

Unit C: Traits of Soil

Lesson 1: Identifying Texture in Soil

Terms

- Clods
- Loam
- Peds
- Permeability
- Soil structure
- Soil texture
- Soil workability
- Textural triangle
- Water-holding capacity

Describe the concept of soil texture and its importance

- I. A. **Soil texture** is the fineness or coarseness of a soil. It describes the proportion of three sizes of soil particles. These are:
 1. Sand—large particle
 2. Silt—medium-sized particle
 3. Clay—small particle
- B. Texture is important because it affects:
 1. **Water-holding capacity**—the ability of a soil to retain water for use by plants
 2. **Permeability**—the ease with which air and water may pass through the soil
 3. **Soil workability**—the ease with which soil may be tilled and the timing of working the soil after a rain
 4. Ability of plants to grow—some root crops like carrots and onions will have difficulty growing in a fine-textured soil

Determine the texture of a soil sample

II. A. Soil texture may be determined in one of two ways:

1. The percentages of sand, silt, and clay may be tested in the lab. Once tested, you may determine the textural class of the soil by referring to the *textural triangle*. There are 12 basic textural classes:

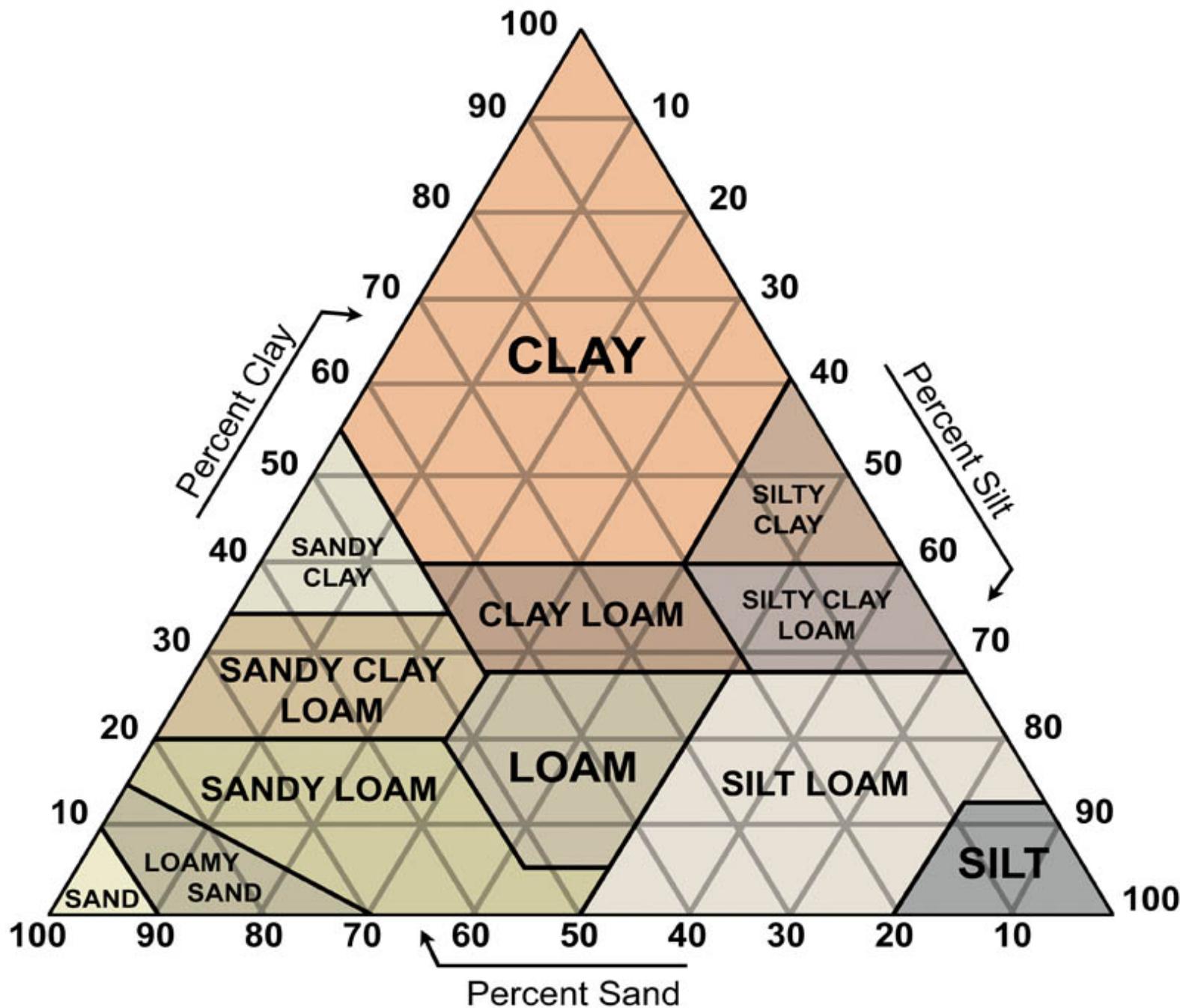
- a. Silt
- b. Silt loam
- c. Silty clay loam
- d. **Loam**—contains some of all 3 soil particle sizes. Sandy clay loam
- f. Loamy sand
- g. Sand
- h. Sandy loam
- i. Sandy clay
- j. Clay loam
- k. Silty clay
- l. Clay

