

Kelly Ferguson

Grade Level: 1

School: Matunuck Elementary

Subject: Science - Soils

Watershed Extensions – “Plant and Soil Relations” and “Soil Texture Analysis”

Length of Lesson: Day 1 – 30 min

Day 2 – 40 min

Soils and Seed Growth – Which Texture is Best?

Background Information	<p>One of the first grade science kits deals with seeds and plants. The children have multiple experiences planting seeds and watching them grow, and making detailed observations and predictions. Prior to introducing this lesson, the students would have already had a chance to plant seeds and watch them grow. They would also have learned the different parts of a plant as well as the essential things that seeds and plants need in order to grow – soil, water, oxygen, sunlight.</p> <p>In preparing for this lesson, it is important for the teacher to gain some background knowledge about soils. Soils are defined as loose minerals or organic materials that cover the land surfaces of Earth and serve as a natural medium for land plant growth. Soils are a combination of organic and inorganic materials. Soil formation occurs through five major factors. The first is parent material. This is where soils are weathered directly from underlying rocks, or are formed in materials that have moved in from another place. For instance, glacial till is ground up and moved by a glacier. The second factor is climate. Temperature, wind, and precipitation over the course of the seasons can affect moisture effectiveness, biological activity, rates of chemical reactions, and kinds of vegetation.</p> <p>The third factor is topography. Slope has an affect on the moisture and temperature of the soil. Steep soils may also be eroded and lose their topsoil as they form. The fourth factor is biological factors. Plant roots open channels into the soils for oxygen to pass through. Animals and micro-organisms mix soils and form burrows and pores. Humans can also mix the soil to the point where it is again considered parent material. The final factor is time. There needs to be time for all of these factors to interact with the soil. Soil formation is a continuous process.</p> <p>Soils are diverse in many ways. One way is their texture. A soil’s texture depends on the size of its particles. It is related to weathering and parent material. Living things depend on the right texture in order to thrive in the soil. A soil’s texture depends on its content of three main mineral components: sand, silt, and clay. Loam is the perfect soil for plants and soil organisms. It has about the same amount of sand and silt, and a smaller amount of clay. It has large enough spaces between particles for air and water to flow in. It has enough clay to stick together and hold humus, which is organic matter. Plant roots can also easily grow in it. It is the best soil for farmers and gardeners.</p> <p>Sand is too coarse for plants. The spaces between particles are too big, and don’t hold water or nutrients. Plant roots also can’t hold onto this soil. The big spaces do allow air into the soil. Silt is too light for plants. It is finer than sand, but feels gritty. This soil is blown away in dust storms and carried down</p>
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	<p>stream in floods. Clay is too fine. Too much clay makes the soil heavy and dense. Spaces between particles are tiny. When the soil is dry, it is too hard for plant roots to push through. No air can get to the surface, and bacteria and other organisms can't breathe.</p> <p>Soil texture is analyzed by rubbing it between your fingers. Soil with more sand will feel gritty like fine sand at the beach. Soil with a greater concentration of silt will feel smooth like powder. Soil with a greater amount of clay will feel sticky, and will hold together when pushed out between the fingers. Soils are also characterized according to how effectively they retain and transport water. Coarse soils, like those consisting mostly of sand, tend to hold less water than those with finer textures. Water is essential in soil because it brings mineral nutrients to plants. However, there needs to be a balance between water and air in the soil. Too much water will saturate the soil and fill spaces needed for oxygen transport. That is why it is necessary to aerate, or make holes in, the soil either by human power or through the burrowing of earthworms and other soil inhabitants.</p> <p>The study of different soil types and their properties is called soil science or pedology. It plays a key role in agriculture by helping farmers select and maintain fertile lands for planting. Understanding soil is also essential in the fields of engineering and construction. With the rising population and the over development of land in the world, we are more and more dependant on soil for the growth of food crops. However, soil is now being replaced with concrete and buildings all over the world. There has been an effort to increase awareness of the importance of soil conservation for our future.</p>
<p>Objectives</p>	<p>Students will:</p> <ol style="list-style-type: none"> 1. Explore the question, "What is the best soil type for growing plants?" 2. (Content) Understand the life cycle of a seed, and the essential role that soil plays in that cycle. 3. (Attitude) Demonstrate a curiosity about analyzing soil textures and their ability to either inhibit or enhance plant growth. 4. (Process) Record observations about the texture of different soil types and make predictions as to which soil type is best suited for plant growth.
<p>GSE's</p>	<p>ESS1 (K-2)–1b: Students demonstrate an understanding of earth materials by recording observations/data about physical properties.</p> <p>ESS1 (K-2) –6a: Students demonstrate an understanding of properties of earth materials by identifying which materials are best for different uses (e.g., soils for growing plants, sand for the sand box).</p> <p>LS1 (K-2)–3b: Students demonstrate an understanding of reproduction by sequencing the life cycle of a plant or animal when given a set of pictures.</p>
<p>Instructional Materials & Resources</p>	<p>For the teacher:</p> <ul style="list-style-type: none"> • White board • Dry erase markers • Large easel pad of lined paper • Tally chart of the four soils (A,B,C,D) • Copy of <u>A Seed Grows</u>

