CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
22575

Project Title
Water Retention Is a Function of Soil Type

Abstract

Objectives/Goals
My project was to determine which soil retains the most water. My independent variable was the watex retained by the soil under the pull of gravity (field capacity) My dependent variable was soil type. I believe sand and gravel will retain the least water because they have large pore spaces. When It researched water retention in soil physics I found that the larger the air spaces the more rapidly the water€ will drain.

Methods/Materials
I collected seven soil samples from various locations. Bulk density and porosity were calculated from the volume of the container and the soil weight according to the following equations:

Bulk density = weight of soil/volume of container
Porosity = 1 - (bulk density / mineral grain density)

Volumetric water content was calculated by dividing the water retained by the soil by the volume of soil. Gravimetric water content was calculated by dividing the weight of the water retained by the dry weight of the soil.

Results
For the seven soils measured the average bulk density of three replicates ranged from 0.26 to 1.50 g/cm3. The soils with the highest values were coarse and medium gravel. The soils with smaller particles hx lower bulk density. The average porosity ranged from 0.43 to 0.73. The highest values were soils ox smaller particles (garden soil, topsoik, and subsoil). The lowest porosity were gravel and sand. Tx average volumetric water content at field capacity ranged from 0.07 to 0.56. The highest values werx potting soil, sand, and subsoil. The lowest were topsoil, coarse and medium gravel. The averagt gravimetric water content ranged from 0.07 to 0.62. The highest values were garden soil, subsoil, anx potting soil. The lowest were gravel and topsoil.

Conclusions/Discussion
I learned that different soil types retain water differently. My hypothesis was correct that gravel and san€ would retain the least water. I was surprised to learn that the finer grain soils (garden soil, topsoil, subsoi„ and potting soil) had more air space than the coarser grain soils. Water was retained in these small air spaces that I could not see. Water retention is an important property of soils that affects plant growth an€ suitability for building sites.

Summary Statement
Water retention is a function of soil type and an important property of soils that affects plant growth and suitability for building sites.

Help Received
father helped collect soil and conduct experiment. US Geological Survey provided balance, graduated cylinders, mother took pictures