Determine the texture of a soil sample

2. The relative amounts of sand, silt, and clay may also be determined in the field using the ribbon method. Five textural classes may be determined using the ribbon method:
 - a. Fine-textured—a ribbon forms easily and remains long and flexible.
 - b. Moderately fine-textured—a ribbon forms but breaks into pieces 1.9 to 2.5 centimeters long.
 - c. Medium-textured—no ribbon forms. The sample breaks into pieces less than 1.9 centimeters long. The soil feels smooth and talc-like.
 - d. Moderately coarse-textured—no ribbon forms. The sample feels gritty and lacks smoothness.
 - e. Coarse-textured—no ribbon forms. The sample is composed almost entirely of gritty material and leaves little or no stain.

Determine the texture of a soil sample

3. The Ribbon Method is the proper method to texture soil. This is done in many steps:
 - a. Take a small handful of soil and place in the center of your palm.
 - b. Add a small amount of water to the soil to moisten it.
 - c. Tighten your hand around the soil and begin to push the soil between your thumb and forefinger.
 - d. Less than an inch of soil means not a lot of clay, the longer the ribbon the more clay is in the soil texture.



Describe soil structure, its formation, and its importance

III. A. ***Soil structure*** is the arrangement of the soil particles into clusters or aggregates of various sizes and shapes. Aggregates that occur naturally in the soil are referred to as ***peds***, while clumps of soil caused by tillage are called ***clods***.

B. Structure is formed in two steps.

1. A clump of soil particles sticks loosely together. These are created through:
 - a. Plant roots surrounding the soil and separating clumps
 - b. Freezing and thawing of soil
 - c. Soil becomes wet and then dries
 - d. The soil is tilled
 - e. Fungal activity

Describe soil structure, its formation, and its importance

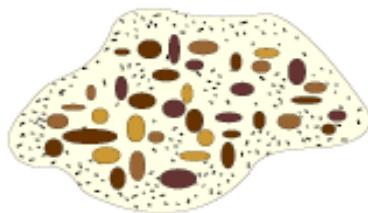
2. Weak aggregates are cemented to make them distinct and strong. Clay, iron oxides, and organic matter may act as cements. When soil microorganisms break down plant residues, they produce gums that also glue peds together.
- C. Soil structure is important for several reasons:
 1. It improves soil tilth.
 2. It improves permeability.
 3. It resists the beating action of raindrops, minimizing the formation of crusts that reduce crop stands.

Identify various soil structures

IV. There are eight primary types of structure. They are:

- A. Granular—aggregates are small, non-porous, and strongly held together.
- B. Platy—aggregates are flat or plate-like. Plates overlap, usually causing slow permeability.
- C. Prismatic or Columnar—aggregates are prism-like with the vertical axis greater than the horizontal. Prismatic has flat caps while columnar has rounded caps.
- D. Blocky—aggregates are block-like, with six or more sides. All three dimensions are about the same.
- E. Structureless—there is no apparent structure. It may be found in one of two forms:
 1. Single grain—soil particles exist as individuals and do not form aggregates.
 2. Massive—soil particles cling together in large uniform masses.

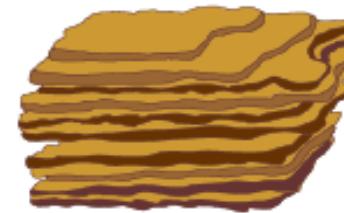
Common Types of Soil Structure



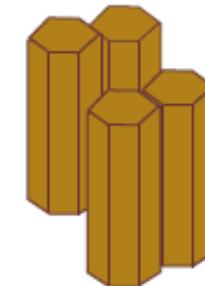
Granular



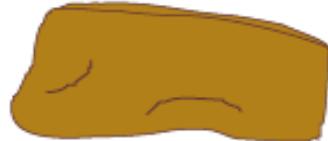
Crumb



Platy



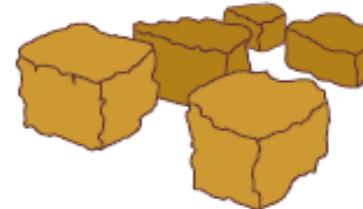
Prismatic



Massive



Columnar



Blocky



Single grain

Review/Summary

1. What are the three major components of soil?
2. What are the four major factors impacted by soil texture?
3. Name the 12 basic textural classes of soil.
4. How does soil texture help form the soil structure?