



What is soil texture?

The amount of sand, silt, and clay in a soil sample.

(coarse)
Sand


2.0 to 0.05 mm
in diameter

(medium)
Silt

0.05 to 0.002 mm
in diameter

(fine)
Clay


0.002 - 0.0002 mm
in diameter



Sand, silt, and clay are terms used to describe the size of soil particles within a soil sample.

SOIL TEXTURE TRIANGLE

Figure 5. Five soil texture groups.



Estimate the texture of a soil sample by using a Soil Texture Triangle.

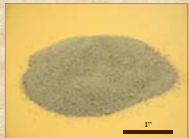
First, estimate the clay content (use the procedure shown in Fig. 6 of the SDSU publication *Land Judging in South Dakota*.)

Next, estimate the volume of sand. Once the percentages of clay and sand are determined, find the percentages on the texture triangle and extend the two lines. The point where they intersect is the texture of the sample.


In this example, the soil sample has an estimated clay content of 25 percent and a sand content of 30 percent. The two lines intersect in the "loam" section of the triangle. In land judging, the term "medium" is used instead of "loam".

SOIL TEXTURE

The Extremes



Coarse-textured soil samples contain a high percentage of sand-size particles. Some samples may be "cloddy" when dry but are easily broken when moistened.



Fine-textured soil samples contain a high percentage of clay-size particles that stick together to form "clods." These "clods" are hard when dry and sticky and plastic when wet.

DETERMINING SOIL TEXTURE BY "FEEL" METHOD



STEP 1: Crush Sample



STEP 2: Moisten Sample

DETERMINING SOIL TEXTURE BY "FEEL" METHOD



STEP 3: Work Sample



STEP 4: Ribbon Sample

Figure 6. A flow chart to place soil into a textural group using the feel method.

SOIL TEXTURE BY FEEL


START Place approximately 1 tablespoon soil to palm. Add water dropwise and knead soil to break down all aggregates. Test in at proper consistency when plastic and moisture, like putty.

Place ball of soil between thumb and forefinger, gently squeeze the soil with thumb, separating it upward into a ribbon. Form a ribbon of uniform thickness and width. Allow the ribbon to stretch and control your breathing, controlling from its own weight. Does the soil form a ribbon?


NO Coarse

YES Does soil make a weak ribbon 1-2 inches before it breaks? **NO** Medium **YES** Does soil make a strong ribbon 3 inches before it breaks? **NO** Fine **YES** Does soil make a very strong ribbon 4 inches before it breaks? **NO** Very Fine **YES** Excessively wet a small piece of soil in palm and rub with forefinger. Does soil feel very gritty? **NO** Medium **YES** Moderately Coarse

DETERMINING SOIL TEXTURE BY "FEEL" METHOD



Differences between Medium and Fine Textures




1"

Dry sample of MEDIUM texture

Characteristics

- Porous
- Subrounded edges
- Easy to difficult to crush
- Dull surfaces

Differences between Medium & Fine Textures



1"

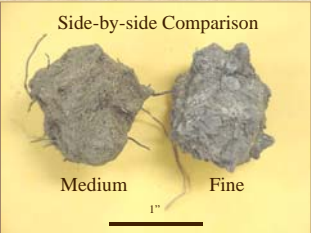
Dry sample of FINE texture

Characteristics

- Non-porous
- Angular surfaces
- Difficult to crush
- Shiny surfaces

Differences between Medium & Fine Textures

Side-by-side Comparison



Medium Fine


1"

Soil Color

Soil gets its color from materials and conditions in which the soil is formed. Soil color is NOT an indication of soil texture.

The familiar terms "black dirt" (referring to the topsoil) and "yellow clay" (referring to the subsoil) are misnomers because sand, silt, and clay can vary in color from white, gray, black, yellow, brown, olive, and red (and all colors in between).


Soil colors CAN give an indication of its wetness, chemical composition, and organic matter content.



