OSU EXTENSION SERVICE

Klamath Basin Research & Extension

Grow It, Cook It, Like It

Farm to School and Nutrition Education Program

FoodCorps

Oregon State University

Hi, I'm Miss Anna!

Q: If you were a vegetable, what type of vegetable would you be?

If I were a vegetable, I would be a pea! Special bacteria can live on the roots of peas (and other legumes). These bacteria make a nutrient called Nitrogen for the soil. Nitrogen is one of the three key nutrients that plants need to grow.

I am like a pea because I build a welcoming and nourishing foundation that allows others to thrive and grow. Plus peas are delicious – I especially enjoy snap peas!

To the right is a picture of me at Henley Elementary asking students what they think of our local ground beef taste test. My Shasta Scorpions and Henley Hornets will recognize me from the cafeteria and maybe even your classroom!

Questions or comments about this lesson? Get in touch!

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Lesson #2: Break it Down!

Today, we're going to learn about organic material and conduct a science experiment to better understand the process of decomposition.

Q: What is Organic Material?

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Review from Lesson #1 – Organic Material

Last week, we learned that one of the four components of soil is organic material (the stuff floating on top of your container in our soil experiment).

We defined **Organic Material** in the soil as plants, animals, and their by-products. It is also called **soil organic matter**.

Normally, you hear the word "matter" when talking about if something is important. For example, your teacher would say, "Doing your distance learning work online really matters – you need to continue learning!"

But **matter** can also mean something that takes up space, or, more simply, stuff.

What is Soil Organic Matter made of?

It includes animals and insects that live in the soil like worms and millipedes.

What is Soil Organic Matter made of?

It includes living plant parts like roots and tubers that grow down in the soil (the "bottoms" from the book *Tops and Bottoms* by Janet Stevens)...

...and dead plant parts such as leaves, stems, fruits, tree bark, and wood chips.

What is Soil Organic Matter made of?

It also includes animal by-products like their waste. Yes, I am talking about...

...animal poop!

This is sometimes called manure and on a farm it commonly comes from horses, cows or chickens.

To summarize: Soil Organic Matter is mostly made of plants & animals that are involved in decomposition

What does decomposition mean, you may ask? Let's break the word down to figure out its meaning.

We'll start with the root – composition, which comes from the verb to compose. **To compose** means to make up or create a whole with pieces.

The **prefix de-** can either mean away/down or reverse/opposite.

Putting our prefix and root back together, we have the opposite of creating a whole...also known as breaking apart.

So, **decomposition is the process of breaking things down into its basic parts.** This is also called rotting or decaying.

Something that doesn't **decompose**? A meal from McDonald's! Click here to read about the legendary 10 year-old burger from Iceland.

Q: What does decomposition look like?

Let's take a brain break and head outside!

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Decomposition Scavenger Hunt Time!

Go outside with an adult to your yard, garden, or a trail/park (as long as you can stay socially distant!) and see if you can find:

- ✔ **A decomposing plant or tree leaf**
- ✔ **A decomposing plant stem**
- ✔ **A decomposing piece of wood**
- ✔ **An animal or insect that lives in the soil**

After you find each item, look closely at it and make some mental notes on what you see. What color is it? What size and shape is it? For the plant and wood, what signs tell you that it is decomposing?

I did my scavenger hunt in my yard!

Decomposition Scavenger Hunt - Results

When you get home or inside, get out a piece of paper to record your results. Answer these two questions, in two separate full sentences.

1. What are the four items you found on your scavenger hunt?

2. What did you **observe** (remember: to observe is to see or notice something) about your items that showed you they were decomposing?

The four things I found on my scavenger hunt:

Browning leaves with small pieces missing.

