

# Composting and Organic Matter



LESSON ELEVEN

## What's Ahead

In this lesson, you'll learn:

- what organic matter is, and why it's good for the soil;
- how to add organic matter to the soil;
- how to compost wastes; and
- how to use green manures and cover crops.

Plants take nutrients from the soil as they grow. Gardening depletes the soil of essential nutrients and organic matter (decomposed animal and plant material). For this reason, gardeners add fertilizer, lime and organic matter to keep the soil fertile. A fertile soil means a more productive garden. Knowing how much to add to your soil is difficult without a soil test. A soil test will give you nutrient levels, organic matter percentage and a pH level.

Plants need at least 16 different nutrients to grow well. In addition, they need water, sunlight and proper temperatures. As the plants grow, they use nutrients, moisture and organic matter, which need to be replaced.

Organic matter helps your garden in a number of ways. It helps hold nutrients and moisture. It attracts and maintains helpful soil organisms and makes the soil crumbly and easier to work. Temperature changes and time act on organic matter to make it usable by plants.

Adding manures, compost (fully decomposed organic materials), cover crops (quick-growing plants used to cover soil) and other organic materials can improve the soil. Organic materials can boost the soil so that you won't need to add as much synthetic fertilizer. High-

quality soil does not come about with one, or even several, additions of organic material. It requires an on-going soil-building program.

## Adding Organic Matter to the Soil

Good sources of organic matter include manures, leaf mold, sawdust, straw and compost. When added directly to garden soil, these materials are decomposed by soil organisms. Various factors, such as moisture, temperature and nitrogen availability, determine the rate of decomposition.

You need enough water and warm temperatures for soil microbes (organisms) to work. Soil microbes also need nitrogen to break down organic matter. You may need to add nitrogen if you add large amounts of undecomposed substances (dried leaves, straw, sawdust). Fresh green wastes, such as grass clippings, are high in nitrogen. Nitrogen fertilizer may not be needed.

## Compost: The Ideal Soil Builder

Compost is a dark, crumbly and earthy-smelling form of decomposed organic matter. Compost is created over time as materials break down naturally.

Compost is a better soil amendment than leaves or straw, because it returns organic matter to the soil in a usable form. Also, since it is fairly well decomposed already, it does not remove nitrogen that your garden plants need from the soil. In fact, it adds nitrogen in a form that benefits the plants.

Microbial decomposition of properly mixed raw organic materials will turn the materi-

## Lesson 11 Composting and Organic Matter

als to a humus. Humus is a dark, fluffy product resembling rich soil. It can be spread and mixed into the garden soil.

### Making Compost

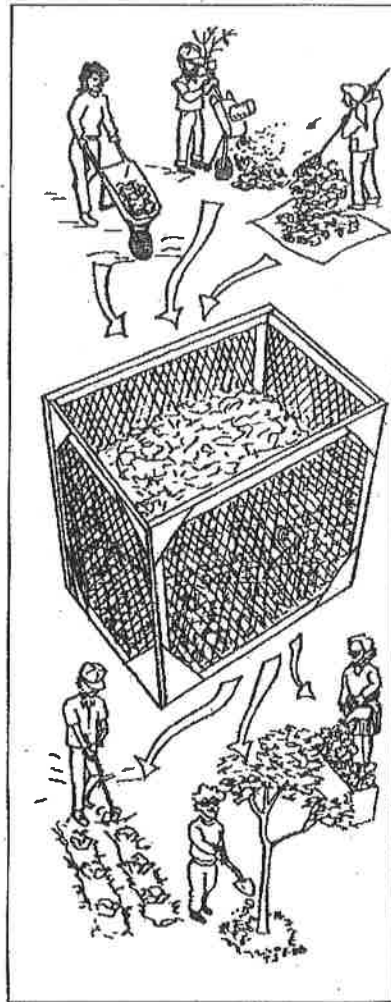
Anything that was once alive can be composted. Yard wastes, such as fallen leaves, grass clippings, weeds and the remains of non-diseased garden plants, make excellent compost. Composting is a practical and convenient way to handle your yard and garden wastes. It is more ecologically effective than bagging them or taking them to the transfer station or landfill.

Take care when composting kitchen scraps. Don't compost meat, bones and fatty foods (cheese, salad dressing and leftover cooking oil). In addition, pet wastes and cat litter should not be composted because of possible diseases.

Compost will result with or without your help. It can take six months to two years to compost if you do nothing. You can speed things up by managing the compost pile or bin.

There are some things that are essential for composting. With the following principles in mind, anyone can compost.

