The Compost Heap

Basic Composting in Alaska

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HGA-01022

Composting is a great way to make a nutrient-rich soil amendment while effectively recycling table scraps and yard waste. Alaska's short, relatively cool summers can make proper composting a challenge, but you can take steps to hasten the process and ensure that a healthy soil amendment is available to add to your garden.

What is Composting?

Composting is a way to accelerate the natural decomposition process by balancing the carbon to nitrogen ratio (C:N) and providing adequate air and moisture to heighten microbial activity.

To Bin or Not to Bin?

A simple above-ground pile, at least 1 cubic yard in size, works well. The size is important since it must be large enough to keep the internal temperature high enough to kill pathogens and weed seeds. Some containers may be smaller than this if they provide insulation.

Containers have advantages, especially when composting fish or nonmeat kitchen wastes like moldy bread or carrot tops. There are many designs for containers; you can even use an old puppy pen. Wire bins are inexpensive and simple to build and they keep most pests out, but they should be easily disassembled and reassembled for turning the compost. For both piles and containers it is important to consider proper air flow (high air penetration, however, reduces heat retention). Tumblers, while expensive, make it easy to turn the compost, thus accelerating decomposition even more. You can also accelerate decomposition in a pile by turning it frequently, but it is not as easy as with a tumbler. In addition to convenience, tumblers are also good for containment and neatness. Moisture regulation is also easier in a bin than in an open pile.

Some Like It Hot

Initial decomposition is begun by mesophylic organisms. As the compost heats up, the thermophilic, or heat-loving, organisms take over. If your pile is at least 3 cubic feet with the right combination of carbon and nitrogen materials, water and air, the interior temperature will quickly rise to between 120° and 160°F. The hot phase will last several days if the pile is turned frequently.

Composting Materials

Fast decomposition requires the proper mixture of materials. Each organic material source has its own unique C:N ratio.

The Carbon to Nitrogen Ratio

A carbon to nitrogen ratio of approximately 30:1 (by weight) is optimal for the process of hot composting to work. This average 30:1 ratio results from mixing a combination of high C:N materials (often called "browns") with low C:N materials (often called "greens"). For example, straw has a high C:N ratio of 80:1 while fish has a low C:N ratio of 15:1.

This variable C:N ratio often causes confusion and frustration for beginning composters who are trying to utilize a wide range of materials (and amounts of these materials) mixed together to achieve the required 30:1 ratio. These materials can be broadly characterized as a source of carbon (browns) or a source of nitrogen (greens). The designation is determined by whether the C:N ratio is greater than 40:1 (brown) or less than 30:1 (green).

Material	C:N Ratio	Green or Brown?
Poultry manure	3:1 to 15:1	Green
Food waste	15:1	Green
Grass clippings (green)	19:1	Green
Cow manure	20:1	Green
Horse manure	20:1 to 50:1	Green or brown
Coffee grounds	20:1	Green
Garden stalks and leaves	25:1	Green
Leaves	35:1 to 85:1	Brown
Grass clippings (dry)	70:1	Brown
Straw	80:1	Brown
Paper	170:1	Brown
Newspaper	400:1	Brown
Sawdust	200 to 750:1	Brown

Selected examples taken from "Compost Fundamentals: Carbon-Nitrogen Relationships," 2009 web access, Whatcom County Extension, Washington State University, http://whatcom.wsu.edu/ag/compost/fundamentals/needs_carbon_nitrogen.htm, and "Home Composting," Cornell Waste Management Institute, http://cwmi.css.cornell.edu/compostbrochure.pdf

Calculating the C:N Ratio

It is said that composting is both an art and a science. The science comes into play once the composting process begins, after the optimal 30:1 ratio is achieved. The art comes from the trial-and-error discovery of the right 30:1 recipe, developed from mixing differing amounts of your available organic materials together.

Fortunately, there are effective shortcuts available to fast-track the art of composting. Compost calculators have been developed that take much of the guesswork and discovery time out of the compost process. One of the best is a free web-based compost calculator from Green Mountain Technologies (see "References"). This compost calculator uses drop-down menus with various organic compost sources. You select the sources and the amount (in pounds) of each source, and the calculator adds it up and gives you the total C:N ratio of the mix, as well as moisture and bulk density. You add or subtract the amounts of each of your materials until you get close to a 30:1 ratio. Once you have calculated how much of each material you will need, you are then ready to shred your materials, weigh the materials on bathroom scale and layer them, alternating carbon (brown) and nitrogen (green) while adding water. When you reach 50 to 60 percent moisture ("wet sponge" consistency), you can sit back and wait for the composting process to happen, usually 6 to 24 hours. Other free compost calculator websites that you may find useful include:

- www.klickitatcounty.org/SolidWaste/fileshtml/organics/compostCalc.htm
- www.martindalecenter.com/Calculators1_2_Ag.html#AGRI-FERT-COMPOST
- www.agric.gov.ab.ca/app19/calc/manure/manure.jsp

Compost Recipes (by weight)

Recipe No. 1
2 parts dry leaves
2 parts straw or wood shavings
1 part manure
1 part grass clippings
1 part fresh garden weeds (that haven't gone to seed)
1 part food scraps (green)

Recipe No. 2
3 parts dry leaves
1 part fresh garden weeds (that haven't gone to seed)
1 part fresh grass clippings
1 part food scraps (green)

Recipe No. 3
2 parts dry leaves
1 part food scraps (green)
1 part fresh grass clippings

Recipe No. 4
1 part dry leaves
1 part fresh grass clippings

Recipe No. 5
1 part dry grass clippings
1 part fresh grass clippings

Recipe No. 6
1 part fish waste (carcass)
1 part sawdust
1 part green materials (lawn clippings)

Procedure for Fast (Hot) Composting

Step 1: Gather enough organic materials to make a pile at least 1 cubic yard in volume. Use the composting calculators or recipes to determine how much of each material is needed. Chop or shred any coarse materials. Ideally, material should be chopped into ¼-inch to 1-inch pieces.

