

# Soil



☞ We know less about life in the earth under our feet than we do about the far side of the moon....



# Three Soil Characteristics that effect RainScaping

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☞ Composition (Including Biology)

☞ Particle size

☞ Compaction

# Soil Composition



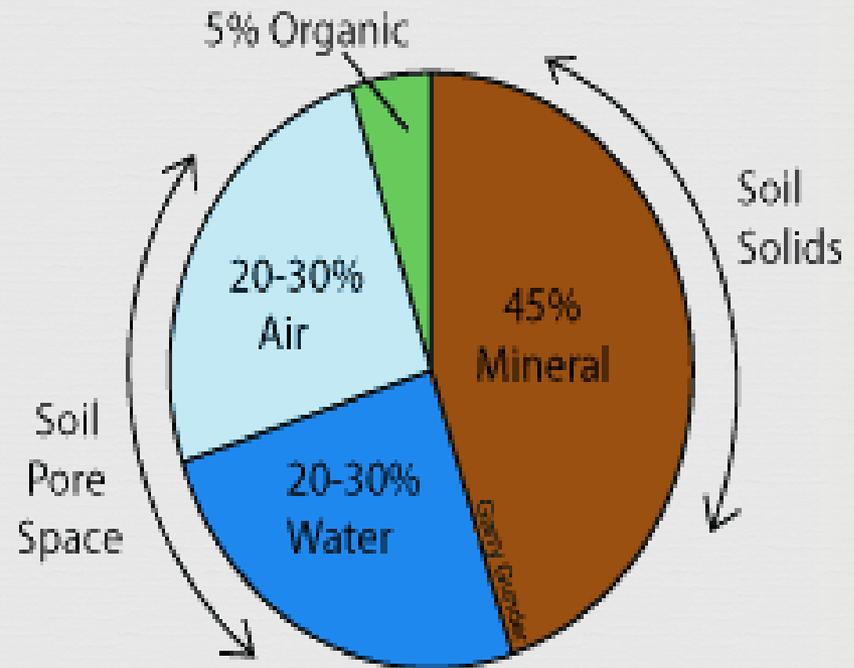
❧ What is soil made of?

# Soil Composition



## Soil Composition by Volume

Soil consists of solids, liquids, and gases. Pores between the solid materials hold liquids and gases that are essential for plant and microorganism growth, and solid materials hold or provide nutrients that can become accessible for organism growth.



# Organisms



- A teaspoon of productive soil generally contains between 100 million and 1 billion bacteria.
- Organisms play an important role in redoximorphic formation, reducing oxygen, nitrogen, iron, and other minerals to complete their life cycle.

# The Dirt -



☞ Each shovel of soil holds more living things than all the human beings ever born