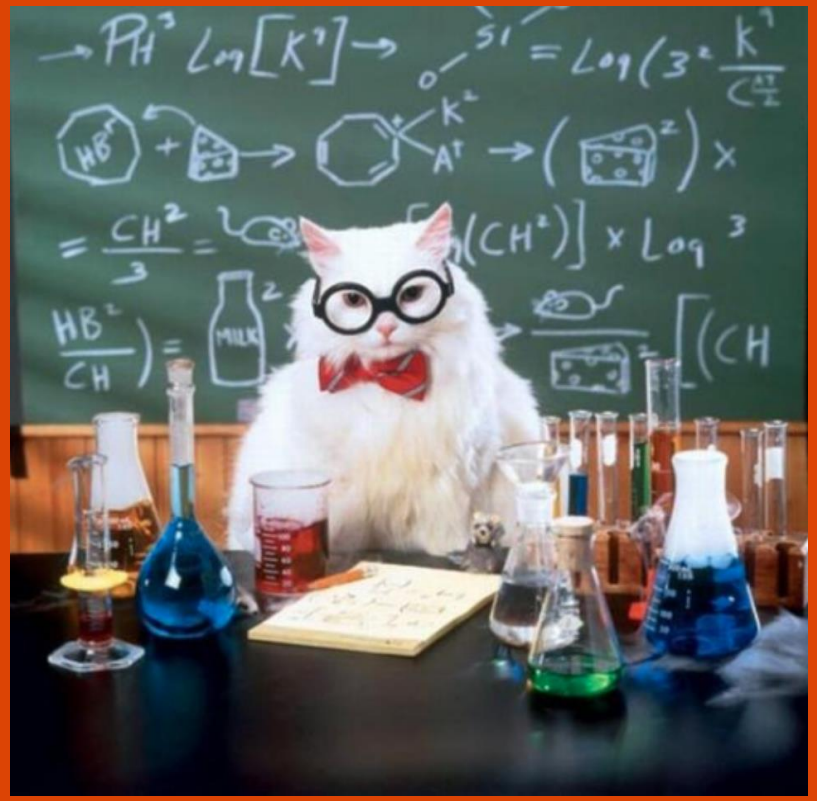
Rotting wood with mushrooms growing on it.

A brown & dried stem.

Ants under a rock – can you spot them?

Q: What factors affect the process of decomposition?

Let's set up our experiment to discover the relationship between soil health and decomposition!



A picture of you, doing your "Break it Down" experiment at home!

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Time for our experiment!

Gather the following materials before you begin:

- ✔ **A marker for your soil.** This can be a stick you find outside, a popsicle stick, a rock, etc. Something that won't move for a few weeks during your experiment.

- ✔ **A piece of organic material to bury in the soil.** Pick anything (with parent permission) that was once alive or is made from something that was once alive. It shouldn't be much bigger than your hand. If you're picking it off a plant or tree, make sure there are at least 10 of them left so you don't harm a living plant. Don't use meat as this may attract pests! Examples: fruit peels, vegetable scraps from the kitchen, leaves, a dead bug, wood, etc.

- ✔ **A trowel or small shovel.** Or some other tool to dig a small hole in the ground.

- ✔ **A piece of paper to record your notes**.

Step #1 – Dig a hole

- Using your trowel, dig a small hole for your item. If you don't have access to a yard or garden, you can also try this experiment in an indoor plant pot.
- As always – **be sure to get adult permission** before you start digging!
- It doesn't need to be very deep or wide, just big enough so that it fits your item.

Do you feel like Stanley Yelnats from *Holes*? Don't get the reference? This is a movie and book that I watched and read when I was a kid. It was one of my favorites!

Step #2 – Bury your item

- Put your item inside your hole and cover it back up with soil.
- Place your marker on top of the soil. That way, you can return to this same spot and know where to dig for your treasure!

My treasure markers – some cool white pumice stones!

Step #3 – Wait patiently

- Wait at least a week (more if you'd like) to return to your item.
- In the meantime, write one full sentence with a **prediction** (a guess for what will happen or what you will see at the end of your experiment) on your notes paper. Keep this piece of paper so you can come back to it.

Step #4 – Uncovering our results

- Dig up your item from the soil, using your marker to find it. Be sure to fill your hole back in after you are done, especially if you're working in a yard or garden.

- **Q: What happened to your item? Was your prediction correct?** Well – it depends! Hopefully you notice some signs of decomposition – like browning, pieces missing, or maybe even a funky smell. Record two full sentences on your notes paper about what you notice. How has your object changed or not changed?

- Depending on what your buried, and your soil, you may see no signs of decomposition at all. Factors about the soil that can either speed up or slow down decomposition include:
  - Temperature – if it's warmer, things will decompose faster.
  - Weather – if it's rainy and humid, things will decompose faster.
  - Moisture in the soil – if the soil has lots of water, things will decompose faster.
  - Presence of **decomposers** – let's talk more about this one...

