

E.T. A LOCAL WAY OF LEARNING

Title: SOIL MOISTURE CAPACITY

Author: Jane Ducey
Eulalie Rivera Elementary School

Grade Level: 4-6

Concepts: 2. Ecosystem
6. Resources
12. Stewardship

Disciplines: 1. Social Studies
2. Science

Objective:

Student shall determine which soil type holds the most water, explain why, and tell how this has direct bearing on the kind of plant material the soil will support.

Rationale:

Different soils have different capabilities and limitations. Understanding the many qualities of soil and the part each plays in producing good soil for growing crops is a challenge for an elementary student. The goal is to get the greatest return with the least amount of water and nutrients, and do it in such a way that the land will remain fertile for a long time to come. We badly need to grow our own food in the Virgin Islands.

Directions/Activity:

Question No. 1: How fast do soils absorb water?

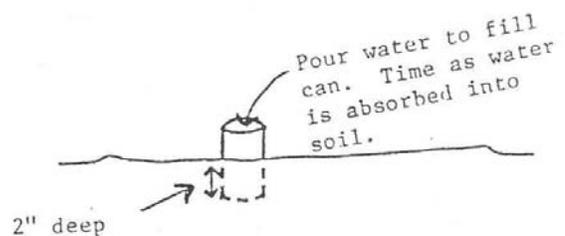
Materials Needed:

An empty can such as a dog food can, open at both ends, preferably with the rim cut off one end.
A small board, 6" x 12" X 1"
A hammer, a ruler, a watch.
Pint measure and Data sheets and pencil.

Activity #1

Mark the can two inches from the sharp end. Choose spots of land that seem to vary greatly, such as a beaten path, an undisturbed hedgerow, a sandy area, a place where the rain always leaves a puddle, a garden, an eroded site, etc.

Set your can, sharp end down, place the board over it and tap the board with the hammer until the can has been driven two inches into the ground.



E.T.

SOIL MOISTURE CAPACITY

Add a pint of water to the can, note the time, and measure how far the water has gone down in one minute, and at subsequent ten minute intervals. Do this for each location and compare the rates of water intake.

Interpretation:

1. The water intake greatly affects the amount of water that runs off, eroding the soil: the more water that goes into the soil, the less runs off.
2. The slope of the land determines infiltration. Water flowing downhill can't soak into the ground as much as water on flat land.
3. Soils that take in water and retain moisture are best for plants. The water may soak into the soil a few feet or may go down into the water table many feet below.
4. Sandy soils let the water through too fast and are dry again shortly.
5. Soils that have been packed by people or animals' feet resist the intake of water. (Walk on the sidewalks).
6. Heavy clay soils make good pond bottoms and hold the water until it evaporates.
7. Organic matter (dead plants and animals) in the soil keeps the soil from compacting and keeps the pores open so water can get in.
8. Grass and plants keep the soil porous with their roots.
9. Activities of living organisms such as earthworms and grubs in the soil also keep it open to rain.
10. Mulches and leaf litter help keep the pores of the soil open so water can get in, as well as act as a deterrent to evaporation.

Question No.2: Which soil holds more water?

Materials Needed:

- Two cans the same size (coffee cans)
- Two 18" squares of cloth
- A scale that takes weights up to 64 oz.
- A two gallon bucket 0" equivalent
- A microscope and some sphagnum moss

E. T.

SOIL MOISTURE CAPACITY

Activity:

Put equal amounts of soil in each can, the first taken from an eroded field, or garden that has been cultivated for many years, and has hard and cloddy soil. Take the second sample from a forest area where the soil is crumbly and free of clods.

Allow the soils to dry for several days, empty them onto their cloths, and weigh and record their weight. Is there a difference? Hold each bag in water for about 10 minutes. Remove the samples and allow to drain. Weigh again and record the weights. Is there a difference in weight between the wet samples? Between the dry and wet weights of each sample? Which sample holds more water? Examine with a magnifying lens some dry sphagnum moss and some that is soaking in water. Can you see why the moss holds so much water?

Interpretation:

1. A soil with little organic matter packs together and so weighs more than an organic soil when they are dry.
2. A soil containing organic material takes in water faster and holds more. The decayed organic matter - humus - absorbs water like a sponge and has a water holding capacity several hundred percent of the dry weight.
3. This water holding capacity of humus also means less erosion and less sediment in streams, etc.
4. Growing plants need lots of water, it takes 80 gallons to produce a pound of potatoes. We cannot afford to waste any water on the islands.
5. Humus comes from composting all plant trash such as grass clippings, kitchen peelings, fruit skins, etc., and returning it to the land. When we package organic matter for the dumpster we remove it from a useful life replenishing the soil.
6. Humus also comes from manure, the undigested matter rich in inorganic nourishment (potassium, nitrogen and phosphorous) to replace that which plants take up when they grow.

Resources:

U.S. Department of Agriculture - Soil Conservation Service