

Exploring Soil Texture

Soil is comprised of a variety of minerals and organic matter, which is typically decaying plant tissues. In this activity we will investigate how soils differ by texture. Soil texture is simply defined as the relative proportion of sand, silt, and clay separates (particles) found in the soil. These particles differ amongst each other in terms of their size. Particles that range in size from 0.05 – 2.0 mm are sand. Particles that fall between 0.002 - 0.05 mm are considered silt. The smallest particles are clay, which is less than 0.002 mm in size. The relative fraction of these soil particles is important because it can determine factors such as the soil's water holding capacity, aeration, drainage, and plant rooting depth.

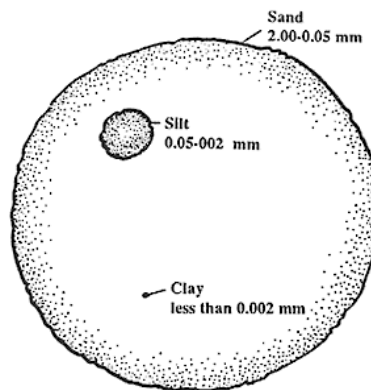


Figure 1. Size of sand, silt, and particles relative to each other.

Soil texture and textural class can be determined a variety of ways. If you know the percentage of your soil separates, then you can find its textural class using the textural triangle (Fig. 2). We can also use a more hands-on approach to determine soil texture by using the “Texture by Feel” method. A more robust scientific approach to determine soil texture is the “Hydrometer” method. In this approach, soils are suspended in a chemical mixture and as soil particles begin to settle (larger granules settling first) the density of the suspension is measured using a hydrometer. We’ll focus on the first two methods in this activity.

Soil Textural Triangle

Below is a figure of the soil textural triangle (Fig. 2). You’ll notice that each side of the triangle corresponds with a percentage of a soil separate – sand, silt, and clay. Within the triangle are the standard twelve soil texture classes. Also inside the triangle are a series of grid lines to help one determine the textural class from the percent soil separate.

In order to read the texture triangle, follow the example using the colored arrows in Figure 2. The percentage of clay separate is read by following the grid lines in the horizontal direction from left to right (blue arrow). The percentage of silt separate is read by following the grid lines from top right to bottom left (orange arrow). Lastly, the percentage of sand separate is read by following the grid lines from bottom right to top left (pink arrow).

If we had a soil that was comprised of 24% clay, 41% silt, and 35% sand (use the colored arrows as a guide), then our soil would be considered a *loam*. Loam is a textural class whereby sand, silt and clay, equally contribute to the properties of that soil. Sometimes, you may only know the soil textural class and are asked to find the percentage range of your soil separates. If that is the case, then you have to find your textural class and go in the opposite direction of the colored arrows to determine the percent sand, silt, and clay.