**Biology:** The compost pile is a home for many organisms. They break down the materials by using the pile as a food source. Bacteria start the process and are the most numerous and effective



composters. Fungi and protozoans soon follow. Later, centipedes, millipedes, beetles and earthworms do their part to break down the plant tissue.

### Carbon to Nitrogen Ratio:

Anything growing in your yard is potential food for these tiny decomposers. Carbon and nitrogen from the cells of dead plants fuel their activity. The microorganisms use the carbon as an energy source and the nitrogen as a protein source. Both are important.

Everything organic has a ratio of carbon to nitrogen (C:N). For fast decomposition, start with 30 parts carbon to one part nitrogen. Mix your materials with this ratio in mind, but don't let this ratio keep you from composting. Materials will decompose in spite of what you do. (Examples of C:N ratios: sawdust 500:1; table scraps

15:1; grass clippings 20:1; leaves 60:1.) A mature compost has a C:N ratio of 12-20:1.

**Particle Size:** The more surface area the microorganisms have to work on, the faster the materials decompose. Chopping or shredding your garden waste will speed up the process. Using an electric or gasoline-powered machine to shred materials is a wasteful practice, so do this by hand.

**Size of Pile:** A large compost pile will insulate itself and hold heat. As the microorganisms

▶ **KEY POINT 1:**

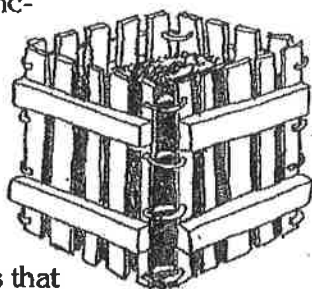
Compost is a dark, crumbly, earthy smelling form of decomposed organic matter.

▶ **KEY POINT 2:**

Organic matter helps soil hold nutrients and moisture, makes it more crumbly and easy to work and attracts soil organisms.

decompose the organic matter, they create heat between 120 and 160 degrees F. A pile has to be big enough to maintain its heat and the life within the pile. A small or flat pile (less than 3 x 3 x 3 feet) will have trouble holding heat.

**Moisture and Aeration:** Compost piles need water and air. Microbes function best when the composting materials are about as moist as a wrung-out sponge. Mixing and aerating the pile occasionally (every three to four days) assures that the microbes have the air they need to breath.



*Wooden Box Bin*

**Time and Temperature:** The temperature within the pile can get as hot as 160 degrees F. Some weed seeds and disease organisms are destroyed in these high temperature ranges. However, cooler sections of the pile may not get sterilized. Turn pile when the temperature drops or goes over 150 degrees F. If a pile is not turned, the composting process will take longer to break down. A well-managed pile could be thoroughly composted in six to eight weeks.

## Easy Home Composting Systems

### Holding Units

Holding units save labor and time. Here are some units to consider.

**Compost Mound:** Yard waste can be composted without a bin if you don't mind the appearance of an uncontained compost mound in your yard. The only cost is your time and effort.

**Garbage Can Composter:** A garbage can is

inexpensive and easy to use. Poke holes in it for air. It can be used for food and garden waste. You'll need to turn the materials.

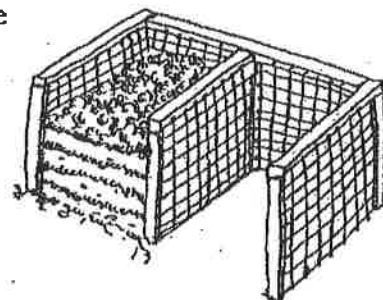
**Snow Fence Bin:** A snow fence bin is simple to make. It works best with four posts pounded into the ground for support.



*Snow Fence Bin*

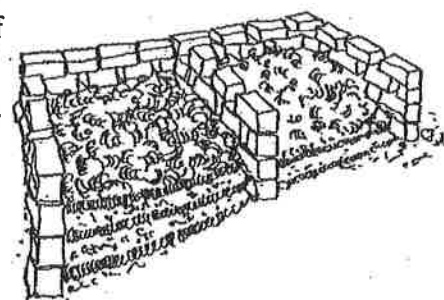
**Wooden Box Bin:** A wooden box bin can be built inexpensively using wooden pallets, or you can use lumber to build a nicer looking bin.

**Wire Mesh Bin:** A wire mesh bin is inexpensive and easy to build out of hardware cloth. Posts pounded into ground can be used for support.



*Wire Mesh Bin*

**Cement Block Bin:** A cement block bin is sturdy, durable and easily accessible. If you have to buy the cement blocks, it can be expensive.



