

THE EDIBLE
SCHOOLYARD
PROJECT

THE PRACTICES OF ORGANIC FARMING: SOIL INVESTIGATION

Summary: This lesson is a part of a four-part series on the practices of organic farming, which includes cover crops, composting, and tillage and cultivation. This is the introductory lesson of that series. In this lesson, students will learn how soil supports plant growth, and conduct a hands-on investigation to identify and describe the soil types in their community.

Time: 30-45 minutes

Teacher Notes:

- This lesson is a part of a four-part series on the practices of organic farming, which includes [cover crops](#), [composting](#), and [tillage and cultivation](#). This is the introductory lesson of that series.
- The “READ” sections of this lesson plan can be used as talking points or a script to introduce activities. Please note, these sections simply provide brief introductions to the topics. We recommend using your experiences to add more information and context to the topics being covered.
- If teaching asynchronously or assigning the lesson plan as homework, for the sections that instruct students to READ, consider recording yourself reading the sections aloud and sending the recording to students. This adaptation offers a helpful strategy for differentiating learning that supports all students, especially English Language Learners.
- The “THINK” and “DISCUSS” sections of the activities provide some great prompts for informal conversations. Consider asking your students these questions as they are gardening. You could also create a “question board” with the different questions and have students informally choose different questions to answer while they garden.



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Teacher Notes Continued:

- The “DO” section of this activity involves a “jar test” that measures the comparative densities of different materials in the soil. The test takes a day to work because different soil particles settle at different rates. You may choose to complete a sample of the jar test one day ahead in order to teach this lesson in one day.
- Optional—as an added activity you could create a public space where students can share the things they notice during each of the rotations. This could take the form of a board with chart paper and markers where students can write down their answers to the questions labeled, “NOTICE.” This extra activity supports students to glean observations from their classmates and learn from one another.
- For more information on the practices of organic farming, see the Center for Agroecology and Sustainable Food Systems curriculum on [Organic Farming and Gardening Skills](#).
- This lesson is part of Edible Schoolyard Project’s [Understanding Organic](#) curriculum and is the third lesson in the “core lessons” of the curriculum.

Materials:

- Samples of soils from in and around the garden
- Tools for digging
- Water for soil test
- A clear jar (ideally a mason jar) for each soil sample
- Gardening gloves (optional)
- Gardening books (optional)



SOIL INVESTIGATION

Student Name: _____

Vocabulary:

- **Rock** is a collection of minerals.
- **Mineral** is an element or chemical compound that is normally crystalline and that has been formed as a result of geological processes. Some rocks are predominantly composed of just one mineral. For example, limestone is a sedimentary rock composed almost entirely of the mineral calcite.
- **Soil Amendments** are materials that are added to the soil to improve its physical or chemical properties.

ANSWER:

1. In your opinion, what does it mean to care for the land? How do we treat the soil? How do we treat the people working the land? How do we treat the plants? Discuss, write, or draw a picture depicting your answers here:

2. Can you name some of the practices of organic farming? Write down or discuss your answers. If you are having trouble thinking of the practices of organic farming, think about the conversation you had during the lesson, [What is Organic?](#).

READ: Many of the practices of organic farming can be found in our school and community gardens. Organic farming practices support the health and well-being of plant life and soil. The practices of organic farming work in harmony with the environment, striking a balance between taking from the land and giving back. In this lesson, you explore some of the practices of organic farming through hands-on activities.

READ: Healthy soil is foundational to healthy crops. The practices of organic farming prioritize caring for the soil and treating the soil as the living, dynamic ecosystem that it is. Soil is alive; it's filled with microorganisms, fungi, bacteria, and bugs. Soil is composed of soil particles, organic matter, water, air and living organisms, and evolves and changes. We can support soil by adding organic matter and other nutrients, ensuring an important balance between extracting and adding nutrients.

Today we are going to spend some time making observations about our soil. First, we will look at different soil samples around our garden space and take the time to notice what we see. Then we will learn about different soil types and try and see if we can categorize the soil types in and around our garden.

OBSERVE: Go around the garden and dig up small samples of soil. Make sure that you aren't disturbing any growing plants. Spend some time looking at the soil. Write down, discuss, or draw your observations. Continue making observations by noticing and discussing.