Soil Textural Triangle

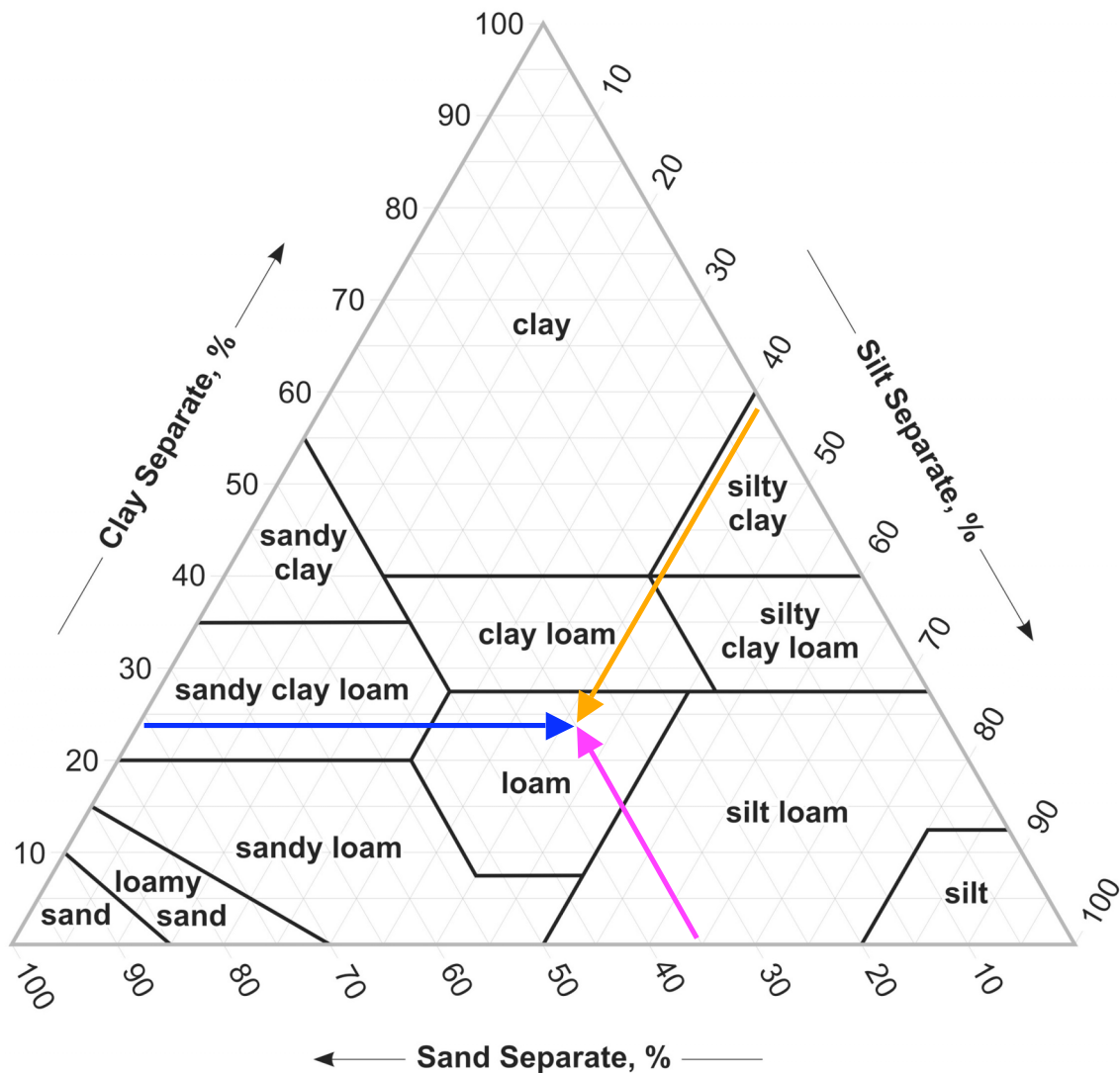


Figure 2. Soil textural triangle with each side corresponding to a percentage of soil separate. The blue arrow represents the direction in which one reads the clay separate, the pink arrow corresponds to the sand separate, and the orange arrow corresponds to the silt separate.

Questions:

1. *If you had a soil that was comprised of 35% clay, 55% silt, and 10% sand, what would be the textural class of that soil?*
2. *What is the maximum percent of silt separate found in a “sandy clay”?*
3. *Why do you think “clay”, located at the top point of the textural triangle, is the largest textural class?*

Soil Texture by Feel

This is by far the simplest technique and all you need is your hands, a squirt bottle of water, a ruler, and a texture flow chart. Each soil separate has a distinct texture that you can distinguish by touch. Sand feels gritty and you can see individual grains with the naked eye. Silt will feel smooth almost silky, but you can only see individual particles under a microscope. Clay is the smallest particle, however, when wet it will feel sticky and can easily be molded into long ribbons (Fig. 3).



Figure 3. Soil ribbon formed by pushing soil upward and out in between your thumb and forefinger.

Activity:

- While you're out in the field, collect soil samples (~50g) from a variety of habitats. Within those habitats also collect soil from different depths in the soil profile. In the field or back at the lab, perform the “Texture by Feel” method on your collected samples by using the texture flow chart (attached).
- Think about the following questions:
 - o *Do your soil textures differ between habits? If so how and why do you think this is so? Think about the vegetation and the topography of your habitats.*
 - o *Do your soil textures collected at different depths differ? If so how and why do you think this is so? Think about the time frame in which these soils formed.*

Soil Texture by Feel Flow Chart

