruticose lichen, which survive in wilderness areas, are sensitive to acid rain and did die rapidly. The Fruticose lichen sprayed with water died as rapidly as those subjected to acid, which was not anticipated and points to its sensitivity to elevated levels of acidity.

Conclusions/Discussion
This experiment proved that lichen can serve mankind as bioindicators of adverse levels of acid in the air we breathe. When the numbers of lichen in an ecosystem decrease, the lichen are telling us, by their absence, that something is wrong.

This experiment was difficult to quantify because I had no accurate, measurable means of assessing how much damage the solutions were doing to the lichen. My only means of evaluating the damage was visual observation, and interpretation of the changes observed.

Summary Statement
Lichens are an effective, low-technology way to monitor the presence of harmful acids in our air and rainwater.

Help Received
My Mother typed a portion of the report; My science teacher suggested that I use color as a means of tracking the failing health of the lichen.