Mini Compost

How Can We Recycle Organic Matter?

Background
When we mention ‘recycling,’ we often think of recycling glass bottles, aluminum cans and newspapers. But another 30% of the household garbage we throw out can also be recycled. These recyclables are food scraps, leaves, grass clippings and other biodegradable organic wastes. Organic wastes can be recycled by composting. Simply stated, composting creates optimal conditions for decomposition to occur. Decomposition is the biochemical process by which bacteria, fungi and other microscopic organisms break organic “wastes” into nutrients that can be used by plants and animals. Decomposition occurs in nature whenever a leaf falls to the ground or an animal dies. It is essential for the continuation of life on earth. The result of decomposition in a compost pile is a nutrient-rich humus that is excellent for improving soil quality and plant growth.

Leading Question
What do you do with your food scraps?

Procedure
1. Assemble a variety of organic wastes including with following: manure and green grass clippings, sawdust, hair, wood ash, leaves, kitchen food scraps, etc. Avoid meat scraps, dairy products, fats and oils which inhibit decomposition, cause odors and can attract pests. Chop the organic wastes into small pieces. You can leave some large pieces of the same materials to compare rates of decomposition between large and small items. Why might there be a difference?
2. Read Necessary Components of a Compost Pile. Turn and Talk: Ask students to provide a summary of the text to a classmate. Students should highlight or underline key information in the text that show evidence of one or two main ideas. Create a compost by alternating layers of the materials as follows (amounts are approximate): one inch of soil, two inches of organic waste, sprinkle of manure or green grass clippings, sprinkle of water. Repeat.
3. Cover with an inch of soil. Water the pile enough to make it moist but not soggy. It should feel like a damp sponge (It feels moist, but you can’t squeeze water out of it).
4. Add the earthworms and observe their behavior. In notebooks ask students:
   a. to make predictions about what each believes will happen in one day, one week, one month, etc.
   b. to date and post their observations, inferences and conclusions.

Concept
Organic waste can be recycled to enrich soil for growing more organic matter.

Objective
Students will learn about recycling organic matter.

Method
Students will build a model compost pile in a classroom terrarium.

Materials
Aquarium, organic wastes, soil (not potting soil), thermometer, trowel or large spoon, 1-2 dozen red earthworms

Subject
Science, Language Arts, Mathematics

Skills
Graphing data, investigating, observing, predicting

Vocabulary
Decomposition, humus, microorganisms, aerate

Time
One class period to a full year

Resources
“The Wild World of Compost”, National Geographic; Mary Appelhof, Worms Eat My Garbage; Pat Hughey, Scavengers and Decomposers

3R’s of the Common Core
Parallel Activities
K-3, Take Me Out to the Compost
7-8, Making Good Compost
9-12, Microorganisms
9-12, Effective Fertilizers

Information:
Composting
Resources:
Environmental Education and Educational Resources, Green Consumption, Consumerism and Sustainable Development

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Classroom Activities

5. Place the compost pile where it will be at room temperature (not in direct sun). Gently mix the compost once a week to aerate it. Use a thermometer to test the temperature of the pile. (For consistency do it at the same location and depth at the same time each day.) Students will date and post their conclusions in their notebooks. Students should have two columns: the first column is the actual temperature measurement to the nearest degree and the second column is the temperature rounded to the nearest five or ten degrees.

6. After the first week of measurements, calculate the following: a. sum, b. average (center), c. range (spread)

7. Make a graph of results, analyze the data and draw conclusions. Determine the overall shape of the graph. Is it symmetrical or is it skewed left or right?

8. Convert fahrenheit temperatures to celsius, using the following formula:

   \[ Tc = \frac{(Tf - 32) \times 5}{9} \]

9. Discuss composting. How does it reduce the amount of waste you would have thrown out? What do you think happens to organic wastes that end up in the landfill? Is the landfill a gigantic natural compost pile, or are there problems with placing large amounts of organic material in landfills?

Evaluation

Students will identify the ingredients of a compost pile.

Classroom Activities

A. Construct a compost pile at home to use for the family garden or a vermi-compost bin in the classroom for disposing of daily snacks.

B. Begin a school garden. Use the soil you’ve made to plant some flowers or vegetables.
Necessary Components of a Compost Pile

SOIL: Contains microorganisms that help decomposition.

ORGANIC WASTES: such as leaves, food scraps and grass clippings. Wastes should be varied, including materials with both carbon and nitrogen. By alternating layers of high-carbon and high-nitrogen materials, you can create good environmental conditions for decomposition to occur.

NITROGEN: many of the organisms responsible for decomposition need nitrogen, thus nitrogen is necessary for rapid and thorough decomposition. Nitrogen is found naturally in many organic wastes, such as manure and green grass clippings, as well as in many commercial fertilizers.

WORMS: they eat the waste, helping to break it down; make droppings, which enrich the soil; tunnel through and aerate the waste, facilitating decomposition and eventually die and become part of the compost.

WATER: necessary for normal functioning of life. Too much water in a compost pile may make it soggy and slow decomposition by reducing needed oxygen.

AIR: the biological activity of fungi, bacteria, small insects and other organisms results in decomposition. Most biological processes require adequate amounts of oxygen.

TIME: decomposition takes time. To speed up decomposition, aerate your pile every few days; otherwise, just leave it and wait.

HEAT: heat is produced by chemical reactions resulting from increased biological activity that occurs during decomposition. Heat helps sanitize compost by killing certain organisms, such as weed seeds, pathogens and harmful insect larvae.

MASS: In order to generate enough heat for optimal decomposition the pile must contain at least one cubic meter of organic material. Thus, the temperatures generated in an aquarium compost pile may be different from those generated in one that is larger.