

Compost Cake



Objective:

Students will learn about the decomposition process by simulating what happens within a compost pile.

Grade Level: 3-6

Groupings: Entire Class

Materials: Compost Ingredient Cards (page 88); long rope (16 feet or more); plastic spray bottle; thermometer (real or pretend).

Time Allotment: 30 minutes

Extensions:

a. Sing “Take Me Out to the Compost” to the tune of “Take Me Out to the Ball Game.”

Take me out to the compost

Take me out to the pile.

Add some soil and a few good worms

I don't care if I'm turned and I'm churned

'Cause it's root root root for the microbes;

If they don't live it's a shame.

For in two, four, six weeks, I'm out in the old garden.

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b. Take and record the temperature at different areas in an active compost pile (center, edges, top, bottom).

Directions:

This activity works best if done just before or after students have built a compost pile.

1. Explain to the students that the basis of a good garden is the soil. One way to replenish soil and build up a good foundation is through the natural recycling process called *decomposition*. People speed up the decomposition process by *composting*. How many students have a compost pile or are familiar with what goes into compost? To illustrate what can go into a compost pile, sort a lunch bag of leftovers after lunch.
2. Tell the students they will get a chance to experience life in a compost pile. Pass out compost ingredient cards to the students. Ask them to hang them around their necks and explain that they will represent the ingredient on their card. Explain that the ingredients are divided into three categories: dried plant matter which is a source of carbon; fresh green plant matter and animal waste which provide nitrogen; and soil which contains a wide variety of macro and microorganisms important in decomposition. Ask the students to sort themselves into these three groups. (You might want to code the cards to make this sorting easier. A simple border around the edges of the cards with identifying letters C, N, and S or words can help younger students).
3. Outline the perimeter of your imaginary compost pile by placing a long piece of rope on the floor in a circle or square. Pretend to loosen the soil inside the rope and add an initial drainage layer. Explain that similar to a layer cake, compost is built in a series of repeating layers. The first layer is carbon materials, the second layer is nitrogen materials, and finally a layer of soil microbe ‘frosting.’ This pattern is repeated until the compost ‘cake’ is at least three feet high.
4. Ask the students how to begin. (Add carbon materials.) Pretend to use your shovel to choose and lift four to five carbon students into the compost. Line them up in a row inside the pile. What comes next? Do the same with the four to five nitrogen students, placing them in a row above the carbon students.

COMPOST INGREDIENT CARDS

CARBON MATERIALS

Dried leaves, straw, dried grass, small dead branches, dead pine needles or anything dried. [Make enough cards for 1/4 of the class.]

NITROGEN MATERIALS

Kitchen scraps, manure, green lawn clippings, newly fallen leaves, weeds or anything fresh. [Make enough cards for 1/4 of the class.]

SOIL MATERIALS

Soil macroorganisms: worms, mites, grubs and insects.

Psychophiles: soil microorganisms (bacteria and fungi) that work best at 55 degrees, but can work in the 30-60 degree temperature range.

Mesophiles: soil microorganisms (bacteria and fungi) that work best between 70-90 degrees, but can work in 60-105 degree range.

Thermophiles: soil microorganisms (bacteria and fungi) that work best at 160 degrees, but can work in the 105-180+ range.

Anaerobes: can work with little to no oxygen.

[Make enough cards so the remainder of the class is distributed equally among the soil materials.]

Directions: (continued)

5. Ask the soil microbes to sit around the perimeter of the compost. Explain that the various organisms in the soil are active at different times and temperatures during the decomposition process. Those active at a particular time and temperature will move to the center of the compost circle when their optimum conditions are indicated. As conditions change, they will move back out to the edges and be replaced by other organisms who work best in the new conditions.

6. Explain that the decomposition process is speeded up when carbon and nitrogen materials are first broken down into smaller pieces. Ask the soil macroorganisms to introduce themselves and pretend to sprinkle them as a frosting layer on top of the nitrogen layer. Squirt the pile with a plant mister and explain that this provides the organisms with moisture and gets the pile cooking. Ask the macroorganisms to move around and begin to break down and mix up the other ingredients.





BAKE a COMPOST CAKE

The soil chef is back again with a new recipe for the garden that is heaps of fun. It's a rich compost cake and it is easy to make. Prepare the pan by loosening an area of soil at least 3 feet by 3 feet with a spading fork. Line the bottom of this "pan" with drainage materials such as corn stalks or thin branches. Now begin layering the cake. First add some materials high in carbon. Try any dead and dried plant matter including dried leaves, straw, sawdust, hay, small thin dead branches, or dead pine needles. Follow this with a layer of nitrogen rich materials such as kitchen scraps, manure, or fresh grass clippings. Then frost with a layer of soil or old compost. Any combination of carbon and nitrogen materials will work, but it is best to have a 3:1 carbon to nitrogen ratio. Continue these layers until the cake is at least three feet high, then moisten with a liberal dose of water from the garden hose. Now as the decomposers start working, the temperature rises and the cake starts to bake. Mix it up every three to four days and continue baking for four to six weeks until you have rich, dark soil. Then add a generous portion to your old garden. It's sure to improve its sense of humus.

Directions: (continued)

7. Tell the students that as decomposition progresses, the pile starts to heat up. Make the analogy of how we get warmer when we work hard or exercise. Pretend to use a thermometer to take the temperature of the pile, announcing a reading of 55 degrees. Have the soil organisms whose cards indicate that they work best at these lower temperatures (psychrophiles) enter the pile and begin to work as the macroorganisms move to the edges.
8. Continue checking and announcing new temperatures at 1 minute intervals, letting the mid-temperature range organisms (mesophiles) move in at 75 degrees, followed by the high temperature range organisms (thermophiles) at 110 degrees.
9. Explain that at this point the oxygen level of the pile is dropping. This usually happens within two to three days in an active compost pile. The thermophiles then move to the edges and the temperature drops again bringing back the mesophiles. Finally the oxygen supply is exhausted and the pile begins to smell. The mesophiles leave and the anaerobes enter. Anaerobes do not need oxygen but they work very slowly. The decomposition activity in the compost is reduced by 90%.
10. Ask the students how the decomposition process could be activated again. (Add more oxygen by stirring up the pile.) Use your imaginary shovel to mix up the pile. Add more moisture (a few squirts from the plant mister) and the decomposition process continues. Explain that after four to six weeks of such activity, decomposition will be complete and you can add rich compost to your garden.