

# COMPOSTING FOR GARDENS

## ASPI Technical Series

### INTRODUCTION

Composting is the natural process of decomposing organic waste materials so that they may return quickly to humus for assisting in plant growth. While nature will compost over a period of time, through proper handling we can render the material reusable in a few months (depending on weather conditions and the season of the year). This is done by allowing a suitable mixture of air (through mixing), water, bacteria and other helpful organisms, and a proper nitrogen/carbon mixture.

Compost is the dark, friable product of composting and is similar in nature to the organic matter found in untilled soil. It keeps soil in good condition for cultivation and horticultural purposes.



TURNING THE COMPOST

### WHY COMPOST?

Perhaps the better question is -- why not compost? Composting is one of the most valuable individual environmental activities which one can perform -- and doing makes us aware of our own need to act to save the Earth.

Composting at home --

#### Responsibility for Wastes

- \* makes us take responsibility for our own waste in our own backyard and perhaps to cut that domestic waste stream in half; saving landfill space and preserving the home environment in a single step;

#### Natural Cycles

- \* perpetuates the natural biological cycle of living matter and allows us to enter into the process. We can truly touch the soil through composting;

#### Saves Resources

- \* avoids waste hauling and disposal;

#### Good Sanitation

- \* puts the waste immediately out of the house and back into the soil (no odor, no flies);

#### Economics

- \* cuts our gardening bills by omitting the purchase of peat moss or humus;

#### Good Nutrient Source

- \* can be used for low-priced mulching around plants, for starting seeds, and as plant growing medium in greenhouses;

#### Model of Good Ecology

- \* offers the neighbors a valuable lesson in what they can do themselves and how their land can be improved;

#### Growth in Self-Reliance

We can begin to live off the land and with the land. Our own appreciation of nature will be enhanced and we can become more aware of the spiritual rhythms of land and seasons.

An added and important reason for composting is that compost replaces chemical fertilizers which are known to retard the growth of beneficial microorganisms. These microorganisms rely on a steady supply of actively decomposing organic matter for food and energy. The composted organic matter aerates the soil, holds moisture and nutrients, and releases these nutrients slowly while the decomposition proceeds. Soil then has a sponge effect and allows for the drainage of excess moisture away from plant roots. Compost also helps control the pH of soil keeping it in a desired growing range of 6.5 to 7.5. Furthermore, compost darkens most soils helping them absorb heat from sunlight, extending the spring and fall growing season by changing the soil itself.

Ideally garden soil should have a ratio of about five percent organic matter, but this is difficult in areas with very hot summers -- which our Rockcastle Valley often experiences -- and in sandy soils. Besides the compost that is generated organic gardeners may be forced to import manure (as our center is), or to obtain leaf mold (decomposed leaves) or turn under winter cover crops such as hairy vetch, rye or buckwheat.

## WHAT CAN BE COMPOSTED?

If the majority of our domestic waste stream is able to be decomposed (two-thirds by USEPA estimates but all domestic waste streams differ vastly), then consider these as good candidates for the compost area:

Food scraps -- egg shells, banana peels, vegetable scraps, coffee grounds, stale food (not greasy products and meat scraps which may be better fed to pets or wildlife);

Garden and yard wastes -- weeds (preferably before going to seed), trimmings, grass clippings, chopped corn stalks, chopped corn cobs, hay, straw, manure, leaves (pine needles should not be added and larger twigs should be chipped or broken down in some fashion);

Household wastes: dust, lint, scraps of natural fibers, pet wastes, hair, charcoal residue, other wood ashes.

Forest Wastes: sawdust, wood chips, bark, etc.

Certain Paper wastes: kitchen and hand paper towel can be decomposed, if the earth worms are sufficient for the operation.

Too much of a good thing is usually bad, for it will slow the decomposition process. If possible, variety is better.

