

TEACHER NOTES + ANNOTATION

What is Soil?

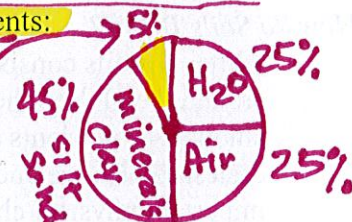
Soil. Earth. Dirt. No matter what we call it, it's the material that constitutes the outermost solid layer of the planet. We build on it. We raise food in it. We mine mineral resources from beneath it. - why Soil is impor. Apparently unchanging and lifeless, soils are dynamic mixtures, teeming with life. One teaspoon of soil in the temperate regions can contain billions of organisms, ranging from simple bacteria and fungi to more advanced forms. Earthworms, insects, and spiders are examples. Bedrock is continually fractured, dissolved, and changed into soil, but the process occurs slowly so we usually never notice.

Soil is a naturally occurring mixture of mineral and organic ingredients with a definite form, structure, and composition. The exact composition of soil changes from one location to another. The following is the average composition by volume of the major soil ingredients:

- ✓ 45% mineral matter (clay, silt, sand, gravel, stones)
- ✓ 25% water
- ✓ 25% air
- ✓ 5% organic matter or humus (both living and dead organisms)

Soil ingred

inorg 95%




What is Soil Ecology?

Plants and animals have important roles to play in soil. Both plants and animals change the composition and structure of soil in many different ways. Plants with roots obtain nutrients and moisture from soil through their roots. Roots get energy to grow from sugars that are made during photosynthesis--a process that occurs in the leaves. Roots absorb nutrients and water primarily through tiny projections called root hairs. Although plants are the most visible large organisms, many animals also inhabit soils. Earthworms are perhaps the best known of this group. Scientists estimate that between 200 and 1,000 pounds of earthworms can be found in an acre of soil. Bacteria and Fungi are found in very high quantities in the soil as well.

How is Soil Formed?

There are thousands of different soils throughout the world. Soils are formed through a combination of five important factors.

1. Parent Material - The parent material is the original rock that gets broken down into smaller pieces or sediment. Most of the sediment is inorganic but plants and animals can decompose and break down into sediment as well. Parent material can be a volcanic deposit such as ash; it can be a sediment that has been transported and deposited by wind or water; or it can be a deposit left by glaciers.
2. Climate - Parent material is broken down into finer particles by a process called weathering, which is controlled by the climate of a given location. Temperature and water are major climatic forces that influence weathering. Warm and wet climates speed up soil formation.
3. Living Organisms - Both plants and animals help to create soils. As they die, plants and animals add organic matter to weathered parent material to help form subsoil and topsoil. As animals dig through the soil, they break it up, permitting more air and water to enter.
4. Topography - Topography is the hilliness, flatness, or amount of slope of the land. The steeper the slope the more probability of erosion and weathering. 
5. Time - The age of a soil must be considered in thousands and even millions of years since it may take hundreds of years for these factors to form one inch of soil from parent material. Wow!

What are Soil Horizons?

Soils develop into layers. These layers, called horizons, are usually seen along road cuts, construction sites and other areas where the soil is exposed. In the hypothetical situation, there are four horizons in a soil profile. The thickness of each varies with location, and under disturbed conditions -- heavy agriculture, building sites, or severe erosion, for example -- not all horizons will be present. Here are the typical layers or horizons of soil:

80#

- ✓ **O = Organic.** It consists of fragments of leaf litter, twigs, roots, decaying animals, animal wastes and other organic material lying on the surface of the soil. This layer is not present in cultivated fields.
- ✓ **A = Topsoil.** It is usually darker than lower layers, loose, and crumbly with varying amounts of organic matter. This is generally the most productive layer of soil. * (Sub=under)
- ✓ **B = Subsoil.** It is usually light colored, dense, and low in organic matter. * (Sub=under)
- ✓ **C = Parent Material.** The unconsolidated organic and mineral material in which soil forms.
- ✓ **R = Bedrock.** The solid rock that underlies the soil and other unconsolidated material.



Rock Fragments

How do Soils Differ?

