

Lesson # 2

Project: 4-H School Enrichment Educational Series

Project Manual: Science-Horticulture

Grades: 4th -6th

Learning Activity: *Nitty Gritty*

Track: Science - Horticulture

Life Skills: Communication, cooperation, social skills, teamwork

Character Focus: Respect_ Good citizenship requires us to respect our environment by keeping it clean and healthy. Replenishing plant life is one way of helping.

Project Skills: Acquiring, processing and interpreting data, analyzing investigations

Louisiana Content Standards Benchmarks and Grade Level Expectations:

SE-E-A3 Describe how humans have had negative and positive effects on organisms and their environments. **4th grade – 8.** Describe how humans have had negative and positive effects on organisms and their environments

SE-M-A4 Demonstrating relationships of characteristics of soil types to agricultural practices and productivity. **5th grade - 50.** Describe the consequences of several types of human activities on local ecosystems (e.g., polluting streams, regulating hunting, introducing non native species)

Time Allotted: 35-45 minutes

Number of Participants: small or large groups

Key Concepts:

1. Soil is formed in layers.
2. Soil is composed of different materials and has several functions.
3. Plants need soil.
4. Enriched soil is best for growing strong plants.
5. Moisture retention capabilities of three primary soil particles vary.

Objective:

1. Participants will list 2 reasons why plants need soil.
2. Participants will list two functions of soil for plants.
3. Participants will define moisture retention.

Getting Ready:

1. Gather a piece of limestone or sandstone for each participant to rub together. (May substitute with sugar cubes to see the same effect.) Use dark pieces of construction paper so participants can see sand particles easily.
2. Obtain 1-cup soil samples from at least 5 locations (schoolyard, playground, sandbox, garden, etc.) and humus, compost, potting soil and top soil. Get soil samples at least 2 inches below the surface. Do not filter the soil, but remove any trash. Place each sample in a sealable bag. Label the type of soil collected in each bag.
3. Set up observation stations for each soil sample collected. At each station place a bag of soil, one paper bag, a stack of index cards (at least one per team member), pencils and one sheet of construction paper.

What You Need for the Lesson:

- “Soil Cake Recipe,” Visit section #5 of the lesson plan to decide if this recipe, Resource sheet #1 on page 8 of this lesson plan, will be used for this lesson
- cups and spoons for the “Soil Cake”
- construction paper (dark)



What you Say:	What You Show or Do:	Wht Participants Do:
<p>sandstone or limestone and rub it together, particles of sand break away. (Demonstrate rubbing sandstone or limestone. Give participants stones to rub and collect the sand on a dark piece of construction paper.) This is one way in which soil becomes mixed with many ingredients. The ration of particles is the key to soil classification. Loam (the most desirable soil) is a mixture of nearly equal parts of sand, silt and clay. If the soil has more silt than loam; more clay than loam, it is clay-like loam and so forth. Why do you think classification is important? (Possible answers: To grow things successfully, farmers need to understand what the soil has in it or if it is healthy enough to accept plants or seeds.)</p> <p>(Experience)</p> <p>3. Different types of soil hold different amounts of water, minerals and air. You will spend a few minutes at a station exploring different types of soil. When I say “Start,” you will have one minute to examine the soil at your station, write at least one descriptive word about the soil on an index card and place the card into the bag located near the soil. When I say “Change,” rotate to the next station. We will repeat this process until everyone has been to each station. Partner up with one person to complete this activity.</p> <p>4. As we work in groups, each of you will receive one or more bags. Take the descriptions written down and compile them</p>	<p>Do this with dark construction paper to show the sand particles.</p> <p>3. Place a labeled paper bag and a stack of index cards near each station of soil. Place students in pairs or 3’s depending on the size of the group. Encourage students to think creatively and more abstract when describing the soil. <i>(The reason for requiring a different index card for each participant at each station is to encourage independent thinking not copying what is already written or suggested by others.)</i> Walk around at all times, monitoring participants and giving suggestions if needed.</p> <p>4. Walk around and monitor participants as they work with the descriptive words and compile them to one index card</p>	<p>3. Participants walk around to the different stations of soil and write down descriptive words on index cards and place the cards in the bag near the soil.</p> <p>4. Participants work together to write down descriptions on a new index card, share the responses with the entire group</p>

What you Say:	What You Show or Do:	What Participants Do:
<p>on one new index card to share with the whole group. (<i>Upon completion of group comments ask the following.</i>) What kinds of things can we say that describe how the soils were alike? (Possible Answers: brown, a type of soil, etc.) What can we say about differences? (Possible Answers: Sand, dirt, rock, leaves, etc.) How is soil formed? Soils are formed by a slow weathering process that takes place above and below the Earth’s surface. This weathering process begins with the physical breakdown and chemical decomposition of rock. Above ground, weathering can start with wind and rain blowing against mountains. Boulders become loosened, and freezing rain cracks the smaller boulders into even smaller pieces. Below ground, rock becomes soil through decomposition. During decomposition, both above and below the ground, rock chemically reacts with water and other acidic solutions to produce “rotten” rock that falls apart more easily. Chemicals released during rock decomposition are sources of the nutrients that help plants grow. The nutrients include nitrogen, phosphorous and potassium and many others. Although wind and water reduce rock into sand, silt and clay, these particles alone do not produce fertile soil. The particles mix with organic matter -- the decayed remains of plants and animals. Decay keeps the soil fertile, able to nourish plant growth, by recycling nutrients.</p>	<p>to share with the whole group. Encourage participants not to change the descriptions.</p>	<p>when called upon. The groups will learn about the different soil types and answer follow-up questions.</p>