## WHO SHOULD COMPOST?

Everyone should have a chance. In our society waste is left to the underprivileged or least member. We need to see "waste" as a resource waiting to be used. We should all bring compost to its full utility

## WHEN TO COMPOST

Anytime. In inclement weather keep a small container indoors to add to the outdoor bin later. In case this entails a long wait do some urban-type composting in the backroom or basement. Cover the composting material with plenty of soil to keep odor to a minimum and turn frequently.

The ideal time is from spring through fall when the earthworms are active. Winter is a time of maintenance, but summer compost requires care as well. Due to the very dry weather the piles need moisture.

## WHERE TO COMPOST

The more places that compost the better. Aside from the obvious farm and gardening composters, usually, in any location where kitchen wastes are produced, a complete waste system to recycle nutrients into the soil should be considered. Besides the home, the following places would benefit from composting: retreat houses, environmentally-conscious schools, old age houses and health care facilities, businesses where a number of people are served daily meals, recreation and youth camps, federal residential facilities and many others. Every place where food is prepared is a potential composting location.

We also use sawdust for nature trails, camping sites, around picnic areas, for compost toilet filler, and for some insulation work. We try to avoid the pine and instead prefer popular and oak sawdust.

## NOTE:

Sawdust is a major waste material in central Appalachia and the wood mills welcome its removal. We use a truck load a year for each one-tenth acre garden plot. It is placed on paths between the plots and around the cold frames. A one-inch spread of sawdust on dirt surface will decompose through the presence of ample worms in a mere four summer months, and the black decomposed materials are raked back into the beds the following spring to help keep the somewhat clay soil in good loose condition and to add carbonaceous materials. We plant beans about every second year and also Austrian winter peas for cover during the winter to add nitrogen by natural methods.

## HOW TO COMPOST

Composting is easy and it is more a question of how quickly you want to reuse your organic wastes. You may dig wastes right back into the soil or place it in a pit, designated composting bin or pile for neat efficient action and maximum aeration. Protective netting or fencing may be required to keep chickens, raccoons, rodents and other animals from picking over or burrowing into the compost area. Some enclose the compost pile or bin with rat screen.

The major tasks in any composting operation include the preparation of basic materials, mixing of proper ingredients, and spreading the product in the growing area.

### A. Preparation

Materials need to be as fine in composition as possible, to allow for good bacterial action. Many types of choppers and mixers exist in garden supply catalogs. Use one of these if necessary. Generally leaves will decompose with relative speed if some effort is made to contact each leaf with soil. The problem is that moist leaves pack down and, if covered with a heavy clay dirt, show little decomposition activity in the first year.

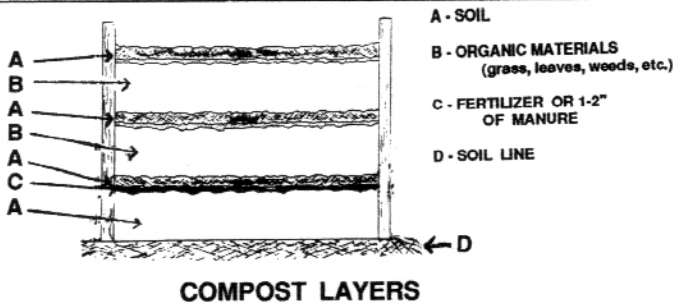
Proper air and moisture and the right bacteria will make wastes decompose into the humus product more rapidly. The biological action is quite complex, however, we do not need to know the exact mechanism for conversion by microorganisms (bacteria and fungi). Where decomposition is relatively rapid, a compost pile will heat to temperatures of about 140 degrees F at the center. Weed seeds and harmful organisms can be killed at that temperature but not along the cooler edges of the pile. Nitrogen in the form of manure or other sources may have to be added to retain a good carbon/nitrogen balance.

BioActivator is a commercial product sold by Necessary Trading Company (800) 447-5354 which contains beneficial microbes that speed decomposition of organic materials into fertile humus. These natural occurring soil organisms stimulate compost activation at about one-half pound per ton, inoculate the soil with beneficial bacteria, stabilize humus applied to fields and tend to reduce odor. It is the most concentrated compost activator available.

