



# Fact sheet

## Home Composting

*William T. Hlubik, Middlesex County Agricultural Agent; Jonathan Forsell, Former Essex County Agricultural Agent (deceased);  
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### What is Composting?

Composting is a natural process where organic materials decompose and are recycled into a dark, crumbly, earthy smelling soil conditioner known as "compost". Compost improves soil structure and moisture retention, and contributes to healthy plant growth by providing plant nutrients.

### Why Should I Compost?

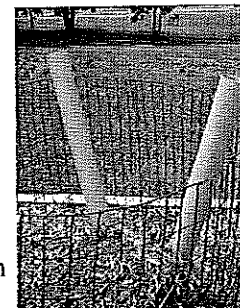
- Composting can save money!
- Reduces fertilizer and water use
- Avoids garbage collection and landfill fees
- Reduces the need for soil and plant amendments
- Composting helps the environment
- Reduces the volume of garbage going to landfills, transfer stations and incinerators
- Composting benefits your soil and plants
- Improves soil structure and texture
- Increases aeration and water holding
- Promotes soil fertility

- Stimulates healthy root development
- Aids in erosion control
- Reduces chemical inputs
- Composting is easy
- Save time bagging grass and leaves
- Quick and fun way to do part for the environment

### Compost Ingredients

#### Do Compost:

- ✓ Vegetable food scraps
- ✓ Grass clippings
- ✓ Leaves
- ✓ Flowers
- ✓ Weeds
- ✓ Sawdust and wood ash
- ✓ Chopped twigs and branches
- ✓ Coffee grounds w/filters



**Don't compost:**

- × Meat scraps
- × Diseased or insect infested plants
- × Weeds with seeds
- × Dog and Cat feces
- × Food with grease or soap residues

**Composting Methods**

**Slow Harvest: Ready in 12-18 Months**

Made by adding layers of available yard waste over several months.

1. Set compost bin where it will get rain.
2. Put yard waste in bin as it is generated in your yard. The material at the bottom and in the center will compost first.

**Fast Harvest: Ready in 5-15 Weeks**

Made by mixing equal weights of green and brown materials at once.

1. Add green materials such as grass clippings or vegetable scraps mixed with brown materials such as leaves (no woody-type materials should be included).
2. Add water to pile until it's as wet as a wrung out sponge.
3. Turn pile with a pitch fork or compost aerator tool twice a week for faster compost production (less often in wintertime).

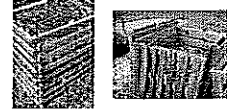
**Types of Compost Bins**

Compost can be made in open piles. However, to help keep a pile neat and maintain conditions needed for rapid decomposition, consider simple homemade or

store bought bins. See back page for demonstration sites in New Jersey.

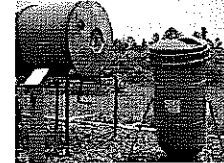
**Homemade Bins:**

- Made from wood pallets
- Made from snow fences



**Store Bought:**

- Compost Tumbler
- Durable Plastic Bin



**Troubleshooting**

Here is how to solve problems should they occur:

Symptom	Problem	Solution
Pile has a rotten odor	Not enough air	Turn pile
Pile has ammonia odor	Too many greens	Add brown material like leaves/straw
Pile is dry	Not enough water; too much woody material	Turn and moisten; add fresh greens
Low pile temperature (pile is not composting)	Pile is too small	Add new materials
	Insufficient moisture	Add water
	Poor aeration	Turn pile
	Lack of nitrogen	Mix in greens like grass or food scraps
	Cold weather	Insulate pile with layer of straw or cover with tarp
Pests (rats, raccoons, insects)	Presence of meat or fatty food scraps	Remove from pile

## Keys to Good Compost

**Water:** The microorganisms in the compost pile need water to live. Water pile only as needed, to maintain compost as moist as a wrung out sponge. Don't let your pile dry out completely.

**Nutrients:** The microorganisms in the pile need carbon for energy and nitrogen for protein in order to survive. A good balance can be achieved by mixing two parts of nitrogen rich green materials such as grass clippings, with one part of carbon rich brown materials such as leaves. However, carbon-rich leaves by themselves will compost.

**Aeration:** To speed up decomposition, turn the pile frequently using a pitch fork. This provides the microorganisms with enough oxygen to thrive so they can heat up the compost. Placing large branches at the bottom of the pile will also help add air to the pile. Minimal turning would be once per month and less frequently during the year.

