

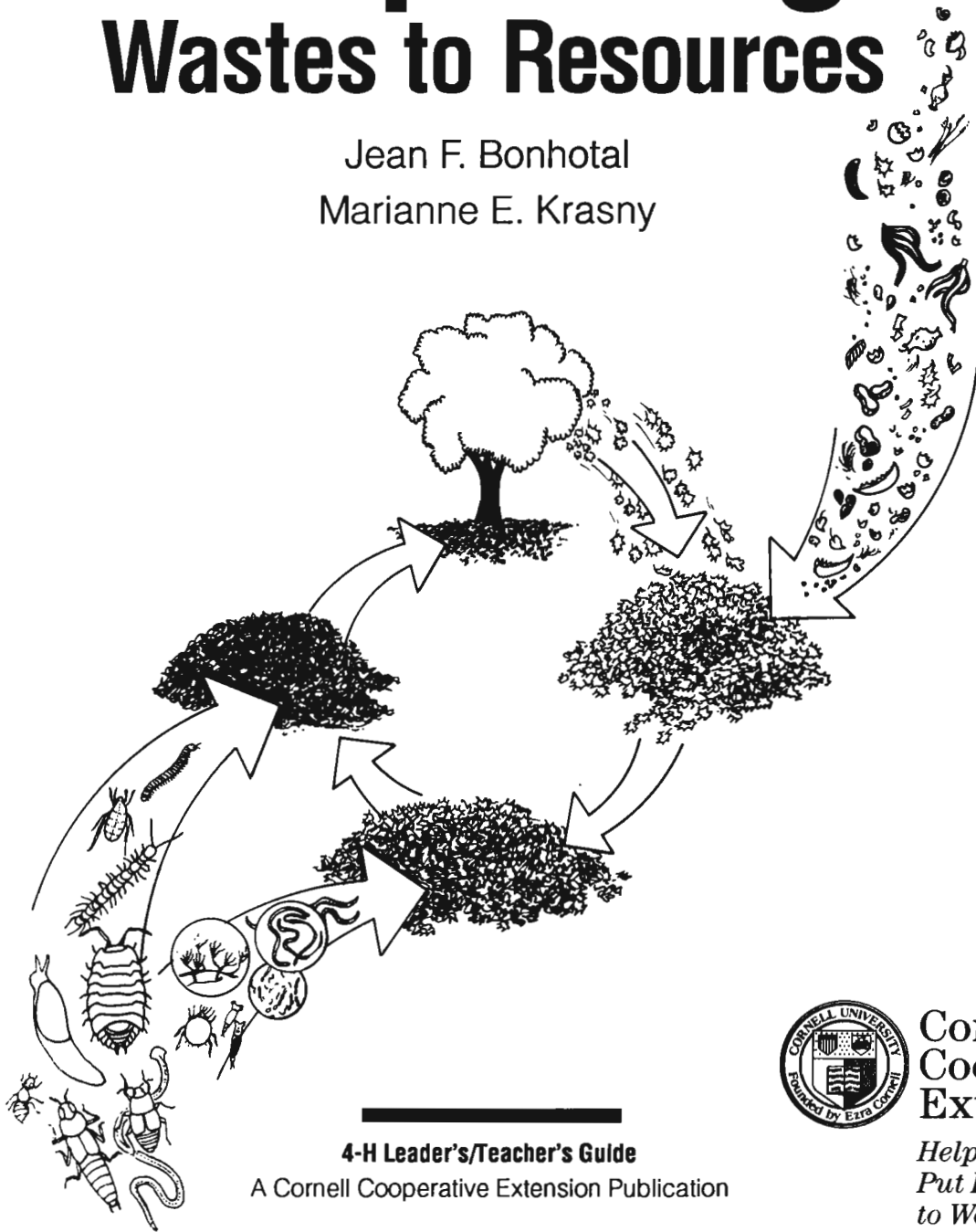
EXPERIENCE



4-H NATURAL RESOURCES

Composting: Wastes to Resources

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Marianne E. Krasny



4-H Leader's/Teacher's Guide

A Cornell Cooperative Extension Publication



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Composting: Wastes to Resources

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This publication was developed to support 4-H programs in New York State.

The authors thank the following persons for their contributions to this publication: Robert E. Kozlowski, extension associate, Department of Floriculture and Ornamental Horticulture; and Thomas Richard, senior research support specialist, Nancy Dixon, environmental planner, and Howard Longhouse, lecturer, Department of Agricultural and Biological Engineering, Cornell University.

The authors also thank the Seattle Engineering Department and the Seattle Tilth Association for granting permission to Cornell Cooperative Extension to adapt the designs of their composting systems.

The illustration on page 24 is modified from Dindal, *Ecology of Compost: A Public Involvement Project*.



Introduction

Composting: Wastes to Resources is designed for adult volunteer leaders, camp counselors, and teachers who want to set up composting projects with youth. This guide explains what composting is and how it works and describes different composting systems. (Specific designs for building com-

posting systems are included in your pocket folder.) Solutions to problems that may arise in composting are provided as well as suggestions about how to use your compost. The Compost Investigations and list of resources will help you and the youth in your group learn more about composting.

Getting Started

Interest is the first step in getting started on a project. As a leader planning to work with youth on a composting project, you are probably already interested in composting. If you work with youth who are concerned about environmental problems, particularly solid waste disposal, then it should be easy to get them involved. Youth who like to garden may also develop an interest in composting.

Knowledge is the second step in getting started on a project. We suggest you read Sections I through IV to learn more about composting. Then meet with your youth group and get them started. The two posters included in your pocket folder—"Best Ever Compost" and "How Does Composting Work?"—will help your group understand composting.

The youth in your group may want to work together to build a composting system, or each may want to build his or her own system. Once your

group has decided which composting system(s) to build, provide the members with photocopies of the instructions in the pocket folder.

Sometimes a composting system doesn't work. Use Section III to prevent or identify and solve composting problems. Reinforce what your group has learned with the problem-solving exercise in that section, which can be copied and distributed.

After the youth in your group have made compost (or have partially finished compost), they can learn more about the composting process by conducting one or more of the investigations in Section V. The instructions and record sheet for each investigation can be copied and distributed. You can also provide copies of the Compost Project Record found in the pocket folder.

Good luck with your composting project!



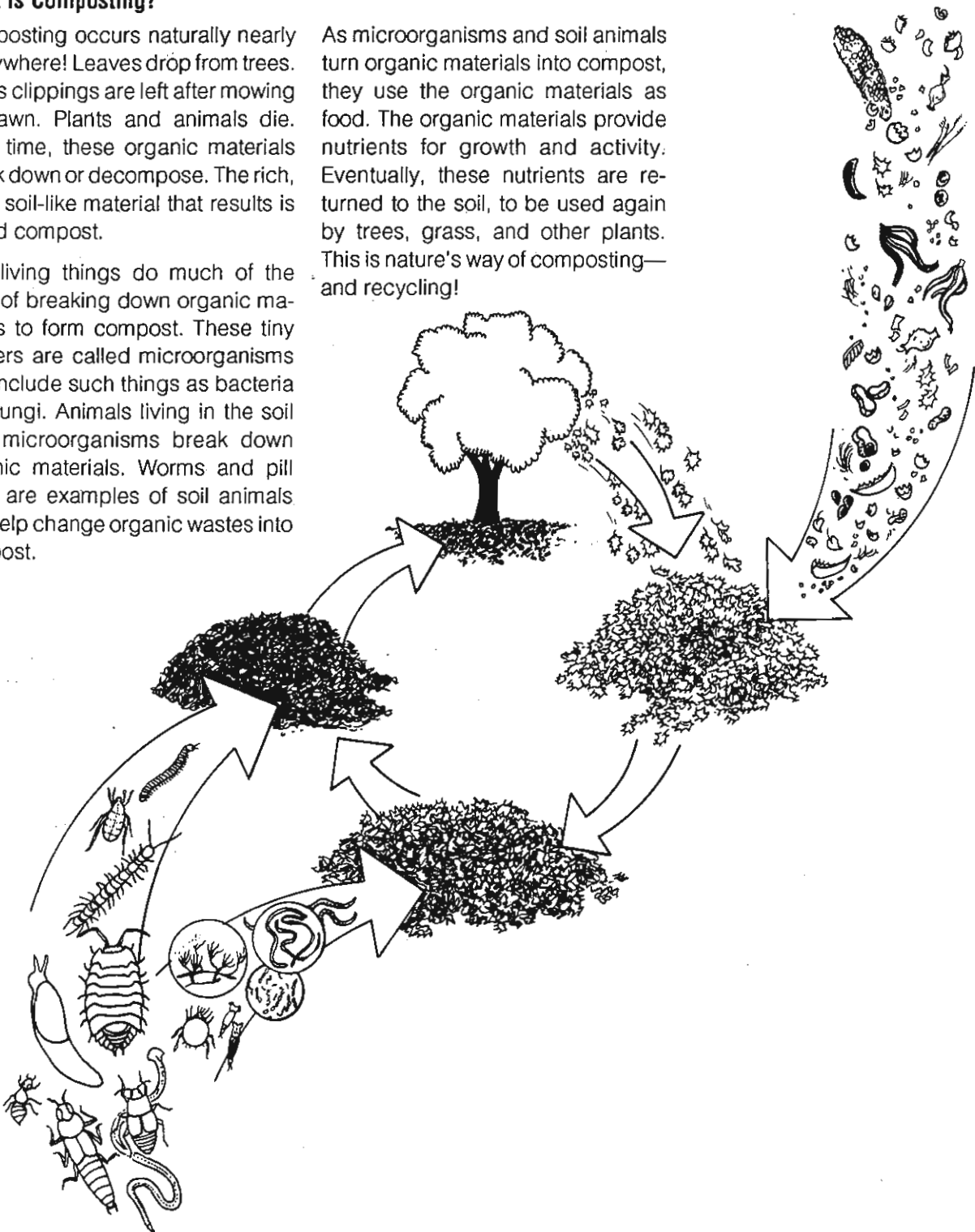
Section I Welcome to Composting

What is Composting?

Composting occurs naturally nearly everywhere! Leaves drop from trees. Grass clippings are left after mowing the lawn. Plants and animals die. Over time, these organic materials break down or decompose. The rich, dark, soil-like material that results is called compost.

Tiny living things do much of the work of breaking down organic materials to form compost. These tiny workers are called microorganisms and include such things as bacteria and fungi. Animals living in the soil help microorganisms break down organic materials. Worms and pill bugs are examples of soil animals that help change organic wastes into compost.

As microorganisms and soil animals turn organic materials into compost, they use the organic materials as food. The organic materials provide nutrients for growth and activity. Eventually, these nutrients are returned to the soil, to be used again by trees, grass, and other plants. This is nature's way of composting—and recycling!

