

Study the Soil Composition in your backyard

June22, 2005

Extra credit lab: Jar test

You can arrange to have 2 jars per group.

Items needed:

1 spaghetti or mason jar, preferably quart size

Shovel for digging hole

Water (will fill in lab)

Step by step:

1. Dig a hole somewhere outside of a vegetable garden, or landscaped area to represent native soil cover of area. Dig the hole 12 inches deep and discard everything. Need to go lower than frostline and in Portland that is 12 inches. (Why? Because freezing and contracting can have unnatural heaving and not be true representation of soil)
2. Dig enough soil below the 12" depth to fill the jar upto 3/4th its capacity with soil.
3. Seal jar with just soil and bring to lab on 27th June, 2005.

In lab:

4. Fill jar to neck with water.
5. Shake thoroughly allowing all clumps to break down and then sit shelf.
6. Over time the materials in the jar will settle. Allow at least a week to settle. The Jar test will be studied and discussed on the 5th of July:

The following settling pattern is expected:

Aggregate is heaviest and will sink to the bottom

Next will be sand

Above that will be silt

Next will be clay, grey, or red in this area

And then organic on top

7. When well stratified you will measure the total height in inches from bottom of jar to top of organics. Then you will measure depth of each material within.

8. Then you will determine percent of material in the soil: for example If the total soil in the jar is 12 inches, and the aggregate is 2 inches, then $2/12 = 1/6$ or 17%; sand 6 inches/12 = 50% etc. etc.

What does this exercise mean? We shall be discussing that in class when the results are available.

Jar Test (in class)

7 July, 2005

For Extra Credit: 10 points

Answer the following questions and turn them in no later than Monday, 11th July

1. Define the term: Soil profile (0.5)

2. The layers of soil observed in your sample are: (0.5)

3. Percent of different soil materials in the sample: Show your calculations in the space provided.(1)

4. Why do the largest particles settle first?(0.5)

5. Why do smaller sized particles settle last?(0.5)

6. What is the stuff floating in the jar, if any?(0.5)

7. Which soil layer is most important for plant growth? How well is your soil sample suited for growing plants?(1)

8. Which soil layer has the most nutrients? Why?(0.5)

9. How is topsoil formed?(1)

10. Why is the topsoil darker than other layers?(1)

11. Soil scientists classify soil particles in the categories of _____, _____, and _____.(0.5)
12. Sediment from erosion can be reduced by (0.5)
- a) planting grass and trees
 - b) digging ditches
 - c) mulching areas
 - d) a and c
 - e) all of the above
13. Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. One of the most important soil properties that affect the available water capacity is: (0.5)
- a. the amount of rainfall the soil receives
 - b. the flooding frequency of the soil
 - c. the type of bedrock
 - d. the soil texture (the percentage of sand, silt and clay in soil)
14. Crops grown in rotations to maintain or improve soil productivity and fertility is called (0.5)
- a. contour farming
 - b. conservation tillage
 - c. crop rotation
 - d. none of the above
15. Draw a soil profile of your sample.(1)

Some helpful information:

Clay contracts and expands therefore it moves and in landslides will slump together causing major problems. Clay also is not porous therefore in flashfloods this causes all the rain to run off the surface rather than sink in. For agriculture this is also a problem not allowing the roots of the plants proper moisture. In buildings of earth adobe allows 15 - 18% of clay as a binder to keep the earth together, while more clay will allow the bricks to crack with changing temperatures, and less will not be enough to bake thoroughly and keep the brick structurally sound.

Sand is a good insulator and allows moisture to move through the mix. It does not retain moisture therefore may be bad for plants that need moist soil. While those that are drought tolerant may not be so picky. Sand is a good binder in soil to keep its integrity and makes good insulated floors

for buildings.

Aggregate gives the soil its structural integrity. The rammed earth wall requires 20% aggregate to give it its strength. Aggregate in soil for agriculture is not necessary and sometimes seen as a hindrance.

Silt is decomposed organics over time which is an indicator in Portland mostly of flood waters from riverways.

Organics are decomposing plant matter that recently grew on the surface that give the minerals and fertilizer to the new plants to come.