



# Homework Activity

## Jar Test for Soil Texture



### ***Background:***

1. What is soil?
2. What natural factors influence the formation of soil?
3. How will the depth of each horizon in your soil profile affect your plants?
4. Which horizon do you expect would provide the greatest amount of nutrients to the plants in your landscape?
5. Why do you need to supplement the culture of your plants with fertilizers or mulch?
6. What are the three categories of soil mineral particles that are active in supporting plant growth?
7. Why is the weathering of the primary soil mineral particles important in supporting plant growth?

### ***What you should be learning.***

Compare the results of the jar test with those from the ribbon test to determine the suitability of your landscape soil in supporting plant growth.

### ***How long will it take?***

This jar test will take 2-3 days. ***You could collect your soil sample for this activity at the same time you dig a hole for the drainage test.***

### ***Supplies you will need:***

Shovel  
Jar with straight sides (Ideally about 1 quart capacity like a mayonnaise jar)  
Ruler or tape measure  
Marking pen  
Clock  
Calculator

### **What to do:**

The basic premise for this activity is to suspend a sample of soil that is representative of your yard or landscape soil (and suspend the particles) in water. The larger particles should settle out before the smaller particles. By comparing the relative volume of each particle category, you should be able to estimate the texture of your soil.

- i. *Collect a representative sample of soil from your garden.*
- ii. *Remove any large objects (gravel, rocks, roots, etc.) With your fingers, break up any dirt lumps or clods.*
- iii. *Fill the jar about halfway with your soil sample.*
- iv. *Optional: Add one teaspoon of Calgon, or one teaspoon of powdered dishwasher detergent to help break up clumps of soil particles.*
- v. *Fill the jar to within about 1 inch of the top with tap water.*
- vi. *Cap and shake to completely suspend the soil in the water.*
- vii. *Place on a flat surface and allow the suspension to settle out.*
- viii. *After 1 minute, mark and measure the height of the sediments at the bottom of the jar.*
- ix. *After about 1 hour, mark and measure the thickness of the additional deposits on top of the first layer of particles in your jar.*
- x. *Allow the mixture to settle out undisturbed for one to two days (at least overnight).*
- xi. *After about 1 -2 days, mark and measure the thickness of the additional layer that has accumulated over the first two layers of particles in your jar.*
- xii. *Carefully transport your jar to class for analysis trying not to disturb the layers of soil particles.*

