

Soil on the Farm

Intro to soil study
grades 4-7

Essential Questions:

Where does our food come from?

Do we have enough?

What do you think are the biggest problems facing our food system today?

What can we do about it?

Guiding questions

What is soil? Where does it come from? What are the factors effecting soil types, health and in turn plant (especially vegetable) growth?

Elicit

Why do we care about the dirt our food grows in?

- 1 Kids partner and share a brief discussion about this question.
- 2 Gather back as a group and get some answers from students
 - Do not give any answers or leading questions at this point
4. Are there different kinds of dirt?
 - Short discussion

Engage

1. Pass around a bucket of soil. Let kids stick their hands in it and feel it, look at it, touch it, smell it, study it.
 - a. What's in this bucket? What is it made of? Please write your ideas down at the top of your data sheet. (these questions are not to be answered)
 - b. . Now that you have studied a soil sample, what questions do you have about it? Write a question at the top of your data sheet.
2. Pass out data collecting materials
 - a. Each group gets a back pack with...
 - i. 4 Magnifying glasses
 - ii. Trowels
 - iii. 8 jars with lids
 - iv. Rulers
 - v. Sharpie

Explore

Time for a hike! Groups will visit 4 sites a wetland, farm field, Oak forest, and Lake-front.

1. Collect 2 soil samples from each of the 4 sites.
2. Soil should be collected by digging 6 inches down and putting the full scoop of that soil into the jar. Find 2 different locations with in each area to dig a sample from. Put each sample in its own jar.
3. LABEL YOUR JAR WITH THE LOCATION NAME. ex: sample 1 wetland, sample 2 Wetland.
4. Sit a moment and observe the sample area. Write down any physical characteristics you can of the area. List any noticeable characteristics. Are there trees? Water? Is it shady or sunny? Are there a lot of bugs in the soil? Do you see other animals around? Are there a lot of plants? What else? Use the observation chart provided.
5. Close jars make sure you have all materials back in your bag
6. Walk back.
7. Soil Activity

Explain

Guiding question- What do you think soil is make of? What other questions did you write down before our hike? Share and write these questions for everyone to see.

Pass out the following two paragraphs for kids to read aloud together.

The formation of soil involves the interaction of numerous physical, chemical, and biological processes, the study of soil gives us an important opportunity to look at the connections between science and a systematic approach to understanding the earth and how it works.

Soil, the main ingredient for agriculture, is one of the most important mineral resources of a nation. *Throughout history, civilizations have prospered or declined as a function of availability and productivity of soils.* Few topics in the science education can illustrate so well the relevance, importance, and human dependence upon earth resources.

Briefly pull apart these paragraphs. Ask students what they mean. Ask for the importance it is trying to convey.

1. How can we figure out what soil is made of? How do we know if it is good for growing food?
2. Please talk with your group and come up with a plan for identifying all the parts of your soil samples. Investigate what is in them and think about where the ingredients for your soil came from.
 - a. Please use only one of your jars of soil from each site.
 - b. We will save the other for a some additional testing
 - c. We will evaluate our soil from all of our sites and eventually determine which is the best for growing food (based on soil health). Remember to keep them separate
3. The materials you have are...
 - a. Sieve
 - b. Large paper
 - c. Pencils
 - d. Several different size (clear) containers
 - e. Tweezers
 - f. Water
 - g. Hair dryer
 - h. Magnifying glasses
 - i. Microscope
 - j. Scale

Walk around to groups and help them design their plans. Guidelines for the plan...

| description | 1 | 2 | 3 | 4 |
|---|------------------------------------|--|---|--|
| Questions and ideas written at the top of paper | Nothing written | Ideas written but missing the questions. Questions missing but missing the ideas | Complete by little effort/sloppy | Complete question and ideas at top of paper and clearly written |
| Work is neat and legible | Sloppy/little thought into project | Incomplete sentences sloppily written | Complete sentences well written | Complete sentences, well spoken, thoughtful |
| Plan for investigating soil sample is clearly explained | No plan | Partially formulated plan | Formulated plan and no strategies for completion | Well formulated complete plan. Clearly outlines tasks and procedures |
| Data table for showing findings included | No data table | Data table not complete | Complete but non matching plan for collection or sloppy work. | Well laid out data chart, matches plan, thoughtfully written |
| Participation of all group members | no one worked together | Some of group worked together | All worked together but did not delegate clear tasks for each group member. | Every one participates equally |

Check all plans before students can get their materials. Allow ample time for the design and execution of soil exploration work.

This will lead into Day 2

DAY 2

1. Execute soil exploration plan. Allow students extra time to work on their soil samples and complete the data charts created.
2. Next walk students through the components that we are suppose to find in soil. Describe each and its purpose for the plant.
 - Inorganic Material
 - Organic material
 - Water
 - Air
 - Microorganisms (soil creating)

Have students separate their soil samples into these categories. (I want the air section!)

Make a comparative analysis of the soil and discuss the differences between the different sites. Why are they different? Again, why should we care about the dirt our food comes from? (Teacher led discussion)

Elaborate

3. Can we tell, yet, which sample would be the best for growing food?
4. Now time for two more tests. Today we will do some tests on your sample 2 from each site. We will try a USDA soil quality test to further compare our sites.

<http://education.usgs.gov/lessons/soil.pdf>

5. NPK discussion – what is this acronym?
 - a. Talk about Nitrogen, Phosphorus, and Potassium and what they do for plants.
6. Soil strip test.
 - a. Add the NPK and the USDA test results to your data tables
7. **Students will write a minimum of one paragraph conclusion outlining the differences between all of the sites and their soil health.**

Evaluate

1. Based on your new soil knowledge, where would you recommend has the best food for growing veggies? Why? If your answer is not the farm, then what do you think we could amend the soil or start to heal it?

Extend

Try a soil amendment. Test to see if it works.

See this link for comprehensive instructions for testing everything (almost) that effects your soil.

http://oregon.4h.oregonstate.edu/sites/default/files/publications/soil_observation_data_sheet.pdf