

## EVALUATING SOIL TEXTURE

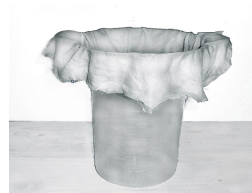
**Objective:** This laboratory exercise shows you how to measure infiltration, water-holding capacity, and workability of different soils. **Video instructions:** <https://vimeo.com/70065208>

### Procedure A: Infiltration and Water-Holding Capacity

- 1) Place the sieve on top of the 1-liter beaker and completely line the inside with the handkerchief as indicated in Fig. 1 & Fig. 2.
- 2) Weigh out 200 grams of soil sample (sand, clay, topsoil, or loam) and place it inside the cloth. Arrange the soil in the sieve so that it has the structure of a shallow bowl (Fig. 3).
- 3) Add 50 mL of water to the center of the “bowl” (Fig. 4).
- 4) Count how much time it takes for the soil to absorb the water completely (Fig. 5 to Fig. 6). This will be your “infiltration” measurement.
- 5) After all of the water has been absorbed, slowly add 150 mL of water to the soil, making sure that none of the water spills over the top edges of the soil. When all of the water is absorbed, measure the amount of water that has managed to percolate throughout the soil and into the beaker (in the case of clay, the water will be absorbed so slowly that you will have to come back at the end of the day to make this measurement). If all of the water is absorbed and there is no percolation, then add 100 mL more water (300 mL total). The amount of water that does not percolate will approximate the “water holding capacity” of your soil sample.



**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**



**Fig. 5**



**Fig. 6**

### Procedure B: Soil Strength/Workability

- 1) To measure workability, take the wet sample and shape out 2-3 balls of approximately one inch in diameter. Make sure balls are similar in size. Place them in a drying oven overnight or dry them at room temperature for about one week.
- 2) After drying, test how much weight is needed to crush the balls (*Note: more strength = less workability*). Place the ball on a bathroom scale and cover it with a brick. While reading the scale, slowly push down on the ball until it is crushed (Fig 7).



**Fig. 7**

**Procedure C: Presenting the Data**

Organize data into a table. Use a bar graph for comparing qualitative differences (topsoil vs clay/sand mixtures) and a line graph for comparing quantitative differences (sand/clay mixtures):

**Sample format for comparing sand/clay mixtures provided in class**

	Strength (g)	Infiltration (s)	Water-holding (mL)
0 % Clay			
25 % Clay			
50 % Clay			
75 % Clay			
100 % Clay			
Top soil			

**Soil Texture Pre-lab Questions (based on video clip and reading):**

1. Number the following soil types in the order of their infiltration rates based on your experience (fastest to slowest): sand \_\_\_\_\_ clay \_\_\_\_\_ topsoil \_\_\_\_\_
2. Number the following soil types in the order of their ability to hold water based on your experience (highest to lowest): sand \_\_\_\_\_ clay \_\_\_\_\_ topsoil \_\_\_\_\_
3. Number the following soil types in the order of weight-bearing strength based on your experience (highest to lowest): sand \_\_\_\_\_ clay \_\_\_\_\_ topsoil \_\_\_\_\_
4. What effect do soils with fast infiltration have on groundwater recharging?
5. What effect do soils with fast infiltration have on run-off?
6. What are two problems associated with run-off?
7. How do soils with low water-holding capacity affect plants?
8. What effect do soils with high weight-bearing strength have on the ability of Earthworms to burrow through the soil?

**Soil Texture Post-lab Questions:**

1. What is an advantage of sand as a soil component in agriculture?
2. What is a disadvantage of sand as a soil component in agriculture?
3. What is an advantage of clay as a soil component in agriculture?
4. What is a disadvantage of clay as a soil component in agriculture?
5. Are the qualities you measured of the clay/sand mixtures intermediate between those of sand and clay? What aspect(s) of its physical properties support your conclusion?
6. Are the qualities you measured of the topsoil intermediate between those of sand and clay? What aspect(s) of its physical properties support your conclusion?
7. Which sample (sand, clay, topsoil, or silt-loam) gives the best textural qualities for growing plants? Why?