



SOILS

UP FROM THE SOIL

SOIL TEXTURE 4-H 316

As the various forms of soil weathering proceed, the soil particles are broken down into finer and finer pieces. Since some particles have been weathered for a longer time than others, some particles will be fine, some medium and some coarse. The relative amounts of the various-sized particles in a soil determine the soil "texture".

Soil texture is one of the most important soil properties for plant growth, because the various-sized soil particles determine the quantity of water a soil can hold, the ease of root penetration in the soil and the ability of the soil to hold fertilizer against the action of percolating waters.

Sand

The coarsest soil particles are called sand. Most sand particles can be seen without a magnifying glass. When rubbed between the thumb and finger, all sand feels rough because sand particles are large and have not been weathered as much as other particles. The sand particles are "angular", that is, they still possess sharp edges which have not been removed by weathering. Soils high in sand are referred to as having a "light" texture.

Silt

The intermediate-sized group of soil particles is called silt. These particles feel smooth and floury like talcum powder. When wet, silt feels smooth, but not slick or sticky. If a ball of silt is rolled between the fingers, it will break up before a long thin ribbon can be formed. When the dry particles are pressed between the fingers, an imprint of the finger will remain. Silt particles are too small to be seen with the naked eye.

Clay

The finest-sized soil particles are called clay. These particles are so fine that a powerful electron microscope is necessary to "see" them. When dry, clay particles feel smooth, but when wet, they feel slick and sticky. If you roll a ball of clay between your thumb and finger, a long thin ribbon will be formed before it breaks apart. Soils high in clay are referred to as having a "heavy" texture.



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The following table gives a size breakdown used by U.S. Department of Agriculture scientists to differentiate between sand, silt and clay particles.

<u>Kind of Particle</u>	<u>Particle Diameter (mm)</u>	<u>Particle Diameter (in.)</u>
Sand	larger than 0.05	larger than 0.00197
Silt	between 0.002 and 0.05	0.0000787-0.00198
Clay	smaller than 0.002	smaller than 0.0000787

If a soil contains roughly equal proportions of sand, silt and clay, its texture is a loam. There are many variations of loam. For instance, if the clay content is relatively higher than the silt and sand contents, the soil may be called a clay loam. Similarly, if either the silt or the sand is higher than the other two size fractions in a loamy soil, the soil would be called a silt loam or a sandy loam, respectively. For a better understanding of textural groups, refer to the textural diagram on page 4 of this exercise.

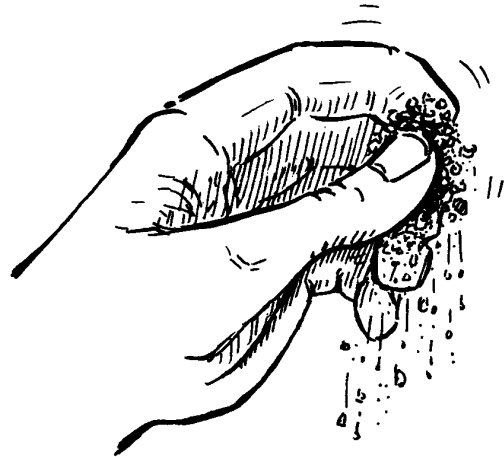
Experiment

How can soil texture be determined? The easiest and quickest method is to rub some soil between your thumb and finger. With practice, you can develop this method to a very high degree of accuracy. For expert help in learning to distinguish soil texture, consult your local Soil Conservation Service technician.

The following procedure can be used to demonstrate that a soil is a mixture of sand, silt and clay particles, and to see how the proportions of the various-sized particles determine soil texture.

Procedure

Obtain a soil sample (about .5 L or 1 pint), a clean quart glass jar and a small amount of calgon detergent. Fill the jar about 2/3 full of water. Pour in soil until the jar is almost full. Make sure all lumps are crushed as finely as possible with your fingers before pouring the soil into the jar. Measure about 15 mL (1 tablespoon) of calgon detergent and pour into the jar. Place the lid on securely and shake the jar vigorously for 3 or 4 minutes. Put the jar and its contents some place where the jar will not be disturbed. Allow the mixture to settle for about 2 days.



RUBBING SOIL BETWEEN FINGERS

Notice how the particles begin to settle to the bottom right after shaking. The larger sand particles settle out the fastest and accumulate on the bottom first. Next the finer sand particles settle out. And finally, particles too small to distinguish with the naked eye will settle out. The finer the soil particles, the longer it takes them to settle to the bottom of the jar. Notice that the soil is separated into layers in the bottom of the jar with the coarsest material on the bottom and the finest material on the top.

Records

After about 2 days, most of the soil particles will have settled out. Make the following measurements with a ruler and record in the table below (1 inch equals about 2.5 cm).

1. Total depth of soil in jar _____ cm _____ %
2. Depth of coarse sand _____ cm _____ %
3. Depth of fine sand _____ cm _____ %
4. Total depth of sand _____ cm _____ %
5. The remaining soil is silt and clay. Estimate the amounts of each.
Silt _____ cm _____ %
Clay _____ cm _____ %

What is the texture of your soil sample? The actual texture can be approximated by using the textural diagrams on the following page.



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