



ACTIVITY

Compost Crazy

Summary:

Participants create their own group compost bin.

Grade Level:

4-8

Time:

1 hour or more for initial set-up, then ongoing 15-30 minute sessions over three or more months.

Learning Objectives:

Participants will be able to:

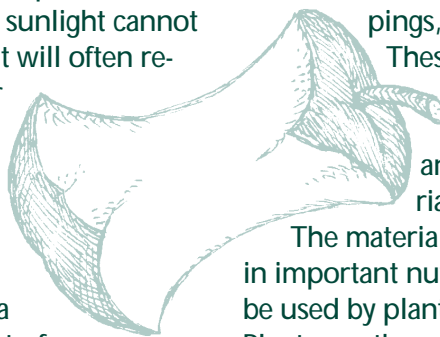
- ◆ Explain the decomposition cycle.
- ◆ Discuss ways composting can help the environment.
- ◆ Create a worm bin and demonstrate its effectiveness in decomposing food scraps.

Materials Needed:

- ◆ A bin, 16" X 24" X 8" (about the size of an apple crate), or 10 gallons (or the materials to make such a bin)
- ◆ For wooden bins: a plastic garbage bag or other liner
- ◆ About 50 sheets of newspaper
- ◆ 2-4 cups of soil
- ◆ 1 pound of red worms (about two generous handfuls)
- ◆ Enough food each week to keep worms happy (worms eat three times their weight each week)
- ◆ Spray water bottle, to keep bedding moist (but not soaking)
- ◆ Small shovel

Background:

Composting food and lawn waste has many benefits over sending it to a landfill. Landfills are often so large and compacted that decomposers, air or sunlight cannot reach the waste, so it will often remain unchanged for many years after it was deposited. Thus landfills grow to massive proportions. Composting can actually reduce a considerable amount of waste in a relatively short amount of time; it also cuts garbage bills and creates a nutrient-rich, moisture-laden soil for gardening.



There are a number of ways to **compost** food scraps and lawn waste. One way is to put them in a compost bin and turn the pile frequently to encourage various microorganisms using bacteria to break it down. The worm bin described below is another efficient way to compost, and it allows the worms to do most of the work. Using worms to compost is called **vermicomposting**. With a classroom worm bin, participants will be able to observe the decomposition cycle as it happens and learn a way to positively impact their environment. Also, if the group is planting a garden or wildlife habitat, the bin will produce good soil for their plants.

The decomposition cycle is a very important part of the cycle of life. Decomposers such as worms, fungus, bacteria, and beetles eat portions of dead organisms, including leaves, old logs, animal droppings, and dead animals.

These decomposers help break down the dead matter, and excrete the materials they don't use.

The materials left over are rich in important nutrients, which can be used by plants through the soil. Plants use these nutrients to help them grow, and animals eat the plants, and so on.

All earthworms act as decomposers in some way. They also **aerate** (move air through) the soil when they burrow, which helps plant growth and aids decomposition. Many earthworms were accidentally introduced into North America when Europeans brought potted plants over in the 1800s. Most people are familiar with the large, thick worms called "night crawlers" (*Lumbricus terrestris*). They generally live between the top layer of soil, which consists mostly of decaying matter, and the second layer, which is a mix of minerals and organic material. Night crawlers eat decaying matter and mix organic material between layers. While they are important to farmers and gardeners, they do not prefer the extremely rich environment of most compost bins. Red





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worms, or “red wigglers” (*Eisenia fetida*), live primarily among leaf litter and in the organic material-rich top layer of the soil. They eat and break down the larger bits of decaying material, and their castings form a rich soil. Red worms, then, do an excellent job of breaking down excess food scraps for compost bins.

For a classroom worm bin, it is important to keep the food scraps small so that the worms can eat through them before flies arrive or before the bin begins to smell bad. Citrus fruit peels (they are acidic and attract fruit flies, which are hard to get rid of) and broccoli and onions (they are smelly) should also be left out. Worms have a hard time breaking down meat or other animal products efficiently, and so it is very important to leave these out of a worm bin (or any compost bin, for that matter).

What to Do:

1. Ask participants, *What do you think happens to leaves, flowers, plants, animals at the end of their lifecycles? How does the food web continue? What have you seen in nature that would give you some ideas about this process?* Write down and discuss participant ideas and guide participants towards an understanding of decomposition. *Why is decomposition important? What role do decomposers play in*

the food web? If the group has not already taken part in the activity “Small Seek” on page 188, consider doing that as a lead-in to this activity.

