



William T. Kemper Center for Home Gardening

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Composting Yard Waste

Yard waste need not find a home away from home. It is one part of the waste stream that can be managed in our own back yards. Solid waste management is everyone's responsibility. Each person should be able to find new and more effective ways to lessen their community's dependence on landfills. New solid waste laws in Missouri and Illinois focus on the need to reduce the volume of waste generated. An important area in which we can reduce waste is in our own back yard. Yard waste can represent up to 20% of the solid waste stream. Gardening practices which can be used to reduce yard waste include leaving grass clippings on the lawn, mulching and composting.

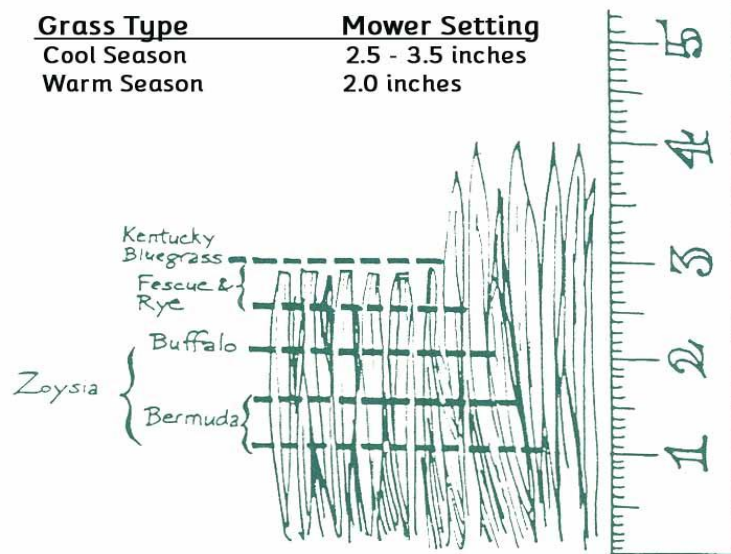
Don't Bag Grass Clippings

The easiest way to start mulching is to take the grass catcher off the lawn mower. Your mower service agent should be able to put a trap door over the discharge end if your mower does not already have one. For conventional side discharge mowers without a trap door, mulching may require a bit of raking following mowing to break up the little rows of clippings. To avoid raking the entire lawn, mow from the outer edge in ever smaller circles toward the center, making sure that the side discharge mower is "walking" or blowing the grass clippings ever closer to the central point. In this manner, clippings are chopped several times and most fall between the blades as mulch. The few that are left near the center can easily be raked and placed into the compost bin or spread in the garden.

Mulching mowers have become quite popular in recent years and their new features are proudly displayed by dealers. Advertising campaigns are helping convert homeowners over to these new "zero discharge" mowers. Mulching mowers are designed differently from conventional mowers with closed trap doors. The first difference is, of course, the lack of a discharge point and a catcher. The second is the horsepower rating, since mulching mowers require more horsepower to cut and re-cut the grass. The special blade not only cuts, it also acts as a vacuum and fan that circulates the clippings back to the blade for additional pulverizing. The air pressure then forces the chopped clippings downward into the lawn.

Mulching mowers require a lawn that is not overly wet and has not been left too long between cuttings. The height of the grass should be somewhat higher than typical settings for bagging mowers and the lawn is best cut when the grass is one-third higher than the height of the blade. For the average lawn, if the grass is left at two inches following mowing, the grass would be cut when it reaches three inches. While the new system takes some getting used to, user satisfaction is running near 100% for those who have made the switch. The lawn must be mowed more often than with conventional mowers, but the time actually spent in the yard is less because there is no need to continually stop and empty the catcher. Mulching mowers should be used every five to six days instead of every week.

Mow grass longer, more often:



Cutting grass higher and with only one third the blade height is easier and faster than cutting grass that has become overgrown. Fertilizing can be decreased since grass clippings contain 4% nitrogen and act like a time release fertilizer when they are returned regularly to the soil. Grass clippings return to the soil to form organic humus that helps hold water while keeping the soil loose and aerated.

