Course	Agricultural Science II
Unit	Soil Science
Lesson	Importance of Soil
Estimated Time	Two 50-minute blocks

Student Outcome

Explain the importance of soil.

Learning Objectives

1. Explain what soil is.
2. Identify reasons for studying soil.
3. Explain how soils are different.
4. Identify career opportunities in soil science.

Grade Level Expectations

SC/ES/3/A/09-11/a SC/ES/3/A/09-11/e

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slide
   - PPt 1 – Soil Definition
2. Activity Sheet
   - AS 1 – Making Soil Artificially
3. Minor, Paul E. *Soil Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1995.
4. *Soil Science Curriculum Enhancement.* University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ❑ Growing plant
- ❑ Various soil samples
- ❑ See AS 1 for materials and equipment needed to complete the Activity Sheet.

Supplemental Information

1. Internet Sites
   - ❑ The Cooperative Soil Survey. Missouri Cooperative Soil Survey. Accessed May 13, 2008, from http://www.soilsurvey.org/.
   - ❑ Missouri Soil Survey Program. USDA Natural Resources Conservation Service. Accessed May 13, 2008, from http://www.mo.nrcs.usda.gov/technical/soils/soilsur_index.html.
   - ❑ Missouri Soils Data. Missouri Spatial Data Information Service. Accessed May 13, 2008, from http://www.msdis.missouri.edu/data/soilsviewer/index.htm.
   - ❑ Soil Science Education Home Page. Goddard Space Flight Center, NASA. Accessed May 13, 2008, from http://soil.gsfc.nasa.gov/index.html.

- ❑ Soil-net.com. Cranfield University's National Soil Resources Institute, United Kingdom. Accessed May 13, 2008, from http://www.soil-net.com/.
- ❑ Soils Around the World. WGBH Educational Foundation. Accessed May 13, 2008, from http://www.teachersdomain.org/resources/ess05/sci/ess/earthsys/soils/.

2. Print
   - ❑ Ashman, Mark R., and Geeta Puri. *Essential Soil Science: A Clear and Concise Introduction to Soil Science.* Malden, MA: Blackwell Publishing, 2002.
   - ❑ Brady, Nyle C., and Ray R. Weil. *The Nature and Properties of Soils.* 14th ed. Upper Saddle River, NJ: Prentice Hall, Inc., 2007.
   - ❑ Coyne, Mark S., and James A. Thompson. *Fundamental Soil Science.* Clifton Park, NY: Delmar CENGAGE Learning, 2005.
   - ❑ Donahue, Roy L., and Roy Hunter Follett. *Our Soils and Their Management*. Danville, IL: Interstate Publishers, Inc. 1990.
   - ❑ Plaster, J. Edward. *Soil Science and Management.* 2nd ed. Albany, NY: Delmar Publishers, Inc., 1992.
   - ❑ White, Robert E. *Principles and Practice of Soil Science: The Soil as a Natural Resource.* 4th ed. Malden, MA: Blackwell Publishing, 2005.

Interest Approach

1. Ask students how soil is important to them. Have students bring small samples of soil from their yards and identify similarities and differences. Have students list what they think makes up their soil.
2. Use an actual growing plant to demonstrate the importance of soil and how it affects the growth of the plant. Have the students explain the interdependence of the plant and soil.
   a. What does the soil do for the plant?
   b. What does the plant do for the soil?

Communicate the Learning Objectives

1. Explain what soil is.
2. Identify reasons for studying soil.
3. Explain how soils are different.
4. Identify career opportunities in soil science.

