



JAR TEST DETERMINATION OF SOIL TEXTURE BY MECHANICAL ANALYSIS

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Background

The determination of the percent sand, silt and clay in a soil is called a mechanical analysis. Particles suspended in water settle at different rates depending on their surface area and volume. Clay particles have a high amount of surface area per unit volume and settle very slowly, while sand particles settle rapidly. After soil aggregates have been dispersed, this procedure can be used to separate the sand, silt and clay particles in normal garden soil. The rate at which particles settle can be calculated using Stoke's Law. In the 'fruit jar' method, simple sedimentation is employed with a minimum of laboratory equipment. Adapted from 'Soil Water Monitoring & Measurement', by T.W. Ley, *et. al.* Pacific Northwest Extension Publications.

What Happens

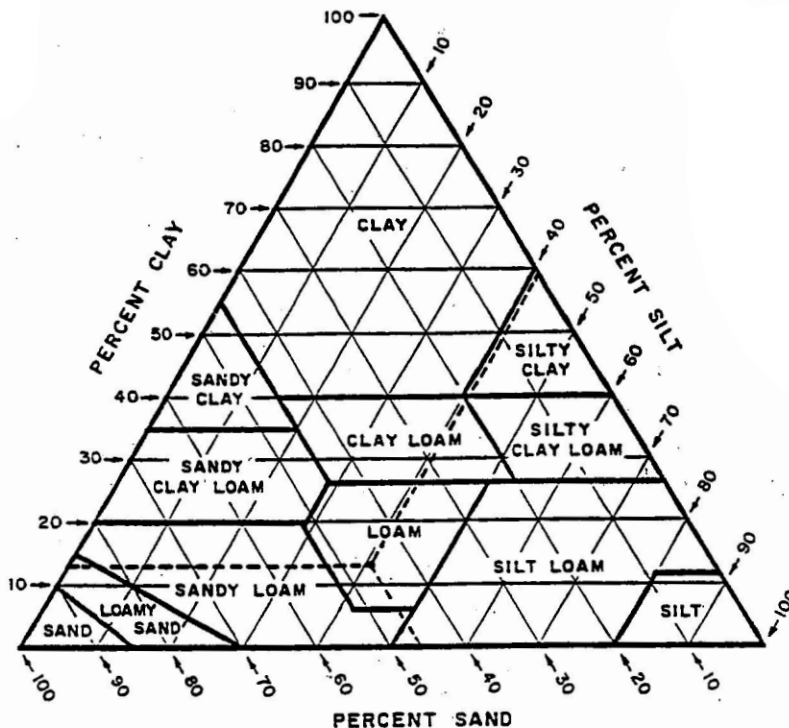
Clay particles are less than 0.002 mm in diameter and will remain in water suspension almost indefinitely. Silt particles ranging from 0.05 to 0.002 mm in diameter settle fairly soon. Sand particles settle out rapidly.

What You Do

Collected garden soil is screened to remove rocks and debris. Soil is added to a fruit jar with water and a touch of dish washing detergent, then shaken well to break up soil aggregates. After setting still for one day, the jar is examined and total soil depth is recorded. The jar is again shaken well and allowed to sit while measurements of sand and silt are taken at specified times. Simple calculations determine percent sand, silt and clay. Soil type is determined by plotting sand, silt and clay on a 'soil texture triangle'.

Materials Needed

- 1 quart heavy duty fruit jar (example: mayonnaise jar) and **tight lid**
- 2 drops of liquid dish washing detergent (**soap will be provided**)
- 1 cup of screened garden soil (no rocks or organic clods)
- Ruler, piece of paper, and masking tape (to label soil source on jar)



Soil Textural Triangle

The percentage of sand, silt and clay in any soil may be plotted on diagram to determine the textural class of that soil.

Test your soil sample



Sift the soil sample to remove rocks and large lumps of organic material.



Place one cup of the sifted soil sample into a straight-sided jar.



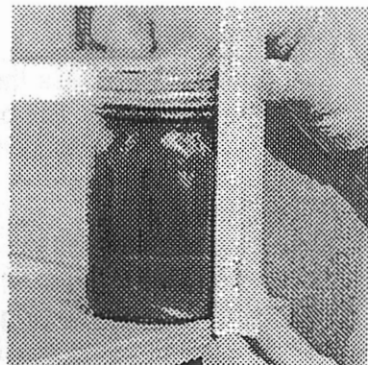
Add one tablespoon of detergent to coat the particles to keep them separate.



Add enough water to fill the jar and put the lid on tight.



Shake the jar for three minutes to thoroughly mix soil, soap, and water.



Set the jar on a flat surface and measure the layers once the sediment has settled.

Soil textural classes. The chart shows the percentages of sand, silt, and clay in the 12 basic soil textural classes, according to the USDA. Although organic matter may have a significant effect on a soil's physical properties, it is not considered in defining the soil's textural class. Each class is represented by an area in the textural triangle diagram. Thus, two soils may have the same texture but different particle size distributions. *Source:* After Wildman and Gowans 1978, p. 3.