When asked in a recent survey in Texas, many householders stated that the main reason they bag their grass is to avoid generating thatch. While thatch is a problem in many lawns, turfgrass specialists have numerous studies that show that GRASS CLIPPINGS DO NOT CAUSE THATCH to build up. Thatch is caused by high-lignin stubble at the plant base derived from roots, rhizomes, crowns, and stolons that decompose slowly. The green clippings contain little, if any, lignin and decompose quickly. If anything, mulching green grass clippings can actually help decompose thatch by supporting a healthy soil ecosystem. With grass mulching, some lawns may need additional aeration and watering to help soil organisms decompose the clippings properly, especially during dry periods.

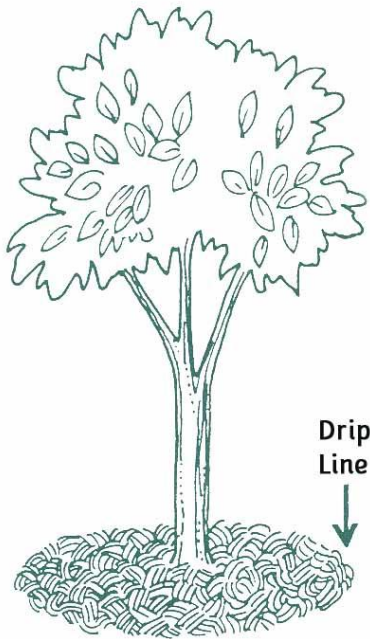
Mulching

Mulch is any organic material such as wood chips, grass clippings, leaves, or compost that is spread over the surface of the soil. Using mulch is a simple way to recycle yard wastes and improve your garden. What does mulch do? Mulch conserves water, keeps down weeds, and keeps soil temperatures from becoming too hot or too cold. Mulch also protects sloping ground from soil erosion and stops compaction caused by driving rain or foot traffic. In addition, mulch provides ideal conditions for earthworms and other soil organisms which are necessary for healthy soil and plants. When mulches break down, they become humus that feeds the soil. A good mulch will do all this and be readily available, free, easy to apply, and will stay in place without much effort.

General rules for mulching

Annuals and perennials (both flowers and vegetables) should be mulched with materials that break down in a relatively short time, such as grass clippings and leaves. This allows you to turn under the mulch on annual beds when the soil is dug.

Trees and shrubs should be mulched with an attractive thick layer of wood chips that requires little maintenance. Paths can also be covered with wood chips, in layers as thick as is practical to wear longer and keep down weeds. Some experts recommend placing a layer of plastic or cardboard underneath the mulch.



Mulch material and their uses

Grass clippings can be spread regularly in thin layers over vegetable and flower beds, or mixed with leaves and spread in a thicker layer. Spread grass clippings no more than 1" thick so that they don't mat and prevent water from penetrating into the soil. Leaves of deciduous trees can be spread as mulch in the fall. Evergreen leaves can also be used, but they take longer to turn a dark color and decay. Sawdust and other finely-ground woody materials can be used on the surface, but should not be mixed into the soil. These finely ground materials that have not been composted may tie up nitrogen in your soil, so, when using these materials, double the fertilizer rates.

Applying mulch materials

Weed the area to be mulched before applying the mulch. For best results, mulch can be spread around any plant as far as the distance of its outermost branching (this is called the drip line), or it can cover an entire garden bed. Mulch can be spread thickly if water is able to penetrate and if it does not smother the roots of the plant being mulched. Three inches of mulch is safe for any woody plant, and up to eight inches can be used for large trees. Thick mulches are harmful to shallow-rooted plants such as rhododendrons and azaleas.

Where to find mulch materials?

The best place to look for mulch materials is in your own yard. Every yard has grass, leaves, and other green materials that can be made into mulch. If you can use wood chips, try contacting a tree service or landscaper listed in the Yellow Pages. If they are working in your area, they are often happy to deliver woody wastes and avoid extra travel and dumping expenses. Some wood shops and coffee roasters make their organic byproducts available to customers and the general public.