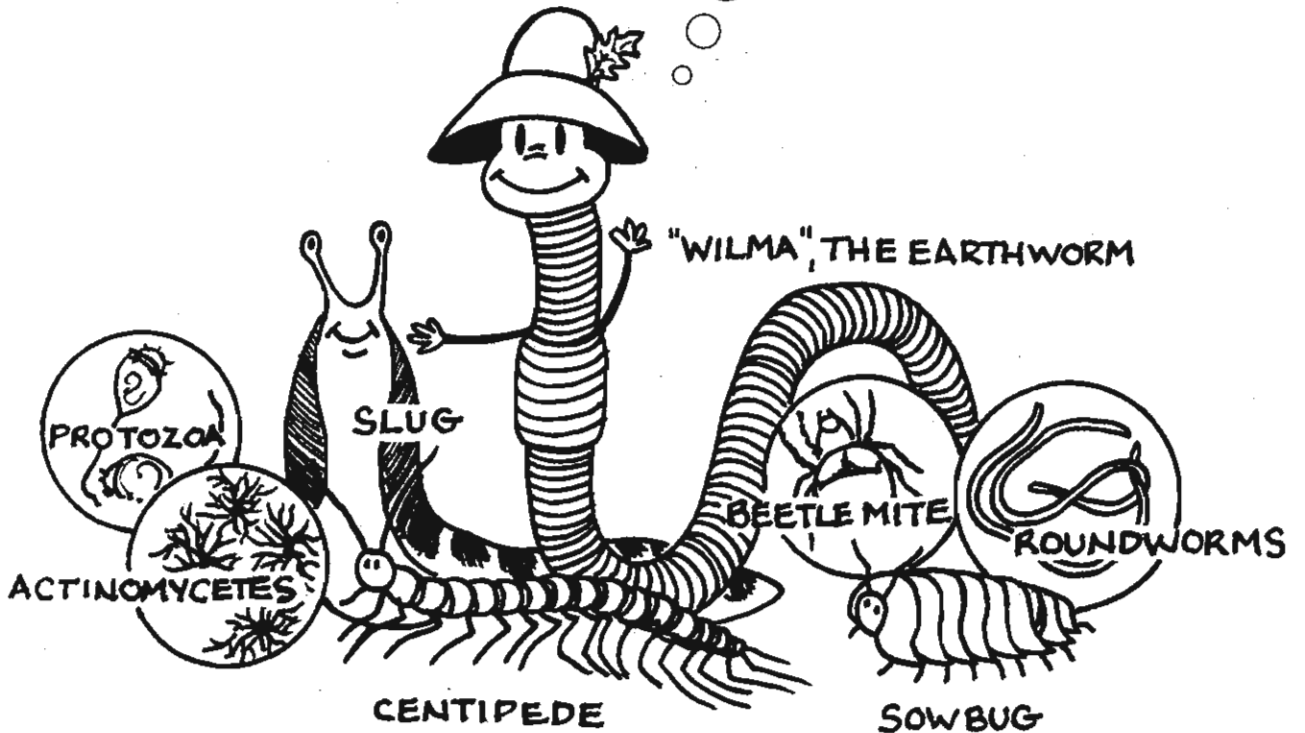




Why Compost?

With the composting methods described in this manual, you can help the composting cycle work even better than it does in nature. The organic wastes you put back into the environment can be used by other living things. This way, instead of going to a landfill or garbage-burning plant, your wastes become valuable resources.

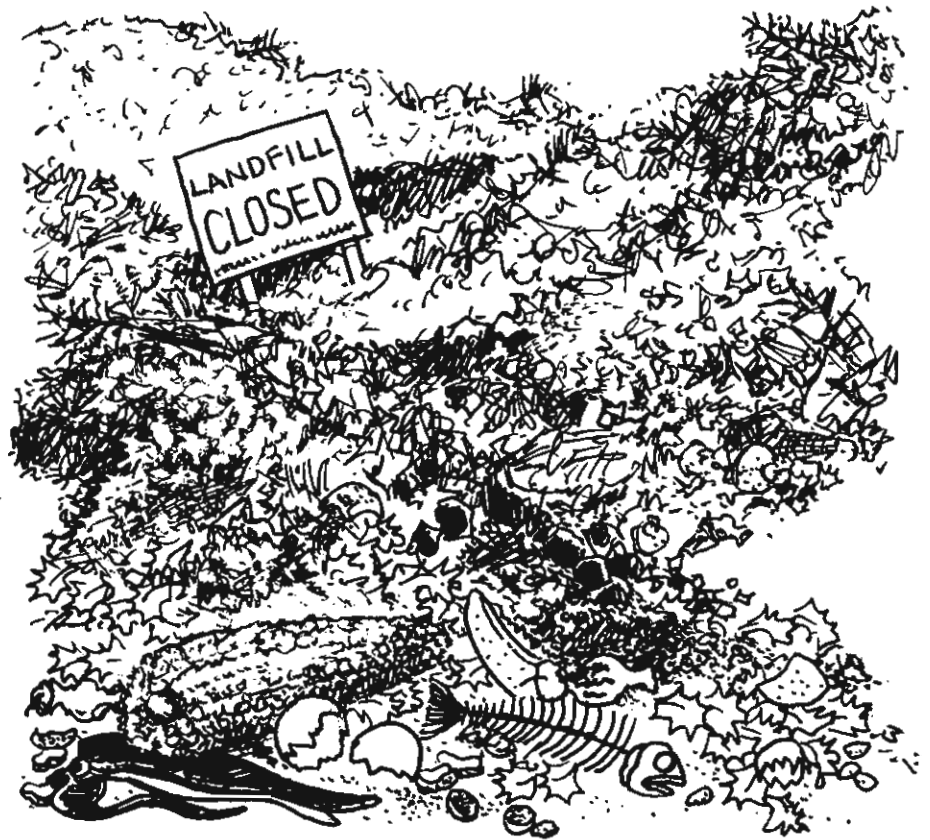
Composting can be fun! It allows you to get acquainted with many new organisms, including me and my neighbors.



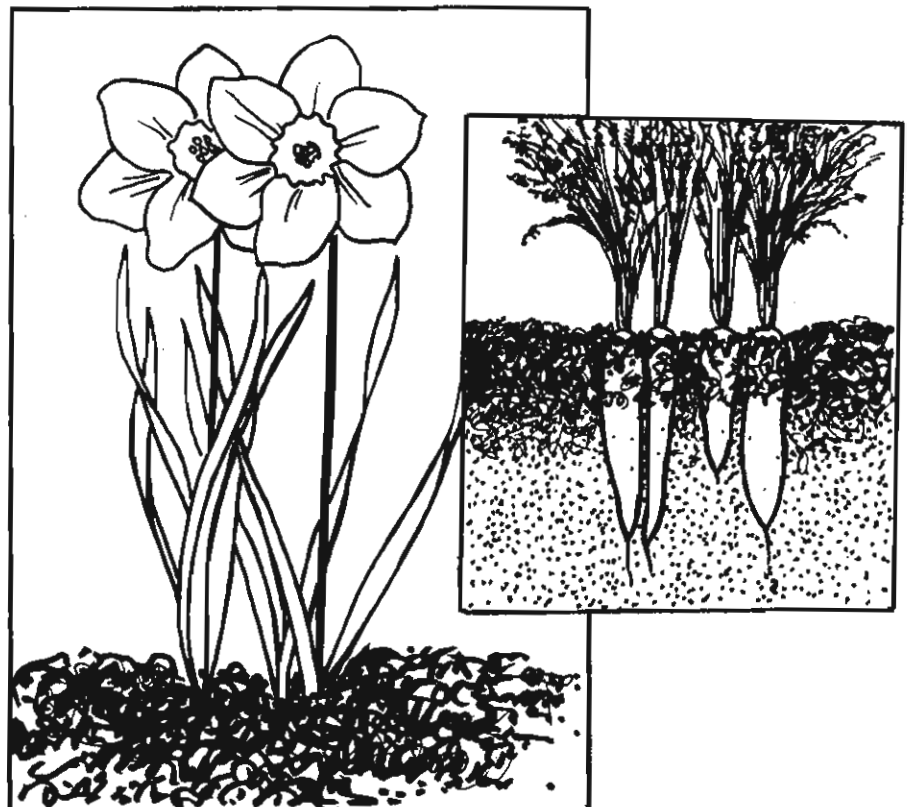


Reasons to Compost

Yard waste and food scraps make up 20 to 30 percent of garbage! Many landfills are filling up and closing. Finding places to put garbage is a big problem. By composting yard and kitchen wastes, you send less garbage to landfills.



Gardeners use compost. Compost allows the soil to hold more water and adds nutrients to the soil. Flowers, vegetables, trees, shrubs, house plants, lawns, and container gardens grow better in soil mixed with compost.



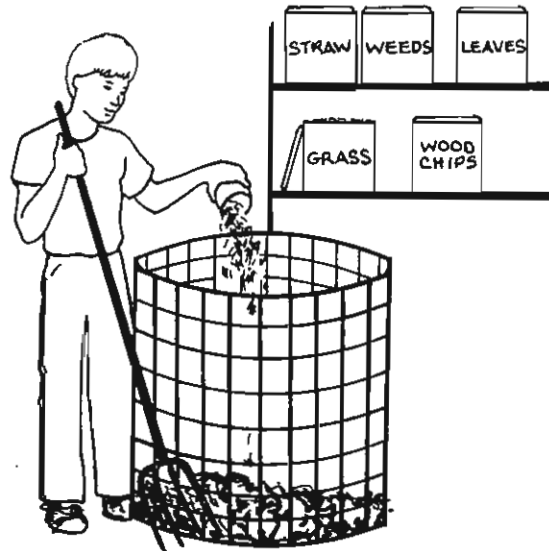


Best Ever Compost

Just Follow the Recipe!

Composting is like baking a cake. Simply add the ingredients, stir, "bake," and out comes—compost!

Whether you compost kitchen wastes or yard and garden wastes, there are a few basic steps to follow. Here are the necessary ingredients and general directions for composting.