Soil Color - Examples

Very Dark Brown

In this soil, the color of the topsoil indicates a high organic matter content. The topsoil here has a medium texture.



Light Brown with white "sploches"

The color of this subsoil indicates a high calcium carbonate content (white "sploches") and a decrease in organic matter. The subsoil in this example has a moderately fine texture.

Soil Color - Examples



Black: The color in this soil could indicate a high organic matter content and/or soils that are wet for long periods. The texture in this subsoil is "fine."



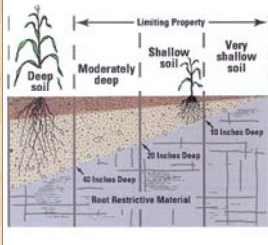
Reddish Brown: The color of this subsoil could be an indication of low organic matter and a highly oxidized or well drained soil. This subsoil has a "moderately fine" texture.



Light Gray: The color of this soil could be an indication of low organic matter and high lime content. The texture of the entire area shown here is "medium."

EVALUATING SOIL DEPTH

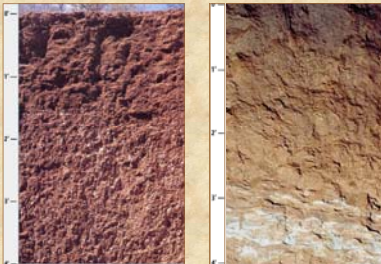
Figure 7. Depth of root zone.



Examples of Unfavorable Root Zones

- Coarse sand
- More than 15 percent gravel/cobbles with coarse textures
- Sodium-affected subsoil (columnar structure)
- Bedrock/Rock (shale, sandstone, slate)

EVALUATING SOIL DEPTH



Deep soil with lime at 18 inches

Moderately Deep soil with bedrock at 36 inches

EVALUATING SOIL DEPTH



Shallow soil with fractured bedrock at 12 inches

Very Shallow soil with sand/gravel at 7 inches

PAST EROSION

How much of the soil has been lost to erosion?

To determine this, first determine how thick the topsoil is. *Get down in the pit and look for a change in texture, color and/or structure.* Measure from the surface down to that point. That point is the current thickness of the topsoil.



PAST EROSION

Example: You determine the current thickness of the topsoil is 7 inches. The site info card states that "**Original topsoil thickness was 12 inches.**" How much soil was lost through erosion?

$$\text{Soil Loss} = \frac{\text{Current Thickness}}{\text{Original Thickness}} \times 100$$

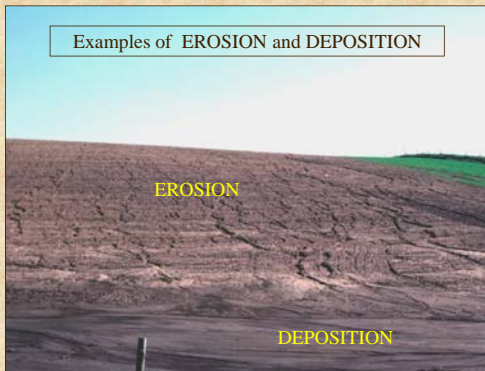
$$\text{Soil Loss} = \frac{7}{12} \times 100$$

