



## COMPOST CREATURES UP CLOSE

### GRADES 6-12

#### BACKGROUND INFORMATION

Have you ever wondered what happens to items we use in our everyday lives when we are done with them? Many of the items eventually return to soil through the process of decomposition. Living organisms such as bacteria, fungi and worms break down materials into smaller pieces and digest them.

By creating a small compost pile in your backyard or school yard, it's easy to see some of the creatures responsible for decomposition up close. Many of the organisms present in a compost pile also live in healthy soils and perform the important task of cycling nutrients and organic matter.

#### STUDENT PREPARATION

- Ask students to think about what they throw away both at home and at school on an average day. Write their ideas down on a white board. Discuss the term biodegradable and ask students to describe what it means to them. Talk about which of those items are biodegradable, or able to be broken down by bacteria, fungi, and other living things. Many of these biodegradable items can be put to use in a compost pile.
- Talk about two essential items for a compost pile: carbon-rich brown materials and nitrogen-rich green materials. Carbon provides an energy source as well as a building block for microbial cells. Nitrogen is needed to build proteins, amino acids, enzymes and DNA of bacteria and other microorganisms involved in decomposition.
- Talk about some of the common creatures that play a role in the decomposition process. What does the biological community look like? What does the soil food web look like?

#### DEFINITIONS

**Decomposition**- the process of breaking down organic substances, such as dead plant or animal matter, into simpler matter; also called rotting or decay

**Biodegradable** – capable of being broken down by bacteria, fungi or other biological means back into natural materials

*Photo Credit: Cornell University*

#### Tertiary Consumers

*organisms that eat secondary consumers*

centipedes, predatory mites, rove beetles, pseudoscorpions



#### Secondary Consumers

*organisms that eat primary consumers*

springtails, feather-winged beetles, and some types of mites, nematodes, and protozoa



#### Primary Consumers

*organisms that feed on organic residues*

actinomycetes and other bacteria, fungi, snails, slugs, millipedes, sowbugs, some types of mites, nematodes, and protozoa



#### Organic Residues

leaves, grass clippings, other plant debris, food scraps, fecal matter and animal bodies including those of soil invertebrates



## **GREAT RESOURCES FOR MORE INFORMATION**

Cornell University “Composting in the Classroom:

<http://cwmi.css.cornell.edu/chapter1.pdf>

Cornell University “Invertebrates of the Compost Pile:

<http://compost.css.cornell.edu/invertebrates.html>

## **ACTIVITY PREPARATION AND PROCEDURE**

Identify an outside area of open grass or soil about 3 feet long by 3 feet wide. Gather the following materials to put into your compost pile:

- Carbon-rich “brown” materials such as fall leaves, straw, dead flowers, wood chips, sticks and corn residue
- Nitrogen-rich “green” materials such as grass clippings, plant material and fruit and vegetable scraps
- A few buckets of garden soil
- A bucket of water

Start the pile with brown materials. Add a layer of green materials, then a thin layer of soil. Add water to the three layers until they are moist but not soggy. Repeat the layering process. For best results, add three parts brown material for every one part green that goes into the pile. Build your pile three to five feet high; if you have enough material to build it three feet high, the pile will be able to heat up and properly decompose the organic matter. Add more material as it becomes available to eventually make the pile three feet high.

Turn the pile every two to three weeks using a pitchfork or a shovel, and keep it moist. When turning the pile, make sure to move items from the center of the pile to the outside and items from the outside to the center. The pile needs air flow so that important aerobic bacteria can thrive and do their job in the decomposition process. Depending on the temperature outside, you should start to see earthworms, millipedes, centipedes, beetles, ants and more within a few weeks. Your compost is ready to use once it looks like rich, dark soil and easily crumbles between your fingers. Transfer the compost to a garden or flower bed.

A compost pile can be started at any time of the year, but the pile will compost materials fastest when temperatures stay warm, and especially above freezing. Consider starting a pile in the spring or fall when materials for composting are readily available. If composting in winter, add fewer materials so that your pile does not get too large to manage. When spring temperatures return, the pile will heat up on its own and continue the composting process. After winter, add plenty of brown materials and turn the pile.

*Note: There are certain items to keep out of a compost pile, both to prevent harmful pathogens from being present in compost and to avoid bothersome pests. These items include animal products (meat, cheese, fish and eggs), animal bones or scraps, dairy products, cooking oil, and manure or pet waste.*

**ADDITIONAL TOPICS FOR GRADES 9-12:**

- Explore compost chemistry! When a compost pile goes through the decomposition process, piles can sometimes “steam” as a result. Have students explore the science of composting and how organic materials turn into compost, expelling energy, carbon dioxide, and water in the process. For more information, check out Cornell University’s “The Science of Composting.” <http://cwmi.css.cornell.edu/chapter1.pdf>
- Conduct individual student research on thermophylic composting (the process that a compost pile undergoes) and create an educational display or infographic.