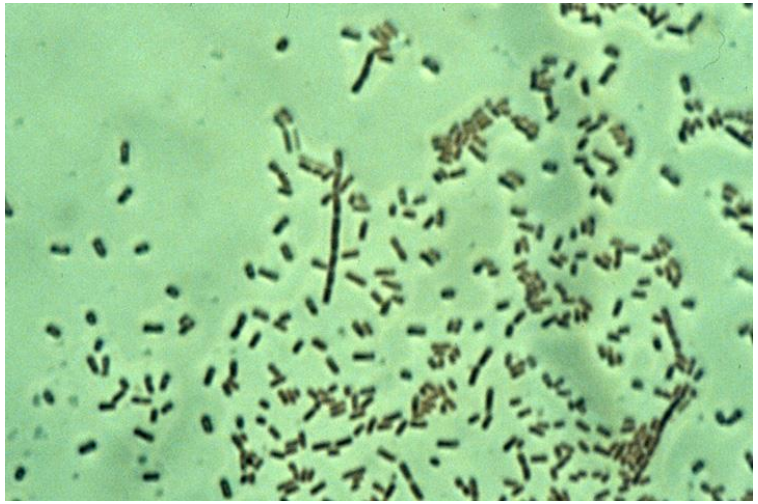
Introducing the hero of the day: decomposers

We call the animals, insects, bacteria, fungi and other very small living things that break things down decomposers. Some key examples are:

Worms!

Fungi (said like fun-guy)! Also known as mushrooms.

Bacteria! We use a microscope to see these tiny things.



But, Miss Anna, why are decomposers *heroes*?

Decomposers break plant & animal matter down by sucking it up and turning it into waste they put back into the soil.

Q: What would happen if we didn't have decomposers?
Imagine a world like this...

Every time a leaf falls to the ground, a plant dies in the forest, or a sick wood mouse passes away, where does it go? **Because of decomposers, they all seem to disappear**.

Without these heroes, we would be buried in every single plant and animal that ever lived and died on this earth. Thank goodness for them – or we would have a lot of leaves piling up!

The waste they put into the soil is also full of **nutrients** (things that are required for growth and life). These nutrients help new plants grow, so we can eat them!

Click here to watch a dog who may be happy to have leaves piling up!

More decomposers = faster decomposition, and more nutrients in the soil

Returning to your experiment...

If you noticed **very little decomposition of the item you buried**, it actually may tell you something about your soil...

- There **may not be many decomposers** like worms, insects, bacteria, or fungi in the soil
- Because decomposers break things down and release nutrients into the soil in the process, **your soil may be low in nutrients**

If you noticed **a lot of decomposition of the item you buried**, it actually may tell you something about your soil...

- There **may be a lot of decomposers** like worms, insects, bacteria, or fungi in the soil
- Because decomposers break things down and release nutrients into the soil in the process, **your soil may be high in nutrients**

Knowledge Check!

- ✓ Send an email to anna.barlowe@foodcorps.org that explains the answer to this question:

  You're walking in the woods and you see a patch of mushrooms with a lot of insects crawling around in the soil near them. If you were to dig up some of the soil below these mushrooms and insects and test it, do you think it would be high in nutrients or low in nutrients? Why or why not?

- ✓ I will respond and let you know if can check off the "Break it Down" activity on your Bingo Board.

Knowledge Check!

- ✓ Be sure to also find a decomposer outside in your yard or garden, so can check off another activity on your bingo board!
- ✓ Congratulations - you are one step closing to earning prizes and have some new knowledge about organic material and decomposers!

Thanks for joining me!

Want more fun farm to school and wellness activities? Want to earn awesome prizes? Visit our website to learn more!

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Klamath Basin Research and Extension Center

Learning Objectives & Science Standards

Overall Program Learning Objectives:

1. Label the life cycle of plants/animals and describe the role humans have
2. Safely prepare a recipe with ingredients from food grown in Oregon
3. Describe what a plant needs to grow and how humans can assist
4. Identify where and how food is grown in Klamath/Oregon
5. Identify an Oregon grown food and taste it.

NGSS Standards Used in Garden Education 3rd Grade:

3-LS1-1 From molecules to Organisms: Structures and Processes
Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3-1 Heredity: Inheritance and Variation of Traits
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS4-3 Biological Evolution: Unity and Diversity
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.

3-LS4-4 Biological Evolution: Unity and Diversity
Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-ESS2-1 Earth's Systems
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Engineering Design 3-5

3-5-ETS1-1 Engineering Design
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Engineering Design
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.