
Environmental Scientist

Overview:

This lesson and activity are designed to give students hands-on experience collecting and understanding the role of a decomposer in the ecosystem

Grade: 4

TEKS

Scientific processes

4.2(A, B, C, D, E)

4.4 (A)

Science Concept

4.5 (A)

4.8 (A, B)

4.10 (A)

4.11 (A, C)

Literature

Water Dance

A Tree's Tale

Vocabulary

Berlese Funnel

Decomposer

Organism

Producer

Materials

Discovery Book

Plastic Coke Bottle

Thermometer

Field Guides

Ziploc Baggies

Hand Lens or Loupe
Large Petri Dish



Decomposers at Work

Classroom Activity

1. Cut the bottom off a plastic 1 or 3 liter plastic bottle and fill with organic matter. Decaying leaves and sticks are excellent organic materials to place in your "decomposer extractor" (Berlese Funnel). Cut a few holes in the bottom and replace on the plastic bottle. This will prevent nearly all decomposers from escaping and the holes will allow moisture inside the "decomposer extractor" to escape. The drying organic matter will force the decomposers to work their way toward the bottom of the plastic bottle and eventually fall into the alcohol.

2. Fill a small clear jar with 1 inch of rubbing alcohol and set the plastic bottle on the jar. Make a small sign or write on the plastic bottle "Decomposer Extractor". For very fine organic material, you might need to place a small piece of window screen material inside the bottle before filling with organic material.

3. Place the "Decomposer Extractor" in the classroom and observe your students' reaction. The decomposers present in the organic material will slowly work their way to the bottom of the plastic bottle and fall into the alcohol. The alcohol will kill and preserve the decomposers. A lamp placed over your "Decomposer Extractor" will accelerate the drying process.

4. Depending on your room temperature and the moisture level of the organic material; it will take several days before you will see any decomposers. Be patient, excitement will build with each decomposer your students discover in the alcohol.
5. After about 2 or 3 weeks remove the "Decomposer Extractor" and view the decomposers with a hand lens, microscope or loupe. Place the decomposers in a petri dish for better viewing. This activity will stimulate your students' imagination and generate lots of questions.
6. Write the word "decomposer" on the overhead and ask your students to brainstorm about the benefits of decomposers. Write their ideas on the overhead. Explain the role of the decomposer is to break down organic materials in an ecosystem and those materials become the nutrients for new plants. Start with the sun and a brief explanation of photosynthesis and the life cycle of a tree. Then explain how an ecosystem is a cycle and like a tree has a cycle too. Ask your students to think about their campus and give examples of the life cycle a tree, photosynthesis, and decomposers at work in the ecosystem.
7. For an extension of this activity, divide your class into 4 or 5 groups and have each group conduct their own "decomposer extractor" experiment. Collect leaf litter from different parts of your campus and compare their data with the teacher's data. What conclusions can you draw from these experiments?
8. Prior to visiting the Eastman Nature and Wildlife Habitat Center, take your class on a virtual tour of the Eastman nature trail at <http://www.eastman.com/EastmanOutdoors/trail.htm> . The trail guide developed by Dr. Eric Taylor will give your students an opportunity to learn about the many different trees along the Eastman Nature and Wildlife Habitat Center. How many of the Eastman Trees are located on your school's campus?
9. Close the lesson on decomposers by reading *A Tree's Tale* by Lark Carrier. This is a wonderful story about the life of a "path-tree" and the human experiences that paralleled the tree's life cycle. Discuss with your students the importance of decomposers in the this story and how they are important to us today. Do you have an "path-trees" in your community?

In the Field

Decomposers at Work

1. Prior to leaving your school make sure you have the following items.
 - Discovery Books
 - Ziploc Baggies (1 gallon size)
 - Pencils (inexpensive mechanical pencils are excellent)
 - Compass
 - Thermometer
 - Papermate Ball point pens (Blue or Black)
 - Water
 - First Aid Kit
 - Sack Lunch or light snack
 - Camera
 - Backpack
 - Salt for pitfall traps
 - Plastic or coffee cans for pitfall traps
2. Before getting on the trail, remind students their observations and data collected will be used back in the classroom to create charts and graphs of their observations.
3. Set your behavior expectations before leaving the parking lot. Explain how students are to behave along the trail and in small groups. State specifically what behaviors you want to see along the trail. Remind students the higher their voices are the less likely they will see wildlife along the trail.
4. Distribute Discovery Books to students and record weather data observations. Teachers a gallon size ziploc baggie make an excellent container for pencils and Discovery Books during lunch or at the end of the day.
5. Walk through the gate and follow the trail. Remember to go slow and listen to your student's observations along the trail.
6. If you have enough adult supervision, divide your class into two groups. Have each group go in opposite directions along the trail. This will help reduce the noise level and also give your students an opportunity to share their observations when the class comes together at the halfway point. This is a good opportunity reinforce the idea that scientists share data too.

Post Eastman Activities

Decomposers at Work

- Ask your students to discuss their experiences while at the Eastman Nature and Wildlife Habitat Center.
- Collect leaf litter samples from different areas of your community and extract the decomposers.
- Have your students create charts and graphs of the data they collected while at the Eastman Nature and Wildlife Habitat Center. Compare the Eastman data with the data collected at your school. Have your students draw conclusions about their observations.
- Create a "Decomposer Zoo" in an old aquarium.
- Place Pitfall Traps around your campus and design experiments to answer specific questions.
- Write a Haiku about decomposers.
- Maintain an Environmental Journal for 1 school year.
- Build a compost pile.

Resources

Publications

A Tree's Tale. Lark Carrier, Dial Books for Young Readers, 1996.

Peach and Blue by Sarah Kilborne

Water Dance by Thomas Locker

Sunship Earth by Steve Van Matre

Field Guide for the Eastman Nature Trail by Eric L. Taylor, Ph.D

The Audubon Society Field Guide to North American Insects and Spiders. by L. Milne and M. Milne, 1980. Alfred A. Knopf. New York.

Simon and Schuster's Guide to Insects. by R.H. Arnett Jr. and R.L. Jaques Jr., 1981. Simon and Schuster. New York.

An Introduction to the Study of Insects. by D.J. Borror, C.A. Tripplehorn and N.F. Johnson. 1989. Saunders College Publishing. Ft. Worth, Texas.

The Magic School Bus Meets the Rot Squad. A Book About Decomposition, 1995, by Linda Beech. Scholastic Inc., New York, NY. One of Scholastic's books based on the animated TV series, this book follows Ms. Frizzle's class as it takes a field trip inside a rotting log to learn about how nature recycles through decomposition.

Web Pages

Berlese Extraction

<http://www.cals.ncsu.edu/course/ent591k/berlese0.html>

Microbe Zoo

<http://commtechlab.msu.edu/sites/dlc-me/zoo/>

Termite Pictures

<http://www.utoronto.ca/forest/termite/taxon.htm>

Woodland Explorer

<http://www.naturegrid.org.uk/woodland/roots.html>

Decomposers and Scavengers

<http://www.nhptv.org/natureworks/nwep11.htm>