

Home & Environment

Household Composting: Methods and Uses for Compost

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The decomposition of organic material is a natural, important process that returns valuable nutrients to the soil for plants to use. Composting is a tool that allows us to control and accelerate this natural process.

Aside from benefiting our soil, a well-maintained compost pile can reduce the amount of yard and food waste that is sent to landfills each year. According to the U.S. Environmental Protection Agency (EPA), Americans produce more than four pounds of waste per person per day (or 1,600 pounds per person per year). The EPA estimates that 65 percent of that waste is organic and could be composted into a rich material that can improve the soil and enhance the growth of lawns and gardens (U.S. EPA, 2006).

Adding compost to the soil can help supplement chemical fertilizers. Compost can even partially replace chemical fertilizers, but you should test your soil and plant tissues before doing so.

This publication explains how composting works, describes a few basic composting methods that can be used by anyone, and provides specific examples for using compost.

How Composting Works

Compost is created from the naturally decomposed parts of organic material such as manure, plants (yard wastes), and food (kitchen wastes) (Figure 1). Its unique physical and chemical properties provide a number of benefits to soil, including:

- Improved soil fertility
- Improved soil structure
- Improved water-holding capacity
- Reduced erosion
- Reduced levels of plant pathogens, insects, and weeds

Decomposition is an integral part of the planet's natural cycle of life (Figure 2). In nature, a number of organisms — from tiny microbes to earthworms — break down organic wastes such as excrement and dead plant and animal material. Composting optimizes the microbes' environment to allow for faster and complete natural decomposition.

That means keeping the microbes healthy and active is a primary concern in composting.

A microbe's basic needs are not much different from our own: they require food, water, and shelter. Like humans, the better these needs are fulfilled, the more efficiently the microbes work. Below are some ways to optimize these requirements for home composting.



Figure 1. Kitchen wastes that can be added to compost piles include food scraps such as apple cores, banana peels, and coffee grounds (left). Yard wastes suitable for compost piles include grass clippings, leaves, and small twigs.

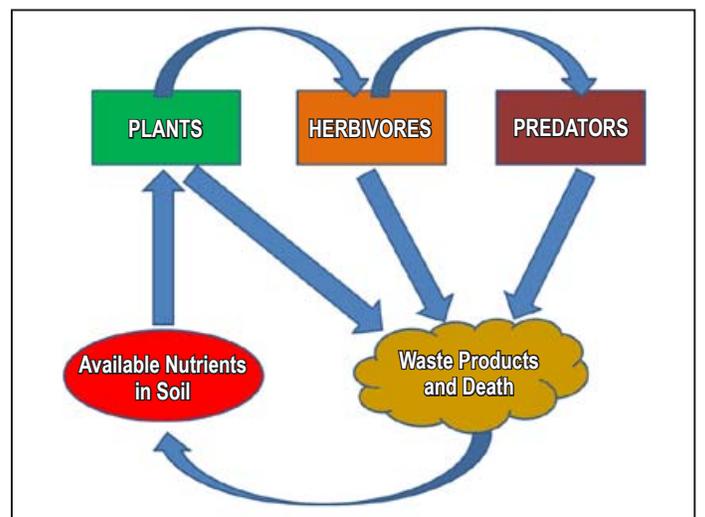


Figure 2. In nature, nutrients continuously cycle in the environment as shown in this illustration.

Provide the Right Food Blend

Microbes can feed on and break down a variety of different organic materials, but in compost a specific blend is best for keeping their populations high. The rule of thumb for producing a good compost is to blend 25 to 30 parts “brown” materials to one part “green” materials (also described in the carbon-to-nitrogen ratio C:N=25-30:1). Brown materials are higher in carbon (C), while green materials are higher in nitrogen (N). Table 1 lists common browns and greens.

Keep Material Moist

Microbes need water to survive and to continue decomposing organic material, but too much moisture can fill up all of the air spaces in the compost pile, which will reduce oxygen levels and kill off the microbes.

Compost with the correct amount of moisture should have the consistency of a wrung-out, damp sponge. Add water if the compost is too dry. If the compost is too wet, turn it more frequently until it air-dries to the proper moisture content.

Keep Microbes Warm

Although microbes do not need homes or clothes to protect them from the elements, they do need shelter. Generally, heat does not hinder microbial activity — indeed, some

microbes important in the composting process can only survive when temperatures are 113°F to 158°F. Cold temperatures are a problem, however, and temperatures below 55°F can reduce microbial activity and slow decomposition.

One way to prevent low temperatures is to make sure the pile is large enough. A pile that is at least 27 cubic feet (or 3 feet per side) will help insulate the interior and allow the heat produced by microbes to remain inside the pile and keep most of the population warm.

Basic Composting Methods

In building a compost pile, there are two main methods, each with its own characteristics and requirements (Table 2):

1. Hot (an example is the University of California method)
2. Cool (an example is the Indore method)

Another option is to dispense with the compost pile and create compost in a bag.

