


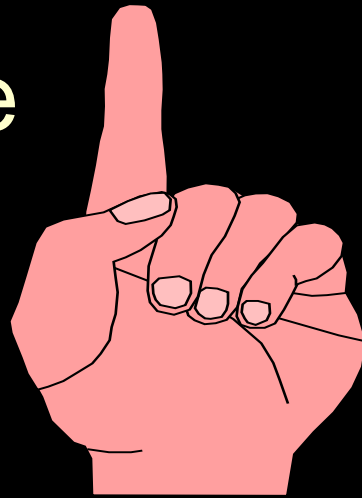
Unit E: Basic Principles of Soil Science



Lesson 4: Understanding Soil Texture and Structure

Important Terms

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



What is soil texture and why is it important?

- Soil texture is the fineness or coarseness of a soil.
- It describes the proportion of three sizes of soil particles. These are:
 - Sand - large particle
 - Silt - medium sized particle
 - Clay - small particle

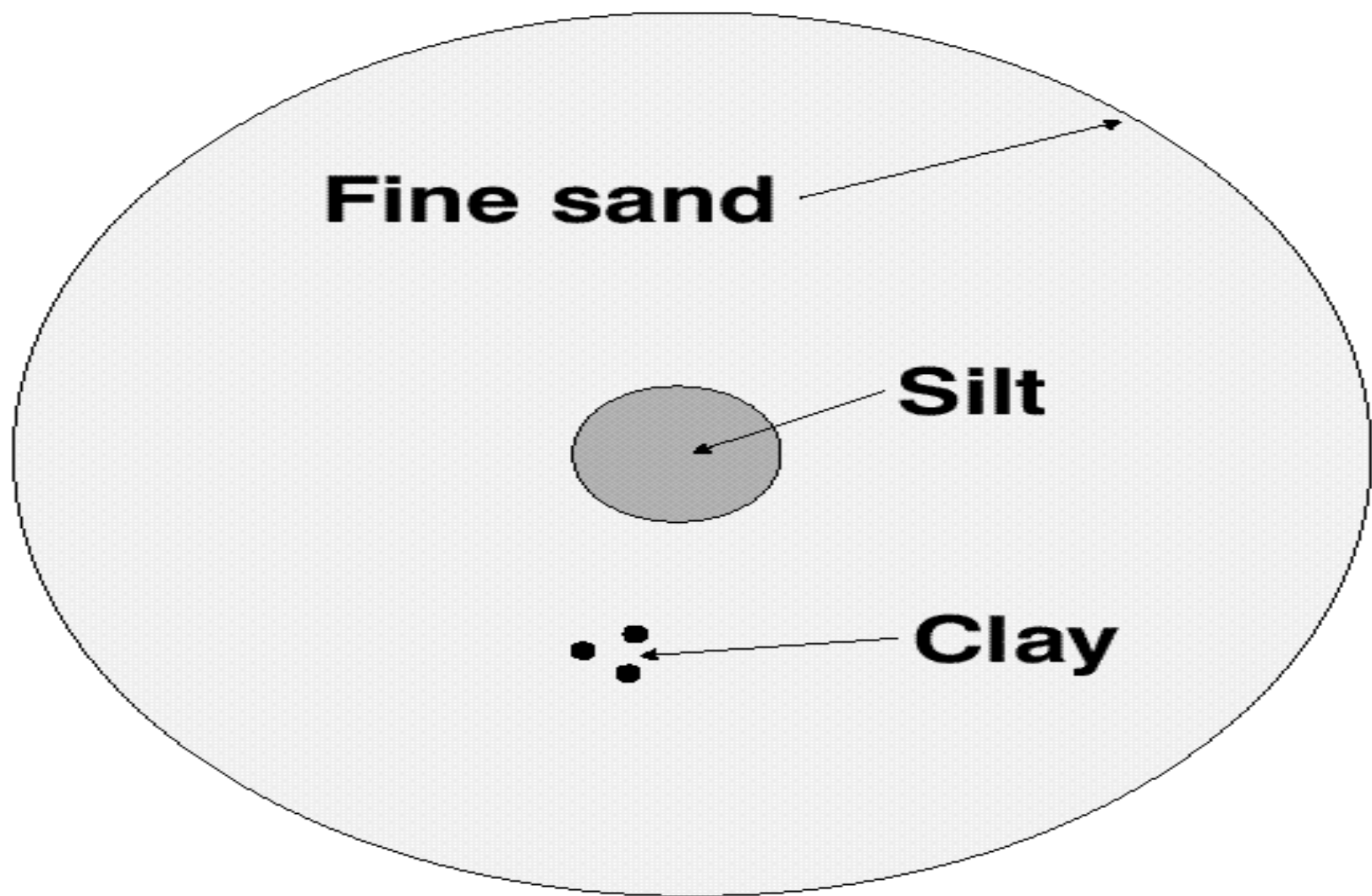
Texture is important because it affects:

- Water-holding capacity the ability of a soil to retain water for use by plants
- Permeability the ease with which air and water may pass through the soil.