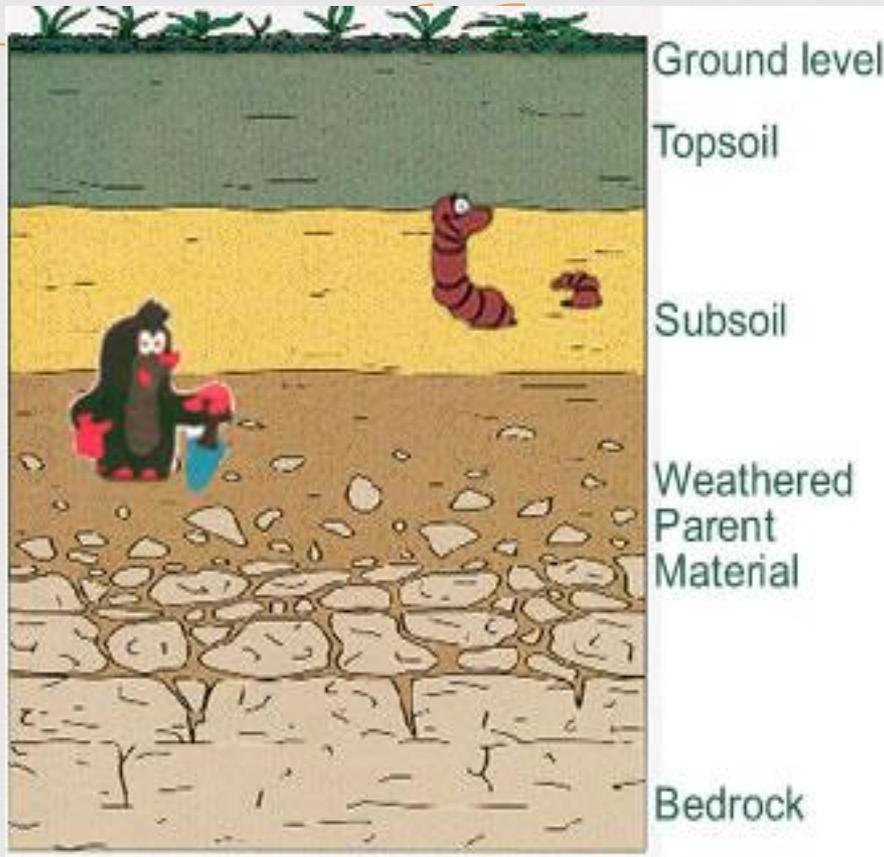


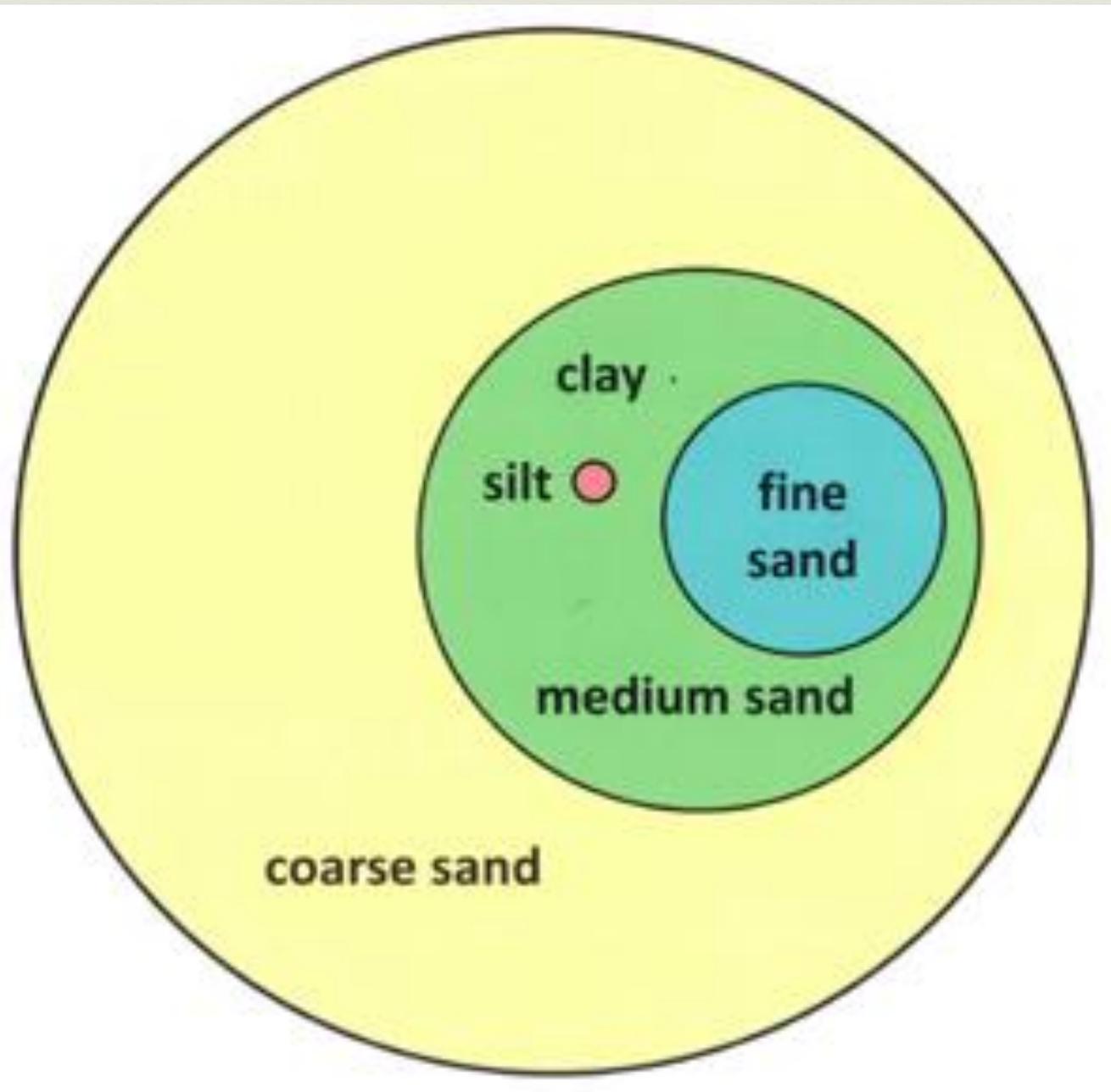
# *Pesticides and Herbicides*



- ❧ All pesticides impact some non-target organisms. Heavy pesticide use tends to reduce soil biological complexity. Total microbial activity often increases temporarily as bacteria and fungi degrade a pesticide. Labels generally do not list the non-target organisms affected by a product. In fact, few pesticides have been studied for their effect on a wide range of soil organisms.

