CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31122

Project Title
Will the Addition of Polyacrylamide to Hydrophobic Soil Affect Its Ability to Allow Water Percolation?

Abstract

Objectives/Goals
The purpose of my science project is to determine if the addition of polyacrylamide (PAM) will help water percolate through a hrydophobic layer of soil. This is important because hydrophobic soil causes greater water runoff which contributes to post fire mud slides. My goal is to find and speed up the rehabilitation process of hydrophobic soil.

Methods/Materials
I collected coarse, upland soil and covered it with dried leaves and wood. With supervision, I burned the organic material for 8 hours and then let it cool. I then did a WDPT test to determine if the soil was hydrophobic. I had 5 test soils: untreated soil, hydrophobic soil hydrophobic soil & linear PAM, hydrophobic soil & crosslinked PAM, and hydrophobic soil with both linear & crosslinked PAM. I placed 1 cup of test soil into clear tube that is standing on wire mesh with a measuring cup inderneath, then I had 147ml of water rain into the clear tube and measured the amount of water that percolated the soil in 30 minutes. I repeated this test for a total of 10 trials per test soil.

Results
The results show that the addition of both linear and crosslinked PAM actually made the soils water repellency worse. Untreated soil allowed an average of 84.2ml of water to percolate the soil and collect in the measuring cup, hydrophobic soil allowed an average of 42.5ml of water percolation, hydrophobic soil with linear PAM had 28ml of water percolation, hydrophobic soil with crosslinked PAM had 33ml of water percolation, while the hydrophobic soil with both linear & crosslinked PAM had 31.9ml of water percolation in 30 minutes.

Conclusions/Discussion
After completing my investigation I found that the addition of both linear and crosslinked PAM to hydrophobic soil made the soils water repellency worse. These findings are very important because both of these materials are widely used today to prevent soil erosion and to retain water, but applying either type of PAM to a post fire hillside could possibly contribute to a mudslide. I believe that finding a way to rehabilitate post fire hydrophobic soil would be both economically and environmentally beneficial.

Summary Statement
The purpose of my project is to determine if the addition of linear or crosslinked PAM to hydrophobic soil will increase water percolation thereby helping to rehabilitate post fire hydrophobic soil.

Help Received
Dr. Bob Sojka guided me to accurate research; Dr. Rick Lentz supplied the PAM; Peter Wohlgemuth helped with forest fire research; mom photographed the testing process; dad supervised the creating of hydrophobic soil