Texture is important because it affects:

- Soil workability the ease with which soil may be tilled and the timing of working the soil after a rain
- Ability of plants to grow some root crops like carrots and onions will have difficulty growing in a fine-textured soil

The Relative Sizes of Sand, Silt, and Clay Particles



How is the texture of soil determined?

- Soil texture may be determined in one of two ways:
 - 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.
 - The ribbon method.

Textural Triangle – 12 basic textural classes

- Silt
- Silt loam
- Silty clay loam
- Loam
- Sandy clay loam
- Loamy sand
- Sand
- Sandy loam
- Sandy clay
- Clay loam
- Silty clay
- Clay

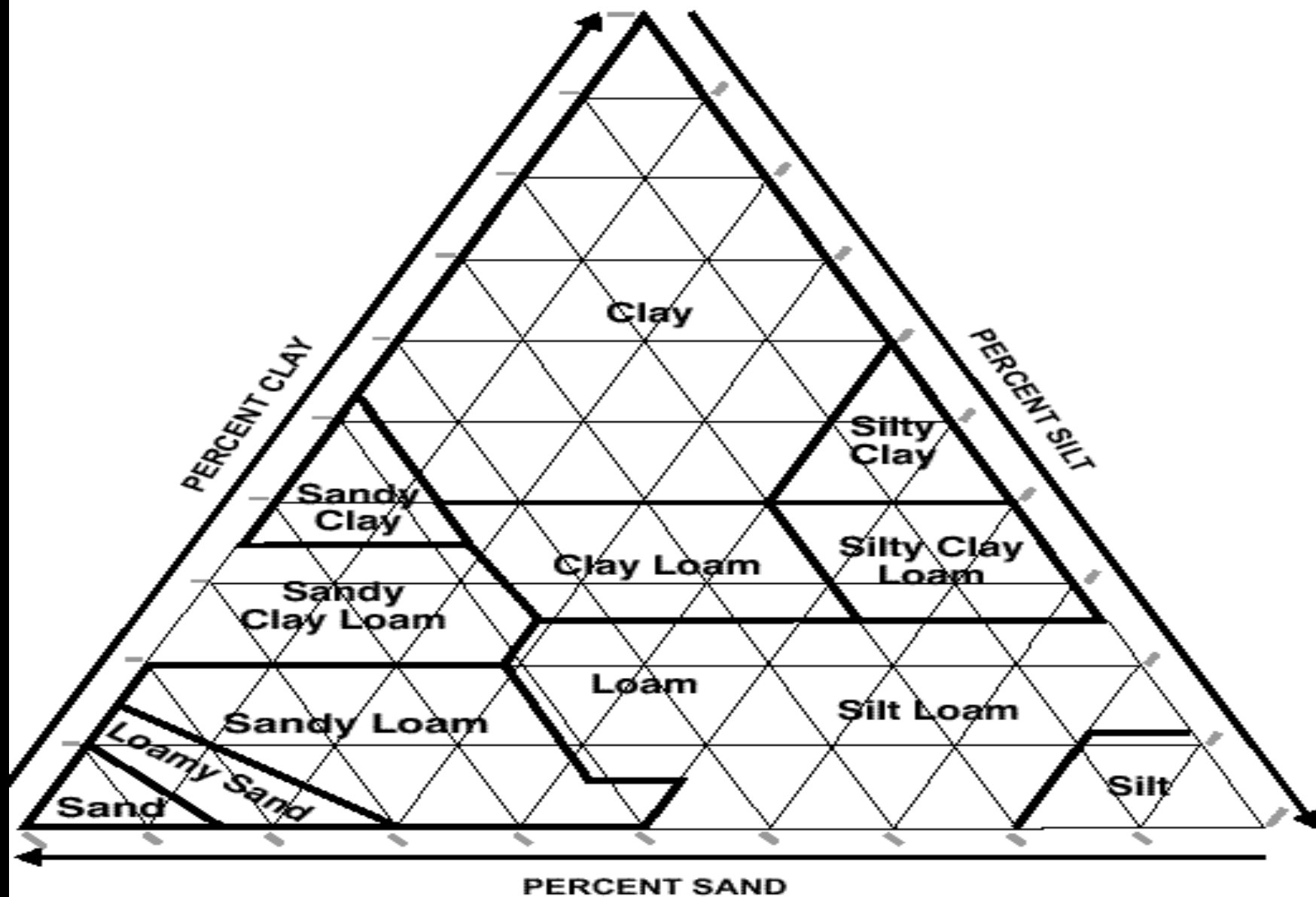
The Ribbon Method.