The Hot (University of California) Method

In general, hot composting optimizes the decomposition process and creates a finished compost faster. These faster results are possible because homeowners must exercise more control over the carbon-to-nitrogen ratio and turn the pile more frequently (thereby creating the best environment

Table 1. Common “Browns” and “Greens” for Composting

| Browns (high in carbon) | Greens (high in nitrogen) |
|-----------------------------|------------------------------|
| shredded paper ¹ | fresh-cut grass |
| dry grass | manure ² |
| sawdust | food waste ³ |
| leaves | coffee and tea grounds |
| corncobs | hair |

¹ Magazines or any paper that contains a lot of color inks are not suitable for composting because some of these inks may contain heavy metals that would become concentrated from the composting process.
² Do not add human, cat, or dog manure to your compost pile because they contain parasitic organisms harmful to humans.
³ Food waste from meat products is a poor choice for compost piles because they can produce problem odors and attract animals more than other food wastes.

Table 2. Hot vs. Cool Composting

| Hot | Cool |
|--|--|
| Produces high temperatures and takes the least amount of time (two weeks). | Produces cooler temperatures and takes longer (at least three months). |
| Requires the most labor (pile must be turned about once a day). | Requires the least effort (pile must be turned once every six weeks). |
| All material must be stored up prior to composting. | More material can be added to existing piles. |
| Good at killing weed seeds and pathogens. | Poor at killing weed seeds and pathogens. |

for the microbes). This extra investment helps promote larger microbe populations, greater microbial activity, and higher temperatures.

The “recipe” for creating a hot compost is:

- 25 to 30 parts dry browns
- 1 part greens (Figure 3).

Make sure the pile is at least 3 feet on each side and no more than 4 to 6 feet tall.

Do not use materials on the pile that are greater than 6 to 8 inches long. These smaller pieces help create a fast, hot compost. Turn the pile frequently (as often as once a day), making sure that material from the inside of the pile ends up on the outer edges and vice versa.



Figure 3. The main building blocks of the hot (University of California) composting method. Hot composting requires 25 to 30 parts (by volume) of dry brown materials to every part of green materials.

Compost using this method should be ready for curing in two to four weeks.

The Cool (Indore) Method

Although cool composting takes longer to create a finished product, it may be easier for those who do not want to spend as much time worrying about the carbon-to-nitrogen ratio or turning the pile as often.

The “recipe” for creating a cool compost is:

- Construct a pile 10 feet per side in layers beginning with a layer of brush at the base to allow air to flow into the bottom of the pile.
- Next, add a 6-inch layer of dry brown materials.
- On top of that, add a 2-inch layer of green material, then sprinkle a very thin (about 1/4 inch) layer of soil. The soil helps add microbes to the body of the pile.
- Continue adding layers (6 inches of brown, 2 inches of green, 1/4 inch of soil) until the pile is 4 to 6 feet tall (Figure 4).
- Turn the pile every six weeks.

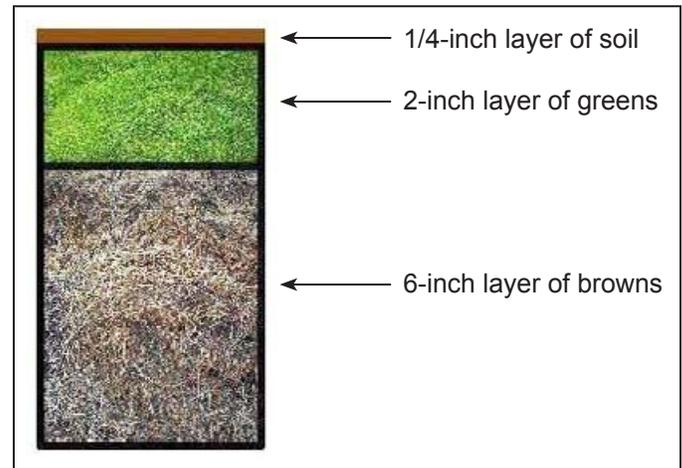


Figure 4. In the cool (Indore) method of composting, the bottom of the pile should have a layer of brush to allow for airflow. The brown, green, and soil layers go on top of the brush in layers, which can be repeated as many times as necessary to create a pile that's 4 to 6 feet tall.

Compost using this method should be ready for curing after about 12 weeks, but can be continued longer.

The Compost in a Bag Method

An alternative to large piles of organic waste material is creating compost in a bag. This method is great for those who have limited space but still want to recycle their organic waste.

The “recipe” for creating compost in a bag are:

- 1 cup of shredded green materials
- 1/2 cup of soil
- 1 tablespoon of dry brown materials
- 1 ounce (by volume) of water

With this recipe, the ingredients can be doubled as many times as will fit in the bag and can be added until the bag is full. Blend the ingredients in a watertight medium-sized plastic bag until everything is thoroughly mixed and moistened. The bag should be strong enough to hold all the ingredients without breaking. Squeeze the bag daily to mix the compost and open the bag every other day to check the moisture. If it is too wet, leave the bag open until it dries to the right level. If it is too dry, add water.