What You Say:	What You Show or Do:	What Participants Do:
<p>Soil is a temporary storehouse for nutrients. Do you think soils have distinct layers? (Possible answers: Yes, often you can see this in rocks and when digging is deep, etc.)</p> <p>5. Nearly all soils develop three distinct layers called “horizons.” Separate layers of a soil differ from one another in various physical and chemical characteristics. Top layers of soil (A horizon) consist mostly of organic material. Subsoil layers (B horizon) have many fine clay particles. The lower subsoil layer (C horizon) contains partially decomposed pieces of solid rock. Beneath the three layers is the parent rock from which the soil originated. Rain, decay and living organisms form the web of life that produces fertile soil. Thus, fertile soil is a renewable resource. Litter and surface soil are full of microscopic life, such as bacteria and fungi. When a leaf falls or a field mouse dies, living worms and bacteria feed on those organisms and make them part of the soil. Decayed organic matter called humus helps keep the soil moist by soaking up rainwater. As rain seeps through, the humus removes chemical elements, and the water leaches them into the soil. The different layers of soil provide home to a variety of animals. Ants, beetles, spiders, snails, worms, to name a few, burrow and tunnel beneath the</p>	<p>5. As an extended activity to this section, you can present the “Soil Cake Recipe” p. 8, as the information is being introduced about the different layers of soil. The “Soil Cake” can be eaten upon completion.</p>	<p>5. Respond to leader with answers. Upon completion of information, eat the “Soil Cake.”</p>

<p>soil and mix and break soil into tiny fragments. Their passages also allow air, water and nutrients to penetrate beneath the soil surface. What do you think we can do to enrich the soil? (Possible answers: Keep chemicals out of soil, use appropriate fertilizers when needed, etc.)</p> <p>(Process)</p> <p>6. How can we identify which soil is sand, clay or loam? (Possible answers: Using our senses of sight, touch, smell, etc.) What other objects can be identified using your senses? (Possible answers: Rocks, sediments, leaves, etc.)</p> <p>(Generalize)</p> <p>7. How can we better identify or compare people based on personal characteristics using our senses? (Possible answers: Identify distinct features, (Sight), sounds, (Hearing), certain foods shared or prepared by that person (Taste, etc.)</p> <p>(Apply)</p> <p>8. Citizenship requires our help to maintain a healthy environment We must know and practice good stewardship of our environment. Plants, whether used for producing food or preventing soil erosion, are necessary parts of having a balance in nature. Following the planting/gardening guide presented in this lesson will assure strong healthy plants for food sources and for protection of our environment. What will you do in your environment to help maintain a balance in nature?</p>	<p>6. Encourage participants to share answers.</p> <p>7. Solicit answers for the question.</p> <p>8. Solicit answers for the question.</p>	<p>6. Share answers.</p> <p>7. Respond and discuss.</p> <p>8. Respond and discuss.</p>
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Ways to Help Members Learn More:

1. Locate a soil testing kit, and test several soils with it.
2. Use a microscope, and view different soil samples to see what is in the soil. Have participants write and draw what they see.
3. Test the hypothesis: the rate of plant germination is greater in commercial soil or potting mix than in natural soil.
4. Investigate and write about a career in landscape architecture.
5. Invite a horticulturist to the meeting to share interactively.

Resources

Down-to-Earth, Enriching Learning Through Gardening. Activities for Grades 6-8. NC State University & A&T State University Cooperative Extension.

www.enchantedlearning.com/geology/soil/ - Information about the layers of soil.

www.gardenwithinsight.com/help100/00000002.htm - Interactive Site that provides hands-on time with a downloadable program working with a garden. Read the tutorial for more information.

Acknowledgments:

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SOIL CAKE

Soil Cake



Items Needed:

- 1 8 $\frac{1}{2}$ inch clear plastic container; a flower pot can be used if it is clear.
- 1 Clean (sanitized) garden trowel
- 2 Packages of Gummy Worms
- 1 Package of Oreo Cookies, crushed
- 1 8-ounce package of cream cheese
- 1 Cup Powdered Sugar
- 1 8-ounce container of Cool Whip
- 1 Large box of Chocolate Instant Pudding
- Milk - amount to mix pudding
- 1 Chocolate Cake Layer (Baked, cooled and crumbled up)

1st Layer: (soil layer) spread crushed Oreo Cookies into the bottom of plastic container, reserve 1 cup for the 5th Layer

2nd Layer: Combine cream cheese, powdered sugar and Cool Whip. Mix the ingredients and spread over the 1st Layer.

3rd Layer: Mix pudding with a little less milk than the directions require so the pudding is thicker. Spread over 2nd Layer.

4th Layer: Bake the cake mix in a single layer, cool it and then crumble. Spread over Layer 3. Add the gummy worms in this layer. Keep some gummy worms for the next layer as well.

5th Layer: Use the 1 cup reserve of Oreo Cookies to spread over Layer 4. Top with more gummy worms and then serve. Use the garden trowel to serve.