- Fine-textured a ribbon forms easily and remains long and flexible.
- Moderately fine-textured a ribbon forms but breaks into pieces $\frac{3}{4}$ to 1 inch long.
- Medium-textured no ribbon forms.
 - The sample breaks into pieces less than $\frac{3}{4}$ inch long. The soil feels smooth and talc-like.

The Ribbon Method.

- Moderately coarse-textured no ribbon forms.
 - The sample feels gritty and lacks smoothness.
- Coarse-textured no ribbon forms.
 - The sample is composed almost entirely of gritty material and leaves little or no stain.

Soil Triangle



What is soil structure, how does it form, and why is it important?

- 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.

What is soil structure, how does it form, and why is it important

- Structure is formed in two steps.
- 1. A clump of soil particles sticks loosely together. These are created through:
 - Plant roots surrounding the soil and separating clumps
 - Freezing and thawing of soil
 - Soil becomes wet and then dries
 - The soil is tilled
 - Fungal activity

What is soil structure, how does it form, and why is it important

- 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.

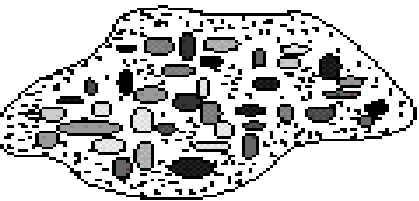
What is soil structure, how does it form, and why is it important

- Soil structure is important for several reasons:
 - It improves soil tilth.
 - It improves permeability.
 - It resists the beating action of raindrops, minimizing the formation of crusts that reduce crop stands.

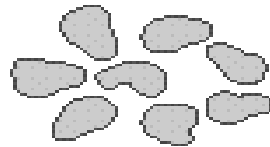
What are the various soil structures and what do they look like?

- There are eight primary types of structure. They are:
 - Granular
 - Crumb
 - Platy
 - Prismatic or Columnar
 - Blocky
 - Structureless
 - 1. Single grain
 - 2. Massive

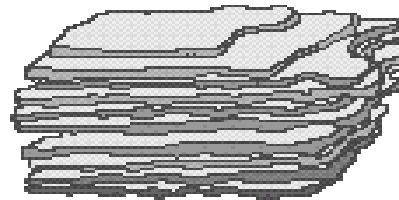
Common Types of Soil Structure



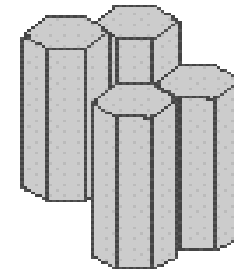
GRANULAR



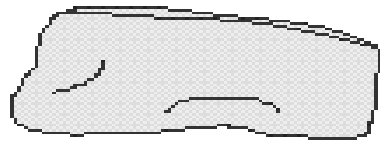
CRUMB



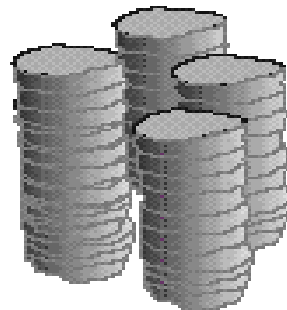
PLATY



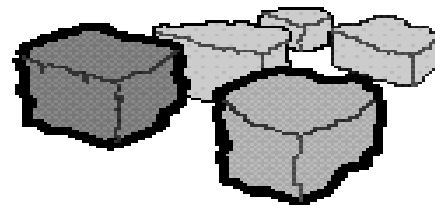
PRISMATIC



MASSIVE



COLUMNAR



BLOCKY



SINGLE GRAIN

Review / Summary

- Describe the concept of soil texture and its importance.
- Determine the texture of a soil sample.
- Describe soil structure, its formation, and importance.
- Identify various soil structures.