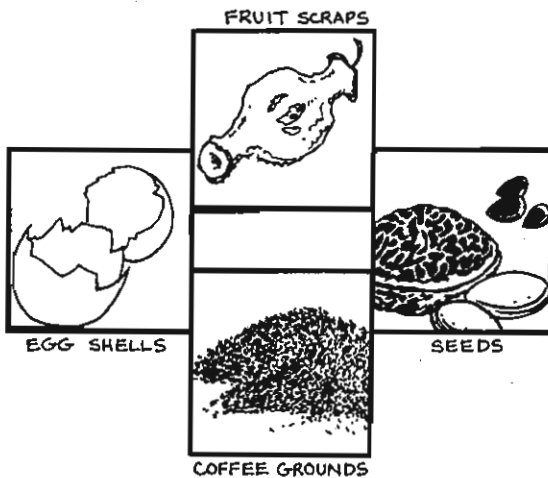
Ingredients

KITCHEN COMPOST

Add a mixture of some or all of the following ingredients:

- vegetable peels and seeds
- fruit peels and seeds
- coffee grounds
- egg shells
- nut shells
- any other vegetable or fruit scraps

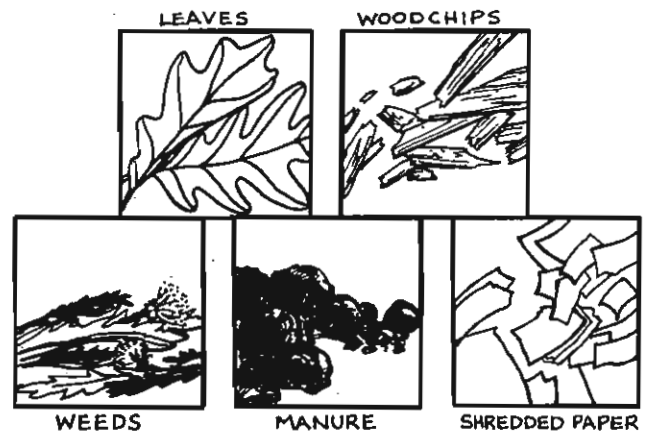
Note: (Do not add meat scraps, bones, dairy products, oils, or fat. They may attract pesty animals.)



YARD OR GARDEN COMPOST

Add a mixture of some or all of the following ingredients:

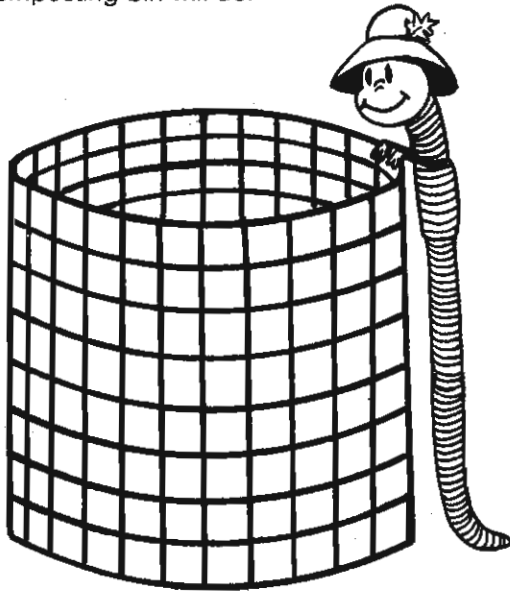
- hay or straw
- grass clippings
- leaves
- ashes
- sawdust
- wood chips
- weeds and other garden waste
- manure
- shredded paper



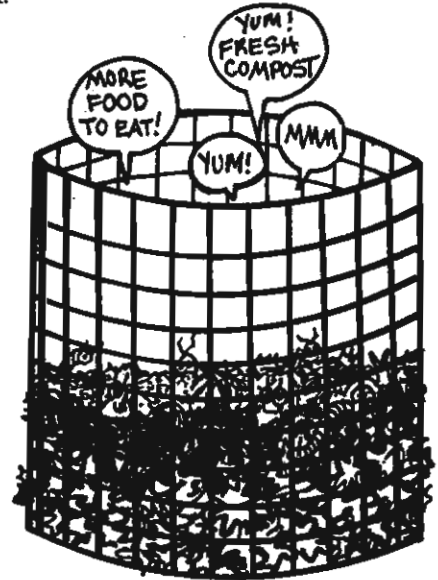


Directions

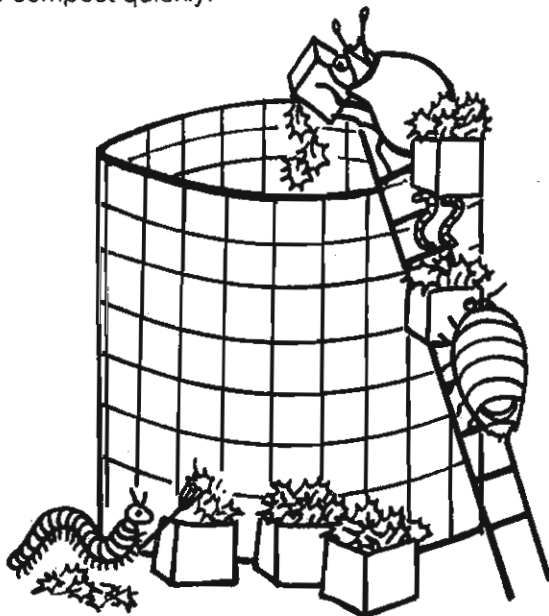
1. Choose a "pot" for baking your compost. Any type of composting bin will do.



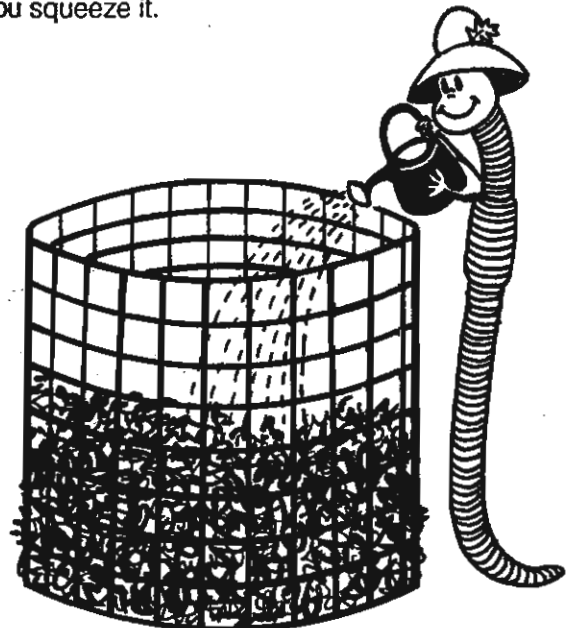
3. Spread soil or "already done" compost over the compost pile. This layer contains the microorganisms and soil animals that do the work of making the compost. It also helps keep the surface from drying out.



2. Place kitchen or yard wastes into the composting bin. Chop or shred the organic materials if you want them to compost quickly.

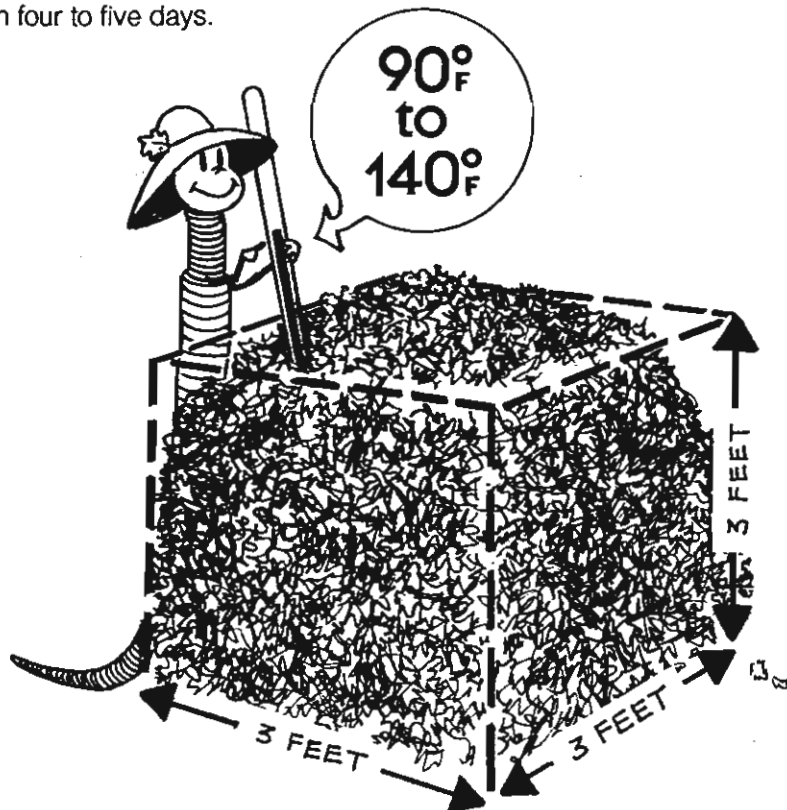


4. Adjust the moisture in your compost pile. Add dry straw or sawdust to soggy materials, or add water to a pile that is too dry. The materials should be damp to the touch, but not so wet that drops come out when you squeeze it.

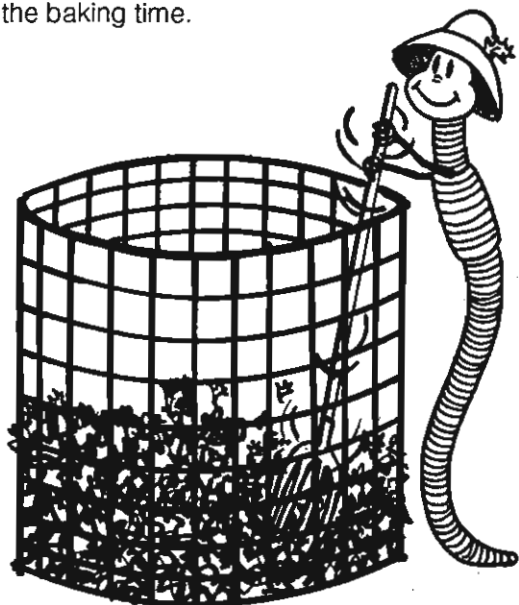




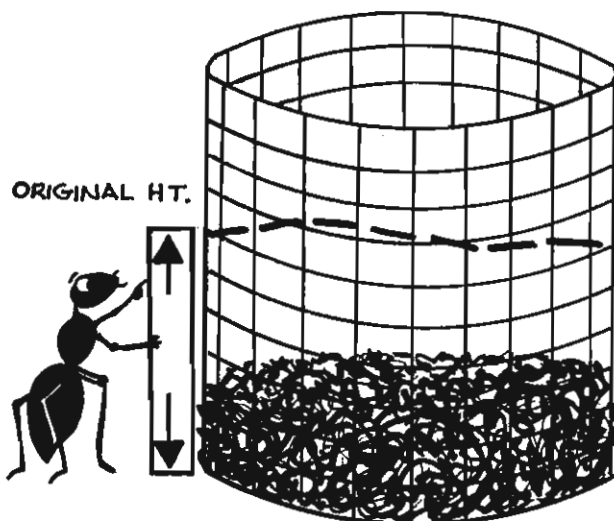
5. Allow the pile to "bake." It should heat up quickly and reach the desired temperature (90° to 140°F, or 32° to 60°C) in four to five days.