# Soil Profile

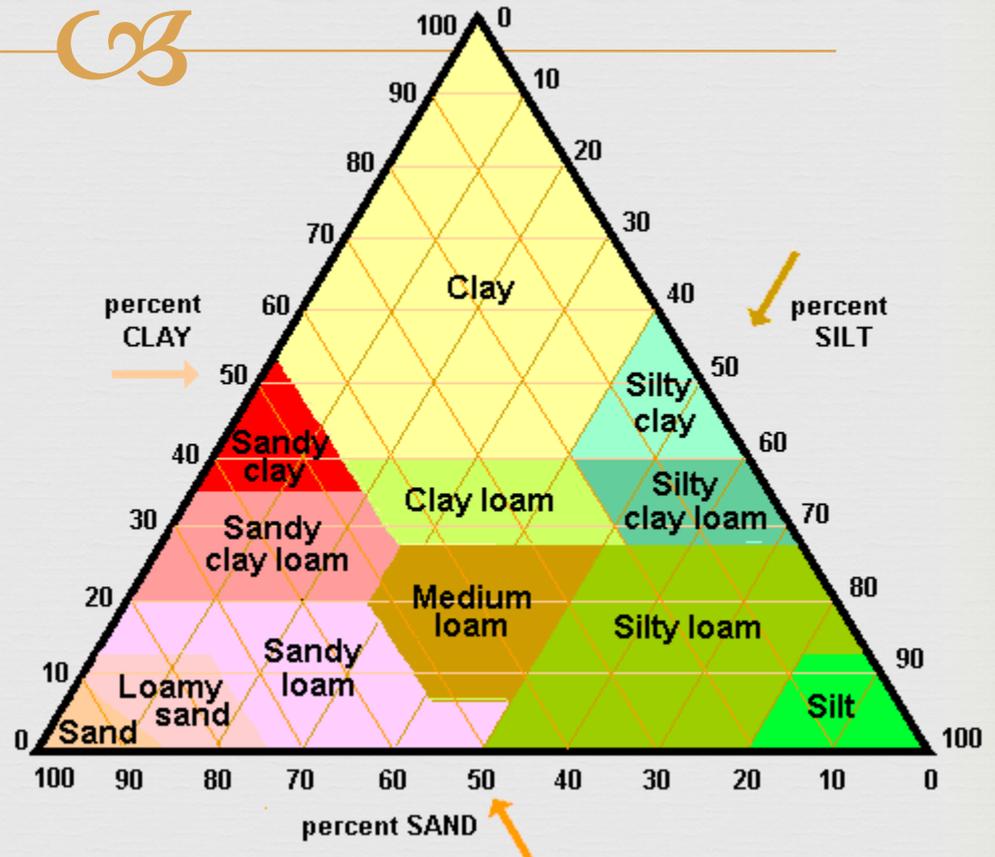




# The Soil Triangle

Soil classification is typically made based on the relative proportions of silt, sand and clay. Follow any two component percentages to find the nominal name for the soil type. For example, 30% sand, 30% clay and 40% silt:

Find 30% along the bottom (sand) line, and follow the slanted line up and to the left. Stop at the horizontal line for 30% clay, and find the soil type: **clay loam**.



