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Compost in a Hurry

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Composting is a biological process in which large volumes of organic materials are rapidly reduced. The small volumes left over, what we call compost, then continue to decompose. One of the many benefits of adding compost to soil is that the nutrients in the compost, though low in content, are released slowly, making them available to plants over a long period of time.

One method of composting involves creating a pile of organic materials and letting it stand for a year, when the compost is ready to use. The main advantage of this method is that little work or physical effort is required to obtain the finished product. Disadvantages are that space is utilized for an entire year, some nutrients may be leached due to exposure to rainfall, and low composting temperatures may not suppress some weed seeds, insects, and disease-producing organisms.

A more rapid method of composting has been developed that produces compost in as little as 2 to 3 weeks. Extra effort is required in exchange for this time savings, but large amounts of compost can be processed quickly in the course of a single growing season. There are several important factors essential for producing compost quickly.

SIZE OF MATERIALS

Material decomposes best if it is ½ to 1½ inches in size. Soft, succulent tissues do not need to be chopped into very small pieces, but hard or woody tissues should be reduced to smaller pieces in order to decompose rapidly. Woody material can be put through a grinder or shredder, though chopping with pruning shears or a sharp shovel is also effective. Fallen leaves can be shredded with the lawn mower.

CARBON TO NITROGEN RATIO

The mixture of materials in the compost pile should have a carbon to nitrogen ratio of 30 to 1. Because of the bulk of dry materials and the fact that green material shrinks even more upon drying, we can use a 1 to 1 volume to approximate the 30 to 1 ratio of carbon to nitrogen. This may need to be adjusted depending on the nitrogen content of the green material or if manures are added to the pile. Mix equal volumes of carbon-rich, naturally dry plant material (dead leaves, dried grass, straw, and woody materials from prunings) and nitrogen-rich, green plant material (grass clippings, wilted flowers, green prunings, weeds, fresh garbage, and fruit and vegetable waste). Paper, cardboard, and newspaper can be used as dried materials, but they must be chopped or shredded and mixed with green materials so they do not mat. Matted materials exclude the oxygen necessary for rapid decomposition. Some green items, such as grass clippings, also tend to mat if not mixed thoroughly with dry materials.

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MOISTURE CONTENT

Composting works best if the moisture content of the pile is about 50 percent—moist, not soggy. Too much moisture slows decomposition and produces a disagree-

able odor due to the activity of methane-producing microorganisms. If the organic material is too dry, decomposition will be very slow or may not occur at all.

Heat is supplied by the respiration of the microorganisms as they break down the organic materials. A pile measuring at least 36 by 36 by 36 inches is recommended to build up the amount of heat necessary for composting and to prevent heat loss. Heat retention is better in bins than in open piles, so rapid composting is more effective if bins are used. Bins with covers retain heat better than those without covers. High temperatures favor the microorganisms that are the most rapid decomposers. These microorganisms function best at about 160°F (71°C), and a good compost pile can maintain that constant temperature. A thermometer to measure the temperature inside the pile is helpful although not necessary.

TURNING

A compost pile needs to be turned to prevent it from overheating and to aerate and thoroughly mix the materials. If the internal temperature of the pile exceeds 160°F (71°C), the necessary microorganisms are killed, the pile cools, and the whole process of composting must start again from the beginning.

Turning is done to move to the center the material that is at the outer edge of the pile. This way, all the material reaches the optimum temperature at various times. Due to heat loss around the margins, only the central portion of the pile is at the optimum temperature. Turning can be made easier if there are two compost bins so the material can be turned from one into another. Bins made with removable sides or slats in the front make the turning process easier.

Once the decomposition process starts, the volume of compost becomes smaller, and some heat is lost out the top. This can be prevented by using a piece of polyethylene plastic slightly larger than the top area of the bins. After the compost is turned, the plastic is placed directly on the top of the compost and tucked in around the edges.

LENGTH OF TIME FOR COMPOSTING

If the material in the pile is turned every day, it takes 2 weeks or a little longer to compost. If turned every other day, it takes about 3 weeks. The longer the interval between turning, the longer it takes for the compost to be ready.