Step 2: Layer carbon and nitrogen materials in appropriate ratios, mixing with a pitchfork.

Step 3: Water as you mix to ensure that all the materials are as damp as a wrung-out sponge (50 to 60 percent moisture content). It may be helpful to cover the pile with plastic or a tarp to control moisture levels.

Step 4: Use a long-stemmed thermometer to monitor the temperature in the middle of the pile. A hot compost pile should reach a temperature of approximately 150°F. Moisture levels of 50 to 60 percent should also be maintained.

Step 5: After the pile has reached its peak temperature (approximately 150°F) and its temperature starts to decrease below 120°F, it is ready to be turned for the first time. If peak temperatures do not reach 150°F, the entire process may still proceed, but at a slower rate.

Transfer material from the outside to the inside of the pile. A pitchfork is a useful tool for this. Continue to turn the pile after it cools down and check the temperature the next day.

Step 6: Once the compost no longer heats when it is turned, the maturation or "curing" phase begins. Allow to cure for 4 to 12 weeks. The cool pile is recolonized by nonheat-loving organisms. These organisms decompose the resistant carbon compounds, shift the compost's pH from acidic towards neutral and convert organic nitrogen into plant-available nitrates. The cool pile is also recolonized by soil organisms that help suppress disease in the compost. The curing process is longer and more important if the hot process was incomplete. Completed compost smells more like soil than its original materials.

Step 7: Consider screening the compost through a ¼-inch mesh screen to return the larger pieces of organic material to the pile for further composting next batch.

Compost Use

Adding quality compost improves the physical, chemical and biological aspects of the soil. The stable organic

material in compost improves soil structure, increases the soil's ability to hold nutrients and enhances the soil food web.

Mix 1 to 3 inches of cured, screened compost into your garden, lawn or perennial bed prior to planting, or add 1 to 3 inches as mulch to your plants in early summer.

Things to Avoid

- Do not add diseased plants, weeds that have gone to seed, woody materials, grease, fat, meat scraps or bones (other than fish) to your pile.
- Do not add dog, cat or pig manure to your compost pile if it's intended for your vegetable garden. Parasites found in these manures can survive the composting process and remain harmful to humans (Refer to USDA's *Composting Dog Waste*, for more information on composting dog waste).
- Do not add excessively high carbon (brown) materials to the soil because they will force the existing microorganisms to "rob" the surrounding soil of nitrogen, delaying and reducing the availability of nitrogen fertilizers applied to your garden.
- Do not apply uncured compost to sensitive horticultural crops since some of the compounds can "burn" the plants. Properly cured compost won't harm the plants.

Other Composting Methods

There are several other ways to add organic matter to your garden and keep kitchen and yard waste out of the landfill, although some gardeners may not characterize these methods as composting in the strictest sense of the word. Unlike hot composting, these methods do not require that you stockpile materials or build a large pile all at once. However, except for vermicompost, which

is actually worm castings or manure, materials that are hot composted produce a superior product that will be higher in essential plant nutrients and less likely to have weed seeds or diseases.

Mulching
With mulching, you can add nutrients to your garden while keeping weeds down and water in. Hay, grass clippings, newspaper and cardboard are all effective mulches. Add mulch around plants or in your paths, but give plants a few inches of breathing space to limit disease incidence.

Sheet Composting
Sheet composting is also referred to as lasagna gardening, no-till gardening or no-work gardening. Add organic matter 18 inches deep. Layer bulking agents with energy materials just like you would in a compost pile, but do it directly in your garden space. Sheet composting can be accelerated by covering the layers with clear plastic. To transplant, pull mulch away to form a hole (insert soil or compost if desired), place the plant in the hole and pack the mulch back around its roots.

For more detailed information on sheet composting, consult Patricia Lanza's *Lasagna Gardening: A New Layering System for Bountiful Gardens: No Digging, No Tilling, No Weeding, No Kidding!*

Cold and Slow
Cold, or slow, composting is recommended if you have only small amounts of fresh material available at a time. To make a cold compost heap, simply pile together your nonwoody yard wastes and kitchen scraps and let them sit for two to three years. Place fresh wastes in the middle of the pile to discourage pests and increase aeration. You can start small and add to your pile gradually, but do not add weeds that have gone to seed or diseased plants.

Vermiculture (Composting with Worms)
Vermiculture is an excellent way to compost in Alaska. For more information, see UAF Cooperative Extension Service publication *Composting with Worms,* HGA-01020.

There are many ways to compost. Whatever works best for your situation is the best method to use. Composting is an economical solution for making a nutrient-rich soil amendment to add to your garden as well as a way to recycle up to 20 percent of the waste generated in your home. For more information on composting, see Extension publication *Composting in Alaska,* HGA-01027.

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Published by the University of Alaska Fairbanks Cooperative Extension Service in cooperation with the United States Department of Agriculture. The University of Alaska Fairbanks is an affirmative action/equal opportunity employer and educational institution.

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9-78/WV/7-13

Reviewed December 2012