UNIVERSITY OF WYOMING

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BACKYARD COMPOSTING

Simple, small-scale methods

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Composting is the process by which organic materials, such as yard and kitchen wastes, are decomposed into a dark-colored, nutrient-rich, soil-building conditioner called humus. In nature, this process occurs slowly when plant and animal materials decompose and their carbon and nutrients are returned to the ecosystem. By establishing a backyard compost pile, this biological process can be accelerated with minimal effort by controlling temperature, oxygen, and moisture contents. The result is a rich, earthy, sweet-smelling humus that can be mixed into garden beds, added to flower pots, or used as a mulch (for perennials and woody plants). It is an excellent and inexpensive organic soil amendment.

Advantages of composting

Composting reduces dependency on manufactured chemical fertilizers. Many manufactured fertilizers supply major nutrients in quick-release soluble forms, while some are slow-release. Long-term benefits of this method of fertilizing are limited. Plants need more than a few chosen nutrients. Incorporating compost into the soil adds long-term benefits by improving the soil structure with organic matter. Chemically treated soils may lose structure over time and, therefore, require more careful water management to prevent erosion, as well as the increased use of manufactured fertilizers.

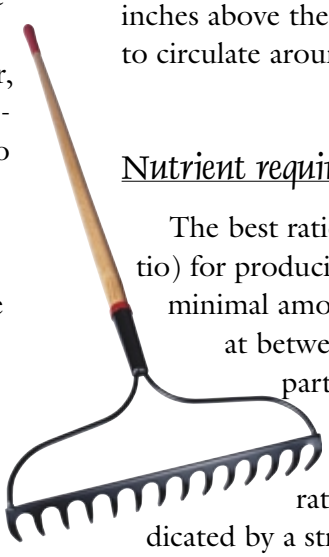
Soil pH is altered by the addition of compost. The ideal pH for growing most fruits, vegetables, and flowers is between 6.0 and 7.5. If your soil's pH is too alkaline (above pH 7.5), compost can help lower it. If your soil's pH is too acidic (below pH 6.0), compost can help raise it.

Composting recycles waste materials generated as kitchen scraps and yard products. By diverting materials from the waste stream, the need for more landfills is reduced.

Composting improves soil structure. Soils in Wyoming have textures that range from heavy clays to sands. When organic matter is incorporated, all soils can be improved by enhancing soil structure and increasing nutrient status. If soils are clay-like, aeration is important to maintain soil productivity. It is vital to transform minerals into useable forms for nutrient uptake by plant roots. Organic matter greatly increases moisture-retention capabilities. By increasing the organic content of soils, water can be conserved. Organic matter added to soils through the use of compost acts like a sponge, soaking up and retaining water. Without organic matter, clay soils become hard and water tends to run off or puddle for long periods of time. On the other hand, sandy soils allow water to drain quickly. Compost and organic matter allow greater amounts of water and nutrients to be retained.

Variables for success

The amount of time necessary to produce compost varies, but if you are determined to be successful, the time it takes to produce nutrient-rich compost is well worth the effort. However, there are several aspects to consider that will reduce the amount of time and effort required to produce compost. These include:



♦ **Location** – Keep the compost pile out of the wind and sun so that it won't dry too quickly.

♦ **Size** – The ideal size for a household compost pile is approximately 1 cubic yard (3 feet wide, 3 feet long, and 3 feet high). If it is too small, the pile will not heat up enough to kill weed seeds and other pests or work efficiently. If the pile is too tall, the weight will compact the pile and push out the air.

♦ **Water** – The pile should be about the consistency of a wrung-out sponge. If it is too wet, then too little air will be exchanged and the pile may give off an offensive odor. If it is too dry, microbial activity may slow down enough that decomposition is minimal.

♦ **Microorganisms** – Occasionally mix in some good garden soil or previously made compost to introduce microorganisms to your pile. The microorganisms digest the compost materials, which will heat the compost pile up to approximately 140 degrees Fahrenheit.

♦ **Air** – It is important to provide plenty of air in your compost pile. This can be achieved several ways: turn the pile frequently (every week or two); use large twigs or poles layered alternately with the other compostable materials; poke deeply at the pile with a pitchfork or pole; or position your compost pile on chicken wire built at least 12 inches above the ground, which will allow the air to circulate around all sides.