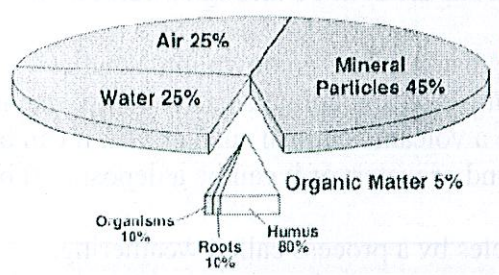
Although soils consist primarily of sand, silt, and clay, there are over 70,000 different types of soils around the globe. There are many characteristics that differentiate one soil from another; for example, amounts of nutrients available, erosion potential, and permeability. Physical characteristics are the easiest to observe and by examining only a few, several generalizations can be made about soil. Two important physical characteristics (or traits) are color and texture.

Color - There are three color categories of topsoil which relate to the amount of organic matter:

1. **Dark soils** -- black, dark gray, or dark brown. Rich in organic content and usually very fertile. They are excellent for gardening and agriculture.
2. **Moderately dark soils** - range from brown to yellow-brown. They moderate amounts of organic matter and are of medium fertility. They can be good for farming and gardening.
3. **Light colored soils** -- pale brown to yellow. They are low in organic matter, fertility, and are sometimes poorly aerated.

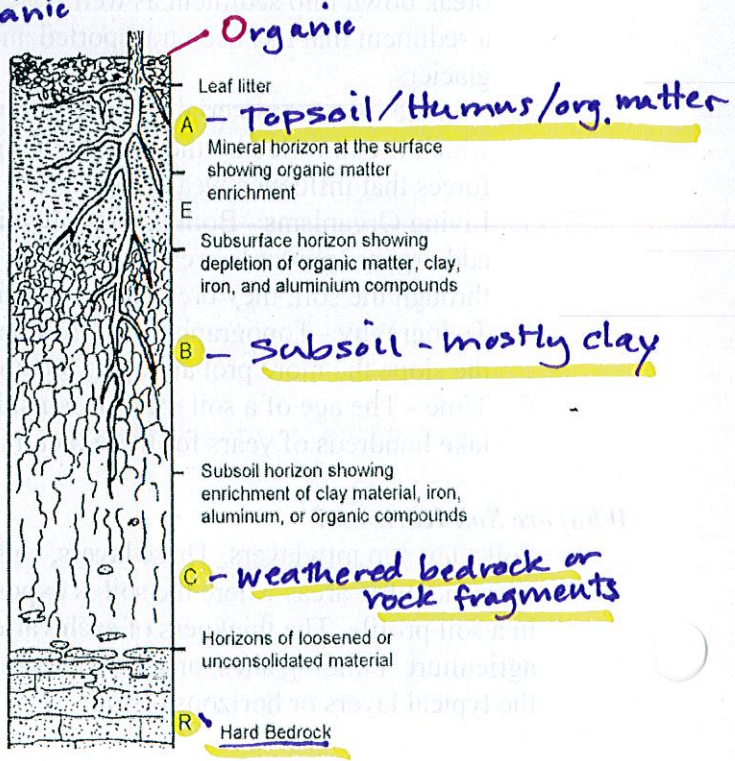
low

Texture - Soils can be classified into three groups by texture: clayey, sandy, and loamy. To test, wet a small amount of soil and rub it between your fingers. Clayey soils are smooth and sticky; sandy soils are very gritty; and loamy soils are between these two extremes.



Soil Composition
95% inorganic
5% organic

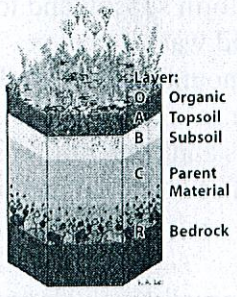
Soil Profile



Got SOIL?

Did you know ...

- It takes 500 years to form one inch of soil.
- There are 109 different soil types in Licking County.
- Each soil type has different attributes and limitations.
- Well-drained, loamy soils are best for gardens.
- Well-drained soils are best for building permanent structures.
- Soils with high clay content may be good for a pond site.
- Flood plain soils are not recommended for building permanent structures.
- Using Best Management Practices can help reduce soil erosion.



There can be no life without soil and there can be no soil without life, they have evolved together. -- Charles Kellogg