

# The Composting Process

## *Solid Waste Management Fact Sheet No. 3*

Composting is the biological decomposition of organic materials. Decomposition occurs naturally. However, in the composting process natural decomposition is accelerated and improved by human intervention. An understanding of the process can lead to better products and fewer problems.

### **Microorganisms**

Decomposition is carried out by microorganisms and invertebrates. They utilize yard and food wastes as a source of energy and require oxygen and water to survive. In the process of decomposition, carbon dioxide, heat, water and soil-enriching compost (partially decomposed organic materials) result. Heat produced in the composting process can be as warm as 150° to 160° F. The increased temperature results in increased water evaporation. Monitoring the temperature of the pile is a way of determining the success of the composting process. After organic materials are decomposed, the temperature of the pile gradually lowers to ambient temperatures. The weight and volume of the compost pile is reduced. This is another way of measuring the effectiveness of the composting process.

Microorganisms that are involved in composting include a wide range of naturally occurring organisms including bacteria, fungi, molds, actinomycetes, and protozoa. Other small invertebrate animals such as mites, millipedes, insects, earthworms, and other similar organisms can also be involved. A wide range of different organisms is usually preferred since there is a better chance that a complete composting process will occur. However, aerobic bacteria are the primary organisms that cause decomposition of materials in a compost pile.

### **Aerobic versus Anaerobic**

Most organisms preferred for the composting process are aerobic (requiring oxygen) since they provide rapid, complete composting. Other organisms can operate without oxygen or anaerobic conditions. Sometimes this process is called fermentation and usually occurs more slowly. However, the greatest limitation to anaerobic organism is that odors usually are produced which can be quite offensive. It is also possible to generate acids and alcohols which may be harmful to some

plants. If you notice a serious bad smell from your compost pile, chances are it needs a greater level of oxygen (which can be created by turning or agitating the pile).

### **Temperature**

Aerobic bacteria vary in the temperatures at which they can survive. Some can survive temperatures of 140° to 150° F and are called thermophilic bacteria. As the composting process starts, lower temperature requiring bacterial species predominate until temperatures increase to a level that they are killed. Then thermophilic bacteria take over and predominate. Thermophilic bacteria are eventually killed by the ever increasing temperatures of the compost pile. As this occurs, the temperature of the pile decreases and lower temperature bacteria begin to take over again. Finally, when most of the material has been composted and the bacteria no longer have an energy source, they die and the composting process is complete.

### **Composting**

A complex 'web of life' exists in the compost pile where various organisms are feeding on the organic materials or on other organisms in the pile. Certain mobile organisms, such as worms may move away from the excessive heat of the center of the pile then move back when the pile cools. Most harmful organisms, such as disease organisms or persistent insect pests, as well as weed seeds are killed in the composting process.

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