**Surface area:** The more surface area the microorganisms have to work on, the faster materials will decompose. Consider chopping materials, particularly brush or branches which have a diameter of 1/4 inch or more. Pile size is also important. For quicker decomposition, pile should be at least 3 feet x 3 feet to hold the heat of microbial activity, but not so large (larger than 5 feet x 5 feet) that air can't reach microbes at the center of the pile.

## Use for Compost

**Mulch:** Spread compost around flower and vegetable plantings, trees, shrubs, and on exposed slopes. This will smother weeds, keep plant roots moist, and prevent soil erosion.

**Soil Conditioner:** Mix 1-3 inches of compost into vegetable and flower beds before planting. This returns organic matter to the soil in a usable form.

**Potting Mix:** Make your own mix by using equal parts of compost and sand or soil. Make sure compost is fully decomposed and screened.

## Resources

Some books to help you along...

*Backyard Composting*, Harmonious Technologies,  
P.O. Box 1865-100 Ojai, CA 93024

*How to Grow More Vegetables*, John Jeavons,  
Ecology Action, 5798 Ridgewood Rd. Willits, CA  
09590

*Let it Rot*, Stu Campbell, Storey Communications,  
Inc., Schoolhouse Rd., RD #1, Box 105, Pownal,  
VT 05261

*The Rodale Guide to Composting*, R.A. Simpson,  
Rodale Press, 33 E. Miner St., Emmaus, PA  
18098

*Worms Eat My Garbage*, Mary Appelhof, Flower  
Press, 10322 Shaver Rd., Kalamazoo, MI 49002

*For additional information on composting or where to get compost materials, call your Rutgers Cooperative Extension county office, found in the telephone directory blue pages, under "County Government" or your county recycling office.*

## Compost Deconstruction Areas

These areas in New Jersey have various types of compost bins on display. Call ahead for hours and when tours or workshops are given.

### Atlantic County

Atlantic County Utilities Authority Geo Garden  
6700 Delilah Rd.,  
Egg Harbor Township, NJ  
Contact: (609) 646-6600

### Burlington County

Burlington County Resource Recovery Geo Garden  
Complex, Rt 543,  
Border of Florence and Mansfield Township  
Contact: (609) 499-5210

Mazza & Sons, Inc. Recycling Facility  
3230 Shafto Rd.,  
Tinton Falls, NJ  
Contact: (732) 922-9292

**Middlesex County**  
Davidson's Mill Pond Park, Riva Avenue, South  
Brunswick, NJ  
Contact: (732) 745-3443

**Monmouth County**  
Deep Cut Park, Red Hill Rd.,  
Middletown, NJ  
Contact: (732) 842-4000

**Morris County**  
Frelinghuysen Arboretum, 53 E. Hanover Ave.,  
Morris Township, NJ  
Contact: (973) 326-7600

**Passaic County**  
Passaic County Office of Recycling  
1310 Rt. 23 N,  
Wayne, NJ  
Contact: (973) 305-5734

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Photos Courtesy of Lindsay Halladay.

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N.J. AGRICULTURAL EXPERIMENT STATION  
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# Fact sheet

## Backyard Leaf Composting

*Franklin Flower, Extension Specialist Emeritus in Environmental Science*  
*Peter Strom, Assistant Professor in Environmental Science*

Many New Jersey homeowners have an excessive quantity of leaves in the fall. One alternative for dealing with leaves is backyard composting. This process involves primarily the microbial decomposition of organic matter. Compost - the end result - is a dark, friable, partially decomposed substance similar to natural organic matter found in the soil.

### The Composting Process

Composting speeds natural decomposition under semi-controlled conditions. Raw organic materials can be converted into compost by microorganisms. As microorganisms decompose organic matter, temperatures within the pile increase, sometimes approaching 150 degrees F. at the center. These inside-pile temperatures speed the process, and kill many weed and disease organisms.

Leaves may be composted by piling them in a heap. Locate the pile where drainage is adequate and there is no standing water. The composting pile should be damp enough that when a sample taken from the interior is squeezed by hand a few drops of water will appear. A shaded area will reduce moisture evaporation from the surface, but tree roots may grow into the pile. If the surface of the pile becomes excessively dry, it will not compost, and those leaves may blow away.

