



What Is This Module About?

It may not be new to you to see garbage piled up on street corners, near the wet market, in vacant lots, perhaps even in front of your house. This is a clear sign that we have a problem when it comes to garbage disposal. Many solutions have already been proposed but most of these provide only temporary remedies to the garbage problem.

Unfortunately, our garbage problem needs more than temporary solutions. We are producing waste faster than we can dispose of it.

This module will tell you about a possible solution to our problem on garbage disposal and how you can directly participate in solving the problem. This solution is composting.

Through composting, you can do your share in solving our garbage problem.

The module has three lessons:

Lesson 1 – *What Is Composting?*

Lesson 2 – *What Do You Need to Make Composts?*

Lesson 3 – *Making and Using Composts*



What Will You Learn From This Module?

After studying this module, you should be able to:

- ◆ understand our garbage problem and how composting can help solve it;
- ◆ explain what composting is;
- ◆ identify the materials needed for composting; and
- ◆ explain how to make a compost.



Let's See What You Already Know

Before you begin this module, answer the following questions first. This test will help you determine how much you already know about the topics that will be discussed.

A. Encircle the letter of the best answer.

1. Which of the following statements about our garbage problem is not true?
 - a. The increase in the number of people's activities has also led to the increase in the production of wastes.
 - b. The use of open dump sites is a long-term solution to the garbage problem.
 - c. Composting is an alternative to using open dump sites.
 - d. Recycling is an alternative to using open dump sites.
2. Which of the following statements about organic materials is not true?
 - a. Organic materials are biodegradable.
 - b. Dried leaves and vegetable peels are examples of organic materials.
 - c. Organic materials come from nonliving things.
 - d. Organic materials can decompose completely.
3. Composting will be most successful when your compost bin _____.
 - a. is warm, has moisture and air passages
 - b. is exposed to extreme sunlight or rain
 - c. has many materials with nitrogen rather than with carbon
 - d. has a mixture of organic and inorganic materials
4. If your compost pile smells bad it _____.
 - a. is ready for use
 - b. is either too wet or too tight
 - c. is too small
 - d. needs more organic materials

5. Turning the pile from time to time will _____.
- a. aid in its decomposition
 - b. kill some of the bad microorganisms in it
 - c. lower the compost heap's temperature
 - d. limit the surface area which microorganisms can work on

B. Identify which materials are ideal for composting. Write your answers in the blanks provided.

pernicious weeds

wood chips and sawdust

hay

meat and bones

human wastes

diseased plants

manure

kitchen wastes like fruit and

straw

vegetable peels

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 39 to find out.

If all your answers are correct, very good! This shows that you already know much about the topics in this module. You may still study the module to review what you already know. Who knows, you might learn a few new things as well.

If you got a low score, don't feel bad. This means that this module is for you. It will help you understand some important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

You may go now to the next page to begin Lesson 1.

What Is Composting?

Before we go to the “how” of composting, it is important for you to understand what composting is. This will help you to better appreciate the benefits that you can get from it.

After studying this lesson, you should be able to:

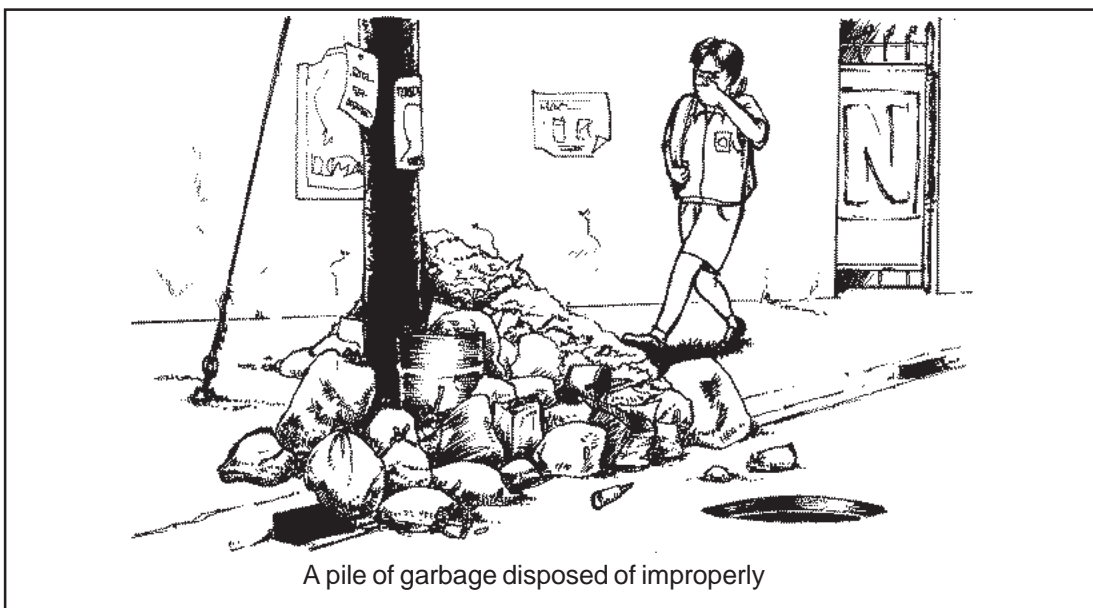
- ◆ understand our garbage problem and how composting can help solve it;
- ◆ differentiate organic from inorganic materials;
- ◆ explain what composting is; and
- ◆ explain how composts are made.



Let's Try This

Imagine that you are about to dispose of a bag of trash.

Now, imagine that all the people in your neighborhood are about to do the same thing. What would be the result?



Are you starting to realize now just how much garbage is produced in one place every day?



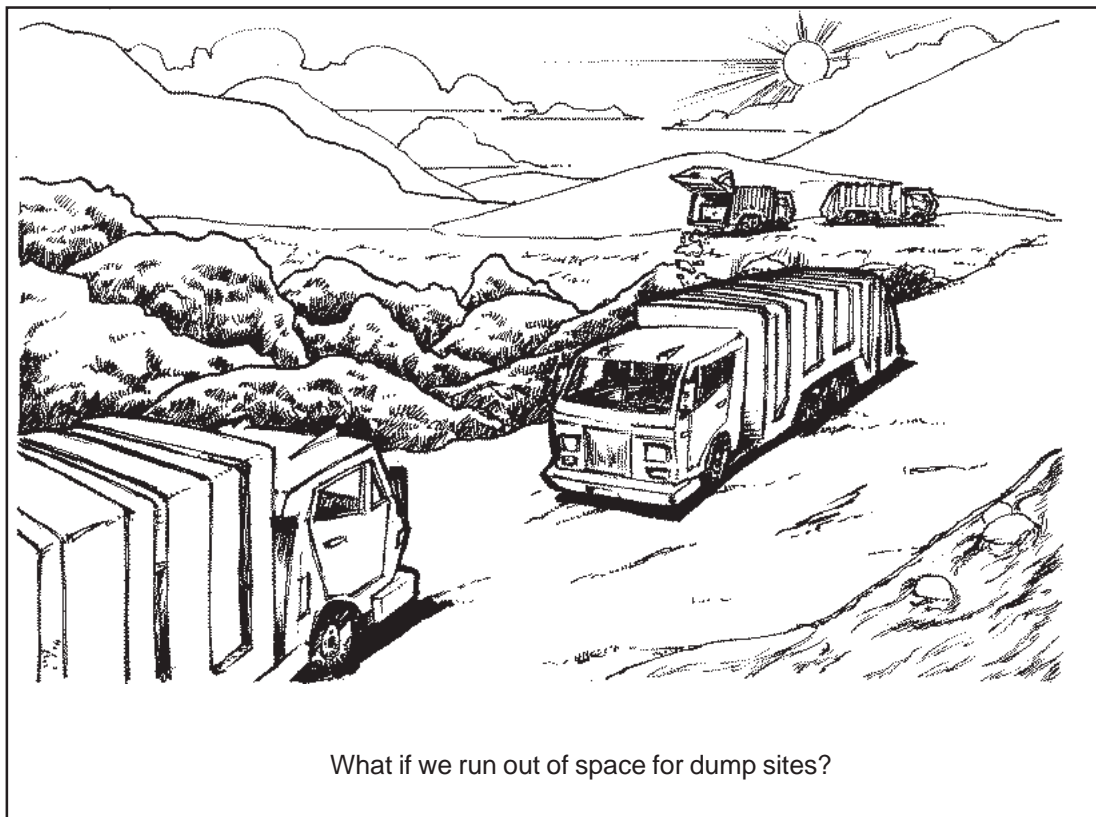
Let's Learn

Our Garbage Problem

To solve our growing garbage problem, we must find alternative ways to dispose of our garbage. Or we must find ways to avoid disposing of anything at all.

