



# FactSheet

Extension

## Ohio State University Extension Fact Sheet

### Horticulture and Crop Sciences

2021 Coffey Road, Columbus, OH 43210

### Composting Series

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## Composting at Home

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Mow your lawn often and let the clippings lie. This is the best use for grass clippings. Composting is another solution. Composting is a practical and convenient way to handle yard trimmings such as leaves, grass, thatch, chipped brush, and plant cuttings. It can be easier and cheaper than bagging or paying to have them removed. Compost also improves your soil and the plants growing in it. If you have a garden, a lawn, trees, shrubs, or even planter boxes, you have a use for compost.

### Why Does Compost Make Soil Healthier?

Compost returns organic matter to the soil in a usable form. Organic matter in the soil improves plant growth by: stimulating the growth of beneficial microorganisms, loosening heavy clay soils to allow better root penetration; improving the capacity to hold water and nutrients particularly in sandy soils; and adding essential nutrients to any soil. Improving your soil is the first step toward improving plant health. Healthy plants help clean air, conserve soil, and beautify landscapes.

### How Does Composting Help the Environment?

Yard trimmings and kitchen scraps use up valuable space in landfills-space that is running out fast! These materials make up 20 to 30 percent of all household wastes. Because of their high moisture content, grass clippings also lower the efficiency of incineration systems. The use of compost can also reduce the use of pesticides and chemical fertilizers in your yard.

## **What Can I Compost?**

All yard trimmings will work as a mulch and for composting, but do not use diseased or infested plants without composting them first. Yard trimmings such as leaves, grass clippings, weeds, thatch, and the remains of garden plants make excellent compost. Other good additions to a compost pile include ground brush, wood ash, and kitchen scraps such as fruit and vegetable peelings, egg shells, and coffee grounds that would otherwise be thrown in the garbage. Care must be taken when composting kitchen scraps. Do not compost meat, bones, and fatty foods such as cheese, salad dressing, and cooking oil. These foods ferment or putrify, cause odors, and can attract rodents and other nocturnal animals that can be pests. Only experts in composting should attempt to compost these materials.

One concern with composting is the fate of lawn care pesticides. Grass clippings and leaves treated with these products should not be used as a mulch immediately after application and mowing, but should be composted. The most widely used pesticides degrade rapidly during composting or become strongly bound to organic matter in the compost. Their degradation is accelerated by the high temperatures and moist conditions that occur in a compost pile.

## **The Essentials of Composting**

With the following principles in mind, everyone can make excellent use of organic wastes.

### ***Biological Process***

What happens in a compost pile? Bacteria, the most numerous and effective microbes, are the first to break down plant tissue. Fungi and protozoans soon join the bacteria. Often, a white layer forms just beneath the surface of the compost. This is usually due to fungi and actinomycetes, a class of filamentous bacteria. Springtails, mites, and other small insects, as well as earthworms, also play a role in decomposition once the compost has cooled.

### ***Materials***

Anything growing in your yard is potential food for these microbes. Microorganisms use the carbon in leaves or woody wastes as an energy source. Nitrogen provides the microbes with the raw element of proteins and nucleic acids to build their bodies.

Everything organic has a given ratio of carbon to nitrogen (C:N) in its tissues. A C:N ratio of 30:1 is ideal for the activity of compost microbes. This balance can be achieved by mixing. Table 1 can help you judge the ratio of your compost ingredients. Composts often are deficient in nitrogen when wood wastes are added to the mixture. This can be corrected by adding 1 pound of urea per cubic yard of compost mixture.

**Table 1. Carbon:Nitrogen Ratio**

Food wastes	15:1
Sawdust, wood, paper	400:1
Straw	80:1
Grass clippings	15:1
Leaves	50:1
Fruit wastes	35:1
Rotted manures	20:1
Cornstalks	60:1
Alfalfa hay	12:1

### ***Surface Area***

The more surface area the microorganisms have to work on, the faster the materials decompose. Chopping garden wastes with a shovel or machete, or running them through a shredding machine or lawn mower speeds composting.

### ***Volume***

A large compost pile insulates itself and holds the heat of microbial activity. Its center will be warmer than its edges. Piles smaller than three feet cubed (27 cu. ft.; 3-4 ft tall) have trouble holding this heat in the winter, while piles larger than five feet cubed (125 cu. ft.; 5-6 ft tall) do not allow enough air to reach the microbes at the center. These proportions are of importance if your goal is fast, high temperature composting. Large piles are useful for composting diseased plants or trees as the high temperatures will kill pathogens and insects.

