Composting

Adding compost to the soil nourishes this orange tree and helps reduce polluted runoff at the same time.

Benefits

- Nourishes plants by adding nutrients to the soil
- Improves soil structure to better retain water, nutrients and air
- Encourages vigorous root growth
- Reduces pest problems
- Reduces need for chemical fertilizers
- Channels household waste into the compost pile and out of the waste stream
- Keeps yard waste out of landfills
- Reduces erosion and polluted runoff
- Cleaner water entering the ocean

Feed your plants and help the ocean

Composting is a method of producing a nutrient rich soil amendment (plant food) by using naturally occurring fungi and bacteria to break down organic waste. The composting process involves controlled biological decomposition of organic material, sanitization through the generation of heat and stabilization of the final product to make it beneficial to plant growth. As bacteria, yeast and fungi digest the waste, they make nutrients such as nitrogen more available. When compost is added to soil, the nutrients are slowly released over time, allowing for easy up-take by plants. Basically, the simple process of composting allows large amounts of household, yard and/or animal waste to be transformed into smaller piles of natural soil conditioner.

Feeding plants with compost is not only good for plants, it helps reduce polluted runoff into waterways and conserves water resources. Organic wastes, such as manure or even grass clippings, can be a source of water pollution, upsetting the nutrient balance in streams, lakes and the ocean. Adding compost to the soil allows for better water retention, often providing greater drought resistance. Generally, the frequency and intensity of irrigation may be reduced for plants in composted soil. Recent research suggests the addition of compost in sandy soils can facilitate moisture dispersion by allowing water to more readily spread from its point of initial application. Furthermore, composting can dramatically lower runoff volume due to improved water holding capacity, healthy vegetation/ biomass, and increased water infiltration. The result is less polluted water entering our waterways and the ocean.

History

Composting is such an ancient practice that it is impossible to attribute its birth to a specific individual or even one society. There is evidence that Romans, Greeks and the Tribes of Israel knew about composting. The Bible and Talmud both contain numerous references to the use of rotted manure straw. Compost is also mentioned in tenth

Composting new plants. *Photograph by Neil - http://picasaweb.google.com/neilb9/081011KCCGarden#.*

and twelfth century Arab writings, in medieval Church texts, and in Renaissance literature. Notable writers such as William Shakespeare, Sir Francis Bacon, and Sir Walter Raleigh all mentioned the use of compost.

In North America, the benefits of compost were enjoyed by both Native Americans and early European settlers. Many New England farmers made compost as a recipe of 10 parts muck to 1 part fish. Today, our recipe has been refined but the basic principles remain unchanged.

Composting Methods

There are numerous methods for making compost: underground, above ground, in bins, in boxes, in pits, in bags, in barrels, in strips, in sheets, and in trenches. All stem from the Indore method developed in the 1920s by Sir Albert Howard, who is credited with founding the organic farming movement. The composting process can take as little as fourteen days or as many as fourteen months, depending on the method. Each method has its own advantages, but they all have the same basic requirements: air, moisture, nitrogen, bacteria, heat, sufficient size, and plenty of organic matter. These elements are critical for the compost pile to heat up correctly.

Composting Methods		
	Hot	**Cold**
Microbial Activity	high	low
Brown to Green Waste Ratio	30 to 1	not critical
Processing Time	short	long
Pathogens/Weeds	not a problem	possibly problematic
Pile Turning	1x per day	once every 3 - 6 weeks

Students spreading garden compost for school garden.
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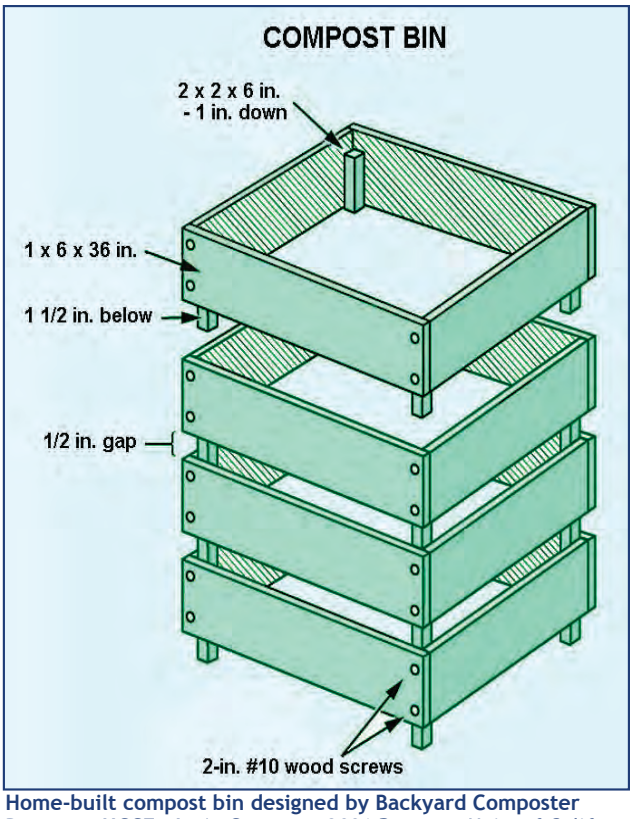
One of the more popular composting techniques is called the *University of California* method, perfected in the 1950s at the U.C. Richmond Field Station by Dr. Clarence G. Golueke. Also referred to as *rapid* or *hot* composting, it yields compost quickly, in as little as two weeks, and destroys most pathogens and weed seeds. When using the hot method, all materials must be stored prior to beginning composting. This process relies on frequent turning of the pile, as often as once a day, to ensure even heating. The carbon-to-nitrogen ratio must be controlled with this technique: this means the composition of the pile needs to be approximately 30 parts of brown (high in carbon) materials, such as dry grass, dry yard trimmings, leaves and shredded paper, to every one part of green (high in nitrogen) material, including food waste, coffee and tea grounds, fresh cut grass and hair. Materials used in the hot method should be no larger than six-to-eight inches long.

