

Home Composting: A Guide for Home Gardeners

Compost is a term for organic matter that has decomposed into a form that plants can use. Compost can be used in potting mixes or mixed in with garden soil. It has many benefits for your plants and recycles materials that may otherwise be thrown into landfills. Though composting bins are available for purchase, methods described in this fact sheet rely on materials from your garden, kitchen, and, if needed, a few items from your garden center. To be sure that compost is available for spring planting, start your compost pile in the fall while cleaning up your garden and preparing it for winter. The compost pile goes dormant during the winter, but it will begin to decompose again when air temperatures increase above 50°F. Another pile can also be started in the spring for fall planting. Composting is a procedure that is relatively simple and very rewarding if done correctly.

Compost contains organic matter which improves the soil by:

- Providing bacteria, fungi, other microorganisms, and worms with nutrients, energy, and a habitat that will stimulate them to breakdown organic residue and out compete or release chemicals that can control certain plant diseases.
- Providing humus, organic material that has been decomposed completely, that helps soil retain nutrients.
- Improving aeration in clay soils which helps plant roots penetrate soil and allows excess water to drain.
- Improving water holding capacity of sandy soils which helps roots absorb the water they need.

What to include in the compost pile:

“Green” materials

- Fresh leaves, plant cuttings and weeds
- Thatch
- Grass clippings. Though they will compost, they will also benefit your lawn if left to decompose on your yard.
- Fruit and vegetable peels and other fruit wastes
- Manure
- Coffee grounds and tea bags

“Brown” materials

- Dead weeds and dry leaves
- Clipped brush
- Wood ash
- Egg shells
- Sawdust
- Wood chips
- Straw

What not to include in the pile:

- Meat
- Bones
- Cheese, salad dressing, oils and other fats; they can cause odors and attract animals
- Plant material with visible signs of disease or insect infestation

- Weeds that can easily grow from root or stem cuttings
- Check with local and county codes as some materials such as raw animal manure may be prohibited in a compost pile
- Human and pet wastes

The importance of the C/N ratio

The C/N ratio refers to the amount of carbon (C) and nitrogen (N) in materials that are added to a compost pile. The preferred C/N ratio is 25 to 30 parts carbon to 1 part nitrogen. Materials categorized as “brown,” such as straw, contain more carbon than nitrogen and have higher C/N ratios than “green” materials such as fresh green grass. A compost pile will decompose faster at lower C/N ratios, with more green material, however, much of the nitrogen used by decomposers as energy will be lost more quickly and will need to be replenished. If too much brown material has been added to the pile, the pile will decompose slowly. To correct this problem, one pound of urea per cubic yard of compost or other green materials should be added to the pile.

Preparing material and assembling the pile

Determine where you would like to locate the compost pile. Make sure that it is accessible from all sides so it will be easy to turn. Also, position the pile close to compost materials and water. Protect the pile from excessive wind and constant sun which may dry out the pile and, if necessary, placed out of direct view from main roads or neighbor’s homes. All material that is added to the compost pile should be shredded. Microorganisms will work faster and decompose materials quicker if pieces are smaller. If leaves and grass clippings are wet, allow them to dry so that they do not clump together when added to the pile.

The pile should be between 3 cubic feet (3 feet tall, 3 feet wide and 3 feet deep) and 5 cubic feet to reach temperatures between 140 and 160°F. At this temperature, the pile’s surface will feel hot. As microorganisms decompose organic material, they create heat that warms the pile. A pile that is small will not be able to maintain this temperature during late fall months and early winter. A larger pile will restrict air movement to the center of the pile.

The pile should be moist like a damp rag. If the pile is too wet, it may not have enough oxygen for the decomposers and fermentation. Decomposition without oxygen can occur and produce compounds that are toxic to some plants. Gardeners will need to

pay attention to their compost pile during seasons with excessive rain. The added moisture could disrupt the oxygen/moisture balance. To avoid wet conditions consider purchasing a compost blanket that will not inhibit air movement rather than covering a pile with plastic which may restrict air flow.

- Compost materials should be added to the pile in the following order:
 - 6 inch layer of brown material
 - 2 inch layer of green material
 - 2 inch layer of soil, which contain decomposers and help prevent odors from developing.

Gardeners can collect green and brown materials in bags and containers until there is enough to make another layer.

During the composting process

Continue to check the pile to see if it is too moist or dry. Simply stick your arm into the pile and test the moisture by squeezing the material at several depths. If the pile is drying out, add water and turn the pile to coat all components. A typical compost pile will take approximately three to four months for material to decompose. It will be necessary to turn the pile frequently during the initial three to four weeks and once or twice during the remainder of the composting period. Turning will help with:

- Incorporating uncomposed material on the outside of the pile into the center where microorganisms can decompose it.
- Creating air spaces and continuing to provide microorganisms with necessary oxygen.
- Eliminating any unpleasant odors if the pile is becoming too wet or too dry.

Knowing when the pile is done

A compost pile that has been mixed well and monitored for moisture and aeration during the three to four month process should no longer be hot in the center and should look dark brown, crumble when squeezed, and smell like fresh dirt.

Using the compost

Before adding compost to garden soil, have your soil’s pH, nutrient balance and organic matter content analyzed as you would before adding fertilizer or amendments. Contact your local county extension office for instructions and assistance with analyzing results (www.cas.psu.edu/directory/).

When adding compost to garden soils or where turf will be planted, mix 1 to 2 inches of compost into the top 6 to 8 inches of topsoil. Compost can be added to potting and germination mixtures as a substitute for peat moss. If compost is used in a germination mix, it should be allowed to sit for an additional month or two so that microorganisms that could potentially attack seedling roots leave the pile or die. Compost should then be screened through hardware cloth with ½ inch squares if clumps are still present. Some sources suggest that compost can also be used as a mulch and applied at a thickness of 1 to 2 inches. Mulch can suppress weeds and help conserve water, however, others have noted that compost can encourage the growth of weed seeds.

Sources

Chaney, D.E., L.E. Drinkwater, G.S. Pettygrove. 1992. Organic soil amendments and fertilizers. UC Sustainable Agriculture Research and Education Program. University of California, Oakland, CA. publication 21505.

Prepared by Kathleen M. Kelley, assistant professor of consumer horticulture

Penn State College of Agricultural Sciences
Department of Horticulture
102 Tyson Bldg.
University Park, PA 16802
October 31, 2002

The Horticulture Fact Sheet series is produced for home gardeners and professionals by the Consumer Horticulture Center at Penn State. The complete series is available on the Web at www.hortweb.cas.psu.edu.

Visit Penn State's College of Agricultural Sciences on the Web: www.cas.psu.edu.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Cooperative Extension is implied.

Issued in furtherance of Cooperative Extension Work, Acts of Congress May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and the Pennsylvania Legislature. T. R. Alter, Director of Cooperative Extension, The Pennsylvania State University.

This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Discrimination or harassment against faculty, staff, or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802-5901, Tel 814-865-4700/V, 814-863-1150/TTY.

© The Pennsylvania State University 2003