



DON'T TREAD ON ME

GRADE LEVEL: K-1

SUBJECT: Science

NATIONAL STANDARDS

(K-1) SC: 1.1, 2.1-2, 10.2, 14.1, 15.1-2, 16.1

THEME: Soil

FOOD AND FIBER TOPIC: III-D

LEARNER OBJECTIVES

Students will learn how the habits and practices of people affect the soil and growth of plants.

VOCABULARY

compacted—Something that is packed tightly and closely together.

particles—Small pieces of matter that make up objects.

BACKGROUND

Why do plants grow well in some places and not in others? Just as people need clean air and water, good food, and shelter to stay healthy, plants also have certain requirements. They too need clean air, water and nutrients to stay healthy. In the soil, plant roots also need breathing space and moving space to grow. This space is between each particle of soil. You may think of each particle of soil as smaller grains of sand. And yes, even the grains of sand are considered soil particles. Healthy soil has particles of many different sizes. These different size particles provide spaces where air, water, and roots can move easily. However, if we really push these particles together tightly, which is called compaction, the air, water, and roots don't move very well. Soil can become compacted by walking or bike paths, motorcycles, or cars. Have you noticed that plants don't grow well in these areas even after we stop using them?

Plants also help keep the soil in place. Plants help stabilize the soil and hold it together. Without plants, the wind and rain move this unprotected soil. Plant roots help prevent erosion by "holding onto" the soil particles. Next time you see a walking path or dirt road, ask yourself again why plants don't grow there.

STEP-BY-STEP INSTRUCTIONS

1. Share background information, and introduce the phrase "soil compaction."
2. Play the Soil Particle Game in the related activities section.
3. Ask students where paths are found and how they got there.
4. Take the class outdoors to look for paths on the school grounds. Each time the group finds a path, have them discuss whether it is well established or new and how they can tell.
5. Choose three locations for further study. Provide garden trowels and let students try to dig soil from each path. Is the soil hard? Is it dusty? If the path was not there, what would be

6. in its place? Are there plants on the path? If not, why not? If there are plants on the path, are they different from plants growing off the path? How are they different? Why?
7. Have students try digging soil from an area away from the paths. How is it different?
8. Provide students with drawing paper, and have them draw pictures of places where plants can grow and places where plants can't grow. Ask students to share their drawings with the class and explain them.

RELATED ACTIVITIES

1. Play the soil particle game. Assign a few members of the class to be water droplets and the rest to be soil particles. To demonstrate how easily water moves through sand (soil with large particles), have the students stand at an arm's length apart and allow the "water droplets" to move through the soil. To demonstrate how close clay particles are together, have the students stand shoulder to shoulders, barely letting the water through. This same game can be played to demonstrate degrees of compaction. To demonstrate the most compacted areas, such as driveways, parking lots, and shopping centers, have the students lock arms. The water particles have no choice but to run off the surface and go around the edges of the soil. Repeat the game, replacing the water droplets with plant roots to demonstrate the effects of soil compaction on the ability of the root to move through the soil.
2. Bring magazine pictures, which illustrate the impact of human activity on the soil (heavy equipment moving soil, buildings under construction, flower beds, vegetable gardens, campgrounds, burned forest, swimming pool, etc.) Place the pictures in a box, and have students draw them from the box one at a time and explain how the activity illustrated in the picture is changing the soil.
3. Fill a wide-mouth quart jar about 3/4 full with marbles, and tell students they represent soil particles. Provide students with long pipe cleaners, and tell them they represent roots moving through the soil. Have students take turns working the pipe cleaners into the marbles like a root moving through the soil. Have students try again while another student pushes down with his or her fingers on the top the marbles.
4. Place a rug or large piece of paper on the floor. Have the students stand on the rug in different places. Now try slowly sliding a yardstick or coathanger underneath. Why doesn't it move freely? Relate this to how compacted soil is very tight and roots don't move well through it.

RESOURCES

Student Books

Taylor, B. (1992). Green Thumbs Up. Random House.

Bond, M. (1993). Paddington's Garden. Harper Collins.

Pallotta, J. and Thomson, B. (1992). The Victory Garden Alphabet Book. Watertown, MA: Charlesbridge Publishing.

Teacher Resources

The Carrot Seed. #301 Literature Activities for Young Children, Book 2. Teacher Created Materials Inc., 1989 (pp. 42-49).

How Does Your Garden Grow? The Mailbox: The Idea Magazine for Teachers. June/July 1995. (pp. 10-19)

Related Internet Websites

Natural Resource Conservation Education. Education and Conservation Partners for a Brighter Tomorrow. This website is designed to help people of all ages understand and appreciate natural resources and learn how to conserve them. <http://www.fs.fed.us/outdoors/nrce/welcome.htm>

Science Mini Lessons. <http://yn.la.ca.us/cec/cecsci/sci-elem.html>

Science and Math Consortium for Northwest Schools. This site is for anyone interested in K-12 education in science and mathematics, in Alaska. <http://www.col-ed.org/ak/>

Consistent with the key principles of environmental education, our mission is to spread information and ideas that will help educators explore the environment and investigate current issues with students. <http://www.nceet.snre.umich.edu/>

Bureau of Land Management Environmental Education.
<http://www.blm.gov/education/education.html>

EVALUATION

Were students able to understand how soil compaction effects plant growth?

ACKNOWLEDGMENT

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