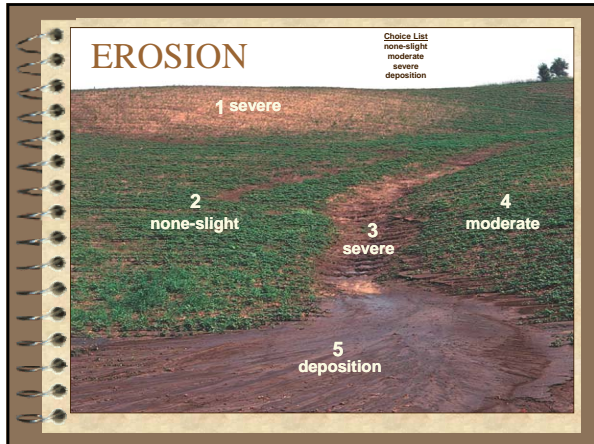
$$\text{Soil Loss} = .58 \times 100$$

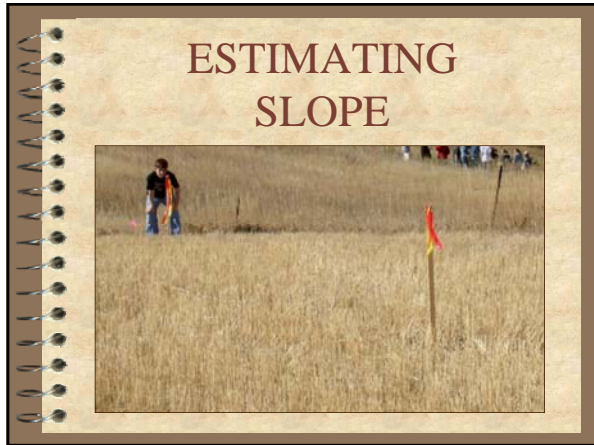
$$\text{Soil Loss} = 58\% \text{ (moderate)}$$

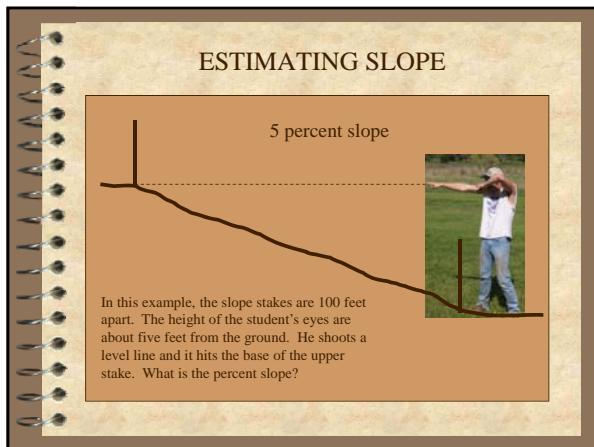


Examples of EROSION and DEPOSITION

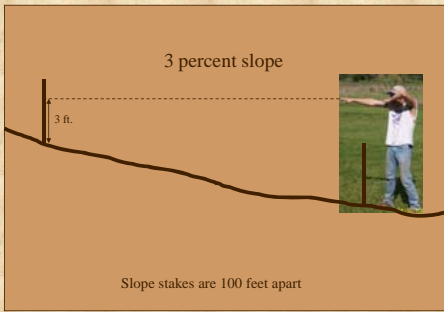




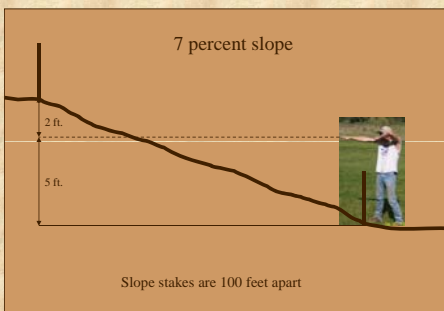




ESTIMATING SLOPE



ESTIMATING SLOPE




EVALUATING STONINESS



EVALUATING STONINESS

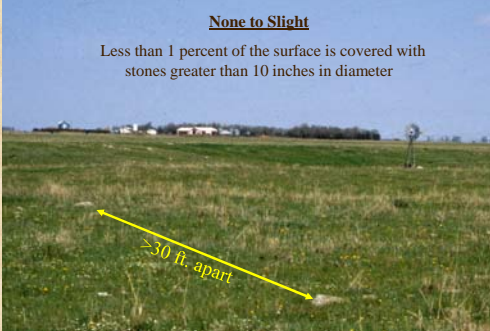
REMEMBER: Only evaluate stones that are greater than 10 inches in diameter.