The leaf pile should be at least 4 feet in diameter and 3 feet in height. If it is too small, it is difficult to maintain adequate temperatures for rapid decomposition. The maximum size should be about 5 feet in height and 10 feet in diameter. If the pile is too large, the interior will not obtain the oxygen needed for adequate, odor-free decomposition. If more material is available, lengthen the pile into a rectangular shape while keeping it 10 feet wide and 5 feet high. If there is sufficient space and material, two or three piles will provide greater flexibility. One pile can contain compost for immediate use; the second is actively composting; and the

third receives newly fallen leaves. If there is space for only one pile, new material may be added gradually to the top while removing the decomposed product from the bottom.

### Containing the Pile

Composting may be done in a loose pile. However, for the most efficient use of space, it can be contained in a bin or other enclosure. The sides of this bin should be loose enough to permit air movement. One side should be open, or easily opened, for turning the pile and for removing the finished compost.

Woven wire or wooden slat fencing, or cement blocks on their sides have been used successfully. Wood gradually decomposes, and wire fencing may rust, so these materials will need periodic replacement. Wooden stakes driven into the ground may attract termites, so lumber treated with wood preservative or metal snow-fence posts may be better.

### Constructing the Pile

Many instruction sheets advocate constructing the pile in layers that may include grass clippings, fertilizer, limestone, manure, soil, and leaves. However, we have found this practice to be unnecessary. The pile can be constructed of leaves only. A small amount of grass clippings may be added to the leaves as the pile is being constructed. However, because of its high demand for oxygen, too much grass tends to cause an anaerobic (without oxygen) condition. This greatly reduces the composting rate, and can produce unpleasant odors. Fresh vegetable peelings may be included, but do not add meat or grease because they may cause odors or attract pests.

Unless leaves are collected in a very wet condition, add water while placing them in the pile. Without moisture, the microorganisms will not function. Moist-en to the point



where it is possible to squeeze droplets of water from a hand-held mass of leaves.

Dead leaves lack adequate nitrogen for rapid decomposition. Therefore, a high-nitrogen fertilizer added to the pile may speed up decomposition. However, since leaves fall only for about 2 months a year, there are 10 months for decomposition before space is needed for the next batch. So, while it is generally unnecessary to add fertilizer, for more rapid decomposition and a product with a higher nutritive content, 5 ounces (about 1/2 cup) of 10% nitrogen fertilizer per 20-gallon can of hand-compacted leaves could be added. Fresh manure could be substituted, but it may cause odor problems.

Ordinarily it is unnecessary to add ground limestone because the pile seldom becomes too acidic. If fertilizer has been added, an equivalent quantity of limestone will counteract any acidity. Little or no limestone should be added if the compost is to be used on acid-loving plants.

Some guides on leaf composting recommend adding layers of soil periodically to the piles to supply the microorganisms needed for decomposition. We have not found this practice to be necessary, because leaves, themselves, contain a multitude of microorganisms. Available commercial activators or starters definitely are not needed.

Avoid packing the materials too tightly. Too much compaction will limit movement of air through the pile. Shredding the leaves generally speeds up composting.

To reduce weed germination, weeds in flower or with seeds should not be composted. Also, it is best to avoid composting diseased plants, or herbicide-treated lawn clippings until after at least three mowings.

## Care of the Pile

The composting pile must be kept moist, but not soggy, for proper decomposition. Inadequate moisture reduces microbial activity, while excessive water may cause anaerobic conditions. A thin outer layer of dry leaves is unavoidable.

The pile should be periodically turned or mixed. The main objectives of turning are to shift materials from the outer parts of the pile closer to the center for better decomposition, and to incorporate oxygen. During warm weather, turn the pile once a month. In cool weather frequent turning is not recommended because it allows too much heat to escape. Piles should be turned immediately if ammonia or other offensive odors are detected. If space is available, turning may be accomplished by shifting the entire pile to an adjacent area or bin.

Within a few weeks after starting, the pile should be hot in the center. Heating generally indicates that the pile is decomposing properly. Failure to heat may be caused by too little or too much water, improper aeration, packing too tightly, or a pile that is too small. As leaves decompose, they should shrink to less than one-half of their original volume. During dry weather it may be necessary to add more water. The moisture content of the interior of the pile should be observed while turning.

## Using Leaf Compost

Finished compost should be dark and crumbly with much of the original appearance no longer visible. It should have an earthy odor. Normally, compost will be ready in 4-9 months.