The major cause of our garbage problem is the continuous increase in population. An increase in population means an increase in people's activities. This increase in people's activities, unfortunately, leads to the production of large amounts of waste. Simply put, the more people there are, the more wastes are produced.

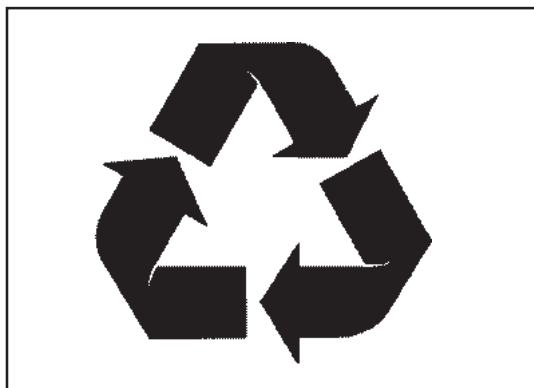
Normally, the garbage produced in our homes is collected then brought to open dump sites.



However, open dump sites can cause contamination of groundwater. Landfills can leak toxic materials into lakes and streams. In addition, existing open dump sites will be filled in a few years and if the only alternative is to open a new one each time one is filled, we may soon end up living in dump sites. I'm quite sure you do not want one near your area. This is why it is important for you and for everyone to participate in solving our garbage problem.

Because of this situation, many people have tried to find ways to solve the garbage problem. The solutions that they have proposed are long-term and more effective since they not only "solve" the garbage problem but provide other benefits as well. However, for these solutions to succeed, some effort on your part is needed.

One of these solutions is recycling. Have you ever seen this symbol?



Let's Try This

The symbol above is the symbol for recycling. Look at it closely. Describe what you think it means.

Recycling involves using materials over and over again. This is why the symbol illustrates a cyclical process. Recycling also involves processing used materials in order to make them fit again for human use. The goal is to make sure that no material is permanently disposed of. One method of recycling is **composting**.



Let's Learn

Before we discuss composting, let us first clarify some things that are related to it.

Organic and Inorganic Materials

Materials can be classified into two: organic and inorganic. Only organic materials can be used in composting.

Organic materials are those which were once living things. Examples of organic materials are leaves and wood. **Inorganic materials**, on the other hand, are those which come from nonliving things like minerals. Examples of inorganic materials are those made of plastic, metal, and rocks.

Organic materials are biodegradable, which means they can completely decompose. Just look at what happens when you burn a piece of paper. The paper will turn to ashes, right?

On the other hand, inorganic materials are nonbiodegradable and therefore will never completely decompose. If you burn a piece of metal, the most that could happen to it is to get bent because of the heat, but it will never completely “disappear.”

What Is Composting?

What do you think happens to the leaves that fall in forests? Who do you think cleans them up?

No one sweeps away the leaves that fall in forests. They disappear over time because they decay or decompose.

The process of decomposition that the leaves as well as other organic materials in forests go through is actually the same as composting. The only difference is that the conditions in forests are not controlled; they occur at their own pace. What we are going to study here is “controlled” composting. You will, therefore, control the pace of the process. But you must remember that you can only use organic materials for composting.

In Lesson 2, you will be shown examples of organic materials that you can use in composting.

Composting is the process of decomposing plant remains and other organic materials. The result, a substance excellent for fertilizing or enriching soil, is called **compost**. Compost eventually turns into **humus**, the organic portion of soil.



Let's Review

Before we continue, let's see if you understood the meanings of some key terms that we have used.

Choose the word in the box that corresponds to each of the definitions given. Write your answer in the space provided.

Organic materials
Inorganic materials
Composting
Compost
Recycling
Biodegradable materials
Nonbiodegradable materials

- _____ 1. Using materials over and over again
- _____ 2. Process of decomposing plants and other once-living organisms
- _____ 3. Materials that come from once-living things
- _____ 4. Materials that will never completely decompose
- _____ 5. The substance produced by composting

Are you sure about your answers? Review them again and then check them using the *Answer Key* on page 40.

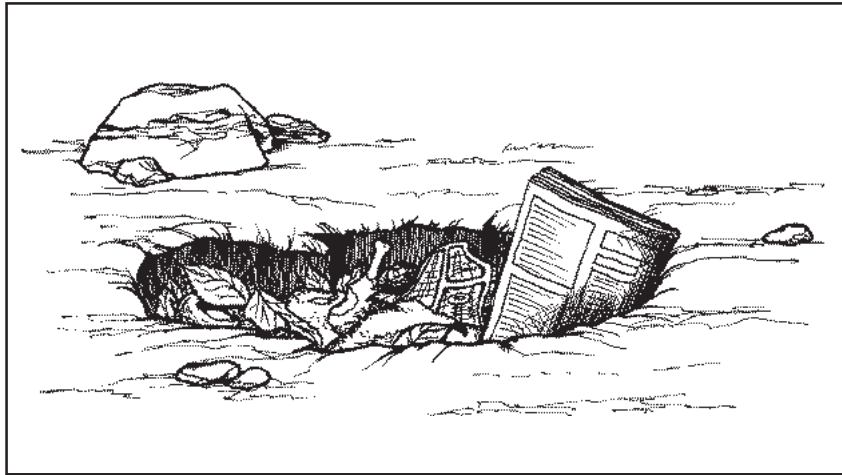


Let's Learn

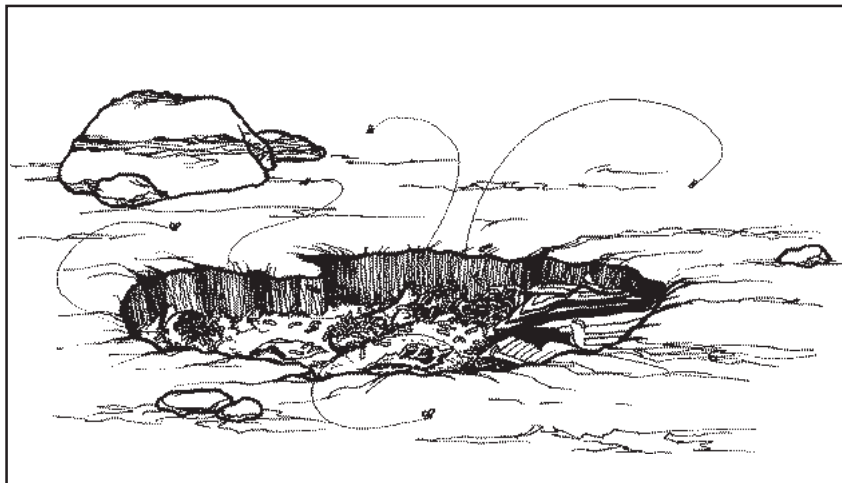
How Composts Are Made

As we said earlier, composting is a method used to speed up the natural decomposition of organic materials under **controlled conditions**.

Let's say you have leftover food, leaves, some soil, and old newspapers that you dumped in a hole in your backyard.



After a few weeks, the bacteria in the hole will increase rapidly. Worms will crawl on the "trash" that you disposed of and decomposition will occur.

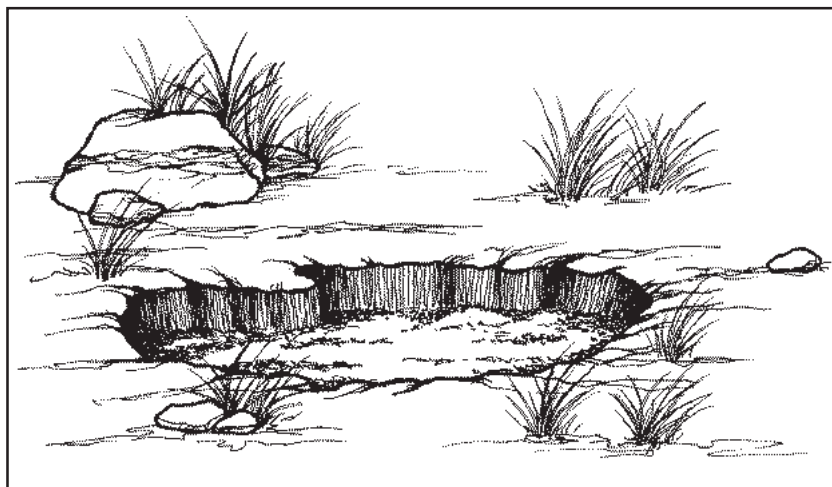


As the bacteria and worms decompose the organic materials, their body heat will cause the temperature of the pile to rise dramatically.

