Soil Texture Using a Soil Sieve

Terrestrial Ecology Extension Activity

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Question

Can one determine the texture of soil by examining the particles found in a particular sample? The purpose of this activity is to determine the amount of clay, silt, and sand particles in a given soil. This additional method of determining the profile of soil is to conduct a profile test using a **soil sieve** to separate out the different particles by their relative size.

Background

Soil is made of both living and dead plants and animals (organic matter) and mineral particles such as sand, silt, and clay. It is said to consist of rocks and minerals (about 45%), water (25%), air (25%), and organic matter (5%). The profile and texture of soil indicate the relative types of rocks and minerals that compose the soil, chief of which are sand, silt, and clay. Soil texture is an important indicator of the ability of soil to absorb and hold both water and plant nutrients. Soil type can be classified as follows:

Soil Types by Percentages
Sands: 85-90% sand and <10% clay and silt
Loamy Sands: 70-85% sand and <15% clay
Sandy Loams: > 52% sand and < 20% clay
Loam: 7-27% clay, 28-50% silt, and <52% sand
Silt Loam: >50% silt, 12-27% clay; or 50-80% silt and <12% clay
Clay Loam: 27-40% clay and 20-45% sand
Clay: 27- .40% clay and less than 45% sand and less than 40% silt

Safety

Remember to observe your rules for lab safety.

Materials

Balance
Weighing paper
Paper towels
Dry soil samples (at least 100 g. per sample)
Soil Sieves (4)
Note: Soil sieves are available in sets with usually 4 screen mesh sizes (#5 = largest, #10, #60, and #230 = smallest; sometimes #120 is used)

Soil Sieves

Procedure

1. Place your weighing paper on the pan of the balance and determine its mass. Record this on your data table. You will need to subtract the mass of the paper for all of your soil measurements
2. Arrange the soil sieves so that the largest screen size is on the top, followed by decreasing screen size to the bottom.
3. Set the balance to 100g PLUS the mass of the weighing paper. Weigh out that mass of soil that has been broken up into loose particles.
4. Place your soil sample into sieve #1 (the largest). Shake your sample over sieve #2 for two minutes so that sieve #2 collects any smaller soil particles.
5. Place the remaining soil from sieve #1 on the weighing paper and determine its mass. Record this on your data table
6. Shake the soil collected in sieve #2 into sieve #3 (the smallest) for two minutes.
7. Place the remaining soil from sieve #2 on the weighing paper and determine its mass. Record this on your data table.
8. Place the soil collected in sieve #3 on the weighing paper and determine its mass. Record this on your data table.
9. Calculate the relative percent of sand, silt, and clay in the soil sample and record your data in the table below.
   - % Sand = mass of sand / total soil mass x 100
   - % Silt = mass of silt / total soil mass x 100
   - % Clay = mass of clay / total soil mass x 100
10. Determine the type of soil based on the relative overall percents you calculated.
11. Answer the conclusion questions and clean up your materials.

Data Analysis

Data Table		
Sample	Mass measured	Soil Percentage
Weighing paper		
Total Soil sample		
Sieve #1: Sand particles		
Sieve #2: Silt particles		
Sieve #3: Clay particles		

Type of Soil for Sample Collected: _____

Conclusion / Questions

1. How would the size of soil particles affect the ability of soils to hold moisture?

2. Which type of soil would be most likely to allow for the greatest amount of ground water beneath the soil? Explain your choice.

3. Why might trees and other terrestrial vegetation have difficulty growing in sandy or gravel-like soil?

4. Why would a soil texture analysis be important not only to an ecologist, but to a construction or a highway engineer?

5. What types of minerals do you think would be helpful to add to soil to make it a healthier substrate for plant growth?

Extensions

Perform this experiment with different soil samples from different locations and compare your findings. Determine the reasons why these samples might have different percentages of sand, silt, and clay.