

## **Unit A:** Principles of Soil

### **Lesson 2:** Overview of Soil Science

**Student Learning Objectives:** Instruction in this lesson should result in the students achieving the following objectives:

1. Understand the definition of soil.
2. Identify focus areas when studying soil.
3. Identify a soil profile.

**Recommended Teaching Time:** 3 Hours Not sure how this lesson would take 3 hours to teach?

**Recommended Resources:** The following resources may be useful in teaching this lesson:

- A PowerPoint has been developed for use with this lesson plan

### **List of Equipment, Tools, Supplies, and Facilities:**

Writing Surface

PowerPoint Projector

PowerPoint Slides

Transparency Masters

**Terms:** The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide 2:

- Sand
- Silt
- Clay
- Holes
- Organic Matter
- Horizons
- Formation of Soil
- Color

- Texture

- Density

**Interest Approach:** Split students up into 10 groups. Hand out a piece of paper with one of the Key Terms on it. Around the room have different pieces of paper taped up with the definitions on it. The students must go around the room looking for the correct definition. After each group decides on a final definition, they must present what they found to the rest of the class. If there are incorrect ones, they must find the group that has the correct definition for them and present again. It is difficult to see which are terms and which are definitions on the back pages 7-9. Make sure what I have done is correct.

## Summary of Content and Teaching Strategies

(PowerPoint Slides 3 and 4)

**Objective 1:** Understand the Definition of soil.

- I. Soil is the driving force for all life on earth. Soil consists of multiple parts:
  - A. Mineral- approximately 45%
    1. Sand-largest
    2. Silt-medium
    3. Clay-smallest
    4. Rocks and Gravel
  - B. **Organic Matter**- decaying matter from living things- approximately 5%
  - C. Air Space- or holes in soil- about 25%
  - D. Water- about 25%

(PowerPoint Slide 5)

- II. There are different percentages for different types of soil, but these percentages are good averages.
  - A. Darker soils usually have a higher percentage of organic matter.

B. Desert soils have a lower percentage of water.

**\*\*Discuss, as a class, how the differences in soils might affect the pie chart in TM: A2-1 or PowerPoint Slide 4. How will it change the percentages if one soil has higher organic matter? Have them write the differences in their notes.**

**(PowerPoint Slide 5)**

**Objective 2:** Identify focus areas when studying soil.

**\*\*Have different students read the following PowerPoint Slides. After each slide, discuss as a class why that focus area (Horizons, Soil Formation, Color, Texture, Density, and Holes) might be important when they study soil.**

I. Horizons

A. Soils are studied in cutouts called soil profiles. These profiles can be split up into different layers, called **horizons**. The most common horizons are:

1. O - organic layer
2. A - topsoil
3. B - subsoil
4. C - parent material
5. R - bedrock

**(PowerPoint Slide 6)**

B. Horizons are defined using many different items when studying soil:

1. Color
2. Organic content
3. Texture
  - a. Sand content
  - b. Clay content
4. Structure
5. Thickness



**(PowerPoint Slide 7)**

- II. Soil Formation
  - A. Soil is formed by the climate over thousands of years.
    - 1. Wind
    - 2. Precipitation
    - 3. Plants
  - B. Soil is transformed by chemical processes as well.
    - 1. Oxidation
    - 2. Hydration

**(PowerPoint Slide 8)**

- III. **Color**
  - A. Soils come in all different colors ranging from black to green, blue, and yellow.
  - B. Different colors of soil usually tell us a history of the soil.
    - 1. Gray colored soils have usually been wet
    - 2. Black colored soils indicate high organic matter, lots of plant life
    - 3. Red colored soils are old
    - 4. Brown colored soils are young

**(PowerPoint Slide 9)**

- IV. Texture- **Texture** is how we identify different soils that feel similar. A triangle is used to identify the different textures with the percentages of sand, silt, and clay.

**(PowerPoint Slide 10)**

- V. **Density**- soil density is defined using mechanical processes. The denser the soil is, the harder it is to grow crops in the soil.

**(PowerPoint Slide 11)**

- VI. **Holes**-the space in soil between the mineral particles. This space is filled with air or water. Plant roots need both air and water to survive, so saturated soils will prevent plant growth due to lack of air to the roots.

**(PowerPoint Slide 12)**

**Objective 3:** Identify a soil profile

- I. Looking at a soil profile, you can immediately identify different layers, or horizons in the soil. There is a pattern of soil horizons that occurs in almost every soil profile.

**\*\* Have each student draw a vertical rectangular box and make 6 layers in the box. They then have to label the layers in the order they think horizons occur in the soil. Once they complete their own task, they can talk with the people around them and see if they agree on the order. Then discuss the order as a class. Identify why they occur in that order and what some possible differences might be due to location of the horizon. Need to show an example of a soil profile as a TM and a PowerPoint Slide. Need to relate this to Afghanistan and have them use the information they discussed to draw the Soil Profile in their area.**

**(PowerPoint Slide 13)**

**Review/Summary:** Have the students stand and share with the class each major focus area used when studying soils (Horizons, Soil Formation, Color, Texture, Density, and Holes). After each focus area has been identified, have the students stand and share the order that soil horizons occur in a soil profile.

**Application:** Split the students up into 6 groups. Assign each group a different soil horizon focus area used in studying soil. That group has to come up with a unique way to remember that focus area. For example, they could come up with a poem to help memorize that soil color is a focus area and the different aspects of soil color.

**Evaluation:** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. **A sample written test is included.**

**Need to Include a Test!!!**

## INTEREST APPROACH PAPER

### Terms

SAND

TEXTURE

SILT

COLOR

CLAY

FORMATION OF  
SOIL

ORGANIC MATTER

DENSITY

HOLES

HORIZONS

## **Definitions**

LARGEST OF SOIL PARTICLES

MEDIUM SIZED SOIL PARTICLE

SMALLEST SOIL PARTICLE

DECAYING LIFE MATTER

WATER AND AIR SPACE

LAYERS OF SOIL

MIXTURE OF 3 SOIL PARTICLES

CLOSENESS OF SOIL PARTICLES

IDENTIFICATION OF SOIL THAT CAN  
IDENTIFY AGE, MOISTURE CONTENT,  
ORGANIC MATTER CONTENT

DIFFERENT WAYS SOIL IS DEVELOPED  
OVER TIME

TM: A2-1

# COMPOSITION OF AVERAGE SOIL