Nutrient requirements and sources

The best ratio of carbon to nitrogen (C/N ratio) for producing compost quickly and with a minimal amount of effort has been estimated at between 25 to 30 parts of carbon to 1 part nitrogen. A C/N ratio that is too high tends to slow the decomposition process, while a low C/N ratio can lead to nitrogen loss as indicated by a strong ammonia smell. Try experimenting to find what combination works best for you. An old standby is to alternately layer equal parts of nitrogen, carbon, and soil.

Sources of nitrogen for the compost pile are identified as the "green" materials: green leaves, lawn clippings, green plant wastes from the garden, kitchen wastes, and barnyard manures.

Sources of carbon for the compost pile include the "brown" materials: dried matter such as grasses and hays, leaves, sawdust, straw, or almost any other dried organic matter.

Location

Important factors to consider when determining a site for your compost pile are shade, wind, water, appearance, and proximity to the garden.

♦**Shade** – The ideal place for a compost pile is in the shade. If this is not possible, cover the pile with a layer of straw, hay, or a sheet of black plastic. This will keep the sun from drying your pile. Keep it away from direct contact with trees and wooden buildings as they, too, may begin to decay.

♦**Wind** – Keep the compost pile out of the wind. This will keep your pile from drying too quickly.

♦**Water** – Position the pile close to a source of water. The closer it is to water, the better you will be able to maintain the appropriate moisture content.

♦**Appearance** – Locate the pile in an out-of-the-way site because a compost pile could be viewed as an eyesore by neighbors.

♦**Proximity to garden** – Consider where the compost pile will be located with respect to the garden. A wheelbarrow load of compost can be quite heavy.

Methods to use

♦**Quick** – The secret with this method is for all material to be as small as possible. To achieve this, use a shredder or chop materials finely. The smaller the material, the faster the decomposition. Remember that fresh materials are nitrogen-rich. Carbon-rich materials should be added, as well as some soil, to introduce microorganisms. Add water to make the materials the consistency of a wrung-out sponge. Turn or stir every week to two to mix the composting material and increase aeration. This method should produce compost in less than a few months.

♦**Medium** – Materials don't need to be shredded, but they must be layered. Alternately layer carbon, nitrogen, and soil. Turn the pile every four to six weeks. You should have compost in four to six months.

♦**Slow** – Alternately layer carbon, nitrogen, and soil materials, and then just leave it alone. This method takes approximately one year. Check periodically for odor. You may need to cover with a carbon containing material or good garden soil to control odor.

Composting for city dwellers

Apartment dwellers have even established compost piles on their balconies or in their kitchens. An easy method would be to use a 5-gallon pail with a tight-fitting lid. Use the quick method for best results.

Materials to use & not to use in a compost pile

Some suggested items that can be used for compost materials are: garden debris, kitchen wastes (non-meat), shredded paper (beware - some inks may contain lead), barnyard manure, leaves, hay, straw, grass clippings, sod, toilet paper rolls, sawdust, wood ashes (ashes and sawdust from plywood or particle board are not suggested), and dust from vacuum cleaner bags (depending on what you have picked up).

Materials that **should not** be used in the compost pile are: bones, meat scraps, fats, dog and cat feces, human feces, polyester materials, plastics, synthetics, diseased animals or plants, plant debris treated with insecticide, toxic material, woody plant parts (may not decompose unless chopped or shredded), poisonous plants, and thorny branches.

Potential composting problems

♦ **Pile too wet** – Add dry ingredients to absorb water; temporarily increase turning to once every day or two.

♦ **Pile too dry** – Add more wet ingredients and/or water so the pile is the consistency of a wrung-out sponge; cover with black plastic or straw.

♦ **Pile not working** – See *Variables for Success.*

♦ **Offensive odor** – A strong ammonia smell indicates there is too much "green" material in the pile; add "brown" materials.

♦ **Leaves (or newspaper) matted** – Try to break up the mats, adding looser materials and/or soil; next time, shred materials before adding them to the compost pile.

♦ **Flies** – Turn pile more frequently; cover completely with soil and straw.

Cold-weather composting

Because of Wyoming's cold winters, composting time typically takes longer. For example, the cold air may not allow the compost pile to heat up adequately, thereby slowing the process. By covering the pile with a sheet of black plastic and adding more nitrogen-rich materials, you can maintain the proper temperature for decomposition (120 to 140 degrees Fahrenheit). Making your pile approximately 1 foot taller and wider (any length) will increase its insulation capacity to maintain a higher internal temperature.

Structures

There are several types of containers available on the market or to construct at home. These are not necessary, but can be very useful in maintaining a composting pile and confining it to an aesthetically pleasing area. Materials for the structures are virtually unlimited. Structures can be made from wood, wire, plastic, concrete blocks, bales of straw or hay, and more. Research the subject and talk with fellow composters to determine what style is right for you.