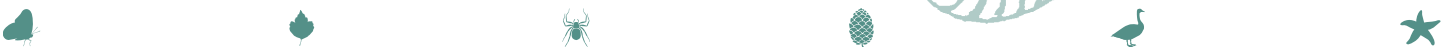
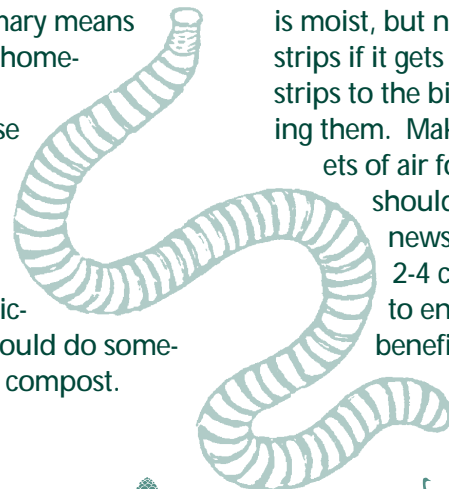
2. Tell participants that for this activity, they will have the opportunity to watch decomposition in action by creating and maintaining a worm compost bin. Discuss the term *composting*. Ask participants if any of them have a compost pile or bin at home, and if they do, ask them what they do with it. Discuss what happens to leftover food, lawn clippings and other waste. If possible, have participants find out whether their region collects lawn bags to recycle lawn waste or if all trash goes to a landfill. Ask participants, *What are some problems with sending everything to a landfill?* (Landfills grow until there is no space left, materials degrade much slower in a landfill, and landfills often leak toxic materials into surrounding water supplies, etc.)

3. If possible, visit a local organic farm or a garden that uses compost as a primary means of fertilization. A homeowner willing to show how they use compost in their garden would also be appropriate. After such a field trip, ask participants how they could do something similar with compost.

4. Ask participants if they know what role earthworms play in the soil. Discuss the difference between “night crawlers,” which live deep in the soil, and “red wigglers,” which live near the top of soil and help to decompose leaves and other organic materials.

5. Have participants help set up the worm bin: Locate or make a bin, approximately 16” x 24” x 8” or 10 gallons. It can be wooden, plastic or glass, though wooden bins should be lined with plastic (like a garbage bag or old shower curtain). Rinse the bin clean with tap water, since some residues can harm the worms that will live in it.

6. Prepare bedding consisting of moist newspaper. Like soil, newspaper strips provide air, water, and food for the worms. Use about 50 pages and tear them into 1/2” to 1” strips. Use black and white print; color print can be toxic to the worms. Put the newspaper strips into a large plastic garbage bag or container. Add water until bedding is moist, but not dripping. Add dry strips if it gets too wet. Add the strips to the bin without compressing them. Make sure to leave pockets of air for the worms. The bin should be 3/4 full of wet newspaper strips. Sprinkle 2-4 cups of soil in the bin to ensure the presence of beneficial microorganisms. Gritty soil particles





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also aid the worms' digestion. Potting soil, or fairly rich, moist soil from outdoors is fine.

7. Before adding worms, measure their weight. If a scale is unavailable, estimate: two big adult-sized handfuls of worms are about equal to a pound. The weight of the worms is important for knowing how much food to feed them and for record keeping. Add worms to bin.

8. Have participants bring in food scraps from home, gather them from their lunches or snacks, or have them work out a deal with the cafeteria if the group's facility has one.

9. Bury food scraps under bedding. Feed the worms fruit and vegetable scraps that would normally be thrown away, such as peels, rinds, cores, etc. Limit the amount of citrus fruits placed in the bin. **NO MEATS, BONES, OILS OR DAIRY PRODUCTS.** Cut or break food scraps into small pieces—the smaller, the better. Measure the amount of food on a scale if possible. If a scale is unavailable, a quart-sized container will probably hold a pound of food scraps, though this will vary with the types of food you use. Feed worms approximately three times their weight per week. Monitor the bin every week to see if the worms are eating the food. Adjust feeding levels accordingly. (One pound of worms requires 3 pounds

of food per week).

10. Place a full sheet of dry newspaper on top of the bedding. This will help maintain the moisture balance, keep any possible odors in the bin, and help prevent fruit flies from making a home in the bin. Replace this sheet frequently if fruit flies are present, or if bin gets too wet.

