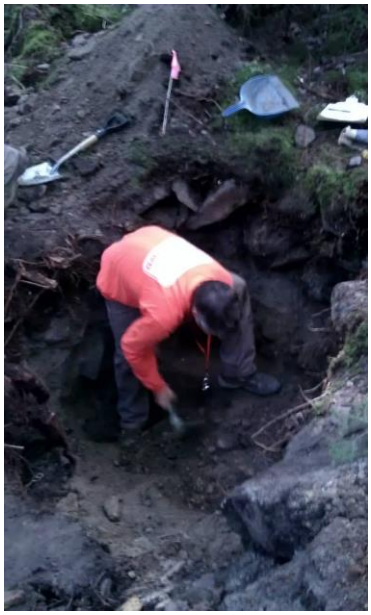
How to Texture a Soil

By Michelle Lee

Description:

I am an environmental science major at Virginia Tech and one of my requirements was to take a soils class. I soon took interest in learning about soil and wanted to find some field experience to go along with my education from the class. This is when I found out about the VT Soil Judging Team. Soil judging serves an important role in the field of science. Here at Virginia Tech, there is a group of individuals involved in the VT Soil Judging Team that practice analyzing and classifying different types of soils, and that compete with other schools to put their skills to the test. If you are involved in any of the scientific fields or have an interest in learning about soil, I would highly recommend looking into this group.

Soil science is the study of soil as a natural resource on this Earth; this includes soil formation, classification, mapping, management, and the chemical, biological, and physical properties of soils. In order to analyze these elements, field and laboratory work must be conducted. One tool a soil judger will use is their hands. This is one of the best ways to determine what type of soil we are observing. A way that we use our hands to classify soils is a method known as texturing. Soil texturing is an analysis of the relative proportion of sand, silt, and clay particles. This is a qualitative method, because we use our hands, but with experience many people can easily discern the different textural classes. When we texture a soil, there are certain techniques we use to determine the particle size and morphology. A "textural feel" of the soil is the easiest and most accurate procedure to do this. From my step-by-step overview of how to texture a soil, I will explain how soil specialists conduct an analysis of a soil sample when conducting research in the field or laboratory.



Source: Michelle Lee, Facebook

To find more information about soil or the VT Soil Judging team, contact John M. Galbraith, an Associate Professor of Crop & Soil Environmental Science at Virginia Tech.

Glossary

Soil: A natural body comprised of solids (minerals and organic matter), liquid, and gases that occurs on the land surface, occupies space, and is characterized by one or both of the following: horizons, or layers, that are distinguishable from the initial material as a result of additions, losses, transfers, and transformations of energy and matter or the ability to support rooted plants in a natural environment. Soil is the natural medium for the growth of land plants, whether or not it has discernible soil horizons.
Soil Survey: The published results of the classification of soil types and other soil properties in a given area.
Pedon: The smallest volume for which one should describe and sample the soil to represent the nature and arrangement of its horizons and variability in the properties that are preserved in samples.
Soil Profile: a vertical section with differing horizons that reflect the combined effects of the particular set of genetic factors responsible for its development.
Soil Horizon: A layer of soil approximately parallel to the soil surface differing from adjacent genetically related layers in characteristics such as color, texture, structure, and consistence.
Soil Taxonomy: A basic system of soil classification for producing and interpreting soil surveys.
Soil Texture Analysis: A qualitative tool used in field and laboratory work to determine the proportions of the various sizes of the soil particles. The three major groups of soil particles are sand, silt and clay. The texture class can then be determined by using your hands to conduct a "textural feel" which will be found by estimating the relative percent by weight of sand (2.0 to 0.05 mm), silt (0.05 to 0.002 mm), and clay (<0.002 mm) size separates in a less than 2 mm fraction of the soil material.
Sand: A particle size class that imparts a gritty feel to soil due to the shape of the individual particles.
Silt: A particle size class that has a floury feel and does not ribbon when pressed between the thumb and forefinger due to the shape of the individual particles when it is moist. When placed between the teeth silt has a gritty feeling.
Clay: A particle size class that exhibits colloidal properties, has a negative charge, and is flat and plate-like in shape. Moist clay is sticky and will ribbon readily when pressed between the thumb and forefinger. When placed between the teeth clay has a smooth slick feeling.
Soil-Texture Triangle: A plot of the type of soil (i.e. silty, clay, sandyloam) by the percentages of texture determined using the data collected from the "textural feel."
Soil Texture Class: The United States Department of Agriculture (USDA) has identified twelve soil texture classes as follows: sand, loamy sand, sandy loam, sandy clay loam, loam, silt loam, silt, silty clay loam, clay, clay loam, sandy clay and silty clay. Each texture class has a distinctive characteristic(s) which can be estimated in the field.
Grittiness Test: A way to determine the sand composition.
Ribbon Test: A way to determine the clay content. Generally, the longer the sample holds the ribbon form, the greater the percentage of clay. A good solid ribbon usually indicates 40% or more clay content.
National Soil Survey Handbook (NSSH): A book providing the main operational and procedural guidance for conducting the NRCS portion of the National Cooperative Soil Survey program.

How to Texture a Soil

Materials:
Plastic containers
Hand shovel
Squirt bottle
Sturdy, close-toe shoes

1. From each horizon identified, obtain roughly two handfuls of samples of the soil and keep these samples in separate plastic containers.

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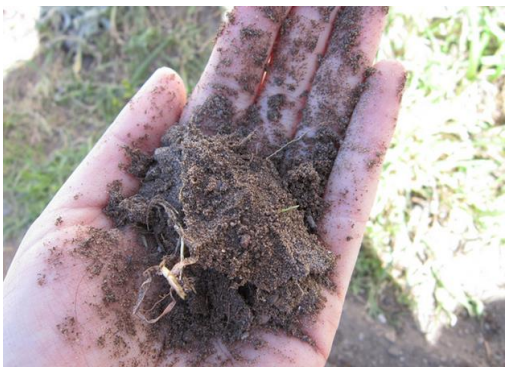
2. Take a small handful of soil that will fit comfortably in the palm of your hand.

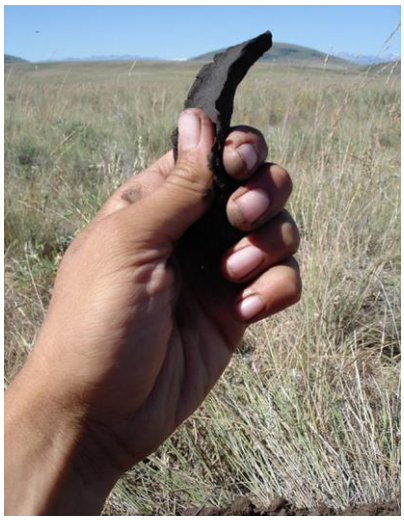


Source: flickr

3. Add water from the squirt bottle until the soil is suspended in a pool of water. Rub the soil particles between a finger and the palm of the hand, an estimate of the percentage of "grittiness", or sand can be determined by feel. The more "grit" felt with the finger, the more sand.

Source: flickr

4. For the ribbon test, wet a sample of soil in the palm of the hand. Moisten the soil just enough to be able to knead the soil into a dough-like consistency. The ball of soil is then pressed out between the thumb and forefinger in a "pinching" motion so that the soil extends out above the hand in a sort of "ribbon." How quickly and easily the soil begins to crack, break, and fall off during the extrusion is the indicator to the amount of clay content in the sample.



Source: flickr

5. Now that we know the percent sand, silt, and clay we can classify the soil using the USDA textural triangle!