Some gardeners need to add mineral supplements either at the start or during the composting process. For detail on types needed see "Composting BioBulletin" by Joe Smillie which can also be obtained from the Necessary Trading Company.

## B. Mixing

The layers required for the beginning process will work well at first but more moisture and especially air are required for the process to continue at the speed desired.



Mixing by hand gives one a sense of accomplishment and exercise. The earthy smell and the effort taken involves us in a special union with our Earth. Why buy automatic tumblers which use energy and have to be cleaned and stored with greater care than turning forks? Many suggest turning about once a month but some do this operation more often, especially during the hotter months. Having empty bins available into which one can toss the incomplete material saves time. Use a good turning fork of the type that you find most comfortable.

## C. Application

Final application to the garden can occur anytime during or preceding the growing season. The turning fork can serve as a spreader as well, thus one can minimize tool investment. Some gardeners prefer to screen composted materials (one inch wire mesh screen) so that only the fine is applied to the soil while incompletely composted materials are returned to the composting bin. Apply in shallow trenches and cover with one inch of dirt to conserve all the nutrients. Where beds are required for celery and other crops, deeper trenches and layers of soil may be fashioned as crops demand.

### TOOLS

Turning fork	Plastic covering
Bins	(optional)
Cart or basket (for carrying materials)	Water
	Some muscle power

### SPREADING THE WORD

Most people, even sophisticated technical ones know very little about composting and are truly unwilling to ask. You may make a difference and succeed in broadcasting the message.

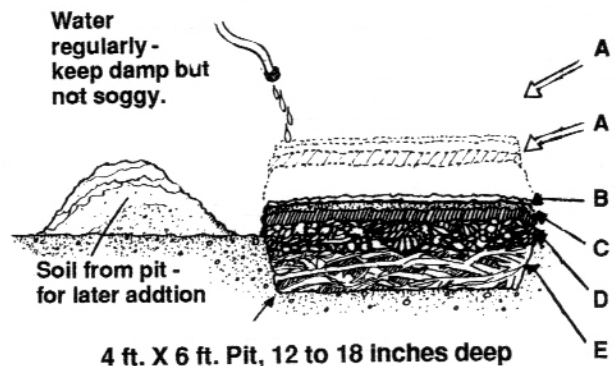
- \* Submit articles to the local newspaper.
- \* Speak at churches and civic clubs.
- \* Enlist garden clubs in composting displays and demonstrations.
- \* Encourage K-12 school projects on composting.
- \* Encourage scouting troops to do composting as merit badge projects.
- \* Get the municipal government to mandate or at least encourage composting.

## EARTHWORMS

Earthworms, some of our best friends, include between two and a thousand species. They will produce more compost in a shorter time than any tool known to us. Furthermore, this compost contains mineral nutrients in soluble form, and castings that assist in soil improvement. Earthworms aerate the soil and a natural increase in their numbers assures us that the balance of air, water, bacterial agents and organic matter is intact.

While the number of Earthworm species is large, some cannot stand the hot temperatures of the compost heap and others prefer soil. Obtain the right worm for the right purpose. For composting, the common Red Wiggler (*Eisna foetida*) is an excellent choice. This type of worm is easily obtained and thrives very well in the compost environment. Use the Indore method of compost formation.