Compost using this method should be ready to cure in four to six weeks.

Finishing Compost

The first part of the composting process is complete when:

- The pile's internal temperature has decreased and remains at a low level (within 5 degrees of the outdoor temperature) for a week or two — when the microbes are active, the internal temperature of the pile will be much higher.

- There is little or no discernible plant material remaining in the pile.
- The material in the pile has a dark, crumbly, rich look (similar to chocolate cake).

The second step in making compost is to allow it rest for one to two months (a process called curing). This curing process ensures that the compost is stable enough to be used. If the compost is applied before it has stabilized, the microbes in it could actually harm plants by stealing nutrients from the soil.

The compost does not require turning while it is curing. However, it is important to keep the material at the same moisture level as during composting to ensure that the microbes have a chance to completely process everything. Once they have done so, the population of these microbes will eventually fall to levels safe enough to use around plants.

Putting Compost to Good Use

Most often, homeowners and gardeners will mix compost into the soil. This can be especially useful in newer subdivisions, where the soils typically are not as productive as they were before being developed. When new homes are constructed, builders remove the topsoil and subsoil to build the foundation or basement. When the builders grade the soil back into place, it is often a mix of topsoil and subsoil, or a layer of subsoil over the topsoil.

Either way, growing lawns or gardens on these soils can be challenging because subsoils contain less organic matter and plant nutrients than topsoil. Plants grown in these soils may suffer from nutrient and water deficiencies, making them more susceptible to weeds, diseases, pests, and drought.

For older homes, the addition of compost to the soil is also greatly beneficial. Over time, the organic matter in the soil breaks down and plant nutrients are used up. Adding compost will help to replenish both.

Below are some ways to help add organic matter and plant nutrients to the soil by applying your newly-made compost.

Gardens

Apply at least 1/2 to 3 inches of compost to gardens before planting every year — this will improve soil fertility. Spread the compost on the surface (a practice called topdressing), or mix the compost with the upper 4 inches of soil.

Another way to build up nutrients in the soil is to bury half-finished compost 12 to 18 inches beneath the soil in the fall. The soil above will insulate the buried compost

from the winter weather and the microbes will continue the composting process. In the spring, blend the rich organic layer beneath with the soil above.

More Purdue Extension gardening information is available at www.hort.purdue.edu/ext/garden_pubs.html.

Lawns

Sprinkle a thin layer (about 1/2 inch) of compost by hand on the lawn every spring. This helps maintain a dense mat of grass roots that prevents the spread of weeds.

Homeowners also can use a spike-toothed aerator on the lawn, and rake the compost into the holes. When applying compost to the lawn, keep in mind that it should not be so thick that it covers the grass.

More Purdue Extension lawn care information is available at www.agry.purdue.edu/turf/publicat.htm.

Trees and Shrubs

Compost (1 to 2 inches) can be broadcast in a ring about 2 feet from the trunk to 1 foot beyond the drip line of the branches. This will provide additional pockets of slow-release nutrients for tree roots and help maintain proper moisture.

Compost Tea

Another way of using compost is to extract the nutrients into water, then apply that tea-like, nutrient-containing water to plants about every two weeks.

To “brew” compost tea, fill a burlap or cloth bag (like a pillowcase) with finished compost, then place it in a 5 gallon bucket of water for one to three days. Agitate the bag a few times each day, just like a tea bag. Compost can be reused several times in this process.

Summary

Producing compost is a good way to turn waste into a resource that benefits both the environment and homeowners. Composting is versatile enough that the time and effort can be as much or as little as one wants to make it. This gives anyone the ability to take part and enjoy the benefits that compost has to offer.

Additional Resources

There are many compost-making methods, many that are variations on the basic methods presented here. The resources below provide more information on composting and related topics:

Campbell, S. 1998. *Let it Rot!* Storey Books, North Adams, MA.

Epstein, E. 1997. *The Science of Composting*. Technomic Publishing Co., Inc., Lancaster, PA.

Foster, C. 2005. *Compost*. Orion Publishing Group, Ltd., London.

How to compost.org — your compost resource. [Online] Available at www.howtocompost.org (verified 20 July 2007).

Martin, D.L. and Gershuny, G. (eds.) 1992. *The Rodale Book of Composting*. Rodale Press, Emmaus, PA.

Managing Yard Waste: Clippings and Compost. Purdue Extension publication ID-182-W. [Online] Available at www.hort.purdue.edu/ext/ID-182.pdf.

U.S. EPA. 2006. *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2005*. EPA-530-F-06-039. United States Environmental Protection Agency, Washington, D.C.

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