### **What do the results suggest?**

8. Fill in your measurements below.

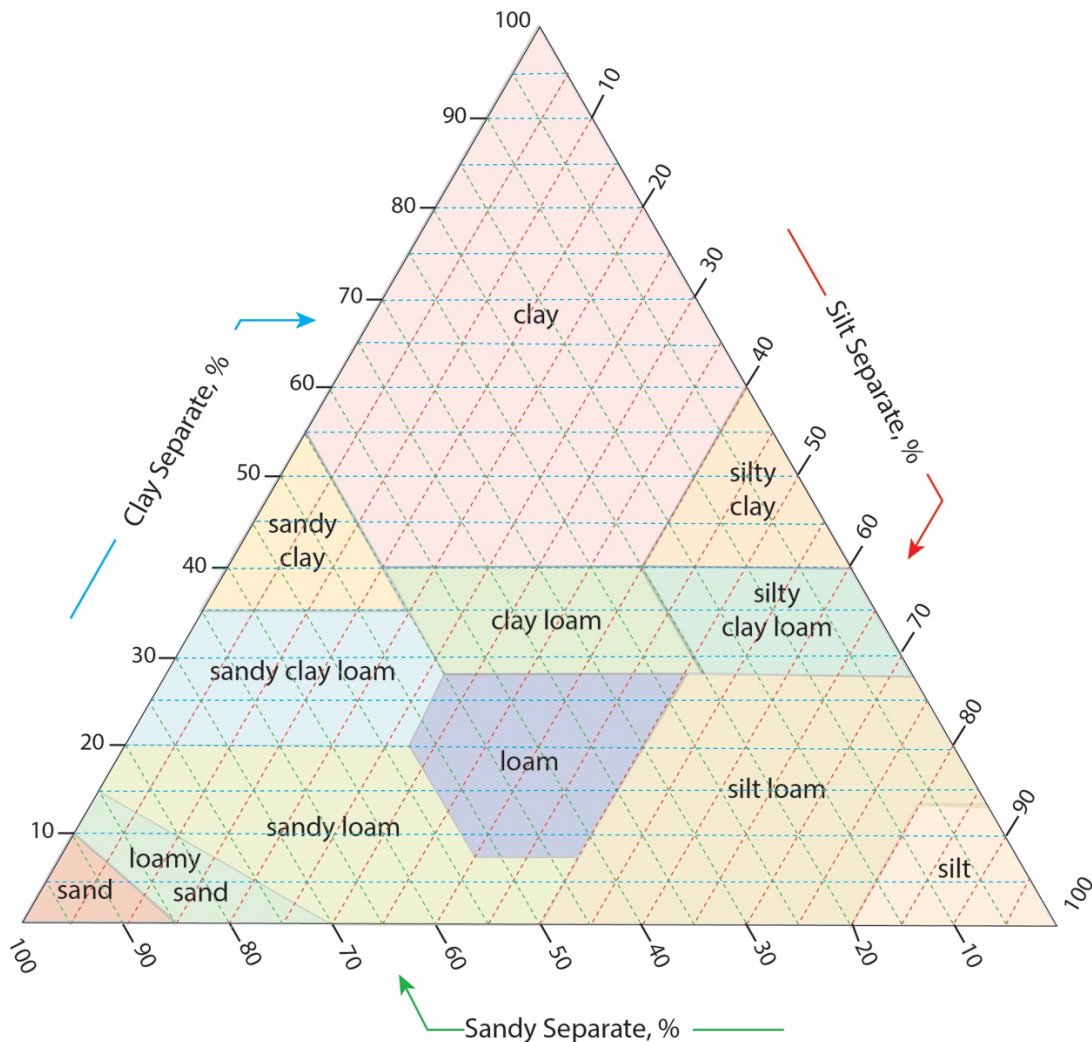
Layer	Soil Mineral Particle	Thickness of layer (mm or inches)	Percentage
Bottom	Sand		
Middle	Silt		
Top	Clay		
	TOTAL THICKNESS		

9. Calculate the percentage of height for each particle by dividing the thickness of each layer by the Total Height and multiplying the results by 100.

$$\text{Percentage (\% )} = \frac{\text{Layer Thickness}}{\text{Total Thickness}} \times 100$$

10. Plot your percentages on the soil texture triangle below.

- On the left side of the triangle, mark the percent of CLAY in your sample.
- From this point, draw a line horizontally, across to the right.
- Put a mark on the bottom of the triangle at the percent of SAND you calculated in your soil sample.
- From this point, draw a diagonal line upward to the left, parallel to the other slanted lines that start on the sand scale (bottom) of the triangle.
- On the right side of the triangle, mark the percent of SILT in your sample.
- From this point, draw a diagonal line downward to the bottom of the triangle.
- The 3 lines you have drawn should intersect in a point. That point will fall into one of the soil descriptions on the graph



11. At which soil class (texture) do your three graph lines intersect?

12. How does soil texture affect how well plants grow?

## Conclusion

13. How is soil structure different from soil texture?
14. Why is the structure important to plant growth?
15. How do soil management strategies such as tillage, irrigation schedule and cultivation affect soil structure?
16. How is a soil profile different from soil texture?
17. Explain why a difference in soil profiles might affect plant growth differently for soils with a similar texture?
18. Complete the table below.

Characteristic	Sandy Soils	Loamy Soils	Clayey Soils
Primary particle size			
Surface to volume ratio (High,Medium,Low)			
Infiltration. The entry of surface water into the soil – opposite of runoff potential (rapid, medium, slow).			
Percolation. The internal water drainage and leaching (high, good, poor).			
Water storage capacity. Ability to store water for plant use (low, medium, high).			
Aeration. The ability of oxygen to reach the root zone (good, moderate, poor).			
Ease of tillage. Ease of seedbed preparation (easy, medium difficult).			
Soil porosity. The amount of pore space in the soil (low, medium, high).			
Field capacity. Maximum amount of water soil can hold against gravity (low, medium, high).			
Nutrient storage capacity (low, medium, high).			
Cation exchange capacity. The amount of cations that can be adsorbed (low, medium, high).			

19. What irrigation and fertilization strategies would you recommend for someone with a soil texture and structure similar to your soil?
20. Later you might conduct a second test to determine the soil texture called the ribbon test. How did the results of the ribbon test compare to this jar test? What information can the jar test provide that the ribbon test may not?