



## Let's Make Compost

### Lesson

#### Goals

Students will experience the process of decomposition and the nutrient cycle.

#### Objectives

Students will build a compost pile.

#### Standards

*Science: Life Science*

GR.1-S.3-GLE.1

GR.2-S.2-GLE.1

GR.3-S.3-GLE.1

GR.6-S.2-GLE.2

*Science: Earth Science*

GR.6-S.3-GLE.3

#### Did you know?

In the United States, each person generates about 4.3 pounds of trash every day equaling 195.7 million tons. About two thirds of our trash is biodegradable and could be composted. So reduce your garbage by composting!

**Total Time** – 60 minutes (plus time for follow-up observations, measurements and care of pile)

#### Materials

- Compost materials
- Shovels and spading forks
- Wheelbarrow
- Water access
- Meter stick
- Soil thermometer
- Healthy snack

#### Background for Teachers

Before beginning the lesson, select a permanent area outdoors for your compost pile. The ideal location is close to the garden for easy hauling as well as easy access. You will also need to collect compost materials. See the end of the lesson for what materials work best. This is a great follow up lesson to The Rotten Truth lesson

[http://dug.org/storage/school-garden-curriculum/The\\_Rotten\\_Truth.pdf](http://dug.org/storage/school-garden-curriculum/The_Rotten_Truth.pdf).

#### Method

Introduction (5 minutes)

1. Ask the class: *What types of materials decompose* (materials that have been alive)? *Why is it important for these materials to decompose* (they become nutrients for other plants)? *Is this a cycle? What are the parts of this cycle* (living plant or animal grows, dies, decomposes, provides nutrients for another living plant or animal to grow)? *What is this cycle called* (nutrient cycle)? *Do you think we can create a nutrient cycle in our garden?*

**Activity (45 minutes)**

1. Demonstrate building a miniature compost pile with samples of carbon, nitrogen and soil prior to building the actual pile. Discuss the different ingredients that can be used in the pile. Stress the importance of the size, ingredients and moisture level.
2. Divide the students into groups for carbon, nitrogen and soil. Assign one student to water. Equip the students with shovels, spading forks and a wheelbarrow.
3. Using the spading forks, have students loosen the ground where the pile will be. The area should be a minimum of 4' x 4'.
4. To build the compost pile, have students gather materials that are higher in carbon (tougher, less water, garden plants that have woody stalks, fall leaves, etc) and those that are higher in nitrogen (softer in texture, weeds without mature seed heads, over-ripe vegetables, thinned plants, etc). Chop all materials (with a shovel) into 1-2" pieces.
5. On the top of the ground with loosened soil, spread 4-6" of mixed, chopped carbon material, followed by 2-3" of mixed, chopped nitrogen material. Sprinkle a handful of soil on top and mix all layers with a spading fork.
6. Water the layers until the moisture feels like a wrung-out kitchen sponge. The layers should appear to glisten but the pile should not be saturated.
7. Rotate groups after one round of layering carbon, nitrogen and soil or let each group build their own pile.
8. Continue the process of layering 4-6" of chopped carbon, 2-3" of chopped nitrogen and a handful of soil; mixing and watering until the pile reaches a maximum of 4-5' tall. Have the students measure and record the dimensions of the compost pile. If you do not have enough material to make it that tall, you can continue to add materials at the appropriate ratios until it is large enough.
9. Have the students make a hole toward the center of the pile and take the temperature. Cover the top of the pile with black plastic (to assure that moisture is retained), making sure not to completely cover the whole pile (this would not allow air to enter). Use rocks to keep the cover in place.
10. Make sure to mix your pile once a week. Check to make sure it is wet enough and add water if necessary. Your pile will take about 2-3 months to decompose. Then you will need to let it cure for 3-4 months. If using in the fall, you can add the compost to the garden and let it cure there over the winter.

### Snack & Conclusion (10 minutes)

1. Have a healthy snack for the kids. While eating, have the students answer the following questions: *What are the ingredients for a compost pile? What will happen to the organic matter? What will the pile look like in a few months? How will the compost be useful after it is decomposed? What materials could you use at home to make compost?*
2. Draw connections to how our old kitchen scraps will be broken down and turned into nutrient rich compost for our soil so we can grow healthy plants, which are sources of healthy food for our bodies. It is important that the students understand that healthy soils lead to healthy plants, which leads to healthy bodies.
3. This is a great time to introduce the nutrient life cycle. Hand out or display the nutrient cycle (end of lesson) and discuss how the cycle works in the garden.
  - a. *Compost added to the soil provides nutrients for the plants. Seeds are planted; they germinate, grow, flower and produce an edible crop. Food is harvested from the plant. As seeds are produced, the plant's life cycle is completed and it begins to die. Gardeners dig the plants out of the ground, chop them up and add them to the compost pile so they can decompose and become compost. This compost is then added back into the garden.*

### Assessment Tools

- Team work and participation

### Possible Modifications and Extensions

- Record the temperature of the compost pile every couple of days for the next week and create a graph with the readings. The pile should heat up to approximately 140° F and then start to cool down. Let the students feel the heat from the pile. Discuss how the heat is being produced through the biological activity of the microorganisms.
- In a month, measure the dimensions of the pile again. How has it changed, what layers can you identify?
- Have students observe chunks of the compost at various stages of decomposition through a microscope. Record any changes.

### Suggested Products

- Carbon (dried matter): dried leaves, straw, dried grass, branches, corn and sunflower stalks
- Nitrogen (fresh matter): green leaves, over-ripe vegetables, weeds without seeds or flowers, grass clippings without pesticides

### **Vocabulary Words**

- **Biodegradable** – capable of being broken down by living microorganisms into simpler compounds
- **Compost** – well rotten plant and animal waste prepared by people to be used as a soil conditioner or fertilizer in gardens
- **Decomposer** – an organism that digests organic waste and dead organisms by breaking them down into simpler compounds and absorbing soluble nutrients
- **Decomposition** – the process of breaking down dead plants, animals and animal waste into simpler nutrients
- **Humus** – dark organic matter found in topsoil that consists of decayed vegetable matter; humus increases water retention of soil and provides nutrients important for plant growth
- **Non-degradable** – material that cannot be broken down by natural processes
- **Nutrient** – any element an organism needs to live, grow and reproduce
- **Photodegradable** – material capable of being broken down by exposure to sunlight
- **Recycling** – the process of collecting matter from garbage or the waste stream so that it can be made into new products
- **Reusable** – a produce that can be used over and over again in the same form

### **Sources**

Jaffe, Roberta, and Gary Appel. *The Growing Classroom: Garden-based Science*. South Burlington, VT: National Gardening Association, 2007.

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# ☀️ Nutrient Cycle