The major horticultural use for leaf compost is to improve the organic content of soil. Most New Jersey soils need an increase of 1/2 to 1% in organic content, particularly to improve moisture-holding capacity and tilth. Leaf compost is not normally a fertilizer, because it is too low in nutrients. Compost serves primarily as an organic amendment and as a soil conditioner. Soil mulch is another valuable use for leaf compost.

*Based in part on Experiment Station Research Project No. 07526.*

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# Fact sheet

## Using Leaf Compost

*Roy L. Flannery, Specialist in Soils, Emeritus and  
Franklin Flower, Specialist in Environmental Science, Emeritus*

Composting involves primarily the microbial decomposition of organic matter. Compost - the end product - is a dark, friable, partially decomposed substance similar to natural organic matter found in the soil. The organic matter content of soils is very important. It influences the physical condition, water-holding capacity, and temperature of the soil, and especially the soil bacterial processes which affect the availability of mineral salts to plants.

### Why Compost Leaves

If newly fallen leaves are added directly to the soil without first being composted, the microbes that decompose the leaves compete with growing plants for soil nitrogen. The temporary nitrogen shortage caused by the microbes can reduce plant growth. To reduce or eliminate this competition for nitrogen, composting of the leaves is recommended prior to incorporating them into soils.

### Need for Organic Matter

Most New Jersey soils need an increase of 1/2 to 1% in organic matter. Sandy soils, such as loamy sands and sands, and soils with very high clay content are improved the most by an increase in organic matter content.

### Benefits of Adding Leaf Compost to Soil

- Among the benefits derived from adding leaf compost to New Jersey soils are:
- Drought damage to plants is reduced because of an increased water-holding capacity of the soils.
- Soil tilth is improved making the soils easier to cultivate.

- Very small amounts of the 16 essential elements needed for plant growth are supplied.
- Adverse effects of excessive alkalinity, acidity, or over-fertilization are reduced by the added buffering of the soil.
- The cation exchange capacity of soils is increased, enabling the soils to hold more plant nutrients for longer periods.
- Decomposition of the organic matter produces organic acids which combine with iron and aluminum ions, thereby reducing their potential toxicity to plants. This also makes more phosphorus available for plants because free iron and aluminum can tie up the phosphates.
- The added organic matter provides a food source for desirable soil micro-organisms.
- When incorporated into the soil, or used in a thin mulch 1/16- to 1/8-inch thick, compost helps seeds to germinate.

Overall, compost improves the physical, chemical, and biological properties of soils. Leaf compost, however, is not normally considered a fertilizer as it is too low in nutrient content. It serves primarily as an organic amendment and a soil conditioner. The nitrogen content of composted leaves on a dry basis is about 1/2 to 1% by weight. For other materials commonly added to backyard leaf compost piles, the nitrogen content is: blood meal 10-14%; grass clippings 2-4%; coffee grounds 1 1/2-2%; eggshells 1-2%; horse manure 1-5%; cow manure 1-1 1/2%; poultry manure 3-5%; ammonium sulfate 20 1/2%; urea 45%; bone meal 1 1/2-4%; and cotton seed meal 6-7%.

## When Compost is Ready to Use

When compost is ready to use (6 to 18 months after starting) its temperature will generally have decreased to slightly above air temperature. Finished compost will usually be drier than leaves during composting. The material also will be crumbly in texture. Before using compost, "screening" may be necessary to remove the larger partially decomposed materials. These materials will sometimes be present in composting piles because not all items decompose at the same rate. The undecomposed organic matter clumps may be broken up and added to another active compost pile for additional decomposition.

## Adding Leaf Compost to the Soil

A good rate of organic matter to work into the top 6 1/2 to 7 inches of most New Jersey cultivated soils is 0.5 to 1.0% organic matter by weight. This is equivalent to adding 900 to 1,800 wet pounds (25 to 50 bushels) of leaf compost per 1,000 square feet of area. To accomplish this, spread a 3/8- to 3/4-inch depth of leaf compost uniformly over the soil surface and mix into the top 6 to 8 inches of soil.

Little or no nitrogen will be released from compost for plant use during the season immediately following incorporation into the soil. It is generally necessary to add nitrogen to soils containing compost to prevent the compost from "robbing" the soil of nitrogen and creating deficiency problems in plants grown in the soil. Adding 1 to 1 1/2 lbs. of 10% nitrogen fertilizer to each 100 lbs. (about 3 bushels) of leaf compost is recommended.