The heat of the pile will kill some of the weed seeds and disease organisms, causing further decomposition.



After the trash has completely decomposed, it turns into humus.



You can contribute to the “composting revolution” by composting your own kitchen wastes in your backyard. In the next lesson, we will discuss what you will need to start composting.



Let's See What You Have Learned

In the blank before each number, write **T** if the statement is true or **F** if it is false.

- _____ 1. Controlled conditions are important to speed up decomposition.
- _____ 2. Compost can act as fertilizer for the soil.
- _____ 3. Rocks are examples of inorganic materials.
- _____ 4. Recycling is a linear process, which means that it has a definite beginning and a definite end.
- _____ 5. Population increase cannot be blamed for the garbage problem.

Check your answers using the *Answer Key* on page 40.



Let's Remember

Before you proceed to Lesson 2, do not forget the important points of this lesson.

- ◆ The major cause of our garbage problem is the continuous increase in population. As population increases, so do people's activities. This increase, unfortunately, leads to the production of larger amounts of waste.
- ◆ Recycling has been recognized as a solution to the garbage problem. Composting is one form of recycling.
- ◆ Composting is the process of controlling the decomposition of organic materials.
- ◆ Organic materials are those that were once living organisms, like plant and animal remains. They are biodegradable.
- ◆ Inorganic materials are those that came from nonliving things. They are nonbiodegradable.
- ◆ The end product of composting is humus.

What Do You Need to Make Composts?

Now that you have an idea of what composting is, we can discuss what you will need to make composts.

After studying this lesson, you should be able to:

- ◆ identify the things needed to make composting successful;
- ◆ identify the organic materials that can be used for composting; and
- ◆ identify the organic materials that cannot be used for composting.



Let's Try This

What do you think are needed to make composts? Write down your ideas on the lines below.



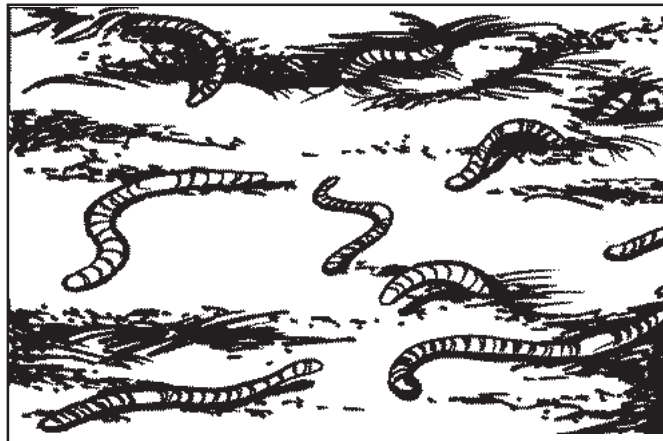
Let's Learn

The Essentials of Composting

Composting has certain requirements. These are needed to ensure that composting will be successful.

Biological Process

A decomposing agent is needed for the materials or wastes to decompose. Did you know that the best decomposing agents are worms? Compost worms can speed up the decomposition of organic materials. Worms are attracted to the warm temperature in compost heaps. As soon as they appear, their population doubles within a month.





Carbon and Nitrogen

Carbon can come from “dry materials” like leaves, woody wastes, sawdust and straw. It serves as the source of energy for the microorganisms, bacteria and, of course, the worms in compost heaps.

Nitrogen, on the other hand, can come from grass clippings, plant trimmings, kitchen scraps, and other “fresh” materials like animal manure and fresh leaves. Nitrogen provides the microbes and worms with proteins and nucleic acids to build their bodies.

The ideal carbon to nitrogen ratio is 30:1, which means that there should be more materials that are rich in carbon rather than those rich in nitrogen.

Here are some examples:

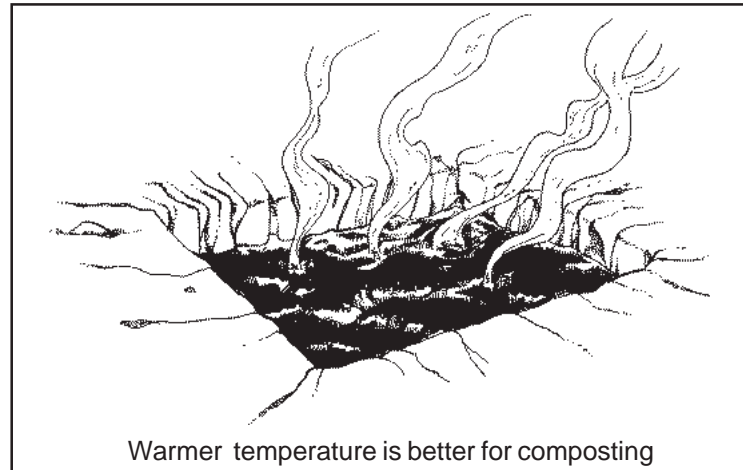
Materials That Are Rich in Carbon	
dried leaves hay sawdust wood	
Materials That Are Rich in Nitrogen	
animal manure vegetable scraps fruit wastes eggshells rotten bread leftover food	

Surface Area

The greater the surface area the microorganisms have to work on, the faster the materials will decompose. Chopping and shredding the materials will make the compost less compact, giving the microorganisms more room to move around.

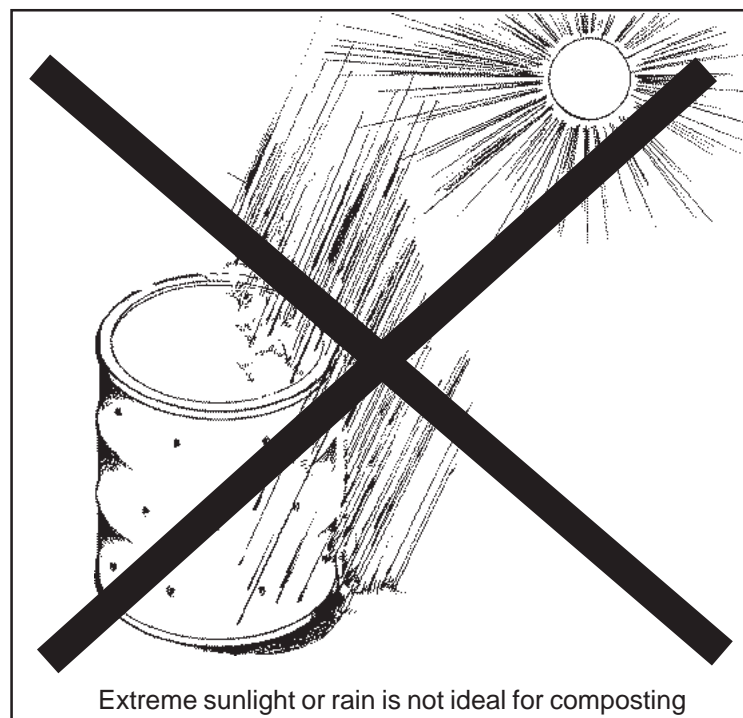
Temperature

For purposes of composting, the warmer the temperature, the better. In a cool environment, the composting process slows down. The internal temperature of a compost pile is also important. When the process of decomposition is at its peak, the compost will tend to generate more heat.



Moisture and Aeration

All organisms, including compost microbes, need a certain amount of water and air to live. Microbes thus function best when the compost heap has many air passages and is about as moist as a wrung-out sponge. Extreme sunlight or rain can adversely affect this moisture balance. Do not cover compost piles with plastic or similar materials because these do not permit air to pass through. However, during wet weather, it is advisable that you cover the piles in order to avoid excessive moisture buildup.



Now that you know all about the basic requirements, let us find out what organic materials you can use to start composting.



Let's Think About This

What did you have for breakfast today? for lunch? for dinner?

How would you like to eat mangoes every day for breakfast, lunch, dinner and snacks? Just plain mangoes day after day after day. You'd probably get bored pretty fast. Worse, you'd probably get sick because your body needs many other nutrients aside from those that mangoes provide. We crave for different foods for a reason. We need a balanced diet to survive. The microbes and worms within your compost heap similarly like and need variety.

Simply put, the quality and quantity of whatever materials you compost will affect the process and determine the success of your compost project. If you keep this in mind when adding materials to your heap, you'll be able to better plan what you put in and thus come up with better results.

