CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Garnet A. Abrams

Project Number
J0801

Project Title
Mycofiltration: Does Straw with Mycelium Make a More Efficient Erosion Control Than Plain Straw Wattles?

Abstract

Objectives/Goals
The objective of this experiment was to find out if straw with mushroom mycelium growing in it will be a better erosion control by retaining road sediment runoff better than straw without.

Methods/Materials
I built a board 122 cm to imitate a road, with sides to contain all of the runoff. I spread 625 grams of soil over an 80 cm length of it and elevated one end to simulate a 5% grade. I then poured 8 liters of water, divided evenly into two watering cans, to replicate rain onto the soil. The water/soil ran unobstructed into a bucket at the end of the ramp in three of the tests. The water/soil ran through plain rice straw three times. The water/soil ran through rice straw inoculated with mushroom mycelium three times as well. I took a sample of the runoffs to find the Suspended Sediment Concentration (SSC). I used a vacuum filter to vacuum off most of the water in the samples, and then dried each filter with its soil sample in a 105º C oven for ninety minutes. The filters with soil were weighed; the weight of the filter then subtracted to find out how much soil was in each sample. The weight (mg) of soil was then divided by the amount of water/soil from the sample (L), to calculate the SSC.

Results
In the tests with no barrier, all 625 grams of soil washed down the ramp with 8 liters of water, so the SSC was 78,125 mg/L. The SSC average was 5,006 mg/L for the tests using plain rice straw, blocking 94% of the sediment. The SSC average for the straw with mycelium was 2,536 mg/L, blocking 97% of the sediment.

Conclusions/Discussion
The results of this experiment agreed with my hypothesis. The mycelium did work better, as I had thought it would, but the difference was not as significant as I had expected.
For this experiment to be applied to the real-world, I would see if straw wattles inoculated with mushroom mycelium are a feasible improvement to plain rice straw wattles. To do this experiment again, I would inoculate straw wattles with mushroom mycelium and use them on the sides of dirt roads as plain rice straw wattles are currently being used.
I felt I needed to do this model to obtain background information before doing it on a full scale.

Summary Statement
My project explored the possibility of increasing the efficiency of rice straw wattles used for erosion control by inoculating them with mushroom spores, creating a mycelium network to further increase their efficiency.

Help Received
Consultation and direction from Scientists from PALCO, Scotia, CA and Shawn Magnuson, President, Humboldt Bay Mycological Society. David Summerlin, Consultant, Fungi Perfecti, Olympia, WA, for supplies & advice. Doug Svendsen, for help building the ramp. My parents for support and transportation.