The classic *Indore* or *cold* composting method is a much less labor-intensive but more lengthy process. Turning is required just once every three-to-six weeks, and maintaining the carbon-to-nitrogen ratio is not so critical. Furthermore, cold composting is advantageous since materials can be continually added to the existing pile. The cold process, however, can take three months or even longer, as the microbial activity is much slower under cooler temperatures. This method is useful when a quick turnaround of compost production is not needed. Unfortunately, since high temperatures are not achieved using the Indore method, pathogens and weed seeds aren't reliably destroyed. Therefore, it is best to avoid adding weeds or diseased plants to cold compost piles. For more information on these and other composting methods, please see http://ucanr.org/freepubs/docs/8037.pdf and http://ceplacer.ucdavis.edu/files/367.PDF.

Composting Bins

Compost bins can be homemade, or can be purchased commercially. Keep in mind the following features when buying or building your bin:

- **volume** - the ideal bin size is three-to-five cubic feet
- **ventilation** - more ventilation in wet climates and less in dry climates
- **construction** - recycled materials can be used. Wood, cinderblocks and used chicken wire are ideal materials. Many commercial recycled plastic bins are now available. Look for one with adjustable ventilation.
- **access for pile turning** - bin should be no higher than four feet for easy access
- **rodent resistance** - vents should be too small to allow for rodent entry



Home-built compost bin designed by Backyard Composter Program, UCCE - L. A. County. *©2001 Regents, Univ. of Calif.*

Vermicomposting

Vermicomposting is the process of using worms (*vermi* is Latin for *worm*) to process organic food waste into nutrient-rich soil. Worms eat decaying food waste and produce vermicompost, a semi-digested, dark, rich, compost. Full of beneficial microbes and nutrients, it is a highly effective and valuable soil amendment. Worm bins can be created simply with a container and tight-fitting lid, moistened bedding of shredded paper or similar material, worms (be sure to check that the worms you'll be using are not invasive to your area), kitchen scraps and yard waste. Essential elements of vermicomposting include adequate ventilation, moderate temperature, low light, adequate drainage, and sufficient humidity. For more information, please visit http://sjmastergardeners.ucdavis.edu/Compsoting_with_Worms/What_is_Vermicompost.htm.

UCCE Master Gardeners from Placer-Nevada Counties have fun with vermicomposting.

Grasscycling

Grasscycling is a form of on site composting. Clippings are left on the lawn after mowing to decompose instead of being bagged up for disposal. This method relies on following specific mowing techniques: cutting the grass when the surface is dry, keeping mower blades sharp (dull blades can shred grass and create an entryway for disease), and following the *1/3 rule* - mow the lawn often enough so that no more than 1/3 of the length of the grass blade is removed in any one mowing. Proper mowing will produce short clippings that will not cover the grass surface. The lawn may need to be cut more frequently. Additionally, in many areas of California, raising the mowing height in the summer encourages deeper roots and protects grass from drought and heat damage. Grasscycling can be done with almost any mower. Check your owner's manual or contact a lawnmower dealer to learn if you can successfully grasscycle with your existing mower. A retrofit kit may be necessary. Mulching or recycling mowers make grasscycling easy by cutting grass blades into small pieces and forcing them into the soil. In some cases, grasscycling is not appropriate, such as when the grass is too wet or when it hasn't been regularly mowed and is too tall. Composting and mulching are good alternatives to grasscycling in these instances. For more information on grasscycling, please visit http://ucanr.org/freepubs/docs/8006.pdf.

Grasscycling is as easy as mowing your lawn.
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Resources

- U.C. Cooperative Extension Master Gardeners: http://camastergardeners.ucdavis.edu/
- UCANR Master Gardener Composting Pages: http://ceplacer.ucdavis.edu/Master_Gardener252/Composting_Pages.htm
- Hodel, Donald R. and Janet S. Hartin, Compost and Mulch, U.C. Cooperative Extension Garden Information Series: http://ucce.ucdavis.edu/files/filelibrary/1359/36627.pdf
- Project Compost: http://projectcompost.ucdavis.edu/about.html
- The Rapid Composting Method: http://vric.ucdavis.edu/pdf/compost_rapidcompost.pdf
- Making and Using Compost: http://vric.ucdavis.edu/pdf/compost_makingandusingcompost.pdf
- Vermicomposting Guide for Teachers: http://www.ciwmb.ca.gov/Publications/Schools/56001007.pdf
- Grasscycling: http://anrcatalog.ucdavis.edu/pdf/8006.pdf
- National Sustainable Agriculture Information Service: http://attra.ncat.org/attra-pub/vermicom.html
- Los Angeles County: http://dpw.lacounty.gov/epd/sg/
- Ventura County: http://portal.countyofventura.org/portal/page?_pageid=876,1126568&_dad=portal&_schema=PORTAL
- Riverside County: http://www.rivcowm.org/composting/compost_in_rc.html
- Santa Barbara County: http://www.santabarbaraca.gov/recycling-trash/pdf/Composting_Booklet.pdf

References

- US Composting Council: http://www.compostingcouncil.org/
- U.S. E.P.A. Composting website: http://www.epa.gov/epawaste/conserve/rrr/composting/index.htm
- California Integrated Waste Management Board: http://www.ciwmb.ca.gov/Organics/CompostMulch/
- Natural Resources Conservation Service - Backyard Conservation: http://www.nrcs.usda.gov/FEATURE/backyard/compost.html
- *The Rodale Book of Composting: Easy Methods for Every Gardener*, Grace Gershuny and Deborah L. Martin, eds.

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