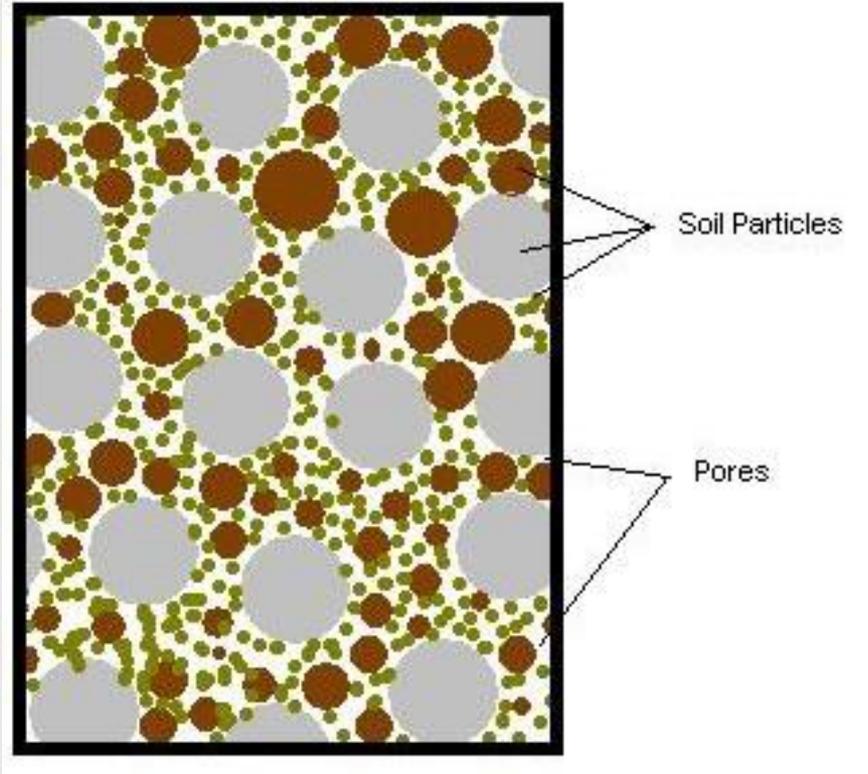
# Soil Compaction



- ❧ What happens to soil aeration, drainage and rooting when soils become compacted?
- ❧ What choices do you have to effectively decrease compaction in soils?

# Compaction: Porosity

∞ The space between soil particles is referred to as "voids" or "pores". This is the area where water can reside in the soil. Therefore, the composition of a soil has a significant effect on the amount of water it can hold.



# Testing our Soil



What might we want to know?

# Soil tests



Figure 38. Dig a hole first.



Figure 39. Fill the hole with water.



Figure 40. Lastly, track time.

The percolation test and the clay test can help you identify soil type in your rain garden area.

## Percolation Test

There are two percolation tests that can help you determine how fast water drains in your soil.

### 1. Water in a hole

- Dig a hole about 1-2 feet wide and 2 feet deep at the rain garden site (figure 38).
- Fill the hole with water (figure 39).
- If the hole drains in less than 24 hours, your soil is probably

suitable for a rain garden (figure 40).

- If there's water in the hole after 24 hours select another site or talk to a professional landscaper.

### 2. Water in a can

- Remove the ends from a 46-ounce can or a large can of juice.
- Insert the can two inches into the ground.
- Pour a quart of water into the can.
- Depending on how many minutes it takes for the water to drain, you may or may not have suitable soils for a rain garden (table 4).

Drainage Time	Soil Porosity	Drainage Conditions
Less than 4 minutes	Excellent percolations and air circulation.	This soil offers the best drainage conditions for planting a rain garden.
4 to 10 minutes	Somewhat compact or dense soil.	Acceptable drainage for a rain garden but slower; may need to aerate or augment soil.
Over 10 minutes	Overly compact or dense.	Very poor drainage; challenging conditions. Must augment soil, mill, and aerate.

Table 4. Drainage time.

## Percolation Test

Different Percolation tests for different purposes

Need to double perc in dry season.