### **Moisture and Aeration**

All life on Earth, including compost microbes, needs a certain amount of water and air to sustain itself. Microbes function best when the compost heap has many air passages and is about as moist as a wrung-out sponge. Extremes of sun or rain can adversely affect this moisture balance. Generally, the moisture content of the compost should be 50 to 60% on a total weight basis. Wet piles that leach water are deficient in oxygen, and can ferment and cause odor problems. Never cover compost piles with plastic because this does not permit introduction of air. Cured composts can be covered, but this can also cause problems. Compost blankets allow for air exchange but shed rainwater from piles.

The larger the pile, the higher the temperature and the faster the composting proceeds, but only up to a certain point. At temperatures higher than 160 degrees F, composting slows down and charring or burning begins. This can become a problem in dry composts, particularly in the summer.

### **How to Prepare and Use Compost**

Remove grass and sod cover from the area where you construct your compost pile to allow direct contact of the materials with soil microorganisms. The following "recipe" for constructing your compost heap is recommended for best results:

- **1st layer:** 3-4" of chopped brush or other coarse material on top of the soil surface. This material allows air circulation around the base of the heap.
- **2nd layer:** 6-8" of mixed scraps, leaves, grass clippings, etc. Materials should be "sponge damp."
- **3rd layer:** 1" of soil serves as an inoculant by adding microorganisms to the heap.
- **4th layer:** (optional) 2-3" of manure to provide the nitrogen needed by microorganisms. Sprinkle lime, wood ash, and/or rock phosphate over the layer of manure to reduce the heap's acidity. Add water if the manure is dry. Add one pound of urea fertilizer or 10 pounds of composted poultry manure per yard of leaves or ground brush if organic sources of nitrogen are not available. Soak these high carbon materials with water before composting. Manure generally should not be used in cities to reduce the potential for fly problems.
- **5th layer:** Repeat steps 1-4 until the bin is full. Scoop out a "basin" at the top to catch rainwater under summer conditions.

A properly made heap will reach temperatures of about 140 degrees F in four to five days. At this time, you will notice the pile "settling." This is a good sign that your heap is working properly.

After 3-4 weeks, fork the materials into a new pile, turning the outside of the old heap into the center of the new pile. Add water if necessary. It is best to turn your compost a second or third time. The compost should be ready to use within three to four months. A heap started in late spring can be ready for use in the autumn. Start another heap in autumn for use in the spring.

You can make compost even faster by turning the pile more often. Check the internal temperature regularly; when it decreases substantially (usually after about a week), turn the pile.

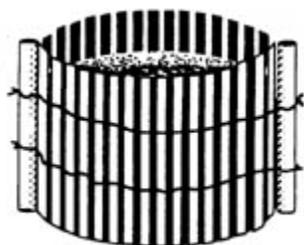
Compost is ready to use when it is dark brown, crumbly, and earthy-smelling. Let it stabilize for a few extra days and screen it through a 1/2" screen if you want the finest product for germination of seedlings. Compost generally should be at least 4-6 months old for use with plant seedlings. Apply a 1-2" layer of compost, and work it in well where you want to grow root crops. Leave it on the surface or work it into the surface 1-2" of the soil for most applications. It is best to keep organic matter near the soil surface. This is known as mulch gardening. It is much easier to control weeds in gardens mulched with compost between rows of plants. Compost used here also does not have to be as decomposed as that worked into seed beds. Have the soil tested for pH and major nutrients (N, P, and K) every two to four years and adjust the amount of lime, ash, fertilizers, etc., added to your compost pile on the basis of feedback from your county agent or Master Gardener. Table 2 is a guide to more efficient composting.

Table 2. Guide to More Efficient Composting

Symptoms	Problem	Solution
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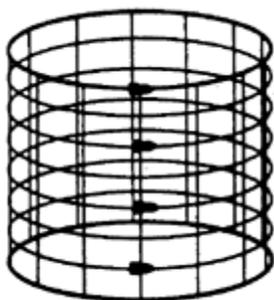
The compost has a bad odor.	Not enough air.	Solution Turn it. Add dry material if the pile is too wet.
The center of the pile is dry.	Not enough water.	Moisten and turn the pile.
The compost is damp and warm only in the middle.	Too small.	Collect more material and mix the old ingredients into a new pile. Turn the pile.
The heap is damp and sweet-smelling, but still will not heat up.	Lack of nitrogen.	Mix in a nitrogen source like fresh grass clippings, manure, composted poultry manure, bloodmeal, or urea fertilizer.

