Monitoring Compost Temperature

Grade Levels: 4–8

Subject Areas: environmental science, social science

Concept: To graph compost temperatures over time to determine decomposition.

Objective: Students will build a compost pile and monitor the temperature of the pile as heat is generated by the process of decomposition.

Materials: pen or pencil
graph paper

Keywords: compost, decomposition

Procedure: Discuss with students the variables that affect the temperature of a compost pile. Have them chart the daily temperatures on a graph.

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temperature is one of the key indicators in composting. Is the system heating up? How hot does it get? How long does it remain hot? How does mixing affect the temperature profile?

Heat is generated as a byproduct of microbial breakdown of organic material, and you can use the temperature of your compost to gauge how well the system is working and how far along the decomposition has progressed. For example, if your compost heats up to 40º or 50ºC, you can deduce that the ingredients contained adequate nitrogen and moisture for rapid microbial growth.

To take your temperature readings, make sure to use a probe that reaches deep into the compost. Leave the probe in place long enough for the reading to stabilize, then move it to a new location. Take readings in several locations, including at various depths from the top and sides. Compost may have hotter and colder pockets depending on the moisture content and chemical composition of ingredients. Can you find temperature gradients with depth? Where do you find your hottest readings? For systems in which air enters from the bottom, the hottest locations tend to be two-thirds or more of the way up. Is this true for your system?

By graphing compost temperature over time, you can tell how far along the decomposition has progressed. A well constructed compost system will heat up to 40º or 50ºC within two to three days. As readily decomposable organic matter becomes depleted, the temperature begins to drop and the process slows considerably.

The temperature at any point depends primarily on how much heat is being produced by microorganisms and how much is lost through aeration and surface cooling. How long the system remains hot therefore depends on the chemical composition of the ingredients as well as the size and shape of the system. Moisture content also affects temperature change; since water has a higher specific heat than most other materials, drier compost mixtures tend to heat up and cool off more quickly than wetter mixtures, providing adequate moisture levels for microbial growth are maintained.