You can compost many kinds of materials at home. This saves time, effort, and gas needed to bring the wastes to the nearest dump site. You also get free fertilizer with which to enrich your soil and make it more productive.



Let's Try This

Put a check mark (✓) in the space before each number if you think the given material can be used to make compost. Put an X-mark (X) if you think the material cannot be used to make compost.

- _____ 1. animal wastes
- _____ 2. dry straw
- _____ 3. pernicious weeds
- _____ 4. meat and bones
- _____ 5. kitchen wastes like fruit and vegetable peels




Check your answers using the *Answer Key* on page 40. Did you get the right answers? If not, don't worry, just read on to learn all about the kinds of materials used in making compost.

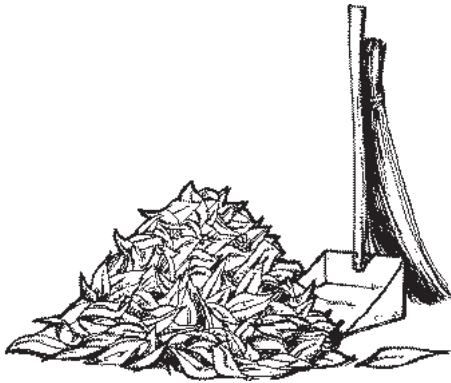

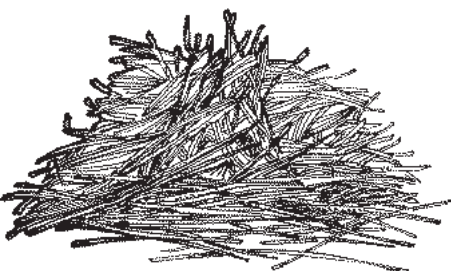




Let's Learn

Organic Materials That You Can Use to Make Compost

The following items can be added to your compost pile.

<p>Grass/Lawn Clippings</p> <p>Fresh grass clippings have high nitrogen content.</p>	
<p>Kitchen Wastes</p> <p>Fruit and vegetable peels/rinds, tea bags, coffee beans, eggshells, and similar materials are great compost materials. They tend to have high nitrogen content and are usually quite soft and moist. As such, kitchen wastes need to be mixed with drier/bulkier materials to allow complete air penetration.</p>	
<p>Hay</p> <p>The greener the hay, the more nitrogen it contains. Be sure that any hay you plan to compost is well-moistened before being added to the pile.</p>	

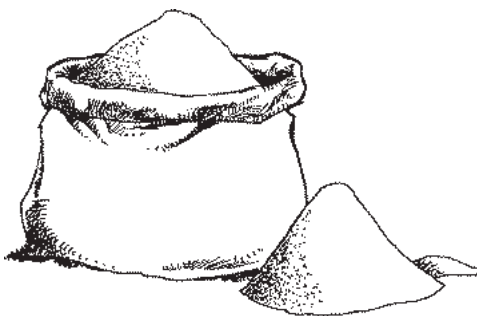
<p>Leaves</p> <p>If you live in an area where leaves are thrown away as garbage, cash in on the bounty by acquiring your neighbors' leaves! Generally, leaves are an excellent compost ingredient. Dead, dry leaves have high carbon content while living, green leaves contain abundant nitrogen.</p>	
<p>Manure</p> <p>Horse, cow, sheep, and poultry manure are often available for free from local ranches, farms, and stables. Manure typically contains quite a bit of nitrogen. The fresher the manure, the more nitrogen it contains. Some manure, however, may contain weed seeds, which may be quite difficult to decompose. Fresh manure can make compost piles heat up quickly. This in turn will accelerate the decomposition of woody materials, leaves, and other materials that have high carbon content.</p>	
<p>Straw</p> <p>Dry straw is good for keeping compost piles aerated because it tends to create lots of passageways for air to get into the pile. Be sure to wet the straw as it very slowly decomposes. Straw has high carbon content and needs to be mixed with materials that also have high nitrogen content in order for it to break down quickly.</p>	




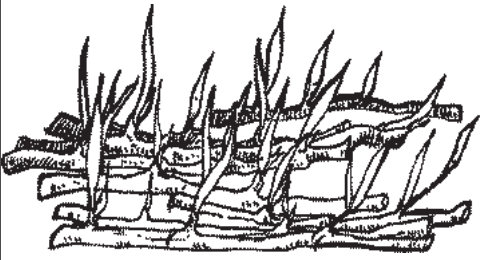

<p>Weeds and Other Garden Wastes</p> <p>Many types of weeds and old garden plants can be composted. Avoid weeds that have begun to form seeds, because they may still grow and survive in your compost pile.</p>	
<p>Wood Chips and Sawdust</p> <p>Wood products have high carbon content. Some sawdust, especially those from broad-leaved and deciduous trees, will break down quickly in an active compost pile.</p>	

Take note that not all biodegradable materials can be composted.

What Not to Compost

Because of toxins, plant or human diseases or weed troubles, there are some materials that should not be put into compost piles. Avoid composting the following:

<p>Chemically-treated Wood Products</p> <p>Sawdust is often available from construction sites and other building projects. If you are considering composting sawdust, be sure of its origin. Sawdust from chemically-treated wood products can be a bad compost ingredient because the chemicals can be passed on to the compost.</p>	
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<p>Diseased Plants</p> <p>Many disease-carrying microbes in plants can be killed if there is sufficient heat in your compost heap. However, it's difficult to make sure that every speck of the diseased material gets fully composted. It is thus best not to compost diseased plant materials at all.</p>	
<p>Human Wastes</p> <p>Human feces can contain disease-carrying organisms that can make people very sick. Composting human feces should, therefore, not be attempted.</p>	
<p>Meat, Bones, and Fatty Food Wastes</p> <p>These materials are very attractive to pests, especially rats. In addition, fatty food wastes break down very slowly because the fats prevent the air that microbes need to circulate in the compost pile.</p>	
<p>Pernicious Weeds</p> <p>Several kinds of plants and grasses can resprout from their roots and/or stems in the compost pile. Just when you thought you had them all chopped up, you actually helped them multiply!</p>	
<p>Animal Wastes</p> <p>Dog and cat feces may carry diseases that can infect humans. It is best never to use them in compost piles.</p>	



Let's See What You Have Learned

Let's see how much you have learned from what we have just discussed. In the blank provided before each number, write **T** if the statement is true and **F** if it is false.

- _____ 1. Materials that are rich in carbon give microorganisms the proteins that they need to build their bodies.
- _____ 2. In composting, the warmer the temperature, the better.
- _____ 3. All organic materials can be used in composting.
- _____ 4. Fresh grass clippings are rich in nitrogen while dry leaves are rich in carbon.
- _____ 5. You should never use animal wastes in composting because they may have diseases that can be passed on.

Check your answers using the *Answer Key* on pages 40–41.

In Lesson 1, you found out what composting is. In Lesson 2, you learned about the things you need to make composts. In the next lesson, we will discuss how you can make your own compost.



Let's Remember

Before you proceed to Lesson 3, do not forget the highlights of this lesson.

Composting has the following requirements:

- ◆ Biological process
- ◆ Carbon and nitrogen
- ◆ Surface area
- ◆ Temperature
- ◆ Moisture and aeration

2. The following can be used in composting:
 - ◆ Grass and lawn clippings
 - ◆ Hay
 - ◆ Kitchen wastes
 - ◆ Leaves
 - ◆ Manure
 - ◆ Straw
 - ◆ Weeds and other garden wastes
 - ◆ Wood chips and sawdust
3. The following materials should not be used in composting:
 - ◆ Chemically-treated wood products
 - ◆ Diseased plants
 - ◆ Human wastes
 - ◆ Meat, bones, and fatty food wastes
 - ◆ Pernicious weeds
 - ◆ Some animal wastes like those of dogs and cats

Making and Using Composts

A compost pile can be as plain or as fancy as you want. You don't even need a bin to make compost. You can just dig a hole in your yard. But if you want something more durable, consider acquiring a compost bin.

In this lesson you will learn how to make your own compost bin.

After studying this lesson, you should be able to:

- ◆ prepare a compost bin;
- ◆ properly care for your compost pile;
- ◆ identify reasons for possible problems regarding your compost pile;
- ◆ explain how you can use compost; and
- ◆ identify the benefits of composting.



Let's Learn

How to Prepare Your Own Compost Bin

Remove the grass cover of the area where you will put your compost pile to allow direct contact between the materials and soil microorganisms.

