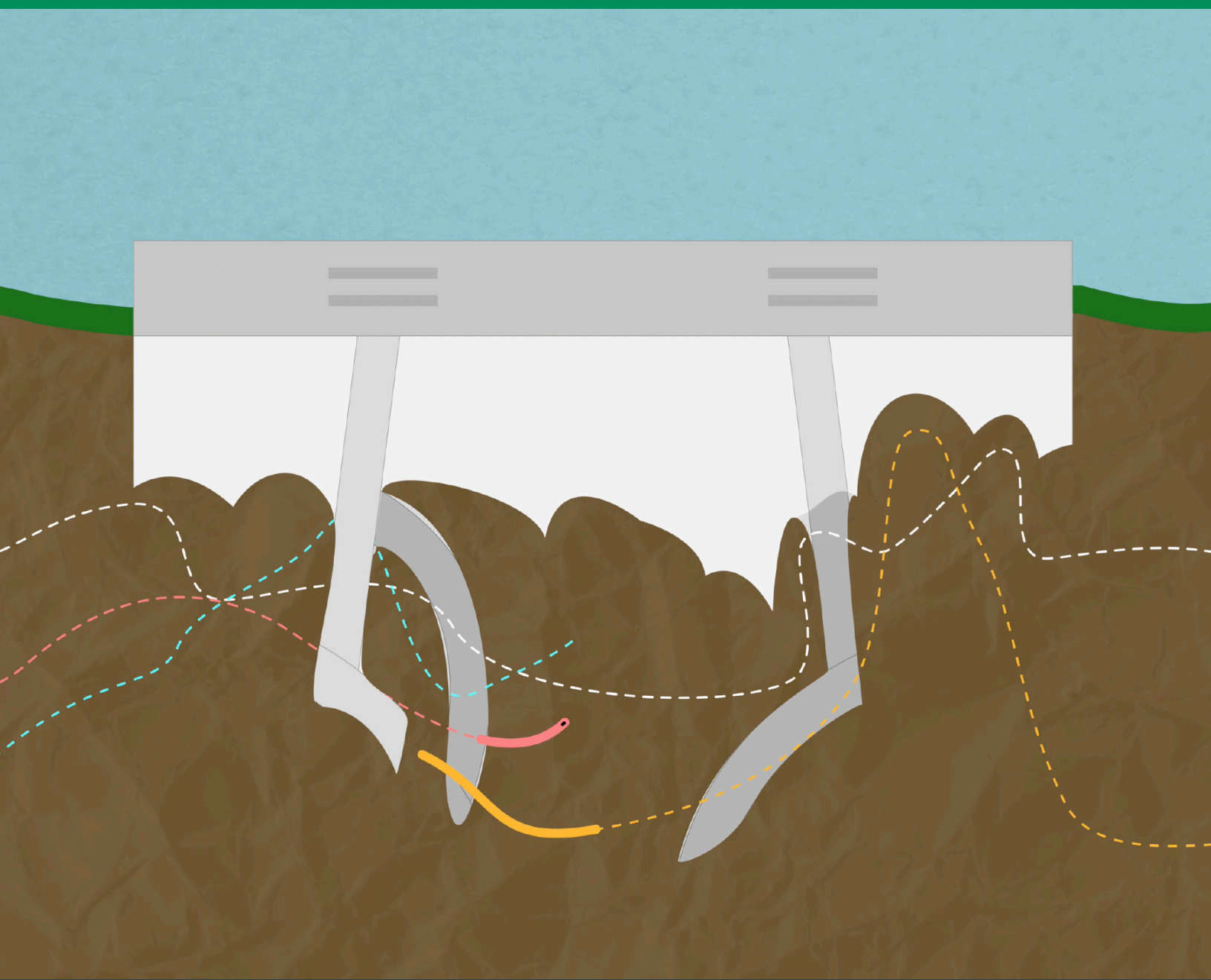


SOIL YOUR UNDIES!

How Healthy is Your Soil?

Jennifer DeBruyn, Associate Professor, Department of Biosystems Engineering and Soil Science



Soil Your Undies!

How Healthy is Your Soil?

Skill Level

Beginner – Intermediate – Advanced

Learner Outcomes

The learner will be able to:

- *Recognize that soils provide valuable services and need to be kept healthy*
- *Define decomposition and understand that soil decomposition is a biologically driven process*
- *Show that decomposition of organic matter, like cotton, indicates healthy soil*

Educational Standard(s) Supported

3-LS4-3, 5-LS2-1, MS-LS2-3

Success Indicator

Learners will be successful if they:

- *Observe decomposition of cotton in soil and can articulate that the decomposition is a result of the activity of soil organisms*

Time Needed

30 minutes to set up the activity

Two months (or more) for observation

Materials List

- Two pairs of 100 percent white cotton underwear
- Shovel or hand trowel for digging
- Landscape flags or labels
- Pencil and paper to record observations
- Camera (optional)

Introduction to Content

This lesson focuses on soil health, understanding that soil is a living system. The lesson also emphasizes that soil microbial activity, specifically decomposition activity, can be a good indicator of how alive and healthy a soil is.

