

Soil, It's Alive!

by Peg Morgan

Objectives

- *Students will investigate soil composition, including soil biology via measurement and observation.
- *Students will perform fieldwork and draw conclusions about soil biology, healthy soil, and human activity.

Method

- *Predictions: How many soil invertebrates will be found in Soil Funnel Trap? How much decomposition will be evident on buried white cotton underwear?
- *Create and bury Soil Funnel Trap. Bury white cotton underwear.
- *Over multiple weeks, observe amounts and types of soil invertebrates and complete a fieldwork report.
- *Dig up white cotton underwear and observe signs of decomposition.
- *Draw conclusions based on fieldwork report and classroom research that makes connections between human activity and healthy soil.

Materials

- *Picture Books:

Dirt, by Steve "The Dirtmeister" Tomecek
Soil! Get the Inside Scoop, by David L. Lindbo and others

*Teacher Resource Book: Life In a Bucket of Soil, by Alvin Silverstein and Virginia Silverstein

- *Videos:

<http://www.farmersguild.org/soil-my-undies-challenge.html>

Complete info about white cotton underwear test

https://thinktv.pbslearningmedia.org/resource/tdc02_sci.life.oate.decompose/decomposers/#.WrPuey7wb3g

Decomposers - PBS

<https://www.youtube.com/watch?v=XapUm5n1zuM>
Life In the Soil

Materials Continued

- *Tools: trowels, plastic tarps, hand lens, Berlese Funnel Traps, white cotton underwear, soil biology identification resource, fieldwork report

Grade Level: 3rd Grade

Subject Areas: Science, Environmental Education, Math, Reading, and Writing

Duration: depends on depth of study

Group Size: large group direct instruction; small group fieldwork and research teams

Setting: outdoors with soil location to dig and study; classroom

Key Terms: dirt, soil, humus, biology, decomposers, soil invertebrates, fungi, other soil organisms

Ohio State Standards:

Grade 3 Earth and Space Science

3.ESS.1, 3.ESS.2, 3.ESS.3

3.MD-3 I can draw charts and graphs with data and explain what these charts and graphs say about the data.

RI.3.3 I can describe relationships between scientific ideas, using language that pertains to sequence or cause/effect.

W.3.8 I can recall information from experiences or gather information from print and digital sources; take notes on sources, and sort evidence into provided categories.

W.3.2d I can write a concluding statement.

Accommodations:

Level 1 (max. support)

Taped science text

Scribe for writing

Work with teacher to create final product

Adult supervision of all fieldwork and scientific tests

Level 2 (mid. support)

Partner reading

Graphic organizers to assist with writing

Modify length of student work

Direct instruction of all scientific tests, and adult supervision during fieldwork and tests.

Level 3 (min. support)

Independent reading

Provide models and exemplars for writing

Complete product with collaborative group. Direct instruction of how to perform scientific tests.

Independent work on fieldwork and tests, adults supervise

Soil, It's Alive! p.2

Background

Due to the inert nature of soils, it can be easily overlooked by active citizen scientists. This project is designed to guide third grade citizen scientists to research soil and discover soil biology. In addition, their research should guide them to understand the importance of soil to a healthy environment. They will investigate composting by studying Antioch College Farm Composting and through classroom research. They will learn about the importance of soil decomposers through growing mushrooms in the classroom. They will get out into the “field” to make observations and perform tests for data about soil invertebrates. These tests include type of soil using soil sample, Berlese Funnel Trap, and White Cotton Underwear Decomposition Test. The third grade pedologists will draw conclusions from their data and research that makes a connection between soil biology, human activity, and healthy soil. Finally, students will use their conclusions to inform Agraria about their soil biology and the health of their soil. Exhibition Night gives the Third Grade Pedologists an opportunity to share this work with their community. This year, with a focus on Soil Biology, the students will create ceramic models of soil biology for display on Exhibition Night. The goal is for each student to consider themselves a Soil Steward.

Procedure

- Step 1: Create student soil teams.
- Step 2: Have each team create a name and establish norms and protocols for discussions and collaborative work.
- Step 3: Have teams create lists of questions they have about soil.
- Step 4: All teams share out and whole class categorizes questions.
- Step 5: Teacher guides discussion about how to investigate and answer questions about soil.
- Step 6: Teacher scaffolds students' investigation with readings, field trips, videos, introduction to equipment (Berlese Funnel Trap, white cotton underwear soil test) that can be used to learn about soil biology and the health of soil.
- Step 7: Direct instruction about data collection, use of data charts, and drawing conclusions from charts. Recommended way to manage this step is through growing mushrooms in the classroom, using a mushroom growing kit.
- Step 8: Obtain a soil sample using soil extraction tube. Take temperature of soil, using a soil thermometer. Take simple moisture reading, using finger pinch and roll of soil. Bury white cotton underwear. Set up Berlese Funnel Trap. Bait the trap with apple and carrot slices and create a natural cover for the trap to prevent excessive wind and rain damage to results.
- Step 9: Over 4 weeks, check the Berlese Funnel Traps. Students observe and count number of soil invertebrates captured. Rebait traps each time.
- Step 10: White cotton underwear decomposition soil test needs at least 4

weeks for any observable results. 6 weeks is even better, if possible.

Step 11: Students create data charts with 1) dates, 2) comparison of predictions to the exact number of soil invertebrates captured in Berlese Traps, 3) soil temperature and 4) level of soil moisture.

Step 12: Teacher guides drawing conclusions from data.

Step 13: Each soil team creates a suggestion for improving health of the soil, based on data, conclusions, and research.

Extension/Agraria Connection

This lesson is easily modified and simplified, depending on available time and resources. This lesson can be accomplished on any plot of available land close to the classroom.

Agraria has all of the necessary equipment onsite, except for the white cotton underwear. This item can be purchased easily at many different stores. Using Agraria is optimal for this lesson if you are going to use all of the soil tests. Using Agraria is optimal for this lesson if you want the students to experience science in the field, with data collection, research components, and writing conclusions.

Evaluation/Assessments

Students write short responses to their questions about soil.

Fieldwork critiques.

Communication and Teamwork rubrics.

Students create a Soil Scavenger Hunt that requires them to write a list of soil components.

Data collection reports.

Summary report based on data, conclusions, and research.