Once a pile is started, do not add any additional materials to it. It takes a certain length of time for each material to break down, and any addition to the pile starts the decomposing process later than the original materials, thereby lengthening the decomposition time for the whole pile.

Nothing needs to be added to the organic materials to make them decompose. The microorganisms active in the decomposition process are always present on plant materials and develop rapidly in any compost pile.

TROUBLESHOOTING

If managed correctly, a pile heats to high temperatures within 24 to 48 hours. If it does not, the pile is too wet, too dry, or there is not enough green material (or nitrogen) present. If too wet, the materials should be spread out to dry. If too dry, add water until the pile is evenly moist. If neither of these conditions exists, then the nitrogen level is too low (the carbon to nitrogen ratio is too high). This can be corrected by adding materials high in nitrogen, such as ammonium sulfate, grass clippings, or fresh manures from livestock (do not use manures from meat-eating animals).

If the carbon to nitrogen ratio is less than 30 to 1, the organic matter decomposes very rapidly, but a loss of nitrogen occurs, producing an ammonia gas. If an ammonia odor is present in a composting pile, it means that valuable nitrogen is being lost in the air. Nitrogen loss can be counteracted by the addition of sawdust or some other high-carbon material to the pile. Other than adding water if the pile becomes dry, this is the only thing that should be added to a compost pile once it is started.

Composting can be done at any time of year, but it is influenced by ambient temperatures and rainfall. Low ambient temperatures slow microbial activity, so it may take longer for the compost pile to heat. During the rainy season, it may be necessary to cover the pile to keep the composting materials from becoming too wet. A tarp or sheet of plywood can be used for this purpose.

MATERIALS TO AVOID

Materials that should not be added to a composting pile include soil, ashes from a stove or fireplace, and manure from meat-eating animals. Soil and wood ashes add nothing but weight to a compost pile and discourage the turning of the pile, which is necessary for the rapid composting process. In addition, wood ashes do not decompose, and they are alkaline in pH. Most soils in California are somewhat alkaline and do not benefit from the addition of alkaline soil amendments. Manure from meat-eating animals such as dogs and cats can contain disease-producing organisms that can infect humans. Manure from herbivorous animals such as rabbits, goats, cattle, horses, elephants, and birds can be used although some may be high in salt content.

SIGNS OF A HEALTHY COMPOST PILE

Rapid decomposition can be detected by a pleasant odor, by the heat produced (this is even demonstrated by the water vapor given off during the turning of the pile), by the growth of white fungi on the decomposing organic material, by a reduction in the volume of the pile, and by the materials changing to a dark brown color.

As composting nears completion, the temperature drops and, finally, little or no heat is produced. The compost is then ready to use. It can be screened through 1-inch mesh wire to eliminate large, undecomposed pieces. These can be added to the next pile, and eventually they will decompose.

ADVANTAGES OF RAPID COMPOSTING

These are just some of the advantages of the rapid composting system:

- A valuable soil amendment is produced from many organic materials that might otherwise be wasted.
- Compost can be made ready for use in as few as 14 to 21 days.
- The rapid composting method described here kills many organisms that can cause diseases in plants. (It does not inactivate heat-resistant viruses such as tobacco mosaic virus.)
- Insects do not survive the composting process though some may be attracted to the pile. If insects lay their eggs in the compost, the heat in the pile destroys the eggs.
- Most weeds and weed seeds are killed. (Some weeds, including oxalis bulbs, seeds of burr clover, some amaranthus seeds, and seeds of cheeseweed, are not killed by the high temperatures in a compost pile.)

FOR MORE INFORMATION

You'll find detailed information on many aspects of soil management in these titles and in other publications, slide sets, and videos from UC ANR:

Pests of the Garden and Small Farm: A Grower's Guide to Using Less Pesticide (Second Edition), Publication 3332
Alive and Well: Sustainable Soil Management, Video V92-D
Compost Production and Utilization, Publication 21514

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