For your compost bin, you can choose from numerous commercial composters or construct your own from wooden planks, concrete blocks, used freight pallets, hardware cloth, barrel or chicken wire.

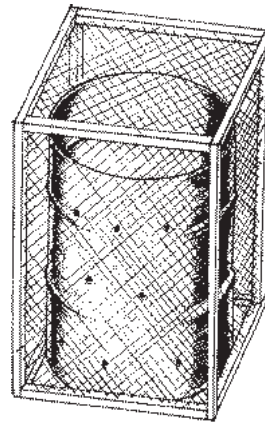
Let us say you are going to use a barrel as your compost bin.

Here are the steps.

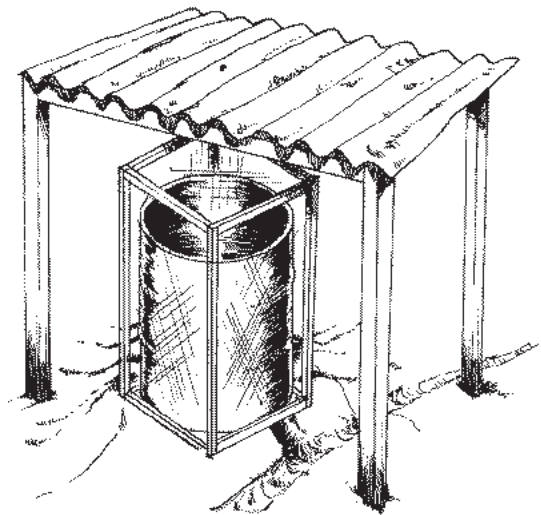
1. Remove the bottom part of the barrel and punch holes all over the barrel.



2. To prevent rats and animals from “invading” your barrel, put a screen around it.

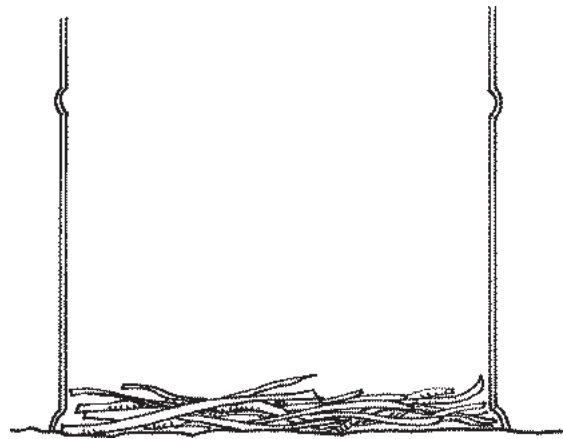


3. Place the barrel in an area where there is a good drainage system. This is to ensure that the area will not stay wet for a long time even when it rains. A shaded area is also desirable for best results. If possible, do not put the pile or structure near trees. Tree roots may be attracted to the loose, moist organic materials in the bottom of your pile. During summer, the roots of some trees may invade the lower area of the bin and make the compost difficult to dig and use.

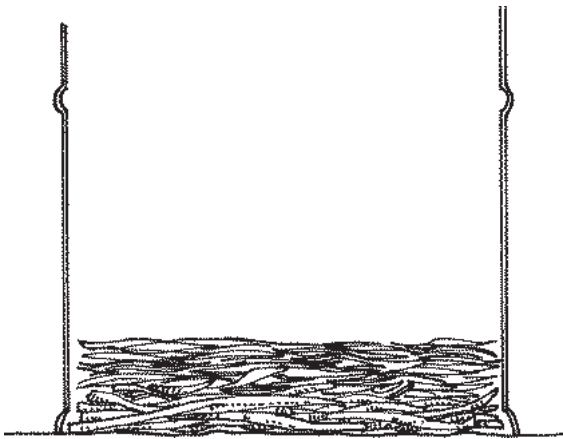


4. Start layering. Layering means placing the organic materials systematically inside your compost bin.

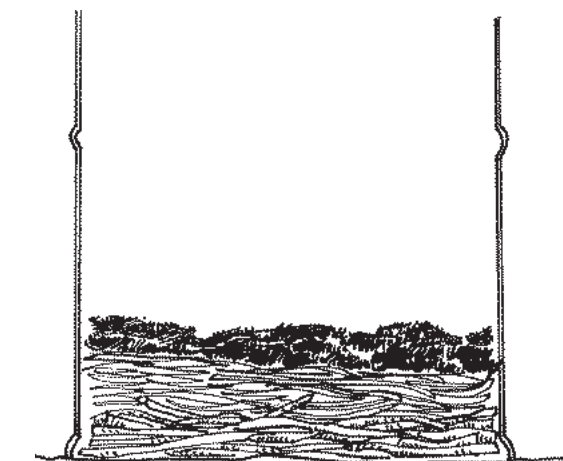
◆ **1st layer:** Put 3 to 4 inches (3" to 4") of dried branches and twigs on top of the soil surface. This material will allow the air to circulate around the base of the heap.

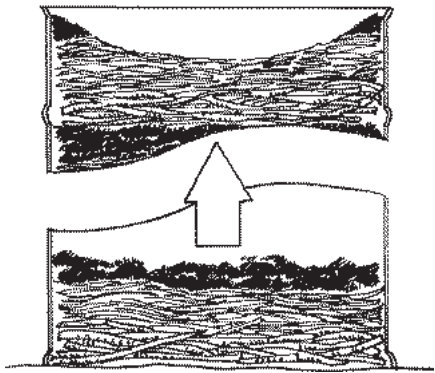



◆ **2nd layer:** Put 6" to 8" of materials rich in carbon (dry leaves, hay, straw, etc.).



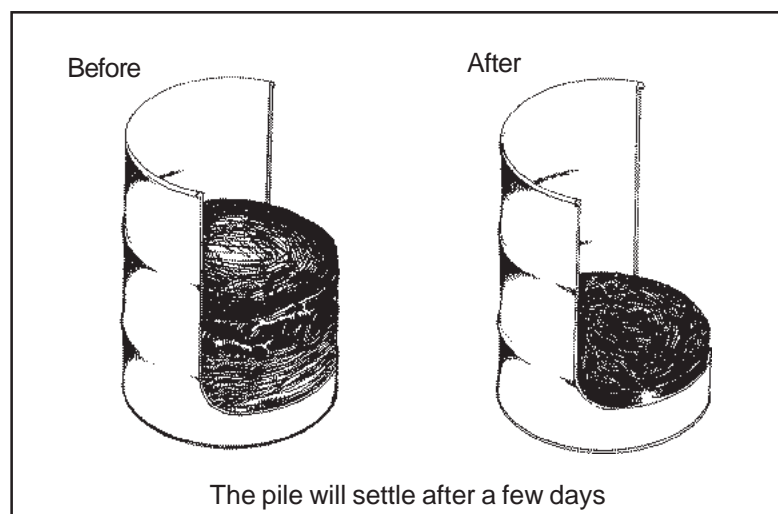
◆ **3rd layer:** Put 2" to 3" of materials rich in nitrogen like animal manure, fresh leaves, etc.



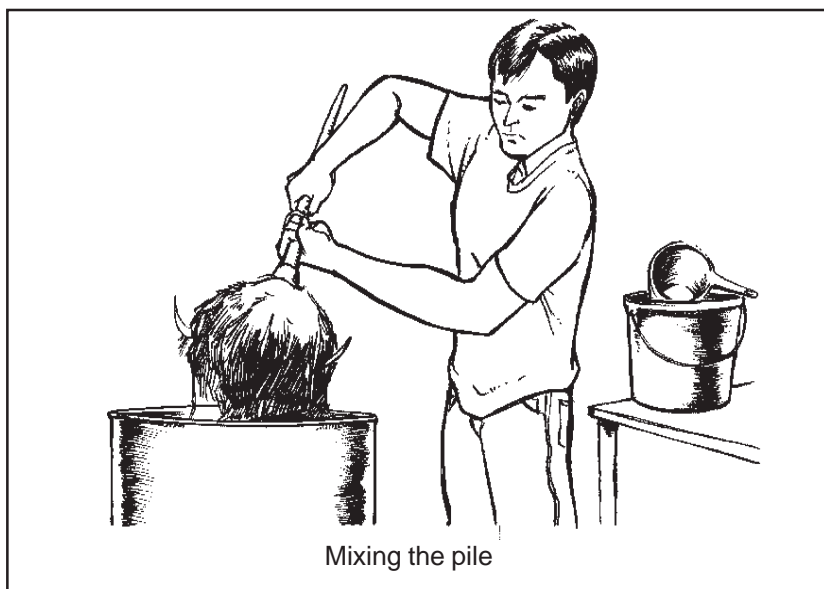
<p>◆ 4th layer: Repeat the layers until the bin is filled. Scoop out a “basin” at the top to catch rainwater for use during the summer. This will ensure that your compost pile will be moist even during the hot summer months.</p>	
<p>5. Cover the pile. You may want to add a small amount of garden soil. Microbes in the garden soil will speed up decomposition.</p>	

Layering is done to ensure that enough air and water reach the bottom of the heap. After you have done the initial layering, you no longer need to layer the additional materials.