11. Cover the bin with a lid made of plastic, plywood, or cloth, but leave the lid ajar so the bin receives some air. If desired, drill small holes into the bin. Place the bin away from windows and heaters.

12. To keep worms happy, feed them about once a week. If bedding dries up, spray with water. (If bedding gets too wet, add dry newspaper strips.) Fluff up bedding once a week so the worms get enough air.

13. Have participants look at the data sheet and make hypotheses (i.e., educated guesses as to what will happen) about the food scraps when placed in the worm bin. As the worms eat through the compost, have participants observe what happens to it. Have them record observed data, including change in height of compost level, general appearance of compost, and the status of the worms. The worksheet outlines several different data



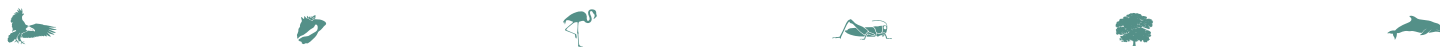
participants can collect. Consider laminating the worksheet, and have participants write on it with a grease pencil so it can be reused week to week. If possible, have them write their thoughts in a journal each week.

14. Give different tasks to each participant in taking care of the worms each week: One job includes adding compost when worms have eaten all the food and bedding, and harvesting the compost. Participants can begin this process by scooping all the material over to one side, placing down new bedding in the empty area, and putting new compost on top of the new bedding. The worms will make their way over to the new compost area in a week or so, at which time participants can harvest without too much trouble.

Another task: make sure material isn't too wet or too dry. Worms will drown or try to crawl out of the bin if it is too wet and they will die if it is too dry. Other participants can measure the amount of compost added and how much the level of the material goes down after worms have eaten it. *How do their hypotheses compare to the data they are collecting?*

15. As compost becomes available, use it in the facility's garden or





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grounds, or for growing potted plants. Have participants make notes of the plants' growth.

For Younger Participants (Grades 1-3):

The concept of composting may be difficult for young children. One idea is to set up a see-through compost bin (use a clear plastic bin) in the facility's room, add earthworms and have participants make close observations of what happens periodically. If they can clearly observe the process, they will be stimulated to ask questions and begin to understand the idea.

Questions:

- What is compost?
- How is it made?
- How does it help plants and the environment in general?

Adaptations:

Refer to general adaptations on pages 11-16.

Hearing Disabilities:

- Have pictures of landfills available to help illustrate the point.
- Have compost and traditional soil samples available for participants to see and touch; allowing them to compare the two.

Learning Disabilities:

- Have pictures of landfills available to help illustrate the point.
- Illustrate the decomposition process by using different sized balls as you explain it as needed. For example, use a basketball, a softball, a tennis ball, a ping-pong ball, and a marble to demonstrate the breakdown of food scraps into compost.
- Have compost and traditional soil samples available for participants to see and touch, allowing them to compare the two.
- Allow participants who have difficulty working with weight measurements to use cups or scoops to measure all necessary materials.
- If possible, have participants collect food scraps at home to bring in to help reinforce learning.
- Have participants work in pairs or small teams and create a concrete schedule of tasks for them to follow to care for the worms.

Motor Disabilities:

Overall:

- Create a raised compost bed (approximately 27 inches high at the top of the bin) or a table-top bin to provide easy access for participants who use wheelchairs.

For participants with limited muscle strength, coordination, or dexterity of the hands:

- Have adaptive scissors available for participants who have diffi-

culty tearing strips of paper.

- Build up the handle of a kitchen scoop (ice or flour) for participants to measure worms, soil, and food scraps. Assist as needed.
- Have an adaptive rocker knife available to cut food scraps into small pieces.

Visual Disabilities:

- Illustrate the decomposition process by using different sized balls as you explain it. For example, use a basketball, a softball, a tennis ball, a ping-pong ball, and a marble to demonstrate the breakdown of food scraps into compost. Encourage participants to handle each of the balls to help them understand the process.
- Have compost and traditional soil samples available for participants to touch, allowing them to compare the two.
- Encourage participants to touch the worms and fully participate in the experiment.
- Use cups or scoops to measure all necessary materials.
- Have a partner or volunteer verbally walk participants through steps of creating and caring for the compost bin.
- Once they learn the steps, participants should be encouraged to be as independent as possible in completing the necessary tasks.

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