EVALUATING STONINESS

None to Slight

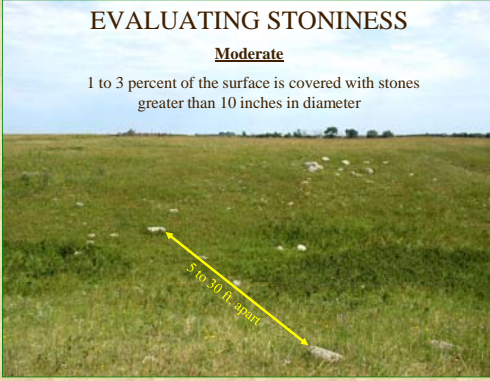
Less than 1 percent of the surface is covered with stones greater than 10 inches in diameter



EVALUATING STONINESS

Moderate


1 to 3 percent of the surface is covered with stones greater than 10 inches in diameter



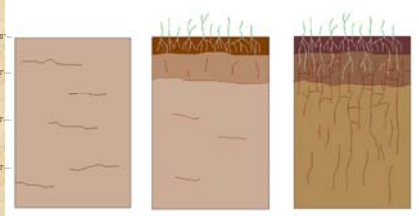
EVALUATING STONINESS

Excessive

> 3 percent of the surface is covered with stones greater than 10" in diameter




Young vs. Mature Soil Effects of Time



Young Soil Mature Soil


Young Soil vs. Mature Soil Effects of Landform Position



(tape in inches)

Young Soil - on flooded landform position Mature Soil - on stable landform position


**SOIL STRUCTURE
AND PERMEABILITY**



GRANULAR STRUCTURE
Usually characteristic of the topsoil. This type of structure has **RAPID** permeability.

1/8"


**SOIL STRUCTURE
AND PERMEABILITY**



PLATY STRUCTURE
Characteristic of the surface or subsurface horizon of some mature forest soils and sodium-affected prairie soils. Platy structure has **SLOW** permeability.

1/2"


**SOIL STRUCTURE
AND PERMEABILITY**




COLUMNAR STRUCTURE
Indicates a sodium-affected subsoil. Moderately fine texture has **SLOW** permeability. Fine texture has **VERY SLOW** permeability.

2"

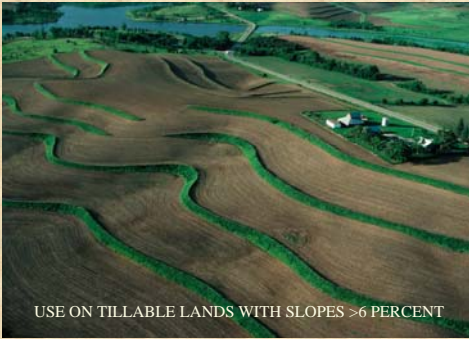
Diversion Terrace
USE WHERE OVERHEAD WATER IS A PROBLEM



Farming on the Contour
USE ON TILLABLE LANDS OF 3 TO 6 PERCENT SLOPES




Terrace and Farm on the Contour
USE ON TILLABLE LANDS WITH SLOPES >6 PERCENT



Grass Waterway

USE WHERE OVERLAND WATER IS A PROBLEM



USDA – NRCS Web Soil Survey
<http://websoilsurvey.nrcs.usda.gov/app/>

SDSU Plant Science
<http://plantsci.sdstate.edu/>

SDSU College of Ag/Bio Sciences
<http://www3.sdstate.edu/Academics/CollegeOfAgricultureAndBiologicalSciences/>

SDSU General
<http://www3.sdstate.edu/>

Land Judging Bulletin
<http://agbiopubs.sdstate.edu/articles/ABS8-01.pdf>

Professional Soil Scientists Association of SD
<http://www.pssasnd.org/>

Soils Sustain Life
<https://www.soils.org/lessons/resources/>

Smithsonian Soils Exhibit
<https://www.soils.org/smithsonian/>

Soil Science Society of America
<https://www.soils.org/>

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