Introduction to Methodology

This activity is an adaptation of a classic cotton strip test used to test soil decomposition capacity. More recently the [Soil Your Undies](#) campaign has been a fun way for farmers to test their soil health by burying a pair of cotton underwear for two months to see the decomposition activity of their soil.

Author

Jennifer DeBruyn, Associate Professor, Department of Biosystems Engineering and Soil Science

Adapted from the Soil Conservation Council of Canada's "Soil Your Undies" Challenge soilcc.ca/programs/soil-your-undies"



Terms and Concepts Introduction

Soil health – The continued capacity of soil to function as a vital living ecosystem that sustains plants, animals and humans.

Decomposition – The process by which organic matter is broken down into simpler organic and inorganic material by organisms, also called rotting or decay.

Biological Activity – The actions of living organisms.

Tips for Engagement

Search for “[Soil Your Undies Challenge](#)” on YouTube to find lots of great videos from other challenge takers!

Setting the Stage and Opening Questions

Soil is more than just dirt – it is an ecosystem full of life! Soils provide a lot of important services for us. You can think of the different soil services kind of like different systems in the human body (see table below). Just like our bodies, it is important to keep our soil healthy to keep those functions going.

Soil property or service...	...is kind of like our....	...because it provides...
Decomposition , nutrient cycling	Digestive system	Nutrients for plants, reduces greenhouse gas emissions and nutrient pollution
Stability and structure	Skeletal system	Increases water holding capacity and aeration, reduces erosion
Moisture regulation	Circulatory system	Holds water, creates network for movement of nutrients and biota
Biodegradation of pollutants and pesticides	Liver	Breaks down wastes, keeps local waters clean
Biodiversity and pathogen dynamics	Immune system	Resists invasion of pathogens, provides resilience when conditions are difficult
Symbiotic relationships with plants (e.g. N fixers with legumes, mycorrhizae)	Social network	Nutrients for plants

One way we can test how healthy our soil is to see how active the soil organisms are, in particular, how well they can decompose organic matter. Would you expect a **healthy soil** to have a high or low rate of decomposition? How could you test this?

Experience

1. Choose two undisturbed soil locations to test. This could be a garden, yard, forest or other site. Just make sure you have permission to dig there!
2. Dig a hole about 6 inches deep in each location and bury a pair of underwear.
3. Mark the location with a flag or label so you can find it later.
4. Record observations about the site. Some questions to answer: What type of site is it (garden, lawn, ditch, forest)? What color is the soil? Can you see any organisms in the soil (e.g. worms, insects, fungi)?
5. After two months (or more), dig up the underwear at both locations. Record your observations.
6. OPTIONAL: Take a picture of your undies and post on [Soil Your Undies Challenge](#) Website!

Share

Which site had greater **decomposition**? What does that tell you about the decomposers or **biological activity** in the soil?

Ask students to share their hypothesis and what they think the results will be over two months.

Process

Why is it important to use cotton underwear for this experiment instead of a synthetic material, such as polyester?

Do you think it matters what season you conduct the experiment in? For example, would you expect there to be more or less decomposition in the summer compared to winter?

Generalize

How does decomposition relate to soil health? Why is it important that our soil is healthy?

Apply

What are some ways we can protect and improve soil health?

Life Skill(s)/TIPPS

- Use the senses to gain new information or find new ways to use information. (HANDS)
- Learn to form ideas, make decisions and think critically. (HEAD)

Supplemental Information

Educational Standards Met

3-LS4-3

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

5-LS2-1

Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

MS-LS2-3

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem



Soil Your Undies Student Handout

Name: _____		Date Project Began: _____		Date of Two-Month Checkup: _____	
Site 1: Observations about the site			Site 2: Observations about the site		
Is this a (circle): LAWN GARDEN DITCH FOREST			Is this a (circle): LAWN GARDEN DITCH FOREST		
What color is the soil? _____			What color is the soil? _____		
Can you see organisms in the soil (ex. worms, insects, fungi)? Circle your answer: YES NO			Can you see organisms in the soil (ex. worms, insects, fungi)? Circle your answer: YES NO		
HYPOTHESIS:			HYPOTHESIS		
OBSERVATIONS AT BEGINNING OF PROJECT:			OBSERVATIONS AT BEGINNING OF PROJECT:		
OBSERVATIONS AT END OF PROJECT:			OBSERVATIONS AT END OF PROJECT:		

Comparing the two sites at the beginning of the project, what was similar and what was different?

Comparing the two sites at the end of the project, what was similar and what was different?

Was your hypothesis correct? Explain. _____