### INDORE COMPOSTING PIT



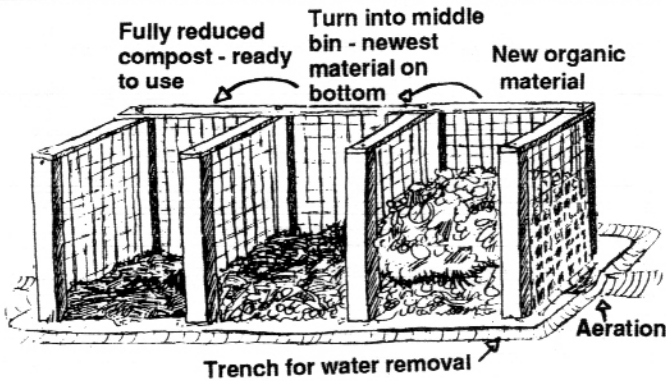
- A - Repeat layers of green matter, manure, topsoil and limestone until heap reaches about five feet in height.
- B - Sprinkle of topsoil and powdered lime.
- C - Two-inch layer of manure
- D - Six-inch layer of green matter (weeds, leaves, plant wastes)
- E - One-foot layer of brush for drainage.

### URBAN COMPOSTING NOTES

1. **Start small.** Make your goal the 8% of the waste stream that is kitchen and yard waste.
2. **Make your composting area attractive and neat.** This does not necessarily mean that the container has to be a purchased one.
3. **Provide for cold weather** composting.
4. **Protect from rodents and varmints.** Don't put oily or meat scraps into the compost.
5. **Turn frequently.**
6. **Use the end product well** around flowers, trees and other plants.

## CONSTRUCTION OF COMPOSTING BINS

Decide on a shady and well-drained site to construct the composting bin or pit. Use whatever siding material is most available but keep it porous for better aeration. Dig a trench around the bins to allow for water removal and a single trench of several inches through the middle of the bin area for aeration. Cover that last trench with stiff mesh screening to allow for ease of compost removal.



COMPOSTING BINS

Manure is preferable to commercial fertilizers for layering in compost piles. Use chicken manure more sparingly due to its "heat" and intensive fertilizing effect. Usually one to two inches of manure is sufficient for each layer.

Notes: Wood hauling platforms are generally discarded, and make good dividers between and backing for composting bins. Use cedar or treated posts for anchors and corners. Wire fencing can work or metal siding. Other building materials include snow fencing, chain-link fencing, un-mortared brick or concrete block. Remember that wood materials decompose rapidly under composting conditions and have to be replaced in a surprisingly few years.

## ADDED SUGGESTIONS FOR GOOD COMPOSTING

\* Use materials as soon as possible after completion of the composting process to avoid nitrogen loss through leaching or volatilization;

\* Compost piles should be moistened occasionally but not soaked. During dry weather moisten about once a week. A pile could be covered during excessively wet periods or dry times when more moisture will be lost by evaporation.

\* It is recommended that compost be pasteurized or sterilized before use indoors as a plant starter in the spring. The USDA recommends placing the moist compost in an oven preheated to about 200 degrees F. Allow the center to reach a temperature of 160 degrees and hold at that temperature for 30 minutes. A probing oven thermometer will help determine when the center is properly heated. Excessive temperatures may be detrimental.

\* Locate the composting pile in a convenient place, near enough to allow frequent visiting. Shady places are often found in backyards, but remember that trees when too close may send their roots into compost piles and sap the nutrients. This can be minimized by burying plastic under the pile floor and covering with dirt.

\* Maximum-sized compost piles should be about 5 by 5 by 5 feet to allow for proper heating and decomposition. Three is an ideal number of bins: one with finished materials, one for medium development and one for beginning organic wastes.

\* When space is limited and one cannot afford room for more than one bin or pile, add new materials to the top and remove finished product from the bottom, making every effort to turn the pile when possible.

\* There are several reasons why a compost pile may fail to heat. These include: too small a pile, too much moisture; too little air; too little nitrogen.

## PLACEMENT OF BINS

- \* Convenient to kitchen and waste generating areas
- \* Shaded section of garden
- \* Accessable to water

- \* On hillside for throwing compost in above -- removing from below
- \* Clearly visible, so others can observe and imitate

## REFERENCES AND RESOURCES

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FERTILIZERS FOR FREE, Charles Siegchrist, 1980, Garden Way Bulletin A-44. Garden Way Publishing, Pownal, VT 05261.

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