A properly made heap will reach a temperature of about 140 degrees Fahrenheit in four to five days. At this time, you will notice the pile “settling.” This is a good sign that your heap is working properly.



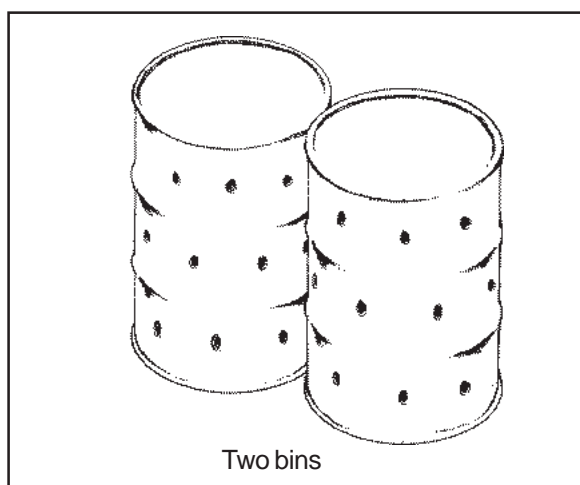
After three to four weeks, fork the materials into a new pile, putting the outside of the old heap into the center of the new one. Add water if necessary. It is best to stir your compost a second or third time. The compost should be ready for use within three to four months.



You can make compost even faster by mixing the pile more often. Check the internal temperature regularly; when it decreases substantially (usually after about a week), mix the pile.

The compost is ready for use when it turns dark brown, crumbly, and earth-smelling. This means that the compost has already turned into humus.

You may also want to have two bins. Two bins are always better where space permits, since one compost pile can be allowed to mature while new materials are being added to the other.



You may also decide to dig a hole in your yard instead of making a compost bin. If so, follow the same guidelines given here about choosing the correct area for your pile. Make sure you dig a pit about 4 feet deep and 1¾ feet wide. Then follow the same procedure for making compost in a bin.



Let's Think About This

What should you do after you have finished preparing the compost bin? Should you just wait?

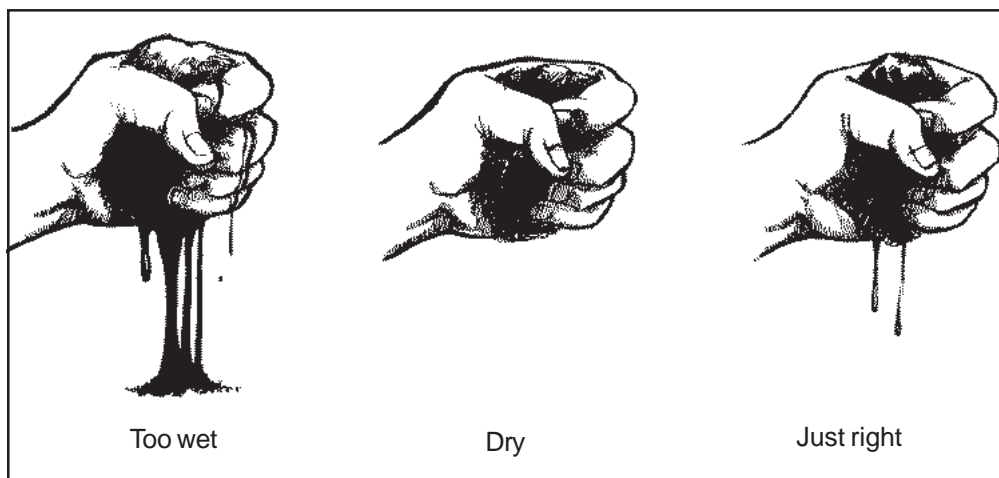
As we have discussed in Lesson 1, this alternative form of garbage “disposal” will require you to exert additional effort. You ought to take care of your compost bin just as you would take care of a pet.



Let's Learn

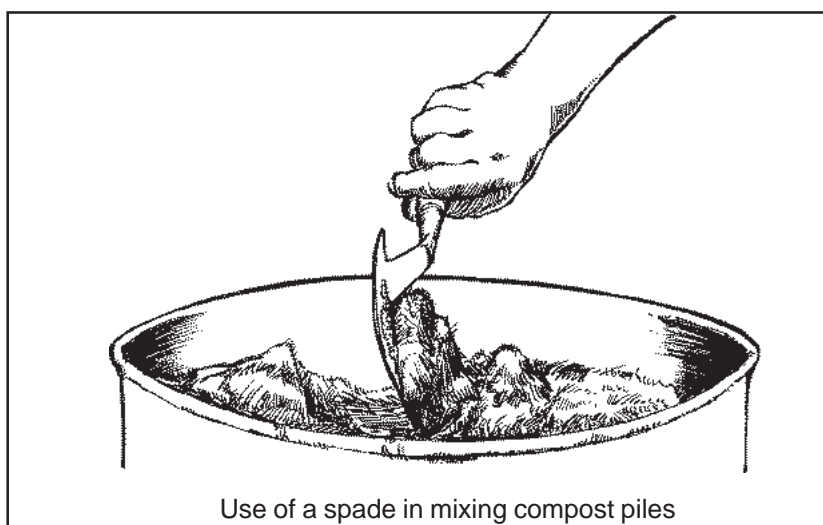
Taking Care of the Pile

Decomposition will take place even if a compost pile is ignored, but at a slower rate. Adding water to maintain moisture and mixing the pile every now and then to improve aeration will speed up the process. To check the moisture content of the pile, squeeze a handful of compost. If a few drops of water can be squeezed out, the moisture is just right. If drops don't fall, it is too dry. If water trickles out, it is too wet. The pile should be covered with plastic or a similar material during wet weather to avoid excessive moisture buildup.



Remember also to check the temperature of your pile regularly with a thermometer. A properly built pile should develop a temperature of at least 110 degrees Fahrenheit at the center in about a week during summer and in about a month during the rainy season. When that temperature is reached, the pile should be opened, any compacted materials should be loosened and mixed or stirred so that the materials previously on top and in the sides are moved to the center.

Piles may be mixed by slicing through them with a spade and turning each slice over. The main objective in mixing is to aerate the pile and shift the materials from the outside closer to the center, where they may also be heated and decomposed.



As the materials decompose, the pile should heat up and shrink, eventually becoming no more than half its original height. Often, the pile's volume may shrink by 70 to 80 percent.



Let's Think About This

What happens if you do not get the desired results out of your compost pile? What are the possible problems that you may encounter?