	<ul style="list-style-type: none"> • Seed/Plant life cycle diagram • Soil cross-section picture <p>For each table of 5 students:</p> <ul style="list-style-type: none"> • 4 bowls of soil (clay, silt, sand, and loam) • 4 clear plastic cups • 4 spoons • 1 cup of water • 12 seeds <p>For each student:</p> <ul style="list-style-type: none"> • Pencil • Copy of <u>A Seed Grows</u> • Seed life cycle worksheet • Soil recording sheet • Scissors • Glue stick • Paper towels <p>(BTS 2.3, 2.4)</p>
<p>Instructional Activities & Tasks</p>	<p>Opening – Day 1</p> <ul style="list-style-type: none"> • Students will be seated on the rug. They will each have a copy of <u>A Seed Grows</u>. • Read the title aloud and ask the students to use their prior knowledge about seeds and plants as well as clues from the title and the illustration on the cover to make a prediction about what the book will be about. (They should talk about planting seeds, things seeds need to grow, etc.) • Choral read the story aloud together. • Ask the students: <ul style="list-style-type: none"> ○ “What was this whole story about?” (Try to guide them to talking about the life cycle of a seed/plant) ○ “What happened first?” (The seed falls and is buried in the soil) ○ “What happened next?” (Rain soaks the soil and the seed soaks up the water in the soil) ○ “What happened after that?” (The roots grow down through the soil) ○ “Then what happened?” (The leaves and the stem began to grow) ○ “What next?” (The sun, rain, and soil feed the plant and it grows taller and its roots grow bigger) ○ “What happens last?” (The plant grows flowers and makes new seeds that fall into the soil) ○ “So what do you think will happen next?” (The cycle will start all over again) • Review the concept of the life cycle of the plant, and that it is like a circle that keeps going around and around. Show a diagram of the plant life cycle.

- Write the word “soil” on the board and ask the students:
 - “What is soil?” (Answers will vary. Tell them that it is a combination of tiny pieces of rock that has layers as you go deeper into the ground. Show a picture of a cross-section of soil. Explain that dead plants and small animals decompose and add nutrients to the soil)
 - “Why is soil so important to the seed and the plant?” (The seed is buried in the soil, rain water soaks through the soil to get to the seed, and the roots grow in the soil and give plants their food, or nutrients.)

Development

- Show students the seed life cycle worksheet.
- Explain to students that they are going to be coloring the 6 pictures at the bottom and then cutting them out and gluing them in the correct spot on the diagram. Remind them that the numbers go around to the right like the hands on a clock.
- Tell them that when they finish, they need to find a partner and they need to explain the life cycle of the seed to their partner by describing what is happening in each of the pictures as they go from #1-6.
- Make sure to tell them to incorporate the importance of the soil when they are explaining the life cycle.
- Have students return to their tables with their materials and begin working.