6. Stir your compost as it bakes if you want to speed up the baking time.



7. The pile will settle down from its original height. This is a good sign that the compost is baking properly.





8. If you mix or turn your compost pile every week, it should be "done," or ready to use, in one to two months. If you don't turn it, the compost should be ready in about six to twelve months.
9. Your "best ever compost" should look like dark crumbly soil mixed with small pieces of organic material. It should have a sweet, earthy smell.



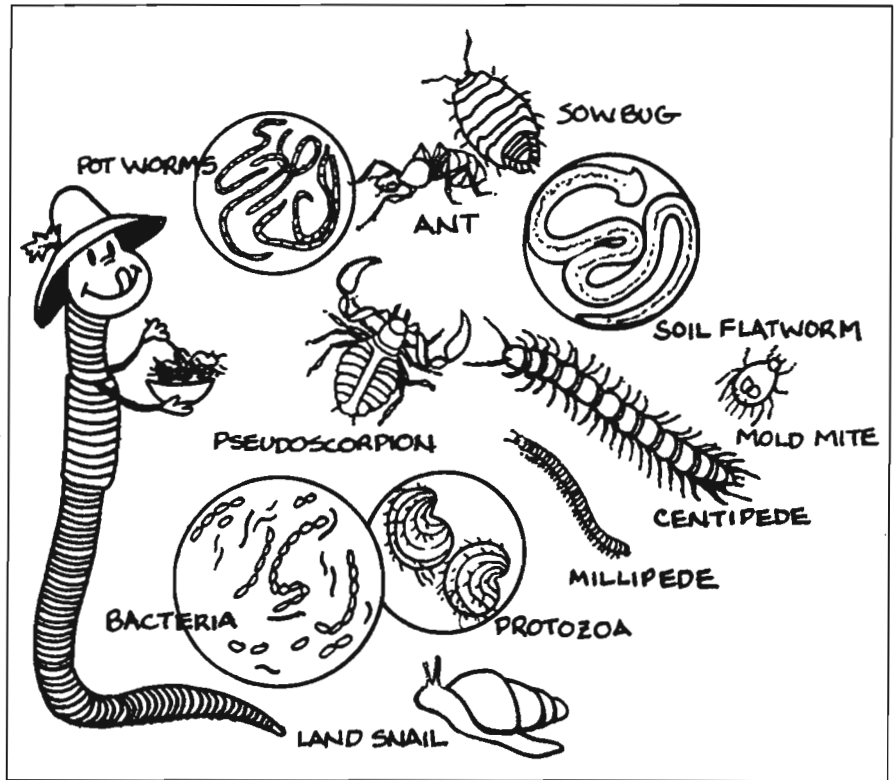
10. Feed compost to hungry plants by mixing it with the soil.





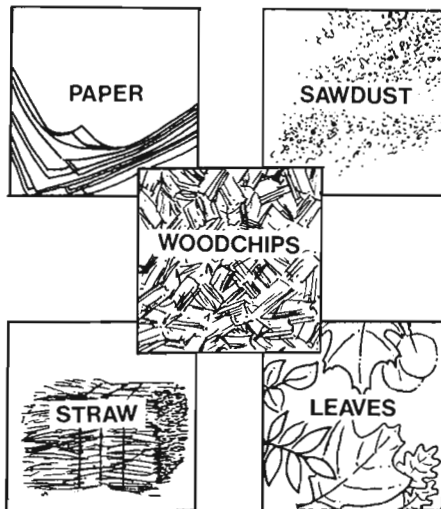
How Does Composting Work?

1. We are the key to composting. Normally, we live in the soil and eat small tidbits of organic matter such as leaves and twigs that nature hands out to us. We would like to have more to eat. A lot of the things that you call waste—for example, banana peels, rotten apples, brown wilted lettuce, fallen leaves, and weeds from your garden—are food for us.



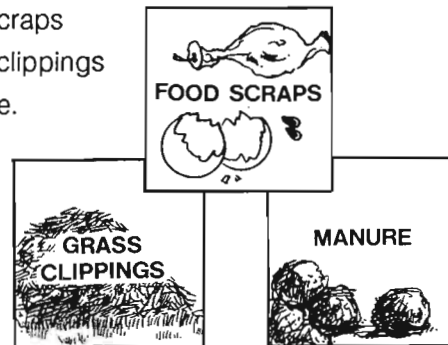
2. We need a balanced diet! We need carbon for energy and nitrogen to help build our bodies. Some of your wastes are high in carbon. These include

- paper
- sawdust
- wood chips
- straw
- leaves.



Other wastes are high in nitrogen. These include

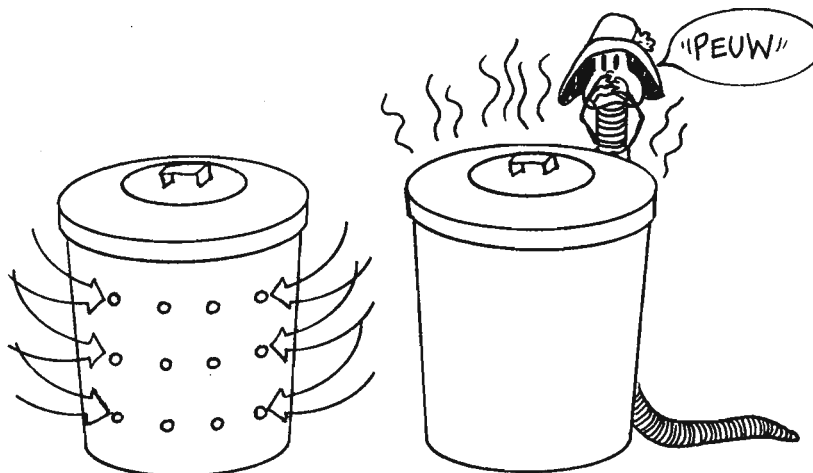
- food scraps
- grass clippings
- manure.



Be sure to include a mixture of wastes high in carbon and wastes high in nitrogen in your compost pile.



3. Don't smother us! We need air to survive. Be sure your compost container has holes in it to allow air to get into the compost pile. If possible, stir or turn your compost pile every week or so to let in more air. If we don't get enough air, many of us will die, and other microorganisms that don't need air will break down the wastes in your compost pile. These organisms give off a nasty smell and are slow workers. I think you'd prefer us in your compost pile!

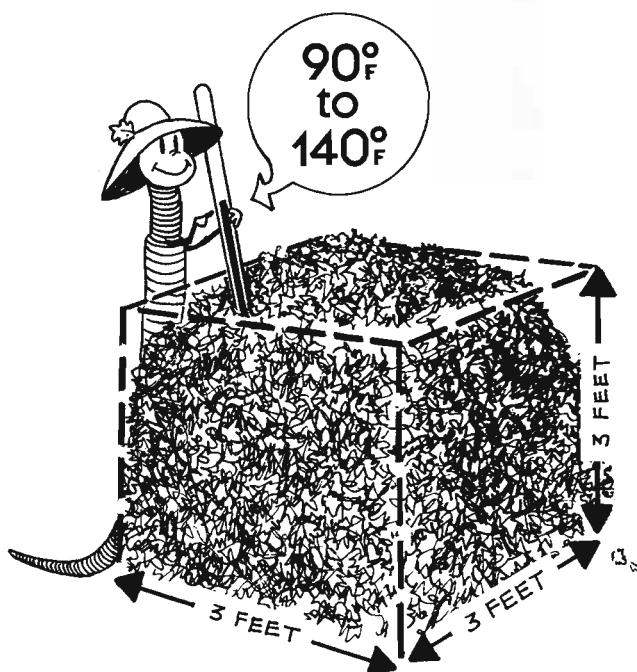


4. Don't let us dry out! We need water. Your compost pile should be about as moist as a sponge that has just been wrung out. If there is not much rainfall, add water to your compost pile.



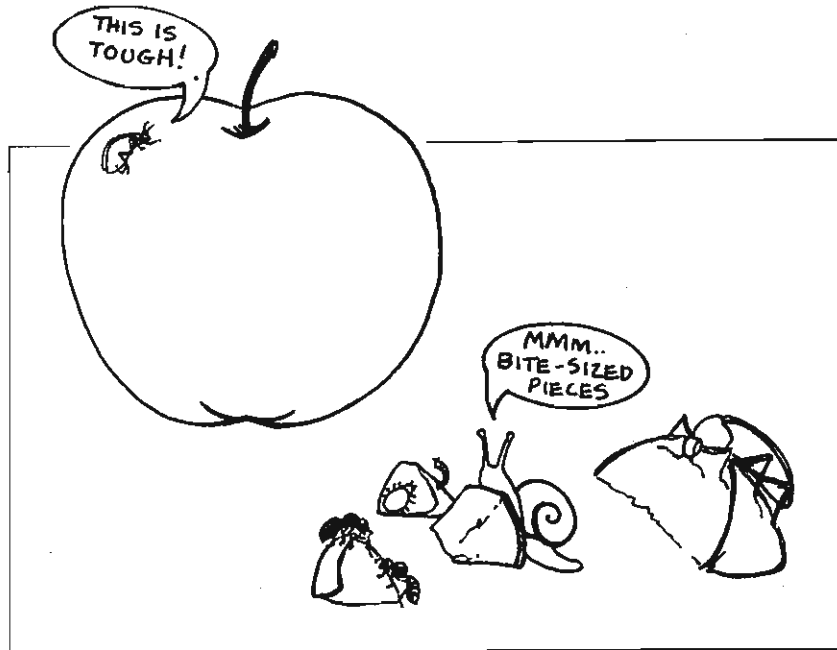
5. Don't let us get cold! We like temperatures of 90° to 140°F (32° to 60°C). If the temperature is too cold in your compost pile, many of us will die, and other microorganisms that work more slowly than we do will come into your pile.

If your compost pile is too small, we will feel the cold air coming in from the sides. The best way to keep us warm is to build a pile that is at least 3 feet x 3 feet x 3 feet (1 meter x 1 meter x 1 meter).





6. We must be able to get to our food! It is harder for us to eat large pieces of food than to eat small pieces of food. For example, if you throw a whole apple into your compost pile, only a few of us can eat it at a time. If you cut up your apple into small pieces, then a lot of us can get to it at once.



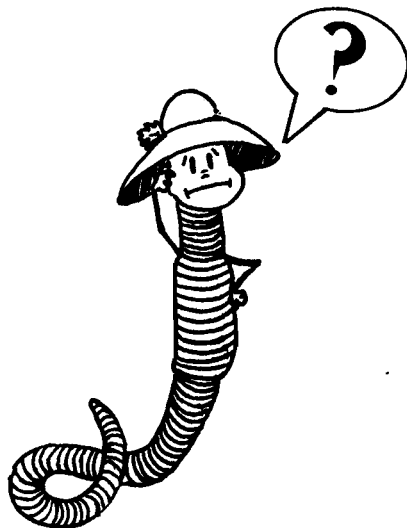
7. If you supply all these things—food, air, and moisture in a good-sized pile—we will be glad to make compost for you. Our job can take from six weeks to three years, depending on how you care for us. When we have completed our work, the compost will be ready to help your plants grow.





