

Understanding Soil Color

HAVE YOU EVER HEARD someone mention the red clay of Georgia or the black soil of the Midwest? Color is often used to describe soil. Color indicates some of the qualities of soil. In this unit, you will learn about why soils in different areas have different colors.



Objective:



Analyze factors that determine soil colors.

Key Terms:



bright-colored subsoil
color
deciduous hardwood forests
dull-colored subsoil
humus
mottle-colored subsoil
native vegetation
structure
tall prairie grasses
texture

Soil Color

Soils have many features that help us in distinguishing between the various types. These include texture, structure, depth of soil horizons, and color. **Texture** refers to the coarseness or fineness of soil particles. **Structure** pertains to the way in which soil particles are held

together. Depth of horizons is the thickness of the individual horizons in a soil profile. **Color** refers to a soil's blackness or redness and to its darkness or lightness.

COLOR OF SURFACE SOILS

Colors associated with surface soils are dependent on the amount of organic matter found in them. Surface soils are placed in one of five color classes:

- ◆ **Very dark**—approximately 5 percent organic matter
- ◆ **Dark**—approximately 3.5 percent organic matter
- ◆ **Moderately dark**—approximately 2.5 percent organic matter
- ◆ **Light**—approximately 2 percent organic matter
- ◆ **Very light**—approximately 1.5 percent organic matter

Native Vegetation

The amount of organic matter in a soil is the factor that determines the color of the surface soil. It is directly related to the kind of native vegetation. **Native vegetation** refers to the type of plant material that grew in the soil. The type of native vegetation varies from one region to the country to another. Two main types of native vegetation that covered much of the land converted for agricultural and horticultural uses are tall prairie grasses and deciduous hardwood forests.

Tall prairie grasses produced abundant roots, which filled the top 1 to 2 feet of the soil. These roots only partially decayed. Over a long



FIGURE 1. Various soil colors. (Courtesy, Natural Resources Conservation Service, USDA)



FIGURE 2. Dark-colored soil (left) is more productive than lighter-colored soil. (Courtesy, Natural Resources Conservation Service, USDA)

period, the roots gave the high organic matter content to prairie soils. These soils are high in **humus**, a type of organic matter that results from the partial decay of plants and animals. They tend to be dark to very dark.

Deciduous hardwood forests accumulated a shallow layer of partially decayed leaves, twigs, and fallen logs on the surface. Because these materials were on the surface, they decayed more rapidly than the roots of prairie grasses. This process left only a thin, moderately dark top layer of soil. As the soil was worked, the topsoil was mixed with the lighter soil underneath to produce a lighter color.

COLOR OF SUBSOILS

Subsoil colors are associated with natural drainage of the soils while the soils were forming. The level of moisture in a soil affected iron compounds that gave color to the subsoil. Subsoil colors are classified as bright, dull, or mottle colored.

Subsoil Classes

Bright-colored subsoil is characteristically brown, reddish brown, or yellowish brown. Good drainage is what gives subsoil a bright color. This is because the iron found in the soil has been oxidized. This can be compared to metal that oxidizes or rusts when both moisture and air are present. Rust has a bright or orange color.

Dull-colored subsoil is gray or olive gray. Poor drainage results in subsoil that is dull colored. This is because the iron found in the soil has not been subject to air or oxygen. The iron compounds do not oxidize, and therefore they leave a grayish color.

Mottle-colored subsoil consists of clumps of both bright and dull colors mixed together. Somewhat poor drainage of the subsoil leads to the mottled look. This is because the soil was saturated with moisture for certain periods. Some soil clumps take on a gray color because of the periods of poor drainage. Other soil clumps assume a bright color because the soil was comparatively dry during other periods.



FIGURE 3. Dark-colored soils are high in humus. (Courtesy, Natural Resources Conservation Service, USDA)

OTHER FACTORS AFFECTING SOIL COLOR

Besides organic matter and drainage, soil color is influenced by parent material, age, and slope of the land.

Parent Material

The color of a soil is associated with the kind of material from which it was formed. Soils developed from sand or light-colored rock will be lighter. Those developed from darker materials, such as peat or muck, will be darker.

Age

As soils age, much of the darker color is lost due to the weathering process. Weathering causes organic matter in the soils to break down.

Slope

Soil on the tops of hills is usually lighter in color than soil in depressions or on level ground. One reason for this is the darker topsoil is washed off the hills, leaving the lighter subsoil exposed. Another explanation is there tends to be greater moisture on lower land. This allows more abundant growth of plants in the lower areas, in turn providing more organic matter and a darker color to lower soil. Also, moisture in the low-lying soil slows the decay of the organic matter.



FIGURE 4. Years of wind and water erosion have changed the soil on the top of this hill. (Courtesy, Natural Resources Conservation Service, USDA)

Summary:



Color refers to a soil's blackness or redness and to its darkness or lightness. The amount of organic matter in a soil is the factor used to determine the color of the surface soil. It is directly related to the kind of native vegetation that grew in the soil.

Subsoil colors are associated with natural drainage of the soils while the soils were forming. The level of moisture in a soil affected iron compounds that gave color to the subsoil. Subsoil colors are classified as bright, dull, or mottle colored.

Besides organic matter and drainage, soil color is influenced by parent material, age, and slope of the land.

Checking Your Knowledge:



1. What determines the color of surface soils?
2. What are the five color classes for surface soils?
3. How do tall prairie grass soils differ from deciduous hardwood forest soils?
4. What are the three subsoil color classes?
5. How do parent material, age, and slope influence soil color?

Expanding Your Knowledge:



Obtain a number of soil samples of different colors and from different locations. Use a Munsell Soil Color Chart to classify your samples. How do your soil samples compare?

Web Links:



The Color of Soil

http://soils.usda.gov/education/resources/k_12/lessons/color/

Soil Color

<http://soil.gsfc.nasa.gov/pvg/color1.htm>

Introduction to Soils

<http://www.physicalgeography.net/fundamentals/10t.html>