## Compost Bins That Can Be Used at Home



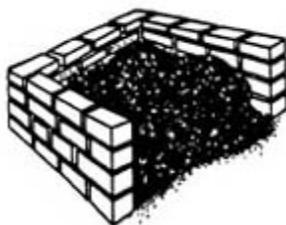
### *Snow Fence Bin*

Bins made with prefabricated snow fencing are simple to make and easy to move and store. To build this bin, buy the appropriate length of prefabricated fencing, and fasten two-by-fours as corner posts to the bottom to form a circle.



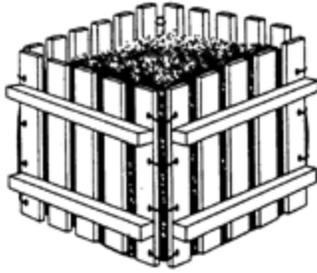
### *Woven Wire Bin*

One easy to make, economical container requires only a length of woven wire fencing. Multiply the diameter you want for the compost heap by 3.2 for the length of fencing to purchase. Fasten the ends with wire or three or four small chain snaps (available at any hardware store) to make a circle.



### *Block Bin*

Compost bins can be made with cement blocks or rocks. Just lay the blocks without mortar; leave spaces between each block to permit aeration. Pile them up to form three sides of a square container or a three-bin unit. This bin is sturdy, durable, and easily accessible. Keep the bin at least 3 inches away from the walls of your house to prevent deterioration of siding.



### ***Wooden Pallet Bin***

Covered bins allow convenient protection from pests and heavy rains. Construct bins with removable fronts or sides so that materials can be easily turned. Old wooden pallets can be used for construction. Wire mesh can be substituted for wooden sides to increase air flow.

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### ***Turning Bins***

This is a series of three or more bins that allows you to make compost in a short time by turning the materials on a regular schedule. Turning bins are most appropriate for gardeners with a large volume of yard trimmings and the desire to make a high-quality compost. You can also turn your compost with only one bin by removing the bin from around the heap, setting up the empty bin nearby, and forking the material into the now empty bin.



Rotating drum bins, which turn using a hand crank, are also commercially available. If your own kitchen, yard, and garden do not generate enough material to fill your bin, ask your neighbors for their clippings and leaves, or start a neighborhood composting project.

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### ***Simple heaps***

Yard trimmings can easily be composted in open heaps. Bins are not required. When food wastes are added, however, the compost may have to be confined in bins that keep out animals such as raccoons, skunks, etc. City ordinances against backyard composting were passed in many areas of the United States decades ago because these pests and flies were not controlled. Food wastes and manures can easily cause fly problems unless great care is taken to cover all such materials with a foot-thick layer of cured compost, wood, or other yard trimmings. Always bury food scraps deep in the compost pile.

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### *Other options*

Prefabricated plastic compost bins can also be purchased at hardware stores and gardening stores, and from catalogs. These are sometimes available from your town or city at below market cost.

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## **Mulching**

Woody yard trimmings, leaves, and grass clippings can be used as a mulch for weed control and water retention by simply spreading them beneath plants. For woody materials up to 1" in diameter, rent or purchase a chipper/shredder, or cut with hand tools. Tree services, if they are in your neighborhood, often will deliver wood chips free. Chips can also be used for informal garden paths. Make sure that the chipped wood has been stored in a heap tall enough to reach temperatures of 110-160 degrees F so that the pathogens and pests are killed by heat treatment. The addition of one pound of urea or 10 pounds of composted poultry manure per cubic yard of shredded wood with lots of water speeds the process.



## **Don't Bag It-The Lawn Maintenance Plan**

The "Don't Bag It" lawn care plan can save the homeowner time, energy, fertilizers, pesticides, and money, and can reduce the amount of waste going to our landfills. The principle is simple: return clippings to your lawn. By leaving your clippings on the lawn and allowing them to work their way back into soil, you will improve soil health and reduce pesticide and fertilizer use.

In fact, grass clippings contain valuable nutrients that can generate up to 25 percent of your lawn's total fertilizer needs. A hundred pounds of grass clippings can generate and recycle as much as three to four pounds of nitrogen, one-half to one pound of phosphorus, and two to three pounds of potassium back to the lawn. These are the three most important nutrients needed by lawns, and are commonly supplied in lawn fertilizers. Also, grass clippings do not contribute to thatch (an organic debris layer between the soil and live grass) since grass clippings are 75-85 percent water and decompose readily.

Why, then, do many homeowners bag grass clippings? Basically, it is a personal preference and habit most homeowners have acquired. Proper lawn care practices will usually eliminate surface clipping debris and ensure a successful "Don't Bag It" program.

In summary, by composting at home, you can help protect the environment, save money, and improve your soil at the same time.

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