# What factors might affect soil drainage?

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Water Table

Soil Compaction

Soil Composition

Soil Health

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## Soil Testing

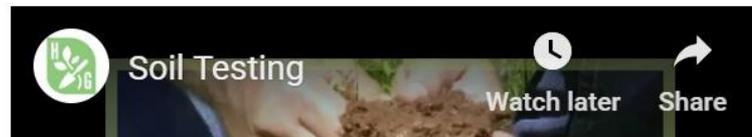
### Why and How to Test Your Soil

Soils contain the nutrients, water, and living organisms that help create healthy and sustainable gardens and landscapes. Recommendations based on the test results will improve these qualities.

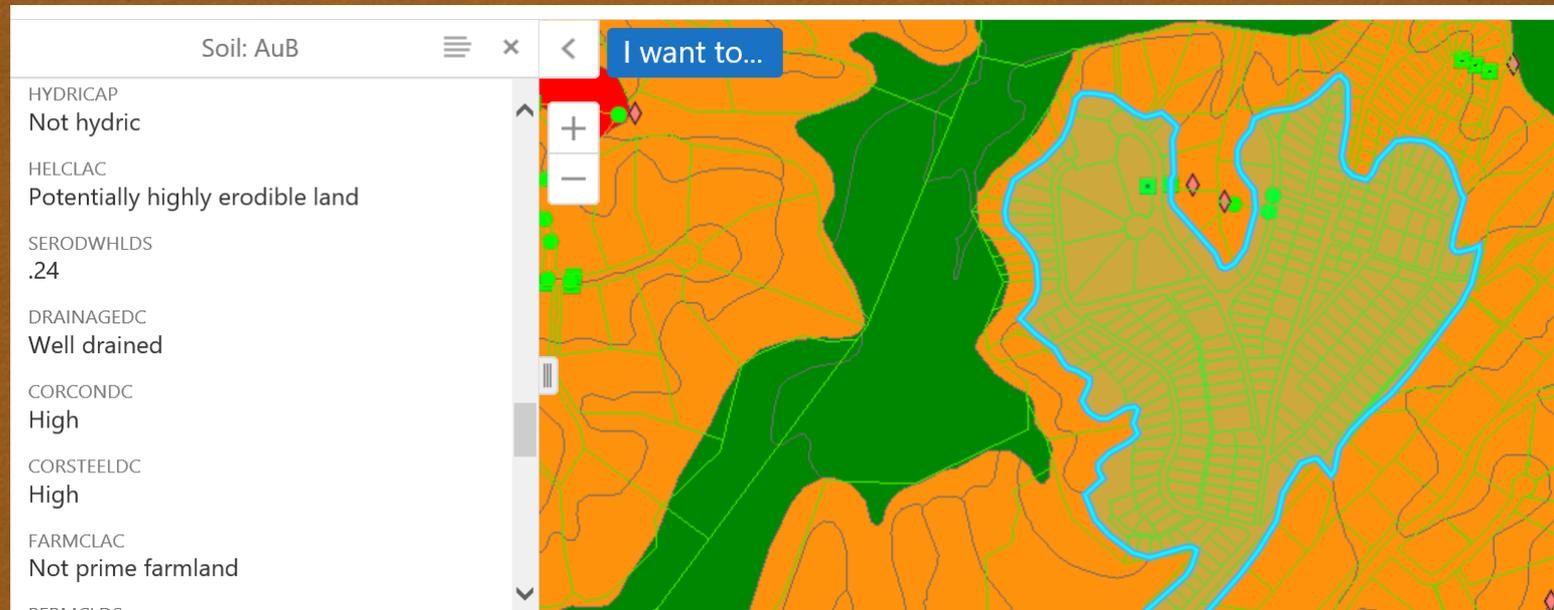
A basic soil test that gives readings for soil pH, phosphate, potassium, and magnesium levels is sufficient for most home gardeners.

The importance of soil to plant growth can be summed up in the aphorism "it's better to plant a \$2 tree in a \$25 hole, than a \$25 tree in a \$2 hole."

### How to Collect a Soil Sample (Video)



<https://extension.umd.edu/hgic/topics/soil-testing>



Soil Group: B

Soil name: Annapolis Urban Land Complex

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☞ Particle size

☞ Compaction

# Resources



☞ Natural Resources Conservation Service

<http://www.nrcs.usda.gov/>

☞ The Encyclopedia of Earth

<http://www.eoearth.org/article/Soil>

☞ Web Soil Survey

<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>