

Anticipated Problems

- 1. What physical features are used to differentiate between soils?
- 2. What colors are used to describe surface soils?
- 3. What factors determine the color of surface soils?
- 4. What colors are used to describe subsoil?
- 5. What factors determine the color of subsoil?
- 6. How do parent material, age, and slope affect the color of soil?



Terms

- bright-colored
- color
- deciduous hardwood forest
- dull-colored
- humus
- mottle-colored
- native vegetation
 - structure
- tall prairie grass
- texture





Physical Features of Soils

Soils have many features that are used to recognize differences between them.

Physical Features of Soils

- *Texture*—coarseness or fineness of soil particles
- Structure—the way in which soil particles are held together
- Depth of horizons—the depth of each soil
- Color—refers to the darkness or lightness of the soil color

Colors Describing Soils

 Colors associated with surface soils are determined by the amount of organic matter found in the soils.



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

Colors Describing Soils

Very dark—approximately 5% organic matter Dark—approx 3.5 % organic matter Moderately dark—approx 2.5% organic matter Light—approx 2% organic matter Very light—approx 1.5% organic matter



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



Factors Determing Soil Color

- Organic matter content is the main factor that determines the color of surface soil.
- The amount of organic matter is determined by the kind of native vegetation.





Factors Determing Soil Color

 Native vegetation refers to the type of plant material that originally grew on the soil.



Factors Determing Soil Color

- Two primary types of native vegetation in Illinois.
 - Tall prairie grass
 - Deciduous hardwood forest



Tall Prairie Grass

Tall prairie grass—Grasses had abundant roots, which filled the top 1 to 2 feet of the soil.

Tall Prairie Grass

- Partial decay of the roots over a long period resulted in a high organic matter content in 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.



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

Deciduous Hardwood Forest

Deciduous hardwood forest—A shallow layer of partially decayed leaves, twigs, and fallen logs accumulated on the surface.



Deciduous Hardwood Forest

- Because these materials were on the surface, they decayed more rapidly than did the roots of the prairie grasses. This left only a thin, moderately dark top layer.
- As these soils have been worked, they have been mixed with the lighter soil underneath to produce a lighter color.

Colors Describing Subsoil

- Subsoil colors are associated with natural drainage of the soils.
 - A soil's natural drainage is the drainage condition that existed when the soil was forming



Colors Describing Subsoil

Bright-colored—brown, reddish brown, or yellowish brown

Dull-colored gray or olive gray

Mottle-colored—clumps of both bright and dull colors mixed together

- The color of subsoil is determined by the status of iron compounds.
 - Determined by the type of natural drainage found in the soil

- Good drainage results in subsoil that is bright in color.
 - The iron found in these soils has oxidized.
 - Compared to metal that oxidizes, or rusts, when both moisture and air are present.
 - Rust has a bright or orange color.

- Poor drainage results in subsoil that is dull or gray in color.
 - The iron found in these soils has not been subject to air or oxygen.
 - The iron compounds do not oxidize.
 - This leaves a grayish color.

- Somewhat poor drainage results in subsoil that is mottled.
 - The soil was saturated with moisture for certain periods.
 - Leaves a gray color in some soil clumps
 - Since the soil was comparatively dry during other periods
 - a bright color is found in other soil clumps



In addition to organic matter and drainage, soil color may also be affected by parent material, age, and slope.



- Parent material
 - The color of a soil is associated with the kind of material from which the soil is formed.
 - Soils that developed from sand or light-colored rock are lighter.
 - Those that developed from darker materials, such as peat and muck, are darker in color.

🗆 Age

- As soils age, much of the darker color is lost due to the weathering process.
- This causes the soil to lose organic matter.

Slope

- Soil on top of hills is usually lighter in color than soil in depressions or on level ground. (partly due to the darker topsoil being washed off the hills)
- There tends to be moisture on lower land.
 Allows for more abundant growth of plants in the lower areas, which leads to more organic matter in lower soils and a darker color.



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

Review

- Name four physical features of soil that helps to recognize the differences among them.
- How does the amount of organic matter affect the color of the soil?
- How does the status of iron compounds affect the subsoil?
- What color would you expect soil to be that has good drainage?