Closing/Summary

- Ask the students to clean up their tables and come back to the rug.
- Hold up an example of a completed life cycle worksheet and ask a student to explain what is going on in picture one. Go through each picture from 1-6, asking a different student each time to explain what is going on in that step.
- Emphasize the importance of soils in the life cycle.

Opening – Day 2

- Students will be seated on the rug.
- Review with students the definition of soil, as well as its important functions in plant growth.
- Be sure that students mention the seed being buried in the soil, the water getting to the seed through the soil, and the nutrients, or food, getting to the seed through the soil.
- Record the students’ input on large chart paper.
- Explain to students that today they will be examining different soil types to try and find out what type of soil is the best for growing plants.

Development

- Tell students that they will have four different kinds of soil in bowls at their tables.
- Explain to them that they are going to be observing the texture of each of the soils. (Make sure that they understand that texture means how it feels)
- Tell them that they are each going to take a little bit of each type of soil, one at a time, and rub it between their fingers. The soils will be labeled A, B, C, D.
- After rubbing each type of soil, they need to wipe their hands with the paper towels and record their observations. They will need to draw a picture of the soil showing its color. They will also need to record what the texture of the soil was like.
- Have a list of descriptive words posted on the board in the classroom to help students (rough, soft, smooth, gritty, crumbly, powdery, slippery, sticky, etc.)
- Tell the students that they will also need to make a prediction at the bottom of the worksheet. They need to predict which soil they think will be the best for growing their seeds, and why.
- Model the drawing, recording, and prediction for the students on a copy of the observation sheet so that they can see exactly what they need to do.
- Have the students return to their tables and start their observations, recordings, and predictions.
- When students finish, have them transfer each type of soil into the corresponding clear plastic cups labeled A, B, C, and D.
- Then have them plant 3 seeds in each of the cups and water them. (Student have already learned the steps to planting seeds in previous lessons)

Closing/Summary

- Have the students clean up and meet back on the rug with their recording sheets.
- Review the importance of soil in the life cycle of a seed with student input.
- Have the students share some of their descriptions of the different soil textures.
- Ask the students to share their predictions about what they thought would be the best soil for their seeds and why.
- Make a tally chart that includes each soil type, and have each student make a tally mark under the soil type that they predicted would be the best, and then explain why.
- Explain to students that they will be watching their seeds grow for the next couple of weeks and doing more observations and recordings. They will find out which of the soil types is best for growing plants and why. This will be compared to their original predictions.

Resources	<p>Soil background information:</p> <ul style="list-style-type: none">• http://soils.usda.gov/education/facts/soil.html• http://soil.gsfc.nasa.gov/soilfert/npk.htm• http://encarta.msn.com/encyclopedia_761576446_5/Soil.html• Active Watershed Education Curriculum Guide <p><u>A Seed Grows</u> book and the Life Cycle worksheet:</p> <ul style="list-style-type: none">• http://www.readinga-z.com
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Name: _____

Date: _____

Soils and Seed Growth: Which Texture is Best?

Directions: Take a small amount of each type of soil, one at a time, and rub it between your fingers. Then draw a picture of what the soil looks like and write what the texture of the soil felt like (rough, soft, smooth, gritty, slippery, sticky, powdery, crumbly).

Soil	Picture: What does it look like?	Texture: How does it feel?
A		<hr/> <hr/> <hr/> <hr/>
B		<hr/> <hr/> <hr/> <hr/>
C		<hr/> <hr/> <hr/> <hr/>
D		<hr/> <hr/> <hr/> <hr/>

Prediction:

What soil do you think is the best for growing your seed? _____

Why is it the best soil? _____