Compost uses

♦ **Mix in garden beds** – The ideal time to do this is when preparing the beds for planting. It is not necessary to dig too deeply. The top 6 inches are ideal for nutrient uptake by most plants.

♦ **Prepare soil for new lawns** – Spread a 2 to 3 inch layer of compost over the area to be seeded or sodded. Then, till it in to a depth of 6 to 8 inches. Then, seed or sod the area as planned.

♦ **Add to flower pots** – A successful mixture for container gardening is ¼ compost and ¾ soil. A higher ratio than this could provide too rich of a growing medium. Adding sand may be necessary for growing cacti and succulents.

♦ **Use as a mulch** – Compost works very well as a top dressing for shrubs, trees, perennials, etc. As a mulch, the compost insulates and protects the plant roots from temperature extremes. It also provides nutrients that will be washed into the soil by rain and snow. A third benefit is that the mulch controls weeds. If the plant roots are close to the surface, care must be taken to avoid injuring them. Be careful to leave room between the compost and the plant. If it touches the plant, the roots will begin to form where they contact the compost. For trees and shrubs, start approximately 1 foot away from the trunk and extend the application 6 to 12 inches beyond the drip line, except in turf areas. Three or 4 inches of mulch is sufficient.

♦ **Give it away** – If you are producing more compost than you can use, give it to your neighbors and friends. In turn, they may provide you with an endless source of ingredients for your next compost pile.

Worms

Earthworms are naturally attracted to compost, which provides them with food. Their tunneling is beneficial to aeration and improving soil structure because their castings are rich in plant nutrients. One pound of earthworms ingest 1 pound of garbage and produce 1 pound of rich compost on a daily basis! They can significantly reduce the time necessary to produce finished compost. Care must be taken, though, to turn the pile every week or two as the intense heat may kill them.

For indoor kitchen waste composting , a worm box is recommended. It is best to purchase commercially grown red worms (*Lumbricus rubellus* or *Eisenia foetida*) for this project. They are sold as fish bait and are commonly called red hybrids or red wigglers. See the list of **suggested readings** for in-depth information on composting with earthworms.

Suggested readings

Appelhof, M. *Worms Eat My Garbage*. Kalamazoo, MI: Flower Press, 1982.

N. M. Trautmann and M. E. Krasny. *Composting in the Classroom*. Kendall/Hunt Publ. Comp., 1997.

S. Campbell. *Let it Rot: the Gardener's Guide to Composting*. Storey Comm., Inc., 1998.

Biocycles Staff (eds). *The Art and Science of Composting*. J. G. Press, Inc. Emmaus, PA, 1991.

Robert Rynk (ed). *On-Farm Composting Handbook*. NRAES-54, Cooperative Extension, Ithaca, NY, 1992.

Liz Ball and Jim Anderson. *Composting*. Workman Publ. Comp. Inc., 1997.

L. Nancarrow and J. H. Taylor. *The Worm Book: The Complete Guide to Gardening and Composting with Worms*. Ten Speed Press, 1998.

N. J. Ordra and B. Ellis (eds). *Soil and Composting: The Complete Guide to Building Healthy, Fertile Soil*. Houghton Mifflin Comp., 1998.

Web sites:

University of Nebraska-Lincoln. *NebGuide*, **<www.ianr.unl.edu/pubs/horticulture/g810.htm>**(February15, 2001).

The Compost Resource Page **<www.oldgrowth.org/compost>**(February15, 2001).

Ohio State University. "Composting at home.", **<www.ag.ohio-state.edu/~nohioline/hygfact/1000/1189.html** >(February15, 2001).

Colorado State University. "Composting Yard Waste.", **<www.ext.colostate.edu/pubs.garden/07212.html>**(February15, 2001).

Also, several magazines have frequent articles on composting and compost structures. A few of them include:

Biocycle

Family Handyman

Mother Earth News

Organic Gardening

Popular Mechanics

Be aware that due to the dynamic nature of the World Wide Web, Internet sources may be difficult to find. Addresses change and pages can disappear over time. If you find problems with any of the above listed sites in this publication, please contact George Vance, P.O. Box 3354, Laramie WY, 82071; (307) 766-2297; gfv@uwyo.edu or Karen Panter, P.O. Box 3354, Laramie, WY, 82072; (307) 766-5117; kpanter@uwyo.edu.

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