Tools for mulch-making

A rotary mower run across dry leaves will make a fine-textured mulch for annuals and smaller plants. A small electric chipper will make a fine-textured mulch of woody stalks and branches up to 1-1/4 inches thick. Gas-powered shredders of 5-8 horsepower capable of processing materials up to 3 inches in diameter can be rented or purchased. Large gas-powered chippers able to handle woody-wastes up to 6 inches in diameter are available at rental shops. In general, the larger the machine, the faster the mulch-making.

Where to find mulch-making tools?

Look under "Rental Service Stores" and "Yards" in the Yellow Pages and find tool rental locations nearest

you. Call ahead, because not all tool rental stores carry chippers and shredders. Let them know the type of material you want to turn into mulch, and find out if their machine can do the job. Shredders and chippers are also sold at lawn and garden equipment stores.

Composting

Compost, also called humus, is a dark, crumbly, and earthy-smelling form of decomposing organic matter. It is a practical and convenient way to transform yard wastes into a resource. Compost enriches soil and improves plant growth. If you have a garden, a lawn, trees, shrubs, or even planter boxes, you have a use for compost.

By composting, you help your community and the State of Missouri meet their top priority for solid waste management reducing waste. Yard waste comprises approximately 20 percent of the average person's garbage and we can't afford to keep throwing it away.

By using compost, you return organic matter to the soil in a usable form. Organic matter in the soil improves plant growth by helping to break heavy clay soils into a better texture, by adding water and nutrient-holding capacity to sandy soils, and by adding essential nutrients to any soil. Improving soil is the first step toward improving the health of your plants. Healthy plants help clean our air and conserve our soil, making Missouri a healthier place to live.

What can I compost?

Anything that was once alive can be composted. Non-woody yard waste such as fallen leaves, grass clippings, weeds, and the remains of garden plants make excellent compost. Chipped wood scraps can also be composted or mulched.

Care must also be taken when composting kitchen scraps. Compost only vegetable scraps and only by the methods outlined in this brochure. Meat scraps, bones, fatty foods (such as cheese, salad dressing, and leftover cooking oil), and pet feces should not be composted. Instead place these items in your regular garbage or bury deeply in an out-of-the-way place.

How can I use compost?

Compost can be used to enrich the flower and vegetable garden, to improve the soil around trees and shrubs, as a soil amendment for house plants and planter boxes and, when screened, as part of a seed-starting mix or lawn topdressing. Before they decompose, chipped woody wastes make excellent mulch or path material. After they decompose, these same woody wastes will add texture to garden soils.

Just as fresh organic matter can be used as a mulch, so can compost at any stage of maturity. Spread around shrubs, trees, and in the garden, compost can be used as a concentrated mulch. Most people, however, believe that once the time and effort has been invested to make a true compost, it is best to use it in ways other than as a mulch.

Like some wines and cheeses, compost improves with age. For a person unfamiliar with the composting process, it is often difficult to tell when compost is "cured" or ready to use. Fresh compost reacts with soils differently than well aged compost and should be used with discretion. Uncured compost mixed directly into gardens or planter mixes can "burn" plants through a stress condition called "phytotoxicity". Fresh compost, like fresh manure, can also rob the soil of nitrogen temporarily while it finishes its curing process.

If the compost looks dark, crumbles in the hand, and can be screened at a 1/2H screen, has a pleasant odor, it is probably "cured". Age is not a good indication of stability since the rate of decomposition is determined

by nutrient balance, mixing, moisture, and aeration. Some composts from active processes are more stable at one month than many stockpiles years old. Aging a compost an additional six months even after it seems cured is a good insurance policy.

Stable compost can be blended into soil mixes and is suitable for most outdoor planting projects. It is typically mixed with other ingredients such as peat moss, shredded bark, sand, or loamy topsoil when used as an outdoor planter mix. Mixing ratios vary, but 10% compost is considered to be a minimum, 30% optimum, and 50% maximum in planting shrubs and trees.

Stable and cured compost probably has its greatest value when rototilled directly into the soil. One cubic yard of compost covers 108 square feet at three inches, 216 at two inches, and 324 at one inch. The rule of thumb is to spread compost no more than one third the depth of the rototiller. A one-inch layer of compost should be tilled in three inches, a two-inch layer tilled in six inches, and a three-inch layer tilled in nine inches. Two or more passes with the tiller helps blend the compost with the topsoil and break up any clumps of material.

