



<http://www.epa.gov/composting/basic.htm>

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Wastes - Resource Conservation

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Composting for Facilities Basics

Compost is organic material that can be used as a soil amendment or as a medium to grow plants. Mature compost is a stable material with a content called humus that is dark brown or black and has a soil-like, earthy smell. It is created by: combining organic wastes (e.g., yard trimmings, food wastes, manures) in proper ratios into piles, rows, or vessels; adding bulking agents (e.g., wood chips) as necessary to accelerate the breakdown of organic materials; and allowing the finished material to fully stabilize and mature through a curing process.

Natural composting, or biological decomposition, began with the first plants on earth and has been going on ever since. As vegetation falls to the ground, it slowly decays, providing minerals and nutrients needed for plants, animals, and microorganisms. Mature compost, however, includes the production of high temperatures to destroy pathogens and weed seeds that natural decomposition does not destroy.

Benefits of Composting

- Reduce or eliminate the need for chemical fertilizers.
- Promote higher yields of agricultural crops.
- Facilitate reforestation, wetlands restoration, and habitat revitalization efforts by amending contaminated, compacted, and marginal soils.
- Cost-effectively remediate soils contaminated by hazardous waste.
- Remove solids, oil, grease, and heavy metals from stormwater runoff.
- Avoids Methane and leachate formulation in landfills.
- Capture and destroy 99.6 percent of industrial volatile organic chemicals (VOCs) in contaminated air. See [Innovative Uses of Compost: Bioremediation and Pollution Prevention](#).
- Provide cost savings of at least 50 percent over conventional soil, water, and air pollution remediation technologies, where applicable. See [Analysis of Composting as an Environmental Remediation Technology](#)
- Reduces the need for water, fertilizers, and pesticides.
- Serves as a marketable commodity and is a low-cost alternative to standard landfill cover and artificial soil amendments.
- Extends municipal landfill life by diverting organic materials from landfills.

The Composting Process

One of the most important steps for evaluating composting options is to become familiar with how the composting process works. Before you begin composting or start a composting program, you should understand the five primary variables that must be "controlled" during composting. These include the following:

Related Links

- [Greenscapes](#)
- [CalRecycle Organic Materials Management](#) [EXIT Disclaimer](#)
- [Composting101.com](#) [EXIT Disclaimer](#)
- [US Composting Council](#) [EXIT Disclaimer](#)
- [Find a Composter](#) [EXIT Disclaimer](#)

- **Feedstock and nutrient balance.** Controlled decomposition requires a proper balance of "green" organic materials (e.g., grass clippings, food scraps, manure), which contain large amounts of nitrogen, and "brown" organic materials (e.g., dry leaves, wood chips, branches), which contain large amounts of carbon but little nitrogen. Obtaining the right nutrient mix requires experimentation and patience and is part of the art and science of composting.
- **Particle size.** Grinding, chipping, and shredding materials increases the surface area on which the microorganism can feed. Smaller particles also produce a more homogeneous compost mixture and improve pile insulation to help maintain optimum temperatures (see below). If the particles are too small, however, they might prevent air from flowing freely through the pile.
- **Moisture content.** Microorganisms living in a compost pile need an adequate amount of moisture to survive. Water is the key element that helps transports substances within the compost pile and makes the nutrients in organic material accessible to the microbes. Organic material contains some moisture in varying amounts, but moisture also might come in the form of rainfall or intentional watering.
- **Oxygen flow.** Turning the pile, placing the pile on a series of pipes, or including bulking agents such as wood chips and shredded newspaper all help aerate the pile. Aerating the pile allows decomposition to occur at a faster rate than anaerobic conditions. Care must be taken, however, not to provide too much oxygen, which can dry out the pile and impede the composting process.
- **Temperature.** Microorganisms require a certain temperature range for optimal activity. Certain temperatures promote rapid composting and destroy pathogens and weed seeds. Microbial activity can raise the temperature of the pile's core to at least 140° F. If the temperature does not increase, anaerobic conditions (i.e., rotting) occur. Controlling the previous four factors can bring about the proper temperature.

Types of Composting

Backyard or Onsite Composting

Vermicomposting

Aerated (Turned) Windrow Composting

Aerated Static Pile Composting

In-Vessel Composting



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Environmental Benefits

Compost use can result in a variety of environmental benefits. The following are a few of the most important benefits:

Compost enriches soils

Compost has the ability to help regenerate poor soils. The composting process encourages the production of beneficial micro-organisms (mainly bacteria and fungi) which in turn break down organic matter to create humus. Humus—a rich nutrient-filled material—increases the nutrient content in soils and helps soils retain moisture. Compost has also been shown to suppress plant diseases and pests, reduce or eliminate the need for chemical fertilizers, and promote higher yields of agricultural crops.



Man Holding Handful of Compost -
Photo Courtesy of Jepson Prairie
Organics

Compost helps cleanup (remediate) contaminated soil

The composting process has been shown to absorb odors and treat semivolatile and volatile organic compounds (VOCs), including heating fuels, polyaromatic hydrocarbons (PAHs), and explosives. It has also been shown to bind heavy metals and prevent them from migrating to water resources or being absorbed by plants. The compost process degrades and, in some cases, completely eliminates wood preservatives, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils.

Compost helps prevent pollution

Composting organic materials that have been diverted from landfills ultimately avoids the production of methane and leachate formulation in the landfills. Compost has the ability to prevent pollutants in stormwater runoff from reaching surface water resources. Compost has also been shown to prevent erosion and silting on embankments parallel to creeks, lakes, and rivers, and prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.



Compost Used as Erosion
Deterrent

Using compost offers economic benefits

Using compost can reduce the need for water, fertilizers, and pesticides. It serves as a marketable commodity and is a low-cost alternative to standard landfill cover and artificial soil amendments. Composting also extends municipal landfill life by diverting organic materials from landfills and provides a less costly alternative to conventional methods of remediating (cleaning) contaminated soil.



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Compost helps cleanup (remediate) contaminated soil

The composting process has been shown to absorb and break down organic compounds (VOCs), including heating fuel, polycyclic aromatic hydrocarbons (PAHs), and explosives. It has also been shown to bind heavy metals and prevent them from entering the water resource or being absorbed by plants. The compost process destroys and deactivates many completely resistant weed germinants, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils.



Compost helps prevent pollution

Composting organic materials that have been diverted from landfills ultimately avoids the production of methane and reduces the formation of leachate. Compost has the ability to prevent pollutants in stormwater runoff from reaching surface water resources. Compost has also been shown to prevent erosion and cutting on environments parallel to creeks, lakes and rivers, and prevents erosion and turbidity on roadsides, hillside, playing fields, and golf courses.

Using compost offers economic benefits

Using compost can reduce the need for water, fertilizers, and pesticides. It serves as a sustainable commodity and is a low-cost alternative to standard landfill cover and efficient for environments. Composting also extends municipal landfill life by diverting organic materials from landfills and provides a less costly alternative to conventional methods of remediation (excavation) contaminated soil.