



Lesson Plan: Worms at Work

Adapted from the Environmental Protection Agency's "The Quest for Less, Chapter 2.3: Composting" – www.epa.gov

Goal: To teach students that food scraps and yard trimmings can be made into compost instead of being thrown away.

Assessment: Students will create a compost bin using worms and food scraps and monitor changes in the bin over time.

Age Group: Grades 3-5

Time: 1 hour for set-up, 15-45 minutes on an occasional basis.

Materials:

- Large plastic bin (about 8 to 16 inches deep) with holes in the bottom for aeration
- Tray for underneath the bin
- Two bricks or other large sturdy objects
- 9 to 14 pounds of newspaper
- One bag of potting soil
- 1 pound of red worms
- Food scraps (such as bread, vegetables, fruits, eggshells, grains, coffee grounds, tea bags)
Do NOT include meat, bones, mayonnaise, fish, peanut butter, candy, or nonfood items
- Tarp or drop cloth
- Bucket or other carrying container
- Household gloves (optional)
- An enlarged diagram showing the top of the bin divided into sections 1 through 8.
- A notebook to record observations (one per student)

Vocabulary

Compost – a mixture that consists largely of decayed organic matter and is used for fertilizing and conditioning land.

Vermicomposting – is the process of having red worms and other decomposer organisms process our organic waste and turn it into a great natural fertilizer.

Castings – nutrient-rich waste materials that worms excrete.

Decompose – to become broken down into parts, to rot.

Bedding – dirt, newspaper or leaves used as a bottom layer in a compost container.

Organic – material that is or was once alive.

Activity

Step 1:

Explain to the class what compost is and how it is made. Discuss the use of worms, the need for and use of organic waste, and other vocabulary words. During the course of this lesson, inform students of good and bad foods to use in composting, as well as the reason why it is better to compost than to throw food scraps away.

Step 2:

- Place bin on top of two bricks and put tray under bin.
- Have the students tear each sheet of newspaper lengthwise into strips that are 1 to 3 inches wide and place half of the pile in the bin.
- Have the students multiply the number of pounds of newspaper by 3 to determine the total amount of water needed (a pint of water weighs a pound, and a gallon of water weighs 8 pounds). Then add half of the water to the bin with newspapers.
- Sprinkle two handfuls of soil and the rest of the newspaper and water. Have students mix the contents well and distribute evenly in the bin.
- Gently place the worms on top of the bedding, spreading them evenly. Keep the bin uncovered so the students will see the worms moving down into the bedding to avoid light.
- Ask students to record all activities surrounding the worm bin, including the date the bin was set up, the number of worms (or pounds of worms) added to the bin, and the number of people contributing food scraps (number of people in the class).
- For the remainder of steps for this activity, have students record the date and day food is added, type of food and weight, and amount of water added. The compost bin should always remain moist.
- Use food scraps that you brought from home or that you asked students to bring from home or save from school lunch, and have students add them to the bin.
- Food can be added daily, weekly, or monthly. Be sure to not overload the system and bury food relatively evenly amongst the different "plots."
- Instruct students to record how much food they are providing the worms and where it is placed according to the diagram.
- Place a sheet of newspaper over the top of the bin to prevent flies from circulating near the area. Store the bin in a cool place out of direct sunlight, and keep the lid tightly shut.
- Have students check the bin frequently as they add food scraps to see the changes that occur. After a period of 3 to 6 months, depending on the size of the container, most of the food and bedding will be transformed into worm castings.

Step 3:

- In order to harvest the compost for use, you must change the bedding and temporarily remove the worms. Spread out a tarp or drop cloth in an open area and dump out the entire contents of the bin.
- Have students help you divide the materials into several cone-shaped piles (larger on the bottom, so the worms will burrow into it and avoid the light).
- Direct students to scoop off the material from the tops of the piles, and put the castings into a container to carry out to the garden. Repeat this procedure until most of the compost is harvested.
- Have students put worms back in the bin, along with any uncomposted food and old bedding. Your class can start a new stock of bedding and add in any additional worms to begin the process again.
- Create a garden in which to use the compost as a soil amendment, or use the compost on the schools' beds or lawn.

NOTE: Other critters may make their way into the compost bin. Many are beneficial, including mold, bacteria, sow bugs, beetle mites, white worms, snails and slugs, flies, round worms, and millipedes. You do NOT want the following in your bin, however: flat worms, ground beetles, centipedes, ants, and pseudo scorpions. If you find any of these organisms, start over.

Step 4:

- Ask students to define and describe decomposition.
- Ask students why it is beneficial to compost items instead of throwing them away.
- Ask students to make observations about the worm bin each week. Do smaller pieces of food tend to break down faster than larger ones? What does the compost smell like? What organisms do they notice? Are the worms multiplying?

Extensions

- Give students gloves to gently examine the critters inside the bin once a week. You might also examine a sample of the soil under a microscope (at the beginning of composting, bacteria are present that help break down the food; later larger organisms such as sow bugs and round worms play a larger role.) Obtain an identification guide to invertebrates and insects and see how many you can identify. Have students draw the different kinds of critters and discuss the differences in each (number of legs, body parts, function).
- Have students write a poem, such as a limerick, that describes what compost looks like and how it feels when touched.

Minnesota Teaching Standards

3rd Grade

Science: 3.1.1.2.1, 3.1.1.2.3, 3.1.1.2.4

4th Grade

Language Arts: 4.2.7.7, 4.6.7.7, 4.8.1.1c, 4.10.6.6

5th Grade

Science: 5.1.1.2.1, 5.1.1.2.2, 5.3.4.1.3