Residents can support composting by becoming compost users, promoting resource recovery by stimulating the market for compost. Using compost rather than chemical fertilizers reduces nitrogen runoff, protecting our lakes and streams. Organic matter conserves water by loosening clay soils and binding sandy soils. Compost stimulates plant growth through time release nutrients while protecting the landscape against weather extremes, especially drought, by keeping soils warmer in the winter and cooler in the summer. The healthy soil ecosystem fosters rapid decay of grass clippings, eventually enhancing the soil food chain that supports the wild bird population.

Essentials of Composting

With these principles in mind, everyone can make excellent use of their organic yard waste.

Biology

The compost pile is really a teeming microbial farm. Bacteria start the process of decaying organic matter. They are the first to break down plant tissue and also the most numerous and effective composters. Fungi and protozoans soon join the bacteria and, somewhat later in the cycle, centipedes, millipedes, beetles and earthworms do their part.

Materials

Anything growing in your yard is potential food for these tiny decomposers. Carbon and nitrogen, from the cells of dead plants and dead microbes, fuel their activity. The microorganisms use the carbon in leaves or woodier wastes as an energy source. Nitrogen provides the microbes with the raw element of proteins to build their bodies.

Everything organic has a ratio of carbon to nitrogen (C:N) in its tissues, ranging from 500:1 for sawdust, to 15:1 for table scraps. A C:N ratio of 30:1 is ideal for the activity of compost microbes. Fresh grass clippings, with a C:N ratio of 20:1, have too much nitrogen. Brown tree leaves have too little: 40:1. The proper ratio of grass to leaves may vary but should not exceed 1 part grass for 1 part leaves. Layering can be useful in arriving at these proportions, but a complete mixing of ingredients is preferable for the composting process. Other materials can also be used, such as weeds and garden wastes. Generally, brown materials, such as fallen leaves and sawdust, are high in carbon, while green materials such as grass clippings and weeds are high in nitrogen. If you save your fall leaves in bags or piles, they will provide an excellent source of carbon to mix with your grass clippings the following spring and summer. Though the C:N ratio of 30:1 is ideal for a fast, hot compost, a higher C:N ratio (i.e. 50:1) will be adequate for a slower compost.

Surface area

The more surface area the microorganisms have to work on, the faster the materials will decompose. It's like a block of ice in the sun - slow to melt when it's large, but melting very quickly when broken into smaller pieces. Chopping your garden wastes with a shovel or machete, or running them through a shredding machine or lawn mower, will speed the composting process.

Volume

A large compost pile will insulate itself and hold the heat of microbial activity. Its center will be warmer than its edges. Piles smaller than 3 feet cubed (27 cu. ft.) will have trouble holding this heat, while piles larger than 5 feet cubed (125 cu. ft.) don't allow enough air to reach the microbes at the center. These proportions are of importance only if your goal is a fast, hot compost.

Moisture and aeration

Virtually all life on earth needs a certain amount of water and air to sustain itself. The microbes in the compost pile are no different. They function best when the compost materials are about as moist as a wrung-out sponge. Extremes of sun or rain can disrupt the moisture balance in your pile. Therefore, you may need to add water to your compost pile if it is too dry or cover the pile if it is receiving too much moisture. It is also important for compost materials to receive adequate aeration. Compost piles comprised primarily of grass clippings do not allow air to circulate through the pile. By mixing leaves or small limbs and twigs with your grass clippings, you provide spaces for air to circulate through the pile.

Time and temperature

The hotter the pile, the faster the composting. If you use materials with a proper C:N ratio, provide a large amount of surface area and a big enough volume, and see that moisture and aeration are adequate, you will have a hot, fast compost (hot enough to burn your hand!) and will probably want to use the turning unit discussed in the next section. If you just want to deal with your yard waste in an inexpensive, easy way, the holding unit (discussed below) will serve you well.

Passive Composting

Heaping yard waste into containers or open piles is the least labor and time-consuming way to compost. This is a form of passive composting because no attempt is made to speed up the decay process beyond that which occurs naturally.