Instructor Directions	Content Outline
Objective 1 *Discuss what soil is. Soil has different meanings for different people. Ask students to give their own definition of soil. Display PPt 1 to use as a guide. Have students complete AS 1 to show how forces of nature can create soil from parent material.* PPt 1 – Soil Definition AS 1 – Making Soil Artificially	**Explain what soil is.** 1. Soil has different meanings for different people. 2. To the farmer, soil is a medium in which crops grow. 3. To the engineer, soil is a building material which supports foundations, roads, or airport runways. 4. The public, in most cases, just takes the soil for granted. It is just "dirt." 5. To the soil scientist, soil is a living, naturally occurring dynamic system at the interface of air and rock. 6. Soil covers the earth in a very thin layer and supports plants and supplies them with air, water, and nutrients. 7. Soils form in response to forces of climate and organisms that act on parent material in a specific landscape over a period of time.
Objective 2 *Discuss the importance of soil and how it affects people. Discuss human dependence on the soil. Contrast plant life with human life. Humans cannot manufacture their own food from the four primary resources of soil, air,*	**Identify reasons for studying soil.** 1. Soil is an essential natural resource that needs to be used properly and protected. 2. A study of soil will increase understanding of how this resource supports life. 3. Soil is composed of layers or horizons that are described in terms of their properties. If soils are

Instructor Directions	Content Outline
water, and sunlight. Human life depends completely on green plants that take nutrients and water from soil and combine them with air and sunshine to provide a food supply.	managed properly, they will continue to support people for many generations to come. 4. People depend on soil: It is expected to produce crops, support buildings and highways, grow trees for forests, provide places for recreation and wildlife habitats, and be a safe place for disposal of wastes. 5. Missouri has nearly 1,000 different soil types. It is necessary to study the soil before beginning construction or planting a crop so that its hazards and limitations are known.
Objective 3 *Use actual soil samples and discuss the physical characteristics of each. (Caution – do not go into a lot of detail at this time. This lesson is an introduction and should provide an overview, rather than an in-depth analysis of soil properties.)*	**Explain how soils are different.** 1. Missouri alone has nearly 1,000 different soil types, ranging from deep to shallow, clayey to sandy, wet to dry, and level to very steep. 2. Some of the differences in soils are so slight (like small differences in the thickness, percent of organic matter of the surface layer, or the amount of clay in the subsoil) that it is hard to tell them apart except under close examination. 3. Some of the differences are significant, such as the difference between a shallow soil that is 10 inches deep compared to one that is over 72 inches deep, or a soil containing 25 percent clay compared to a soil containing 60 percent clay.
Objective 4 *Discuss the careers that are available in soil and crop management.*	**Identify career opportunities in soil science.** 1. Agricultural production a. Farm manager b. Land specialists for banks c. Technical representatives for fertilizer firms 2. Natural resources a. Soil scientist in public service agencies b. Technician for recreational industries 3. Environmental science a. Government agent b. Private consultant for waste management and water quality issues

Instructor Directions	Content Outline
Application AS 1 – Making Soil Artificially	Answers to AS 1: 1. The rocks break or crack as they contract after their expansion by heating. 2. The bubbles are carbon dioxide gas made from carbon and oxygen released from the limestone by a chemical change in the rock caused by the acid in the vinegar. 3. Freezing water expands with tremendous force. Water finds its way into the cracks in the rocks, freezes, and breaks the rock into smaller and smaller pieces. Other activities: 1. Invite a guest speaker from a soil science area. 2. Ask the students to list the ways in which soils affect the quality of their lives. 3. Take a field trip to observe different soils. 4. Bring in soil samples for examination.
Closure/Summary	All life depends on soil; therefore, it is important for people to study the soil so they can learn how to protect it for the future.
Evaluation: Quiz	Answers (answers may vary): 1. Soil is a living, naturally occurring dynamic system at the interface of air and rock. 2. Soil is an essential natural resource. A study of soil will increase an understanding of its proper use and protection, how soil supports life, what soil is made of, proper management of the soil, and how soils are different. 3. Some of the differences in soils are slight, like small differences in thickness, the percent of organic matter of the surface layer, or the amount of clay in the subsoil. Other differences are significant, such as the difference between a shallow soil that is 10 inches to bedrock compared to one that is over 72 inches to bedrock, or a soil containing 25 percent clay compared to a soil containing 60 percent clay.

Instructor Directions	Content Outline
	4. a. Farm managers Land specialists for banks Technical representatives Government jobs Private institutions b. Public service agency job Recreational industries c. Government agency jobs Private consulting jobs 5. Soil supports life. Knowing that, people must study the soil so that they can learn how to protect it for future use.