READ: For every activity you are going to take the time to notice. What does that mean? Sometimes when focusing on certain tasks you might not always pay attention to your surroundings. *Noticing* allows you to pay attention to the little things, like what the day's weather is like outside or what can be observed in the soil. While you work, try to take the time to slow down. You will use the questions from the NOTICE section to help you make those observations.

NOTICE: Think about or discuss your answers to the following questions:

- What is in the soil?
- What colors are in the soil?
- What are the textures in the soil? Describe them.
- What does the soil smell like?
- Is there anything growing in the soil? What is it?
- Do you notice any creatures in the soil?
- What else do you notice about the soil?

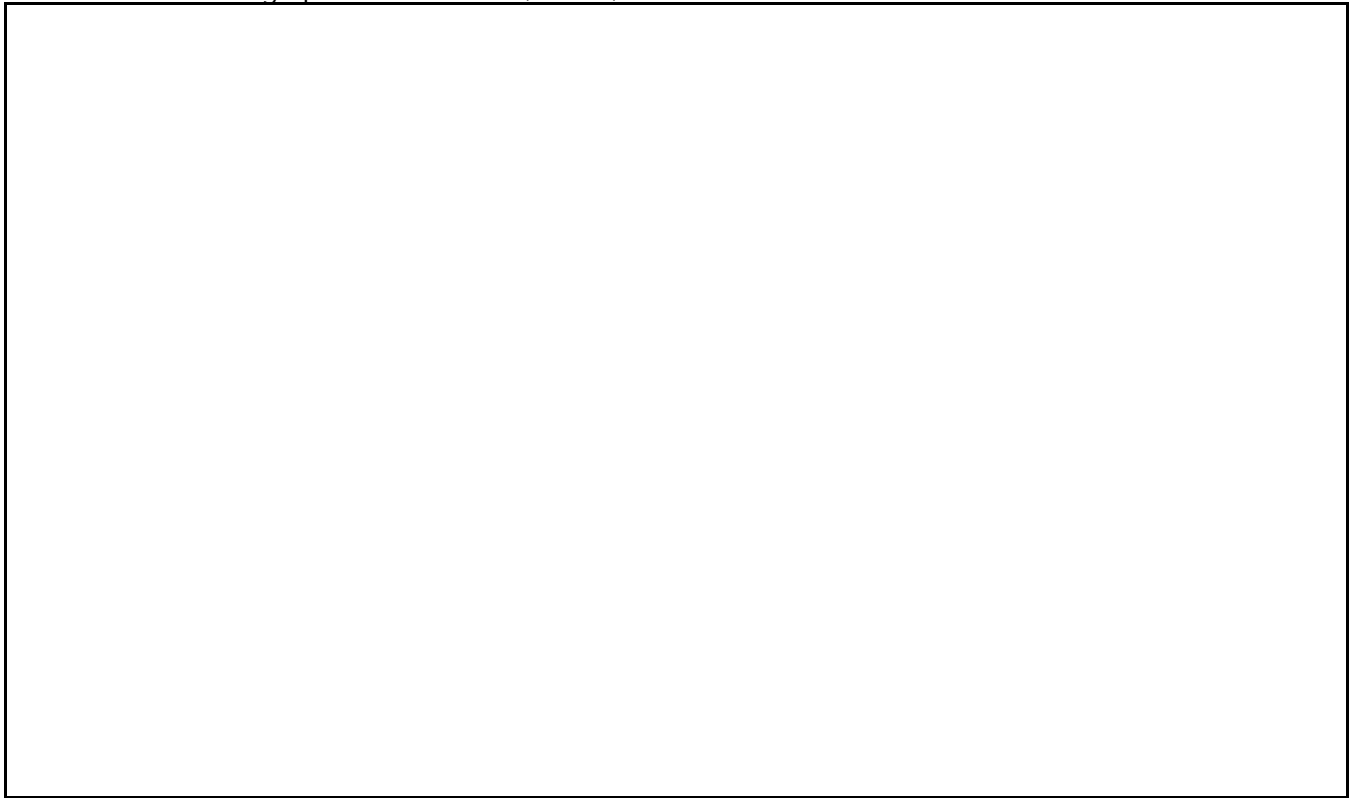
DISCUSS: Discuss these questions:

- What do you think are some of the elements in the soil that you don't see?
- Why is soil important to plants?