The preceding recommendations supply only the needs of the leaf compost. Most plants require an additional 1 to 3 lbs. of actual nitrogen per 1,000 square feet for normal feeding. This nitrogen should be applied to the soil in addition to that applied in the leaf compost.

## Using Leaf Compost as a Mulch

Leaf compost can also be used as an organic mulch on the surface of soil in place of peatmoss, straw, etc. Organic mulches are valuable because they:

- Reduce rainfall runoff, thereby making more water available for plant growth.

- Decrease water evaporation losses from the soil.
- Keep the soils cooler in hot weather and warmer in cold weather.
- Reduce alternate freezing and thawing of soils which can injure the fibrous roots of plants.
- Help to prevent soil erosion by wind or water.
- Keep soils friable, therefore easier to cultivate.
- Increase biological activity of earthworms and other soil organisms.
- Prevent soil spattering on leaves, flowers, or fruits such as strawberries.
- Reduce soil compaction from rain and irrigation water.
- Help to control weeds.
- Present a pleasing appearance.

Recommended thicknesses of mulch layers: 2-3 inches for deciduous shrubs and trees, vegetables, and rosebeds; 3 inches for flower beds; and 3-4 inches for shallow-rooted, acid-loving plants.

## Other Uses for Leaf Compost

Leaf compost may also be used in potting soil. However, no more than 25 to 30% of the potting soil should be leaf compost. Frequently leaf compost will continue to decompose. If more than 25 to 30% of the potting soil is leaf compost, there will be a significant volume reduction of the potting soil after 1 year.

Composting generally destroys most weed seeds contained in the compost material; however, not all of them will be destroyed. Some are heat resistant, and others will not be fully exposed to the high temperatures. If a completely pasteurized leaf compost is desired for potting soil, it will be necessary to heat it in an oven until the temperature of the center of the mass reaches 180°F and is maintained for 30 minutes.





# Fact sheet

## Vermicomposting (Worm Composting)

*Jonathan H. Forsell, Agricultural/Resource Management Agent, Essex County*

Kitchen wastes, such as fruits, vegetables, coffee grounds, tea bags, and eggshells, are a part of the solid waste stream. Most of this material is disposed of as garbage at transfer stations, landfills, and incinerators at a high economic and environmental cost to citizens. A positive alternative is to compost kitchen scraps using red worms to make a valuable compost for use as a soil amendment or as a starter mix for house plants or seedlings. **Note:** Avoid meats, oils, and grease in the compost system.

Worm composting is enjoyable, and it demonstrates the natural process of decomposition and the life cycle of the organisms involved.

### Materials

- A worm bin can be made from an old dresser drawer, a 5-gallon plastic bucket, or from wood. A wooden box should be approximately 2 ft. X 2 ft. X 8 in. high. Do not use cedar, as it is toxic to the worms.
- Bedding material: shredded, moist newspaper, cardboard, and/or leaf compost.
- Watering can or container to provide water for the system.

- Red worms (*Eisenia foetida*) 1 pound. They can be ordered from:

Flowerfield Enterprises  
10332 Shaver Road  
Kalamazoo, MI 49002

Lower East Side Ecological Center  
P. O. Box 20488  
New York, NY 10009

### Procedure

1. Shred newspapers or cardboard or use leaf compost. Moisten this material and place it in the bin loosely to provide for air circulation.
2. Add 1 lb. of red worms to the bin. They will crawl to the bottom of the bedding material to avoid the light.
3. Place food scraps except animal products (meats, greases, etc.) under the bedding. The worms can consume 3 to 3 1/2 lbs. of kitchen waste per week while making vermicompost.
4. Keep the bin covered loosely with plastic or newspaper to retain moisture. The box should be checked every day or two

for moisture. When the surface or edges of the bedding begin to dry, add water.

## Summary

The process takes about 3 to 4 months to produce a finished vermicompost product, which looks like brown coffee grounds. The compost consists of worm castings, partially decomposed kitchen waste, and some undecomposed bedding. The worms eat not only the food, but also the newspaper or other bedding. Vermicompost can be mixed into garden soil to improve structure and to provide nutrients, can be used as mulch, or as a potting soil mix.

To separate the compost, place it on a table under lights. The worms will go to the bottom of the pile away from the light. Remove the finished compost and start the process over again. Because the worms have reproduced, you can separate out the surplus and start a new box. Always keep the bin at a temperature above freezing and below 95°F. The bin should be kept indoors in winter, but can be placed in the shade in summer. Stop feeding for several days or weeks before ready to use.

## References

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