Let's Learn

Diagnosing Composting Problems

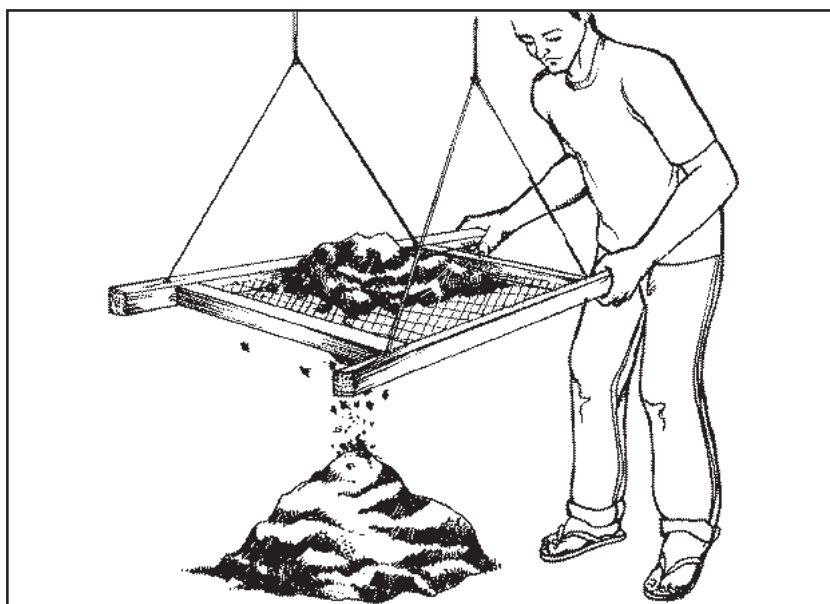
- Symptom #1:** The pile is producing a bad odor.
- Diagnosis:** The pile may be too wet, too tight or both. Mix it to loosen and allow more air to circulate. If the pile is too wet, mix it but at the same time add dry, new materials. A bad odor may also indicate that animal wastes are in the compost pile.
- Symptom #2:** No decomposition seems to be taking place.
- Diagnosis:** The pile is too dry. Moisten the materials while mixing the pile.
- Symptom #3:** The compost is moist enough and the center is warm but not hot enough for complete breakdown.
- Diagnosis:** The pile may be too small. Try adding more materials to make a larger pile. Mix the old ingredients that may have only slightly decomposed into the new pile. Another possibility is that your pile may be lacking in nitrogen. Add more organic materials that are rich in nitrogen like animal manure, fresh grass clippings, eggshells, etc.
- Symptom #4:** The heap is moist, has no bad odor, and is slightly decomposed but still not hot enough.
- Diagnosis:** There is not enough nitrogen available for proper decomposition. Mix nitrogen sources such as fresh grass clippings, manure, or fertilizer into the pile.

Now you know how to make a compost bin and how to treat some possible “illnesses” of your compost pile. The only question left is: If everything goes right and the compost turns into humus, what next?

How to Use the Humus

You’ll know that the compost has turned to humus when its appearance becomes crumbly and it smells like rich soil with no hint of rotting odor. Another indicator is when you can no longer recognize the original composted items. At this point, you’re ready to use the compost to benefit your garden.

In some cases, screening compost through a one-inch wire mesh will help sort out incompletely decomposed materials before use. Twigs decompose slowly and if they have become a part of the debris, they may have to be removed from finished compost and returned to the heap.



You can add the humus to your garden soil. Humus is also very suitable for potting houseplants or planting many types of seeds. Humus is an excellent top-dressing for flowers, vegetables, shrubs, and trees.



Benefits of Composting

If you practice composting, what will you get in return?

Composting has several benefits.

- ◆ It improves soil structure. With the addition of compost, sandy soil will be able to hold water better and clay soil can be drained faster.
- ◆ It reduces soil erosion and water run-off. Plant roots can penetrate compost-rich soil more easily and therefore hold the soil more firmly in place.
- ◆ It provides food for earthworms, soil insects, and beneficial microorganisms.
- ◆ It assists the soil in holding nutrients, thus lessening the need for chemical fertilizers.
- ◆ It improves plant health, making them less susceptible to diseases and insect pests and thereby reducing the need for pesticides.
- ◆ It reduces the wastes which might otherwise fill up landfills. Leaves, grass, and debris often found on the streets and which tend to clog drains and street gutters can instead be composted.
- ◆ It saves you money you would have otherwise used to buy commercial soil conditioners.



Let's Review

In the blank provided before each number, write **T** if the statement is true and **F** if it is false.

- _____ 1. Layering of compost materials is done to ensure that enough air and moisture will reach the bottom of the heap.
- _____ 2. The pile should never be covered to let air and water into the heap.
- _____ 3. Decomposition will be faster if you leave the compost heap to decompose on its own.
- _____ 4. The compost is ready when it starts to release a bad odor.
- _____ 5. Humus can be used as top-dressing for plants.

Check your answers using the *Answer Key* on page 41.

Did you get all the answers right? If not, review the items that you missed before proceeding.



Let's Sum Up

You have just finished the last lesson in this module. Before you take the post-test (*What Have You Learned?*), read the highlights of the module first.

- ◆ The major cause of our garbage problem is the continued increase in population. With the increase in population comes an increase in people's activities. This, unfortunately, leads to the production of large amounts of waste.
- ◆ Recycling has been recognized as a solution to the garbage problem. Composting is one form of recycling.
- ◆ The end product of composting is humus.

- ◆ Composting has the following requirements:
 1. biological process;
 2. carbon and nitrogen;
 3. surface area;
 4. temperature; and
 5. moisture and aeration.
- ◆ Not all organic materials can be used in composting.
- ◆ The compost bin or pit should be placed in a shaded area.
- ◆ To make a compost bin using a barrel:
 1. Remove the bottom part of the barrel and punch holes around the barrel.
 2. Put a screen around the barrel.
 3. Place the barrel in a shaded area where the drainage is good.
 4. Arrange the materials in layers inside the barrel.
 5. Cover the pile.
- ◆ If you decide to dig a compost pit, it should be at least 4 feet deep and 1 $\frac{3}{4}$ feet wide.
- ◆ The compost is ready to use when it turns dark brown, crumbly, and earth-smelling.
- ◆ Make sure that your compost bin or pit remains moist and has enough heat at the center to speed up decomposition.
- ◆ The problems you may encounter in composting may be mostly due to lack of water, air, and moisture.
- ◆ To use the humus, add or mix it to your garden soil.
- ◆ Composting has several benefits; foremost among these is the improvement of the condition of the soil.



What Have You Learned?

Encircle the letter of the correct answer to the following questions.

1. Which of the following statements about composting is not true?
 - a. Composting is a form of recycling.
 - b. You can control the speed of decomposition.
 - c. Composting is the process of decomposing inorganic materials.
 - d. Only organic materials can be composted.
2. The end product of composting is _____.
 - a. organic material
 - b. humus
 - c. inorganic material
 - d. waste
3. Which of the following is not an organic material?
 - a. hay
 - b. dry leaves
 - c. roof sheets
 - d. leftover fruits and vegetables
4. Which of the following is not a benefit of composting?
 - a. It saves you money.
 - b. It reduces the amount of wastes which might otherwise fill up landfills.
 - c. It makes old bottles clean and ready for use again.
 - d. It reduces soil erosion.
5. Which of the following are needed in composting?
 - a. biological process, carbon and nitrogen, surface area and right temperature, moisture and aeration
 - b. organic materials, inorganic materials, biological process, carbon and nitrogen
 - c. dried leaves, animal manure, carbon, nitrogen and worms
 - d. biological process, carbon and oxygen, surface area, temperature, moisture and aeration.

6. Which of the following materials should not be used in composting?
 - a. kitchen wastes
 - b. hay
 - c. pernicious weeds
 - d. wood
7. Which of the following statements is not true about the role of worms and bacteria in composting?
 - a. They aid in decomposition.
 - b. They “break down” the organic materials.
 - c. They cause temperature to rise inside the compost bin.
 - d. They block the air passages to the compost bin.
8. Compost materials are layered _____.
 - a. to ensure that the compost heap will be filled faster
 - b. to ensure that enough water and air circulate in it
 - c. to ensure that the temperature at the bottom is colder than the temperature on top
 - d. all of the above
9. After you have prepared the compost bin, you should _____.
 - a. check the number of worms in it
 - b. mix the pile from time to time
 - c. add another layer of compost every day
 - d. add worms regularly to aid in the decomposition
10. The compost is ready when _____.
 - a. it acquires a rotten smell
 - b. it becomes hard as a rock
 - c. it turns dark brown, crumbly, and has an earthy smell
 - d. it does not decompose

How did you do in the test?

Check your answers against those in the *Answer Key* on pages 41–42.

If you got:

- 0 – 4 You should study this module again.
- 5 – 6 You should go back to the parts of the module which you did not understand.
- 7 – 8 Good! Just go back to the items which you were not able to answer correctly.
- 9 – 10 Very good! You have learned a lot from this module. You can now practice composting.



Let's Try This

Apply what you have learned in this module. Start making your own compost bin following the steps described in this module. While preparing and caring for your compost bin, answer the following questions. Write your answers on the lines after each number.

1. What materials do I need to make my own compost bin?

2. How do I construct a compost bin?

3. Where should I place my compost bin?

4. What materials from the wastes which my family and I generate each day can be used in my compost bin?

5. What materials from our household wastes should not be placed in the compost bin?

6. What steps should I take in maintaining the compost bin?

7. What possible problems could I encounter with my compost bin and how can I solve them?

After answering the questions, you should review the various parts of this module to see if you are really ready to make your own compost bin. You may also seek the assistance of your Instructional Manager or Facilitator, friends, colleagues, neighbors, and others if you have any questions or problems. Good luck and happy composting.



