Creating a Soil Recipe

Materials:
- Garden Journals or Soil Recipe worksheets
- Trowels (1 per group)
- Cardboard/Newspaper
- Access to water, different types of soil samples, rocks, and plant material
- Optional: tweezers, hand lenses, rulers

Overview & Objectives
Students love to get their hand dirty while exploring the garden, but soil is often overlooked as an area of study. Healthy soil is essential for a healthy garden, and it can take over 500 years for an inch of topsoil to form (Soil Science Society of America). This lesson in an introduction to soil as an exciting and complex part of the school garden ecosystem. Students will use their scientific observation skills to familiarize themselves with soil and compare soil found in different locations throughout the schoolyard. They will then try to create their own soil.

Students will:
- Compare soil from different locations
- Recognize the parts of soil
- Demonstrate that soil is alive and created over a long period of time

Pre-Activity Questions:
1. Define soil. What is its purpose in the garden?
2. What makes up soil? What do you think you will find in the soil?
3. Is all soil the same? Do you think the soil in the garden will look the same as soil in the field?

Standards and Curricular Connections

Next Generation Science Standards
2-ESS1-1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly
4-ESS2-1 Make observations and measurements to provide evidence of the effects of weathering and erosion
5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and atmosphere interact

Fourth graders working together on a card sort probe
Group "What do you know about Soil?" card sort probe. Note that many of the answers are incorrect
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Online Resources


Gateway Greening Lending Library

- Diary of a Worm, Dorren Cronin and Harry Bliss
- Soil! Get the Inside Scoop, David Lindbo
- Dirt, Steve "Dirtmeister" Tomecek
- Uncovering Student Ideas in Earth and Environmental Science, Page Keeley and Laura Tucker
- The Growing Classroom: Garden-Based Science, Roberta Jaffe and Gary Appel

Activity

- Inform the class that today they have to figure out what exactly is soil. By the end of the soil dissection, they should have a "recipe" for soil, including all needed ingredients.
- Organize students into small groups of 3-4 students. Each group should have at one trowel, newspaper/cardboard, and a garden journal or worksheet. If available, give each group a hand lens, ruler, and tweezer. Remind students about tool safety and respecting wildlife found in the soil.
- Instruct the groups to find different soil study sites around the schoolyard, as supervision allows. Soil study sites can include, an empty garden bed, next to the compost pile, a bare patch in the field, and the native plant garden.
- Start digging! Each group places several trowels of soil onto their newspaper/cardboard. Using their hands, tweezers, and hand lenses, students observe the soil and predict what makes up soil. Record soil ingredients in journals or worksheet.
- Walk among the groups, encouraging deeper investigations. Students will easily identify leaves and worms but may need probing to figure out what soil is. Are the soil ingredients the same at the top and bottom of the hole?
- Have the students compare their findings with another group. Were all their ingredients the same?

Seed to STEM Connections

- Erosion v. Weathers
- Soil Shake
- Worm Composting
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Gateway Greening Resources
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Facebook @ GatewayGreening

Discover season-specific gardening how-to’s and examples of current lessons:

YouTube @ gatewaygreening

Looking for Field Trip opportunities or need to ask a question about our education services? Please contact education@gatewaygreening.org or 314-588-9600 ext 107

Activity

- Bring the class back together. What ingredients do they think are found in all soil? At the end of the discussion, they should have their ingredients in four categories: organic matter (decaying plant and animal material and decomposers), rocks (weathered into various sized particles), water, and air. You may need to guide students to recognize that water and air are in the soil. Did any of the soil feel moist? Were there spaces between the soil particles? What was in those spaces?
- Have the groups create soil using the four ingredients by breaking rocks, tearing dead leaves and sticks, and mixing in water. Emphasize that living plants grow in soil but are do not become a part of the soil until they die and start to decay.
- Bring the class back together. Did any group create soil that looked like what they dug up? It is impossible for humans to mimic the centuries long process of decomposition and weathering that creates soil. Soil is alive and needs time to be created.

Inspired by “Space Travelers” Activity in The Growing Classroom: Garden-Based Science

Additional Activities & Follow Up

- Create a cinquain poem about soil observations. A cinquain is a 5-line poem. The first line is the noun and subject of the poem (soil). The second line is two adjectives describing the subject, and the third line is three verbs. The fourth line is a four letter phrase about the subject. The last line is a synonym.
- Make mud pies! With the dug up soil, investigate how much water it takes to turn soil into mud. Use a pipette or a spray bottle to keep an accurate measurement. When the soil turns into mud, create pies and decorate with flowers, seeds, and other found material. Leave out in the sun to see how long they take to dry.
My Soil Recipe

What I notice about my soil

What does your soil feel, look, and smell like? Add an illustration

I think my soil ingredients are:

1. __________________________

2. __________________________

3. __________________________

4. __________________________

How was the "soil" I made different from the soil in the ground? Why?