

The Rotten Truth

Wyoming Science

Objectives:

- Students will demonstrate and explain the process of decomposition.
- Students will be able to list the methods and ingredients for making compost.

Background:

Decomposition is a fundamental process on which all life depends. We'd all be knee deep in garbage without it. Bacteria, fungi, and other microscopic organisms that live in the soil, air, and water are responsible for turning once living plants and animals into nutrients that can be used again and again. Think of them as nature's recyclers. They have the ability to produce special enzymes which allow them to break down dead plant and animals and use them as food. No job is too big as they enlist the help of friends and family. As they eat, they grow and multiply at an amazing rate, in just 4 hours, one bacterium can grow to a colony of 5,096. And at days end there are millions and billions of them working together. Why, in 1 teaspoon of soil, there are more bacteria and fungi than all the people on Earth!

Despite their microscopic size you've probably seen evidence of them right in your own homes. Remember that orange with blue-green mold in the back of the refrigerator? Or that black or white fuzzy slice of bread? Or those damp old gym socks that you left in a plastic bag newly spotted with black and pink. These are colonies of our microbial friends hard at work at the fine art of decomposition.

There are many containers suitable for making compost, provided they are accessible, resist decay, and allow air flow. How do you decide which containers will work best? Consider the amount of time and space you have, and the quantity of materials you will be composting. Most compost containers fall into one of these categories: heaps (simple stacked piles), hoops (caged enclosures), bins (boxed enclosures), and barrels (drum enclosures).

For fast, hot compost, the ideal pile size is 1 cubic yard (3 feet x 3 feet x 3 feet). This volume effectively retains the heat generated by the bacteria. The volume of a single pile should not exceed 2 cubic yards in order to maintain proper ventilation of the pile. If space is a limiting factor, the pile sides can be insulated so that higher temperatures can be maintained in a smaller volume. Once you have selected the container and location for your compost pile remember 1 part green



Standards

Science

Life Systems: 1.3
Earth, Space,
& Physical Systems: 1.4

Science As Inquiry:
2.1, 2.2A, 2.2C,
2.2D, 2.2E

Materials

- Ziploc quart bag
- Decay Buffet: fruit and vegetable peelings, leaves, plastic bag, paper bag, waxed utensils, hay, straw or grass, plastic utensils, paper cups, milk cartons, straws, paper napkins, and other stuff.
- Tape
- Scissors
- Soil
- Mist spray bottles or bowls of water
- Gloves (food handlers will work)
- Composting Containers transparency
- My Compost Pile activity sheet
- Crayons

Estimated Time

(2) - 30 Minute
Activities

Grades 3-4

notes:

(grass clippings, kitchen scraps, no meat or dairy, etc.) to 2 parts brown (straw, aged manure, dry leaves, etc.). Layering helps the pile to get going, but stirring the pile is important and will accelerate the decomposition of your dead plants and scraps into beautiful, earth-like smelling (not stinking) compost.

Activity Procedures:

Activity 1 - Decay and Decomposition

1. Divide the class into pairs.
2. Provide each pair of students with a ziploc quart bag and ask them to write their names on some tape and then stick the tape on the bag.
3. Set up a “Decay Buffet” of items noted in the list of materials to be placed in the bags.
4. Students should place one small piece of each item at “The Decay Buffet” into their bags. Have them cut up items, if necessary. Stress that they not add any meat to their bags as potentially harmful bacteria could grow.
5. One student can place the items in the bag and the other student can record the exact contents.
6. The recorder should also note his or her partner’s predictions as to what will happen to each item over time. Will the item rot? Smell yucky? Remain the same?
7. Optional; you may want the students to switch roles and create a second compost bag with a list of contents and predictions.
8. Ask the students to add about 1/2 a cup of soil to their bags and to lightly mist the contents with a plant mister. (Adding a teaspoon of water and mixing the contents will work the same way.)
9. Have the students blow into the bags (to inflate slightly) and carefully seal them. Once the bags are sealed, leave them in bags for 2-8 weeks. You may decide to keep the bags together, or place them in various locations with differing conditions. (If you let the students choose their compost bag’s location, be sure to have everyone register their locations on a class master list or you may be unpleasantly surprised when a missing bag finally makes its presence known.)
10. Have students create compost bag journals. Ask them to observe their bags periodically and record what they see happening inside. Remind students that they are not to open the bags until the designated date.
11. On the designated date, have the students take their bags outside. Distribute plastic gloves to the students to wear while sorting through the contents of their bags with their partners.

12. Caution: students with known allergies to fungus and fungal spores should not participate!
13. Record any items still identifiable and in their present state. Provide misters or water bowls so items can be cleaned off for closer observation and identification.
14. Are any items missing? Check the list and note the items missing.
15. How did the results compare with the predictions?
16. Define and discuss the process of decomposition or decay.

Activity 2 - Containers and layers for composting

1. Provide each student with a My Compost Pile activity sheet.
2. Using the background information, review the methods for making compost pile. (More information about composting can be found at (<http://www.cityfarmer.org/homecompost4.html>)).
3. Discuss the different type of composting containers using the transparency.
4. Optional: Create your own school compost pile!