Section II

Which Composting System Is for Me?



There are many ways to compost wastes. Some methods need a backyard, and others can be used by apartment dwellers. The method of composting you choose will depend on whether you plan to compost yard wastes or kitchen wastes, how much money and time you wish to spend, how much room you have, and how soon you need the compost.

To determine which composting system is for you, first decide whether you will be composting yard and garden or kitchen wastes. Then read the brief comparisons of the different systems on the chart below. More information on each composting system follows.

<i>System Used</i>	<i>Cost</i>	<i>Time for Finished Compost (Rate of Composting)</i>
Yard Waste		
Compost mound	None	Slow if not turned; fast if turned often
Holding unit	Low	Slow
Turning unit	High; lower if scrap and recycled materials are used for construction	Fast, minimum 6 weeks
Mulch	Low	Can use immediately, but material should be shredded
Commercial bin	High	Fast, minimum 2 weeks
Kitchen Waste		
Compost pockets	None	Can use immediately
Garbage can composter	Low	Slow; faster if turned or mixed
Worm composting bin	Medium	Fast, minimum 4 weeks
Turning unit	High	Fast, minimum 6 weeks

Note: Kitchen and yard wastes can be composted together, but the combination may attract rodents.



Composting Systems



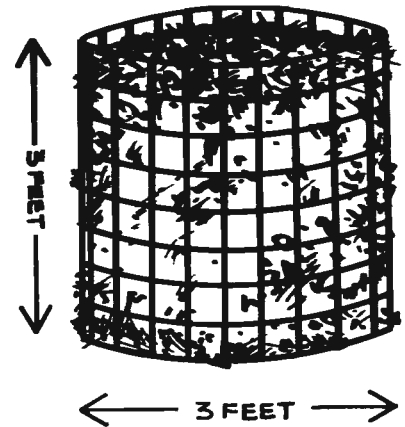
Wastes can be composted using any of a number of systems, from simple to elegant. The simplest designs are inexpensive and require relatively little work. The fancier systems—for example, a wood and wire turning unit or a worm composting bin—can cost \$100 or more. They make excellent woodworking projects for youth.

The descriptions that follow are a brief introduction to the different types of composting systems. More detailed instructions on how to build particular composting systems or bins are in the pocket folder.

Holding Unit

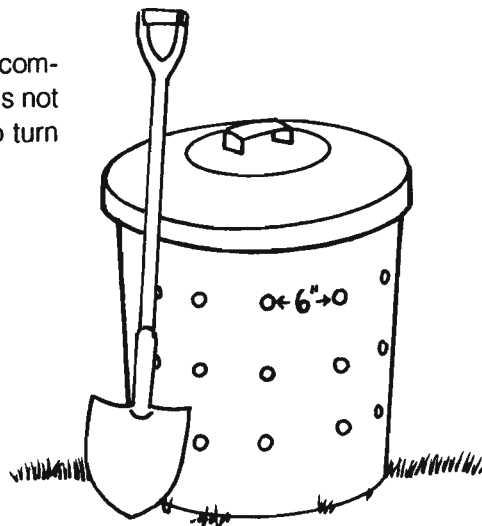
A holding unit can be any simple container that holds your yard and garden wastes while they break down. Once your holding unit is built, no other work is required except placing wastes into the container. Because the amount of air reaching the waste is not increased by turning, this method takes a relatively long time to produce compost—from six months to two years. You can speed up the process by chopping or shredding the wastes.

Nonwood materials such as grass clippings and garden weeds work best in a holding unit. These materials can be added continuously. Designs for four types of holding units are included in the pocket folder: a wire mesh bin, a snow fence bin, a cinder block bin, and a wooden box bin. You may want to design your own holding unit.



Garbage Can Composter

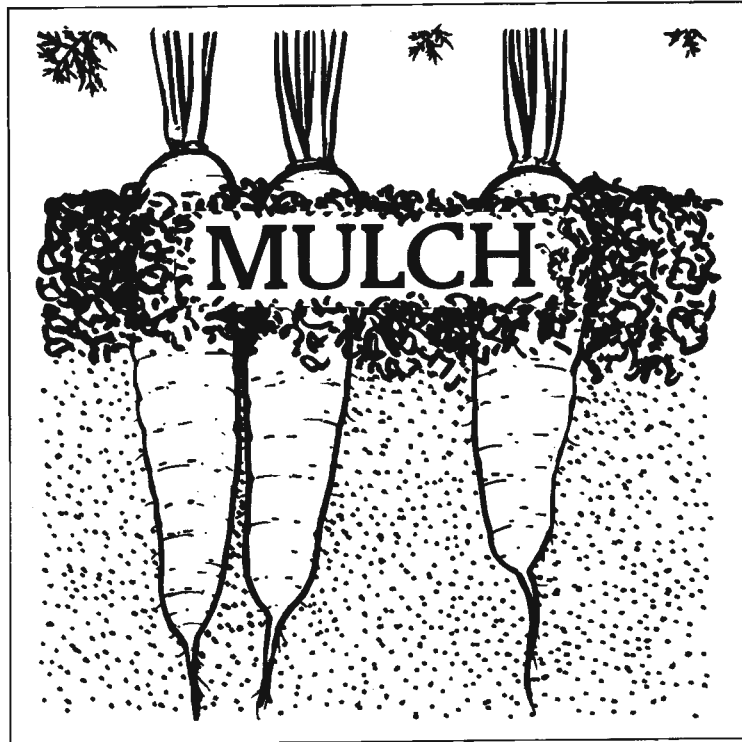
A garbage can can be used to compost food wastes. This system is not fancy, but it works. It is best to turn your wastes with this method.





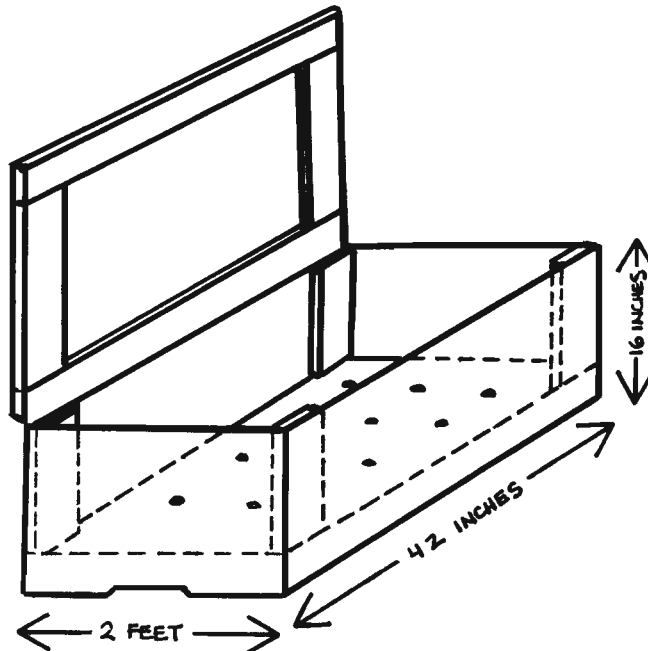
Mulch

Mulch is placed on top of the soil in gardens or around trees to suppress weeds, keep soil moist, keep plant roots cool in summer and warm in winter, and prevent soil from washing away or becoming hard. Yard wastes can be used as mulch and placed around plants in the garden or along paths and in play areas. The only costs are your time and work. You can also mulch with compost made using one of the methods described in this manual.



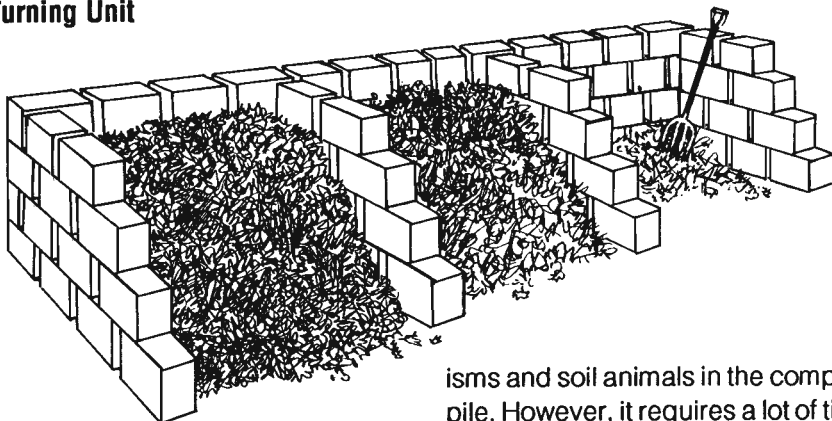
Worm Composting Bin

A worm composting bin, if built with care, can look quite elegant and can even be used as a bench. After you have built the bin, provided bedding, and located a source of worms, a worm bin requires relatively little maintenance. Simply add kitchen wastes as they become available.





Turning Unit



A turning unit looks like three holding units placed side by side. While the compost in one bin is “cooking,” you add wastes to the empty bin right next to it. As you might have guessed from its name, in a turning unit the wastes are stirred or turned every week or so. This speeds up the composting process by allowing more air to reach the microorgan-

isms and soil animals in the compost pile. However, it requires a lot of time and energy!

You can use a turning unit for either yard or kitchen wastes. If you plan to compost food scraps, be sure to build a unit that prevents nuisance animals from getting to the wastes.

When putting wastes in a turning unit, do not add too much of any one material at a time. This is important because the microorganisms in the turning unit need a variety of nutri-

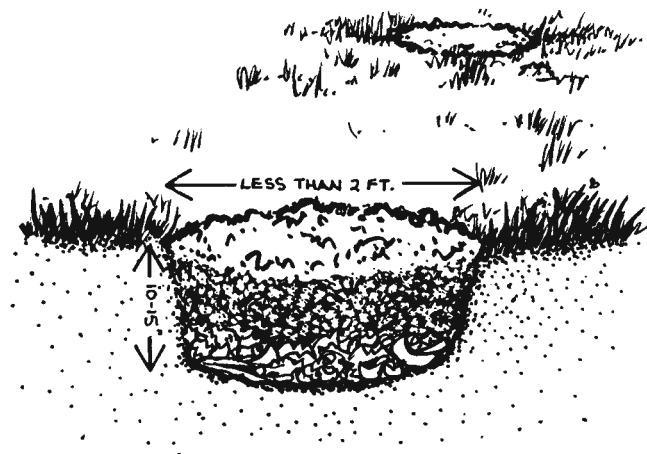
ents. Either add thin layers of different kinds of organic materials or mix your wastes together.