*Cement Block Bin*

### Turning Units

Turning units of three or more bins allow you to store waste and turn it on a regular schedule. This method is a lot more work, but it produces high-quality compost in a short time.

**Cement Block Turning Units:** A cement block turning unit looks like three cement block bins in

## Lesson 11 Composting and Organic Matter

### ▶ KEY POINT 3:

In a compost pile, soil organisms break down materials by using them as a food source.

Compost Troubleshooting Guide		
Symptom	Problem	Solution
Bad odor	Not enough air	Turn pile
Center of pile dry	Not enough water	Moisten and turn pile
Pile damp and warm only in middle	Pile too small	Add more materials and mix with rest
Pile damp and sweet-smelling, but no heat	Pile lacks nitrogen	Mix in fresh grass clippings, fresh manure, blood meal or ammonium sulfate

waste in small holes (pockets) in your garden, and let the microorganisms and soil animals do the work. Store your kitchen scraps in a plastic container until you are ready to compost them.

**Plastic Trash Bag:** If you need only a small amount of compost, you can use a plastic trash bag to compost relatively fine material, such as leaves, lawn clippings or chopped garden refuse. Make

a row. It is sturdy, and if you can find used cement blocks, it is inexpensive to build.

**Wood and Wire Three-Bin Turning Unit:** A wood and wire three-bin turning unit can be used to compost large amounts of yard, garden and kitchen wastes in a short time. Although relatively expensive to build, it is sturdy, attractive and should last a long time. Construction requires basic carpentry skills and tools.

### Other Home Composting Systems

**Worm Composting Bin:** Worms in the house? Yuk! But this composting system actually works! The worms stay in the box and eat house scraps. The box gives off little or no odor. Worm composting can be done in an apartment or home with no yard space. Fill the bin with moist bedding (peat moss or shredded newspaper), and mix food wastes throughout bin. As worm population increases, divide and move to fresh bedding.

**Compost Pockets:** This is an easy composting shortcut. You bury your fruit and vegetable

layers as in a compost pile, or mix all materials together. Add water to dry material. Tie the bag and turn it over every few weeks to aerate the material and distribute the moisture. Open the bag to allow air to enter.

### Cover Crops and Green Manures

Other sources of inexpensive soil improvement are cover crops and green manures. Green manure is grown for the purpose of being tilled into the soil. It decomposes and increases soil fertility and organic matter content. Cover crops are grown to reduce erosion and topsoil loss, control weeds and enrich the soil when they are tilled in before planting.

Green manures and cover crops, such as winter rye or oats, are planted in the garden in the fall and tilled in the spring. For best results, sow seed about four weeks before the first killing frost. In a fall garden, plant cover crops between the rows and in any cleared areas. Till in green manures at least two weeks before planting

vegetables. They should not be allowed to go to seed.

Legumes are plants from the pea family that add nitrogen to the soil when they grow and decompose. Legume cover crops can increase the amount of nitrogen in the soil and reduce fertilizer needs.

A deep-rooted cover crop allowed to grow for a season in problem soil can help break up hard-packed soil and greatly improve tilth (the physical condition of the soil).

## Summary

Now that you've learned about organic matter and composting, apply your knowledge by answering the **Study Questions** and doing a **Study Activity**. In Lesson 12, you'll learn about harvesting, crop storage and garden clean-up.

## Study Questions

1. Define compost, organic matter, and C:N.
2. How does organic matter benefit your garden soil?
3. What items shouldn't be used in a compost pile?
4. How does composting work? List the principles of composting.

(See answers on the bottom of this page.)

## Study Activities

### Compost Set-Up

Plan a compost system for your use, and start up a pile.

### Compostables

List composting materials easily available to you.

### Pile Field Trip

Visit a friend's or neighbor's compost pile. Explore and observe new techniques.

### Build a Bin

Request compost bin construction plans from your library or University of Maine Cooperative Extension office, or call 1-800-287-1471.

## Other Resources

Check at your county Extension office for these materials:

- Bulletin #1143, Home Composting
- Bulletin #1140, Composting to Reduce the Waste Stream
- Bulletin #1159, How Compost Happens

### Study Question Answers

1. Compost: A dark, crumbly, earthy-smelling form of decomposed organic matter. Organic matter: Decomposed animal and plant material. C: N: Carbon to nitrogen ratio.
2. Helps hold nutrients, moisture; attracts and maintains soil organisms; makes soil crumbly and easier to work.
3. Meat, bones, fatty foods, pet wastes, cat litter.
4. Soil organisms break down materials in the pile by using them as a food source. Biology; C:N ratio; particle size; pile size; moisture and aeration; time and temperature.