When you are done making your observations return the soil back where you found it.

Student Name: _____

WRITE OR DRAW: As you were observing the soil, what were some of the textures you saw? Were there small and large pieces? Describe, draw, and label below:



READ: A soil's texture is determined by the size of mineral and rock particles in it. The size of the mineral and rock particles depends upon the environmental factors that impact the speed of weathering and erosion, such as precipitation, temperature, wind, and plant life. Even at its fastest, minerals and rocks take thousands of years to break down. Different types of soil are composed of different types and sizes of rocks and minerals. See page 2 of the [Soil Investigation Visual](#) to learn about some different types of soil.

Soil types are important because they determine the amount of air and oxygen in the soil. Different types of soil also have different rates of drainage and ability to hold nutrients. Knowing what type of soil your garden has will help you better determine what plants might grow best in your soil, and what amendments your soil needs to be its most fertile. All soil types benefit from increases in organic matter and compost.

Student Name: _____

DO: Next, we are going to do a “jar test” to observe the different layers of soil in the garden. A jar test can be prepared ahead of time because results take a full day.

- Take a sample of soil.
- Break up the sample into smaller pieces.
- Add the broken-up soil to a clear jar, filling it roughly $\frac{1}{3}$ full of soil.
- Add water to the jar, filling it up completely. Firmly seal the lid on the jar.
- Stir and shake the jar to make sure the soil is well dispersed.
- Set the jar down and let the mixture settle for at least 1 minute. Use a permanent marker to draw a line where the settled material and the water interface. Everything below this line is the sandy component of your soil.
- Leave the jar undisturbed for two hours and, again, mark the line between the settled section and the water. The layer between your two marks is the silty segment of your soil.
- Leave the jar undisturbed for a day and, again, mark the line between the settled section and the water. This last layer is the clay segment of your soil.
- You can now approximate what percentage of your soil is sand, silt, and clay based on your jar test!

EXAMINE: Take a look at the [Soil Investigation Visual](#). Discuss the different soil types and their characteristics.

DRAW OR WRITE: Now that your soil sample has been left out for a while, come back, and take a look. Draw, write, or discuss what you see. What are the different soil types in your soil? How can you tell? Use the [Soil Investigation Visual](#) to help you determine the types of soil. Label with the different soil types.

DISCUSS (OPTIONAL): Compare the appearance of the soil in your jar before and after you let it sit.

- How do you explain your observations in the jar test? How does the jar test help us determine the soil type?

READ (OPTIONAL): The jar test is designed to take advantage of the fact that different soil types have different densities. This means they settle out of water at different rates—the densest soil particles settle out the most quickly, while the least dense particles take longer to settle.

READ (OPTIONAL): Now that we have made some observations of our soil, we are going to try and identify the layers of soils in our garden. Soil is made up of different layers. See [Soil Investigations Visual](#) page. 1. Each layer has its own characteristics.

- The **surface layer** is the upper surface that is mostly decomposing plant material. The layer is made up of living and decomposing materials like plants, bugs, etc.
- The next layer, the **topsoil** layer, is made up of materials that are more broken down. This layer is a mixture of decomposed plant material and decomposed minerals (rocks). This is where seeds germinate and plant roots grow. Topsoil is considered very precious because it has the highest concentration of microorganisms and organic matter. Good topsoil takes time to build up.
- The lower layers are the **subsoil**. Subsoil is a mixture with more broken minerals and a small amount of decomposed plant material. The deepest layers of subsoil are mostly broken bedrock material. These layers can be very deep down and are not easily observable in our garden unless we dig very deep.

REFLECT ON CONNECTIONS: Consider the ways you might make personal connections to and take action towards the practices of Organic farming. Use your [Circles of Connections](#) worksheet to answer the following questions:

- What are some of the ways you, your community, and the broader society can care for the land? Try to be specific, using some topics from today’s activities, for example, ask yourself:
 - How might I take care of the soil?
 - What are different ways I could support caring for the soil? In my community? School garden? Or beyond?

References:

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