Which wastes: Non-woody yard wastes are the most appropriate.

How: Place the holding unit or pile where it is most convenient. As weeds, grass clippings, leaves and harvest remains from garden plants are collected, they can be added to the unit or pile. Chopping or shredding wastes, alternating high-carbon with high-nitrogen materials, and providing adequate moisture and aeration will all speed the composting process.

Advantages & disadvantages: For yard wastes, a holding unit or pile is the simplest method. The unit or pile is portable; it can be moved to wherever needed in the garden. The method can take from 6 months to 2 years to compost organic materials, so you only need to be patient.

Variations: Holding units can be made of circles or hardware cloth, old wooden pallets, or wood and wire. Sod can also be composted with or without a holding unit by turning sections of it over, making sure that

there is adequate moisture and covering it with black plastic. For aesthetic reasons, the open pile should be positioned in a place inconspicuous to you and your neighbors.

Active Composting

Creating a compost pile and managing it so that the decay process is accelerated may be referred to as active composting. Part of this process involves turning wastes on a regular schedule. Active composting is most appropriate for gardeners with a large volume of yard waste and the desire to make a high-quality compost in a matter of weeks to months.

Which wastes: Non-woody yard wastes are appropriate.

How: Alternate layers of high-carbon and high-nitrogen materials to about a 30:1 ratio. Add more nitrogen materials if the pile doesn't get hot, and keep the pile as moist as a damp sponge. Check the pile temperature regularly. When the heat decreases substantially (5-10 days), turn the pile. Repeat this process each time the pile in the first bin cools. After 4 to 8 weeks, the compost should be ready for garden use.

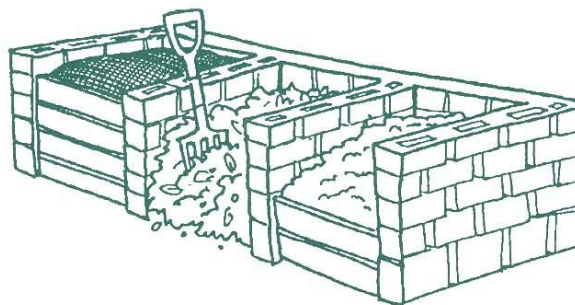
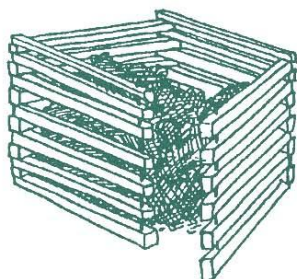
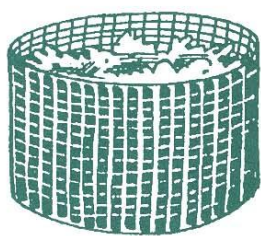
Advantages & disadvantages: This method produces a high-quality compost in a short time, but requires more effort and working space than a holding unit.

Variations: The unit can be built of wood, a combination of wood and wire, or concrete blocks. Another type of turning unit is the barrel composter, which aerates as it tumbles the wastes.

Troubleshooting

The following chart is a guide to more efficient active composting.

Symptoms	Problem	Solution
The compost has a bad odor	Not enough air	Turn it
The center of the pile is dry	Not enough water	Moisten materials while turning the pile
The compost is damp and warm in the middle but nowhere else	Too small	Collect more material and mix the old ingredients into a new pile
The heap is damp and sweet-smelling but still will not heat up	Lack of nitrogen	Mix in a nitrogen source like fresh manure, bloodmeal or ammonium sulfate



Typical backyard composting bins

Community Facilities

For those homeowners who don't have the space, uses, or physical ability to deal with all of their yard waste, a few municipalities have set up municipal composting programs or offer special leaf and grass collection services. Many of these programs provide the finished product to residents at little or no additional cost.

Check with your city or county public works department, university extension agent, or your local trash hauler to find out which options are available to you. For additional information on yard waste management write to: Compost, Missouri Department of Natural Resources, P.O. Box 176 DEQ/WM, Jefferson City, Missouri 65102-0176.