Discussion:

- What are some things you have thrown away over the past couple of days?
- What happens to these things? Do they disappear? Decompose? Remain in the same form forever?
- Will placing the bags in various conditions have an effect on what occurs in the bags?
- Can you think of any other types of compost containers that would get the decomposition job done?



vocabulary:

- *biodegradable*
- *compost*
- *decomposer*
- *decomposition*
- *nutrient*

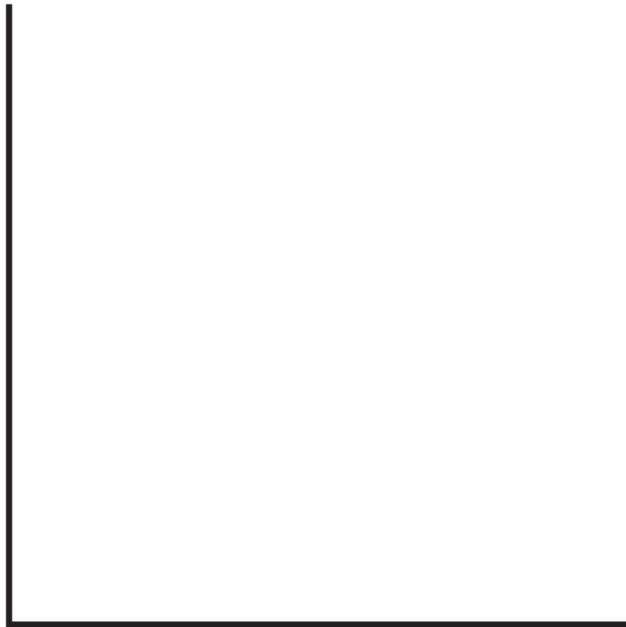
My Compost Pile

Color a legend for your compost pile. List the type of dry and wet ingredients you are going to add. Then create a compost pile by drawing a pile in the bin. Remember to use the colors you have selected showing the different layers.

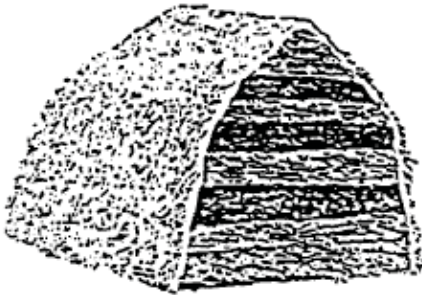
Moisture

Dry Ingredients

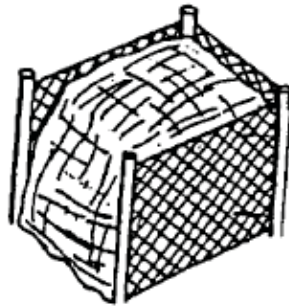
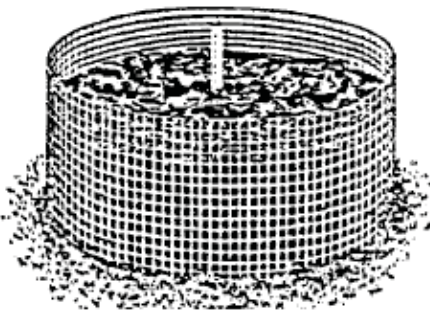
Wet Ingredients



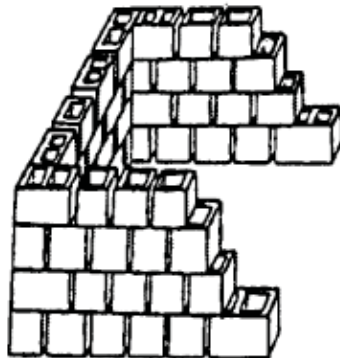
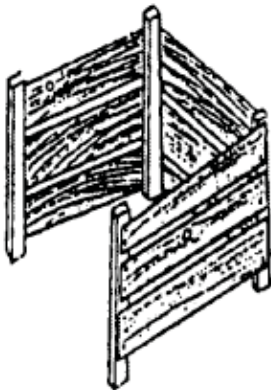
Composting Containers



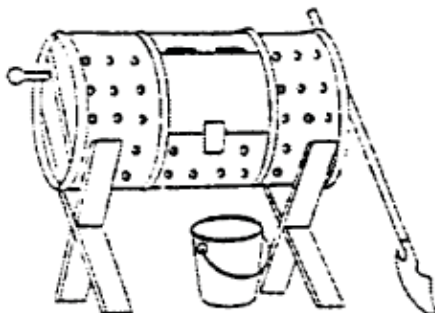
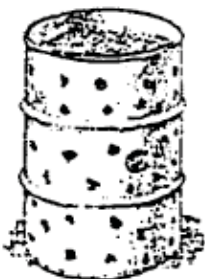
Heap It (no cost, good if you have ample space) Simply pile your materials in heaps. If well constructed heaps are good for “no turn” composting. Just leave the pile for several months or more.



Hoop It (low cost, tidier than heaps) Woven wire mesh fence makes good enclosures and keeps the pile tidy. If you secure it with hooks or twists of wire, you can undo the hoop, set it up next to the pile and turn the pile back into the hoop in its new location.



Box It (looks good, easy to cover, low to moderate cost) You can use almost any type of scrap or new lumber, bricks, or cinder blocks. Make sure to leave space in the sides for air to get through, and make the front removable for easy access to turn or retrieve the compost. Construct several bins side-by-side to facilitate turning of the compost.



Barrel It (good for limited space, easy turning, moderate to high cost) If you don't have enough space for a pile of elaborate bins, a modified 55-gallon drum can work very well. By perforating the drum with air holes and cutting access hatch on the side you can create a system which will compost small amounts of material quickly.