When the microorganisms in a turning unit have the right mixture of nutrients and enough air, they work very quickly and give off a lot of heat. The organic materials in a turning unit can heat up to about 150°F (66°C). If you turn your compost pile as the temperature starts to drop, the microorganisms get more air and a new mixture of materials. They start working very hard again, and your pile heats up. Keep turning your pile until the compost is ready. A “hot” pile makes compost in about one month.

You can design and make your own turning unit by using either cinder blocks or wood to build three holding units right next to each other (see the instructions in the pocket folder).

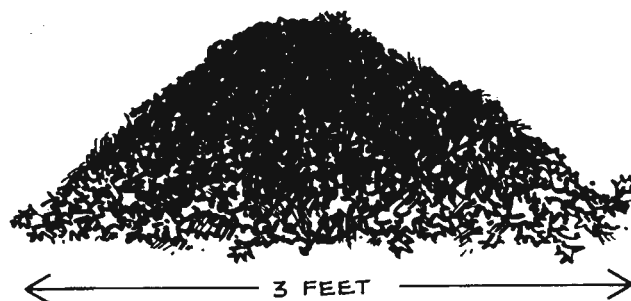
Compost Pockets

This method also doesn't require building a bin. You simply bury your wastes in the ground.



Compost Mound

A compost mound doesn't require a bin—you just pile your organic wastes in a mound.





Section III

My Compost Isn't Working

HELP! My compost isn't working!

Use the following chart to identify and fix problems in your compost pile. The problem-solving exercise that follows can be copied and distributed to the youth in your group. It shows the importance of air, moisture, and the size of the pile when making compost, as well as the need to balance wastes and protect the pile from nuisance animals.



<i>Symptom</i>	<i>Problem</i>	<i>How to Fix It</i>
Pile is wet and smells like a mixture of rancid butter, vinegar, and rotten eggs	Not enough air Or too much nitrogen Or too wet	Turn pile Add straw, sawdust, or wood chips Turn pile and add straw, sawdust, or wood chips; provide drainage
Pile doesn't heat up	Pile is too small Or pile is too dry	Make pile larger Add water
Pile is damp and sweet smelling but will not heat up	Not enough nitrogen	Add grass clippings or other sources of nitrogen
Center is dry and contains tough materials	Not enough water	Add water and turn
Pile is attracting animals	Meat and other animal products have been added	Keep meat and other animal products out of the pile; enclose pile in 1/4-inch hardware cloth



Solving Problems in Your Compost Pile

Name: _____

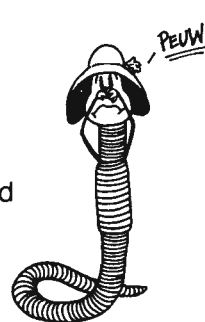
Date: _____

How might you solve these compost problems?

1. My compost pile isn't warming up. I should



2. My neighbor has a compost pile that smells like rotten eggs. She should



3. Our school compost pile seems too wet. We should





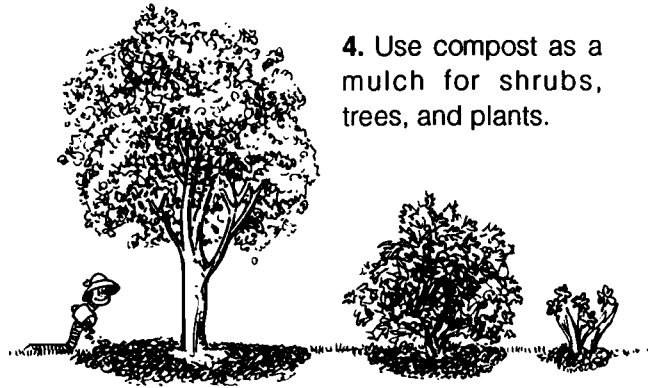
Section IV

What Can I Do with My Compost?

1. Spread compost on your garden before rototilling or turning the soil in the spring. Then mix the compost into the soil while rototilling or turning.



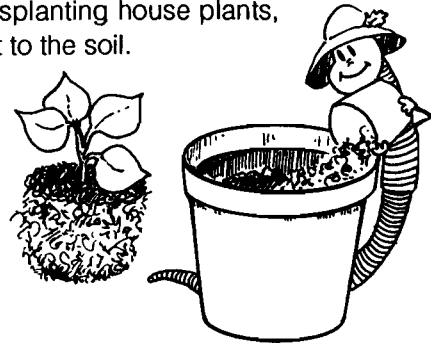
4. Use compost as a mulch for shrubs, trees, and plants.



2. Place or bury compost in your garden between plant rows. The plant roots will grow into the compost and take up the nutrients.



5. When transplanting house plants, add compost to the soil.



3. In flower gardens, dig in compost around the plants.



6. Use your compost for some of the Compost Investigations in Section V of this guide.



Composting Don't

Don't use compost to sprout tender seeds. The seeds may be killed by a fungus in the compost that causes damping-off disease.

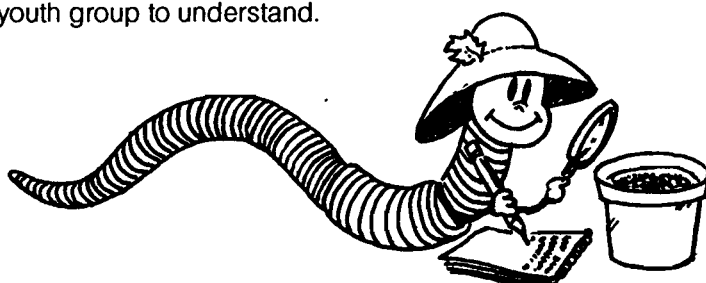




Section V

Compost Investigations

Each compost investigation included in this section covers one or more "compost concept." Following is a list of the investigations and concepts. Choose one or more of the investigations, depending on which concepts you think are important for your youth group to understand.



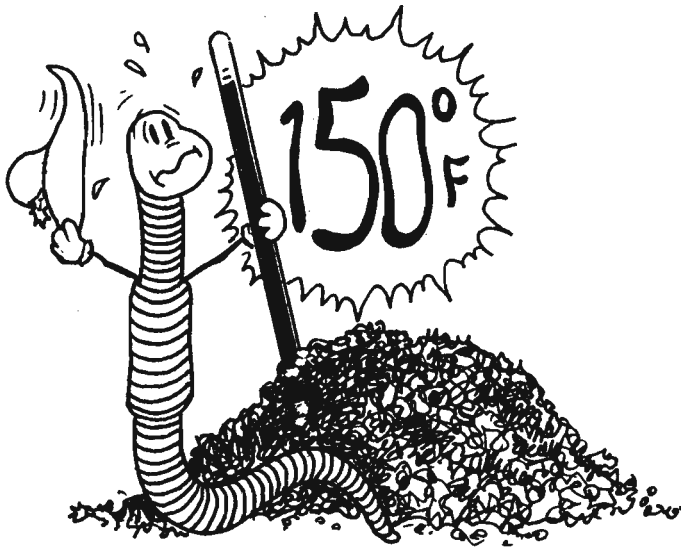
<i>Investigations</i>	<i>Concepts</i>
How Hot Is My Compost?	Importance of air
Discover Composting Microorganisms	Importance of microorganisms
Discover Compost Animals	Importance of soil animals Compost food chains
Watching Wastes Rot I	Importance of organisms that break down wastes Biodegradable and nonbiodegradable wastes
Watching Wastes Rot II	Importance of air and size of wastes
Growing Plants with Compost	Wastes to resources



How Hot Is My Compost?

When your compost pile is working ideally, it will get hot. The temperature can rise to 150°F (66°C) during the composting process. In the winter, if the compost is working fast, snow will melt on the pile and you may even see water vapor coming off the top. The center of the pile will be warm to the touch.

Turning your compost pile adds air to the pile. Because the microorganisms and soil animals in the pile need air to do their work, turning the pile increases their activity. What effect does turning the compost pile have on its temperature?



What You Need

- candy or meat thermometer
- work gloves
- record sheet
- pencil

What to Do

As your compost pile works, take its temperature. Wearing a glove, place the thermometer deep into the center of the pile. Record the temperature on the Compost Temperature Record.



Compost Temperature Record

Name: _____

Date compost pile started: _____

Today's date: _____

Date last turned: _____

Temperature (°F or °C): _____

Observations (smell, color of material):

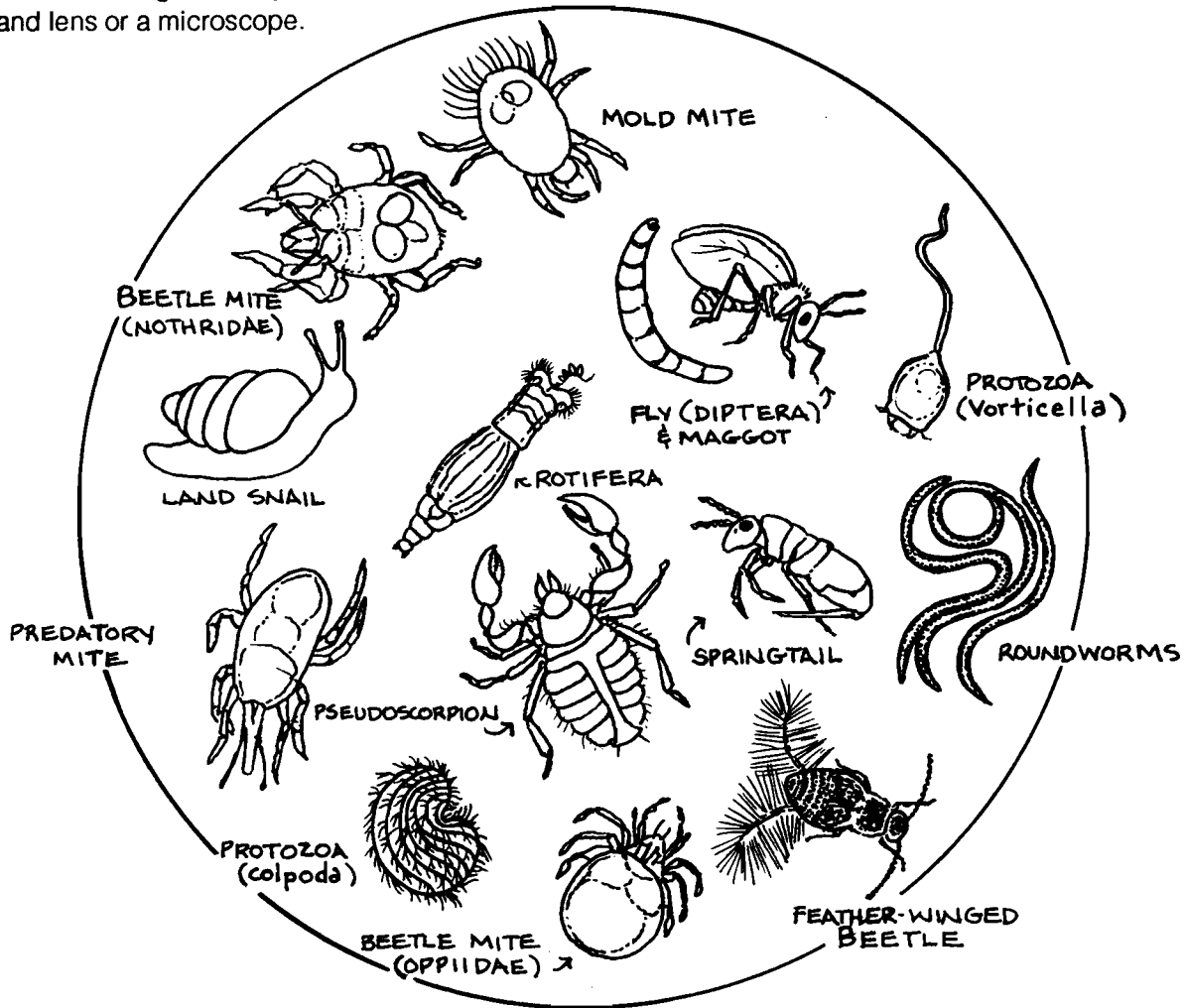
What effect did turning the pile have on its temperature?