Answer Key

A. Let's See What You Already Know (*pages 2–3*)

- A. 1. **(b)** The use of open dump sites is a short-term solution to the garbage problem because as time passes, the dump site will be filled and another one will have to be opened. An example of a long-term solution would be recycling in which wastes are processed so that they can be used again; this way no waste is disposed of permanently. There will be no need to open one dump site after another.
2. **(c)** Organic materials come from living things. Examples of these are leaves and vegetable and fruit peels. Inorganic materials, on the other hand, come from nonliving things. For example, a diamond is an inorganic material because it comes from minerals, which are nonliving things.
3. **(a)** The right temperature (warm), moisture, and aeration are essential for composting to be successful.
4. **(b)** If the compost bin is too wet or too tight, the materials that you will put in it are more likely to produce a bad odor. For example, if you placed animal wastes in the compost heap and the heap is too wet, this will cause bad odor.
5. **(a)** Mixing the pile will distribute the heat and moisture in it and thus hasten decomposition.

- B. hay
kitchen wastes like fruit and vegetable peels
manure
straw
wood chips and sawdust
These are all organic materials that are ideal for composting.

The following items should not be used in composting:

- ◆ Pernicious weeds, because decomposition may not be able to prevent them from growing.
- ◆ Human waste is likely to cause bad odor, not to mention illnesses.
- ◆ Diseased plants may pass on disease-carrying microbes to the compost.
- ◆ Meat and bones attract pests and are, therefore, not ideal.

B. Lesson 1

Let's Review (page 8)

1. Recycling
2. Composting
3. Organic materials or biodegradable materials
4. Inorganic materials or nonbiodegradable materials
5. Compost

Let's See What You Have Learned (page 11)

1. **(T)**, if you are able to control the conditions, you can speed up the process of decomposition.
2. **(T)**, the nutrients coming from the decomposed materials are very good for plants.
3. **(T)**, no amount of composting will completely decompose a rock.
4. **(F)**, as the name suggests, recycling is a cycle or a cyclical process. It is a cycle because in recycling, materials are reused as many times as possible.
5. **(F)**, the increase in population can be considered as the root cause of the garbage problem. The increase in population leads to an increase in people's activities and eventually to the increase in the amount of wastes produced.

C. Lesson 2

Let's Try This (page 16)

1. **8**
2. **4**
3. **8**
4. **8**
5. **4**

Let's See What You Have Learned (page 21)

1. **(F)**, organic materials that are rich in nitrogen provide proteins while those rich in carbon give body-building nutrients to the microorganisms in a compost bin.
2. **(T)**, warm temperature hastens decomposition.

3. **(F)**, some organic materials may not be good for composting, like diseased plants and some animal wastes.
4. **(T)**, fresh materials like grass clippings, animal wastes, and vegetable scraps are rich in nitrogen; dry materials like leaves, twigs, and wood are generally rich in carbon.
5. **(F)**, animal manure is, in fact, a good compost material. Animal wastes like those from your dog or cat, however, should never be used in composting.

D. Lesson 3

Let's Review (page 33)

1. **(T)**, if you layer your compost heap, the bottom part will receive enough heat and moisture even if it is covered by other materials.
2. **(F)**, the pile should be covered during wet weather because this will help avoid excessive moisture buildup and speed up the decomposition process.
3. **(F)**, from time to time, you should mix the pile to distribute heat and moisture, and to hasten the decomposition.
4. **(F)**, if your compost heap produces bad odor, this is an indication that it may have a problem.
5. **(T)**, the main benefit that you can get from composting is producing humus which you can use as top-dressing for your garden plants.

E. What Have You Learned? (pages 35–37)

1. **(c)** is the correct answer because the statement is not true—only organic materials can be used in composting. The rest of the statements are all true: (a) because in composting, organic wastes are processed and turned into useful fertilizers; (b) because by mixing the pile from time to time you can ensure the equal distribution of heat, air, and moisture in the heap and thus speed up decomposition; and (d) because only organic materials can be completely decomposed and turned into compost.
2. **(b)** is the correct answer. The decayed organic materials, or compost, eventually turn into humus, the organic portion of soil.
3. **(c)** is the correct answer. Roof sheets are inorganic; they are made from metal, a nonliving thing. The other choices are all organic materials because they all come from living things: hay from grass; dry leaves and leftover fruits and vegetables from plants and trees.

4. **(c)** is the correct answer because this is not a benefit of composting, but of another form of recycling. All the other choices are direct or indirect benefits of composting.
5. **(a)** is the correct answer because it lists all the things essential to composting. **(b)** is incorrect because it includes inorganic materials which cannot be used in composting. **(c)** is too specific; dried leaves and animal manure are not the only organic materials which can be used in composting. **(d)** is incorrect because it is nitrogen and not oxygen that is needed in composting.
6. **(c)** is the correct answer. Pernicious weeds should not be used in composting because they can resprout from their roots in the compost pile. The rest of the given materials are considered ideal for composting.
7. **(d)** is the correct answer because it is not true that worms and bacteria block the air in the compost bin. Worms and bacteria have nothing to do with the aeration of the compost pile. In fact, worms need air to survive in the pile.
8. **(b)** is the correct answer. **(a)** is wrong because layering involves segregating the materials you are to compost and thus it takes a longer time to fill up the bin. **(c)** is wrong because the temperature at the bottom will actually be warmer than the temperature on top.
9. **(b)** is the correct answer. Mixing the compost pile from time to time will ensure that enough air and moisture will enter the pile. There is no need to check the number of worms **(a)** nor add worms on a regular basis **(d)**. They will gradually increase in number as you add materials to the compost heap. Neither is there a need to add new layers to your compost every day **(c)**. Layering is only done at the beginning; afterwards you may add any kind of organic materials to the compost heap.
10. **(c)** is the correct answer because this indicates that the compost has turned into humus. If your compost has a rotten smell **(a)**, becomes hard **(b)**, or does not decompose **(d)**, it may have some problems and may not have been properly prepared.



Glossary

Aerate To expose something to or mix it with air or oxygen.

Biological Something that has to do with the life process of living organisms.

Debris The remains of something crushed, smashed, destroyed, etc.

Deciduous Refers to plants that shed all their leaves at a certain time of the year, usually autumn.

Decomposition The process of breaking down materials into simpler forms; the decaying or rotting of materials.

Groundwater Water that can be found in the rocks beneath the surface of the earth and which can surface in springs.

Landfill A place where rubbish or wastes are disposed of by burying them under layers of earth.

Nucleic acid An important component of the cell which determines the characteristics of an organism.

Pallet A small wooden platform on which goods can be stacked for lifting and transporting, especially by forklift trucks.

Pernicious Harmful or destructive.

Toxic Poisonous.



References

- Christina, AH and GK Evanylo. 1997. *Compost*. Virginia Cooperative Extension. <<http://www.ext.vt.edu/pubs/compost/452-231/452-231.html>>. September 20, 2000, date accessed.
- Environment Canada. *Composting*. <<http://www.ns.ec.gc.ca/udo/paydirt.html>>. September 20, 2000, date accessed.
- Greenweb. *The Beauty of Compost Heaps*. <<http://www.boldweb.com/greenweb/compost.htm>>.
- Johnson, Eric. 1996. *A Composting Introduction*. Rotweb. Abstract at <<http://net.indra.com/~topsoil/Intro to Compost.html>>. September 25, 2000, date accessed.
- Johnson, Eric. 1996. *Composting Questions and Answers*. Rotweb. Abstract at <<http://net.indra.com/~topsil/How to Compost.html>>. September 25, 2000, date accessed.
- Michael, Frederick. *Composting at Home*. Ohio State University Extension Fastsheet. <<http://www.ag.ohio.State.edu/~ohioline/hyg-fast/1000/1189.html>>. September 20, 2000, date accessed.
- Relf, Dianne. 1994. *Composting*. Virginia Cooperative Extension <<http://www.ext.vt.edu/departments/environtment/fastsheet`yardwaste/Oct94pr4.html>>. September 20, 2000, date accessed.
- Relf, Dianne. 1997. *Yardwaste Recycling*. Virginia Cooperative Extension <<http://www.ext.vt.edu/departments/enviroshort/fastsheets3/landsmaint/maya2prs.html>>. September 20, 2000, date accessed.
- Startback, Christopher. 1998. *Making and Using Compost*. Department of Horticulture, University of Missouri-Columbia. <<http://muextension.missouri.edu/xplor/agguides/hort/906956.htm>>. September 25, 2000, date accessed.