Colorado State University Extension

ST[EMpower]

The Dirt on Dirt, Part 3
What is the composition of soil?

http://travel.nationalgeographic.com/travel/national-parks/great-sand-dunes-national-park/sand

Meet Soil Scientist Dr. Jim Self

I am originally from Michigan, having grown up in the Detroit area and working on my parents farm in northern Michigan. They ran a cow-calf operation along with a small feedlot where they finished off steers for market. We mostly grew hay, but also corn silage, feed corn, barley, and oats.

After graduating from high school, I entered Colorado State University majoring in Agronomy since my interest in agriculture grew from working on the farm. Having gotten frustrated at chasing cows all over the place, and due to my less than stellar horseback riding skills at roundup, I decided to go into crop production. I completed my bachelor's degree at CSU in 1974, and then went on to the University of Missouri-Columbia where I got my master's degree in soybean physiology. I then went on for a Ph.D. at the University of Arizona where I studied secondary plant compounds in desert plants.

I came back to CSU in the early '80's and got a job at the Soil, Water, and Plant Testing Lab, while I finished my dissertation. I had always worked in labs, and the Soils Lab fit in well with what I liked doing. Eventually, I took over as Director of the lab and have been there ever since for about 30 years.

At the Soil, Water, and Plant Testing Lab, we analyze environmental samples for ranchers, farmers, consultants, government agencies, and university researchers from all over the world. We analyze for the mineral content of samples which include the elements in the periodic table, as well as physical properties of soils such as sand, silt, and clay.

ACTIVITY

Background: We started the soil series before the summer break. If you are interested in the first two soil activities, please visit http://www.coopext.colostate.edu/tra4h/stem.htm. Those lessons are entitled The Dirt on Dirt, Part 1 and Part 2.

Soil is made from **organic** and **inorganic** matter. Our activity this month is focused on the **inorganic** part of soil. It is comprised of sand, silt, and clay. Sand is the largest particle size, clay is the smallest particle size, and silt is in between sand and clay particle sizes. Silt and clay particles are so small that you cannot see them with the naked eye, while you can see the individual particles of sand. All **inorganic** soil is comprised of the different sized particles, but in different percentages. If you have soil with a lot of clay, it will not drain well after a rain, unlike water draining quickly through sandy soils.

Knowing the composition of your inorganic soil will help you to provide a better substrate for your plants. If you have a lot of sand in your soil, it will not hold the water, and therefore, you will need to increase the amount of water required for each plant. On the other hand, if you have a lot of clay in your soil, it will hold the water, and you can easily over-water your plants.

Materials: slender quart canning jars (one jar for each soil sample you collect), newspaper, hammer, water, hand trowel, sharpie, sandwich size baggies, non-foaming dishwasher detergent, teaspoon, ruler

- You can compare soil samples from several places, like your home, your school, a park, and other favorite places. Use the hand trowel to collect your samples. Keep each sample you collect in a separate sandwich size baggie, and label each baggie with the location of that sample.
- Lay out one sheet of newspaper for each sample and with your sharpie, identify the sample on the newspaper. Spread the soil on a newspaper to dry. Remove all rocks, trash, roots, etc.
- After the soil has dried, use the hammer to crush lumps and clods. Continue until you have pulverized each of your soil samples.
- You need 1 quart size canning jar for each soil sample you have collect. Use the sharpie to label each jar with the soil sample's location.
- Fill the jar 1/4 full of soil and add water until the jar is 3/4 full.
- Add a teaspoon of non-foaming dishwasher detergent to each soil sample.
- Put on a tight fitting lid and shake hard for 10 to 15 minutes. Repeat for each sample.
- Set the jars where they will not be disturbed for 2-3 days.
- Soil particles will settle out according to size. With the sharpie, mark each jar with the depth of the sand that has settled **after 1 minute**. Sand will settle first because it is the heaviest particles.
- **After 2 hours,** mark on the jar the depth of the silt with your sharpie.
- **When the water clears,** mark on the jar the clay level. This typically takes 1 to 3 days, but some soils may take weeks.
- Measure the thickness of the sand, silt, and clay layers.
    - Thickness of sand deposit _____
    - Thickness of silt deposit _____
    - Thickness of clay deposit _____
    - Thickness of total deposit _____ (not the water, just the soil layers)
- Calculate the percentage of sand, silt, and clay.
    - [clay thickness] / total thickness] = _____ percent clay
    - [silt thickness] / total thickness] = _____ percent clay
    - [sand thickness] / [total thickness] = _____ percent sand

POWER WORDS

organic: of, relating to, or derived from living matter.
inorganic: not consisting of or deriving from living matter.

Activity modified from: http://www.ext.colostate.edu/mg/gardennotes/214.html