What effect does turning have on the speed of breaking down material in a compost pile? Why?



Discover Composting Microorganisms

The insects, worms, bacteria, and fungi found in your compost pile do the work of composting. You can see some soil animals with the naked eye. For microorganisms, you need a hand lens or a microscope.



What You Need

- sample of compost
- glass slide
- hand lens or microscope
- record sheet
- pencil

What to Do

Put a compost sample on a glass slide with a drop of water. Observe the sample under a hand lens or microscope. Draw pictures of what you see. If possible, identify the organisms you see.



Discover Composting Microorganisms Record

Name: _____

Date: _____

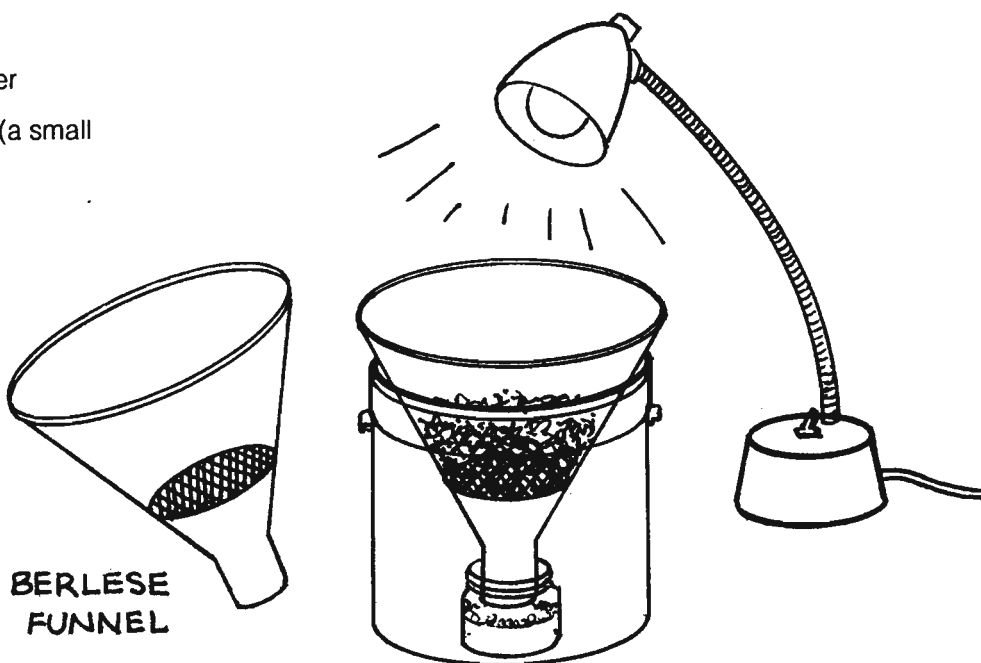
Draw pictures of the microorganisms that you see in your compost sample.
Can you name any of the organisms?



Would you like to observe some of the animals that live in your compost pile in person? You can do so by making an insect trap called a Berlese funnel.

What You Need

- small piece of window screen
- large diameter funnel
- small jar with soapy water
- container to hold funnel (a small plastic bucket will work)
- compost sample
- light source
- hand lens or dissecting microscope
- record sheet
- pencil



What to Do

Cut the screen to the diameter of the funnel about two-thirds of the way down from the top of the funnel. Place the screen into the funnel.

Fill the jar half full with soapy water. Put the jar in the bottom of the container.

Put the funnel with screen into the container so that the bottom of the funnel is suspended above the jar with soapy water.

Put the compost sample into the funnel.

Place the light source over the top of the funnel. Leave for several hours or overnight. The soil animals will crawl away from the light source to the bottom of the compost in the funnel. Then they will fall into the soapy water and die.

Pour the excess soapy water out of the jar. Observe the soil animals with the naked eye, under a hand lens, or with a dissecting microscope. Do you recognize any of the animals from the diagram of the compost food web? Record your observations.



Discover Compost Animals Record

Name: _____

Date: _____

Draw a picture of the animals that you see in your compost sample.

Can you name any of the animals? The picture on page 24 will help you.

What role do these animals play in the food web?



Watching Wastes Rot I

Some wastes break down faster than others in a compost pile. Some materials never break down in a compost pile.

Microorganisms and soil animals do most of the work of breaking down wastes in compost. Do you think wastes will break down if these organisms are not present? How long will it take?

What You Need

- flower pots
- compost sample
- sterile potting soil, perlite or vermiculite (sterile mix)
- organic wastes, such as orange peels and apple cores
- paper wastes, such as paper napkins and paper bags
- plastic wastes, such as styrofoam chips and plastic bags
- labels that stick on the pots
- record sheet
- pencil

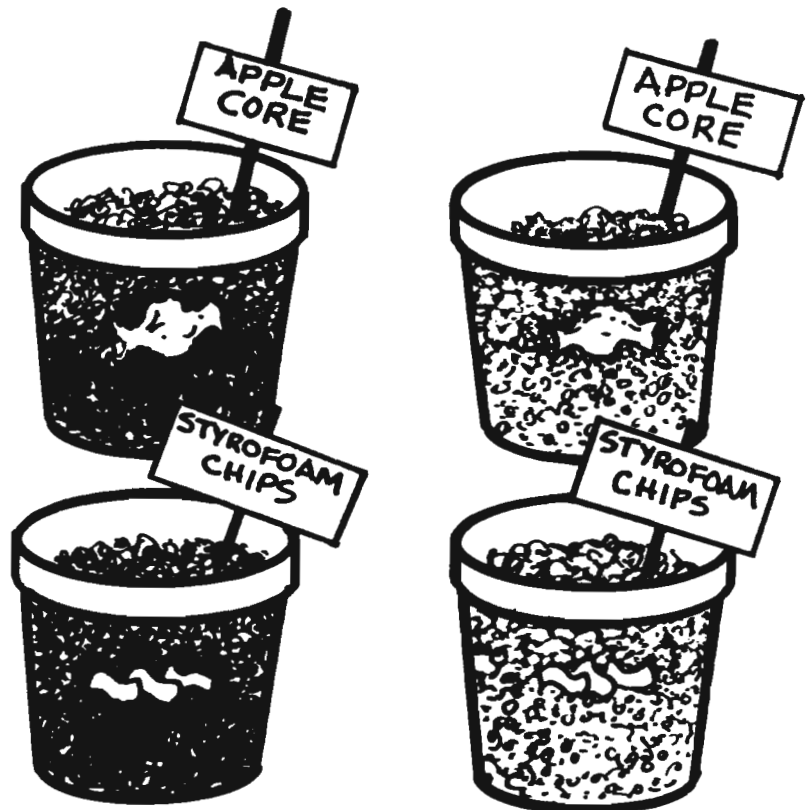
What to Do

Fill half the flower pots half full with compost. Fill the other half of the pots half full with sterile mix.

Gather your organic, paper, and plastic wastes. Place one-half of each waste in a pot with compost and the other half in a pot with sterile mix. For example, place one apple core in a compost pot and one apple core in a sterile pot. Place three styrofoam chips in another compost pot and three styrofoam chips in another sterile pot. Label the pots with the names of the wastes.

Cover the wastes with compost or sterile mix, filling the pots. Add water to all the pots so that the compost and sterile mix are damp but not wet to the touch. Check your pots every few days to be sure they are still moist.

After one week, examine the wastes in each pot. Which wastes are decomposing? Cover the wastes again, and continue to check them once a week for as long as you want. Record your observations.



Compost

Sterile mix



Watching Wastes Rot I Record

Name: _____ Date experiment started: _____

Fill in the following table each time you check your pots. Under "Waste," write the name of the item that you buried in the pot. Under "Compost," describe the condition of the item buried in compost each time you check it. Include such things as how decomposed the item looks, what color it is, and whether or not you see fungi (spots or thin strands) on it. Under "Sterile Mix," describe in the same way the condition of the item buried in sterile mix.

Date: _____ Time since waste was buried: _____

Waste	Compost	Sterile Mix
1. _____	_____	_____
	_____	_____
	_____	_____
2. _____	_____	_____
	_____	_____
	_____	_____
3. _____	_____	_____
	_____	_____
	_____	_____
4. _____	_____	_____
	_____	_____
	_____	_____
5. _____	_____	_____
	_____	_____

Which items decomposed most quickly?

Which items didn't decompose at all?

In general, did items decompose more quickly in compost or in sterile mix? Why do you think this is true?



Watching Wastes Rot II

The organisms in a compost pile need air. When there is not enough air, the organisms die. New organisms that can survive without air come into the compost pile. These new organisms produce a gas that has a nasty smell.

The organisms in a compost pile also need to be able to get at the wastes to break them down. Is it easier for the organisms to get at large pieces of waste or small pieces?

Let's investigate how long it takes to break down wastes in the presence and absence of air. Let's also see how long it takes to break down wastes of different sizes.

What You Need

- wide-mouth jars
- compost sample
- organic wastes (you may use one or several kinds of wastes)
- flower pots
- labels for jars and pots
- record sheet
- pencil

What to Do

Fill two wide-mouth jars half full with compost. Place equal amounts of a particular waste in each jar. Then fill the rest of both jars with compost, burying the waste. Fill the first jar with water and place a lid on the jar. Add just enough water to the second jar so the compost is damp but not wet to the touch. Leave the second jar exposed to air. (Check on the second jar every few days to make sure the compost is still moist, but do not overwater.)

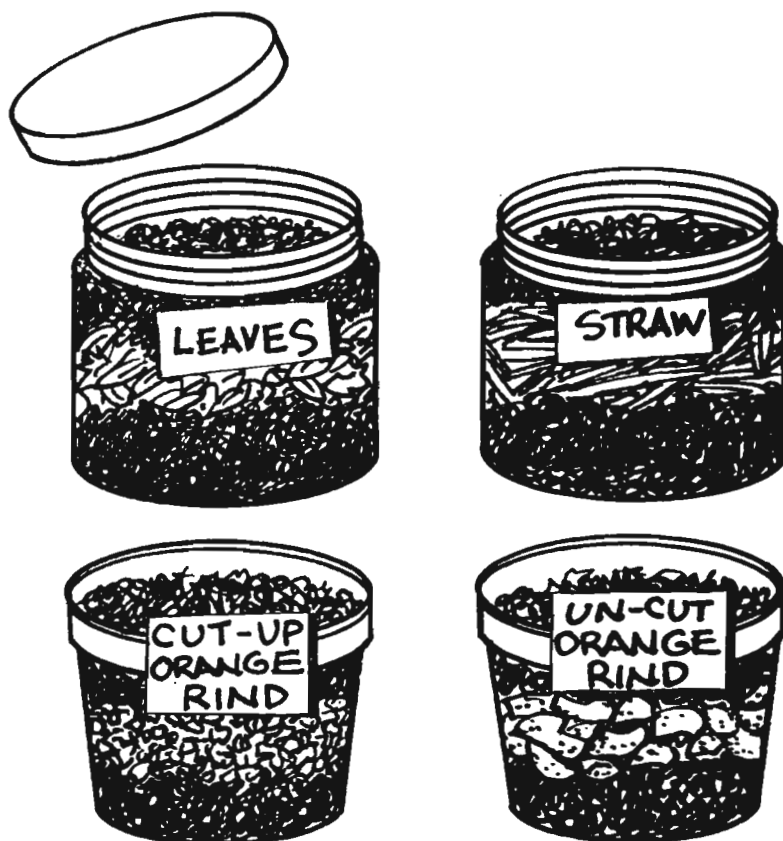
Repeat the procedure with other wastes. Label each jar with the name of the waste placed in it.

Take two more equal portions of a particular waste. Cut the first portion

into small pieces. Leave the second portion uncut. Fill two flower pots half full with compost. Place the cut-up waste in the first pot and the uncut waste in the second pot. Cover the wastes with compost, filling the pots. Add water to the pots so that the compost is damp but not wet to the touch. Check your pots every few days to be sure they are still moist, but do not overwater.

Repeat the procedure with other wastes. Label each pot with the name of the waste placed in it and whether the waste is cut up or uncut.

Check your wastes after two weeks. Which wastes are decomposing? Record your observations.





Watching Wastes Rot II Record

Name: _____

Date: _____ Date experiment started: _____

Fill in the following table. Under "Waste," write the name of the item that you buried in the jar or pot. Under "Compost," describe the condition of the item buried in the compost. Include such things as how decomposed the item looks, what color it is, and whether or not you see fungi (spots or thin strands) on it.

<i>Waste</i>	<i>Exposed to Air (yes or no)</i>	<i>Compost</i>
1. _____	_____	_____ _____ _____
2. _____	_____	_____ _____ _____
3. _____	_____	_____ _____ _____
4. _____	_____	_____ _____ _____
5. _____	_____	_____ _____ _____



	<i>Waste</i>	<i>Cut/Uncut (C or U)</i>	<i>Compost</i>
1.	_____	_____	_____ _____ _____
2.	_____	_____	_____ _____ _____
3.	_____	_____	_____ _____ _____
4.	_____	_____	_____ _____ _____
5.	_____	_____	_____ _____ _____

Did items decompose faster in the jar with air or the jar with water?

Was there a smell coming from either jar? If yes, what caused the smell?

Were items more decomposed when they were cut up or uncut? Why?



Growing Plants with Compost

See how your garden grows! Adding compost to the soil can increase the soil's ability to hold water. In addition, compost can add nutrients to the soil. This helps the plants in your garden to grow.

On the other hand, it is difficult for seeds to sprout in pure compost. In fact, sensitive seeds may even be killed by a fungus if you try to sprout them in compost. This problem occurs mostly when the organic material is not completely broken down.

Let's do an experiment to see if adding compost to the soil has an effect on the sprouting of seeds and the growth of plants.

What You Need

- flower pots or cups with drainage holes
- gravel for drainage
- compost
- perlite
- seeds (bean, pea, radish, or lettuce seeds work well)
- colored toothpicks
- record sheet
- pencil

What to Do

Put one inch (2.5 cm) of gravel in the bottom of each of the flower pots. Label the pots 1 to 4.

Add compost only to pot 1.

Using a measuring cup or other plastic cup, measure one part compost and an equal amount of perlite. Mix the compost and perlite together thoroughly. Fill pot 2 with this 1-to-1 compost-to-perlite mixture.

Using a measuring cup or other plastic cup, measure one part compost and three parts perlite. Mix the compost and perlite together thoroughly. Fill pot 3 with this 1-to-3 compost-to-perlite mixture.

Fill pot 4 with 100 percent perlite.

Plant three to four seeds of the same species in each pot. Bean seeds are fast growing and easy to observe, but many seeds will do.

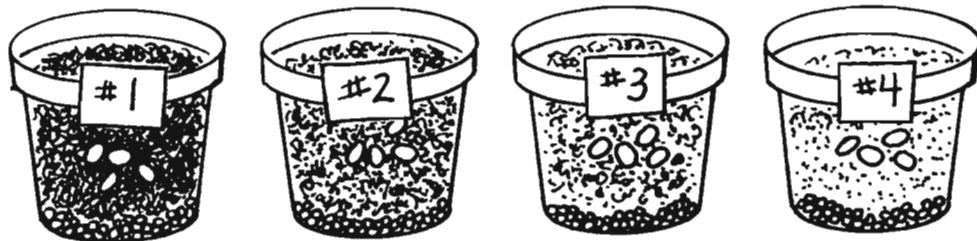
Water your seeds following the instructions on the package. Make sure you add the same amount of water to each pot.

After four or five days, your seeds should have sprouted. Count the number of seeds that have sprouted in each of the four pots. Record the number of seeds that have sprouted on your Growing Plants with Compost Record. Then thin extra plants so you have one plant in each pot.

Follow the growth of your plants for four to five weeks. Once a week, measure the height of the plant in each pot. Record the height of the plants on your Growing Plants with Compost Record. Note if any plants die.

After five weeks, count the number of surviving plants. Compare the number of surviving plants in the different mixtures of compost and perlite. Then measure the height of the plants.

Note: To be more scientific, you may want to have more than one pot for each of the four compost "treatments."





Growing Plants with Compost Record

Name: _____

Plant species: _____ Date planted: _____

Sprouting

<i>Date</i>	<i>Pot number</i>	<i>Number of seeds sprouted</i>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Growth

<i>Date</i>	<i>Pot number</i>	<i>Plant</i>	<i>Height</i>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Summary

What effect did the compost have on the sprouting of the seeds? Why?

What effect did the compost have on the growth of the plants? Why?



Section VI

Glossary

Actinomycetes. Microorganisms that have the characteristics of both fungi and bacteria. Actinomycetes create cobweb-like growths throughout the compost and give compost an earthy aroma.

Bacteria. In a compost pile, the microorganisms that do most of the work to decompose wastes. Hard-working bacteria cause the compost pile to heat up. Under a microscope, bacteria look like small round or rod-shaped organisms.

Carbon. An element that is abundant in wood chips, sawdust, straw, and leaves. Carbon provides energy for living things.

Celsius (C). A temperature scale in which 0° is freezing and 100° is boiling. [Degrees in Celsius = $5/9 \times$ (degrees in Fahrenheit - 32)]

Compost. A rich soil-like mixture that is produced when organic materials break down.

Compost mound. A pile of yard, garden, or kitchen wastes that is not contained by a bin; the wastes take 6 months to 2 years to break down, depending on the amount of turning.

Compost pocket. A small hole in the ground containing yard, garden, or kitchen wastes that are buried in small amounts and left to break down.

Composting. Converting organic wastes into a rich soil-like material.

Composting system. The method used to convert organic wastes into compost (e.g., a compost mound, a compost pocket, a holding unit, or a turning unit).

Damping-off disease. A plant disease caused by a fungus that damages plant roots; the damping-off disease fungus is found in soils and compost and may cause young plants to die.

Decompose. To break down or rot.

Fahrenheit (F). A temperature scale in which 32°F is freezing and 212°F is boiling. [Degrees in Fahrenheit = $(9/5 \times$ degrees in Celsius) + 32.]

Fungi. Organisms such as molds, yeast, and mushrooms that feed on dead organic matter.

Holding unit. A simple container that holds yard, garden, and kitchen wastes while they break down.

Invertebrate. An animal without a backbone, such as an insect or worm.

Kitchen wastes. Food scraps, such as potato peels, apple cores, moldy food, and wilted lettuce.

Microorganism. A tiny living thing that is so small you need a microscope or magnifying glass to see it. Microorganisms help break down organic wastes.

Millipede. A tiny worm-shaped animal with many pairs of legs. Millipedes live in soil and compost.

Mite. A tiny animal, no bigger than a pinhead, that lives in soil and compost.

Mulch. A covering, such as leaves, straw, peat moss, or compost, that is placed on top of the soil in gardens and around trees. Mulch suppresses weeds, keeps soil moist, and keeps plant roots cool in summer and warm in winter.

Nitrogen. An element that is found in food scraps, grass clippings, and manure. Nitrogen is used by living things for growth.

Nutrient. A food ingredient that supplies energy for living and growth.

Organic material. Matter that has come from living things (plants and animals).

Perlite/vermiculite. A lightweight material that is used for starting plant seeds.

Pill bug. A small animal that lives in moist soil and rolls up in a little ball when it is threatened or scared.

Potworm. A small worm that lives in soil and compost.

Roundworms (also known as nematodes). The most abundant invertebrates in the soil. These small worms (less than one centimeter) prey on fungal spores, protozoa (a type of microorganism), and each other and are very good for compost.

Solid waste. Household trash, yard and kitchen wastes, old machinery and equipment, and many agricultural and industrial wastes—items that people throw out.

Turning. In a compost pile, mixing and moving the organic material.

Turning unit. Three holding units built next to each other. After compost has been in one bin long enough to start breaking down, it is turned into the next bin. Wastes from the top and sides are put on the bottom and middle, and wastes from the bottom and middle are put on the top and sides. This way, more air reaches the compost and it breaks down quickly. New wastes are added to the empty bin rather than to compost that is already started.

Yard and garden wastes. Grass clippings, dead leaves, small branches, and weeds.