What Is This Module About?

If you are a farmer, do you use pesticides in your farm? Do you know that pesticides are harmful to your health and to the land that you are farming?

Have you heard about pesticide poisoning? What about infertile land due to excessive use of pesticides? These are just some of the bad effects of pesticides in farming. Pesticides fight pests that damage the crops and therefore help to increase crop production. However, its unsafe and the excessive use has led to damage in human health and the environment. Even if you are not a farmer, it is important for you to learn about the bad effects of using pesticides since it may affect your health and your environment. You will learn more about this in this module.

This module consists of three lessons:

Lesson 1 – *Why Use Pesticides?*

Lesson 2 – *Alternatives to Chemical Pesticides*

Lesson 3 – *Organic Fertilizer*

What Will You Learn From This Module?

After completing the module you should be able to:

- describe the bad effects of pesticides;
- identify alternative ways to fight pests and diseases that damage plants; and
- explain how to prepare and use organic fertilizers.

Let's See What You Already Know

Before you start studying this module, take the following test to determine what you know about this topic. Write the letter of the correct answer in the blank provided.

1. Pesticides are compounds used to _____.
   a. control pests
   b. keep plants healthy
   c. keep water clean
   d. cure human diseases
2. Pesticides have _____.
   a. no harmful effects
   b. both harmful and useful effects
   c. only useful effects
   d. no effect
3. Pests are _____.
   a. all harmful to plants
   b. all helpful to plants
   c. both helpful and harmful to plants
   d. neither helpful nor harmful to plants
4. When you see a single pest on the farm, you should _____.
   a. spray homemade pesticides immediately
   b. monitor the pest to know when it becomes harmful to plants
   c. don't mind it because it is only one
   d. spray chemical pesticides
5. When you see a snake, you should _____.
   a. immediately kill it
   b. kill it only when it harms you, but keep it because it eats the rats in the farm
   c. kill it when its population is becoming big
   d. b and c
6. When spraying plants, it is safer and better to use _____.
   a. homemade pesticides
   b. chemical pesticides
   c. either a or b
   d. none of the above

7. Chemical control should be used _____.
    a. only when the alternative methods to control pests are not applicable and unavailable
    b. whenever possible
    c. everytime there is a pest in the farm
    d. when there is no time to prepare alternative controls
8. Which among the following is made up of decomposing matter like remains of plants, animal and other natural wastes that carry average amounts of nitrogen, phosphorous and potassium?
    a. organic fertilizer
    b. chemical pesticide
    c. homemade pesticide
    d. commercial fertilizer
9. Compost-making is the way to produce organic fertilizer. Which of the following cannot be included in the compost?
    a. plastics
    b. animal wastes
    c. food wastes
    d. dried plants
10. Integrated Pest Management is a concept that _____.
    a. helps maintain balance in the environment
    b. gives effective ways to combat diseases and pests in plants
    c. studies the life cycle of pests and finds natural ways to fight them
    d. all of the above

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 30.

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 more 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 to understand 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 now go to the next page to begin Lesson 1.

Why Use Pesticides?

What are some of the pesticides and their uses? Are they safe to use? What are their effects on plants? On the health of the person using them? In this lesson, you will learn about some of the pesticides that farmers use. You will also learn about their effects on the health of people and the environment.

After studying this lesson, you should be able to:

- tell when pests become harmful;
- discuss the harmful effects of pesticides on the human body; and
- explain the harmful effects of pesticides on the environment.

Let's Study and Analyze

Analyze the two pictures below, and then identify which of the two environments is a good example of a "balanced nature."

Environment 1

Environment 2

1. Which of the two environments would you consider an example of "balanced nature?" Why do you say so?

   _____

   _____

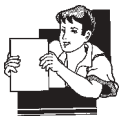
2. Which of the two environments needs pesticides in the farm? Why do you say so?

   _____

   _____

Compare your answers with those in the *Answer Key* on page 30.

Is your analysis similar to what is given in the *Answer Key*? If yes, very good! If not, don't lose heart. Read on and learn more about imbalance in nature and the pesticides that cause it.



Let's Learn

Pesticides are compounds used to control pests. Pests are natural components of crop production, and not all of them damage crops. In fact some of them are helpful in the field. However, when the balance of nature is destroyed (or when there is **nature imbalance**), pests can cause great damage to crops.

Nature imbalance takes place when pests do not have natural enemies, or when natural control agents in the field are destroyed. For instance, when people kill all the snakes, the population of rats will increase because there are no more snakes to eat them. In this case, pests (the rats) will damage the crop. This in turn reduces crop production and consequently affects the country's supply of food.

To prevent the harmful effects of pests and diseases on crops, pesticides are used. Below are some of the common pesticides and their use.

Chemical Pesticides and Their Uses

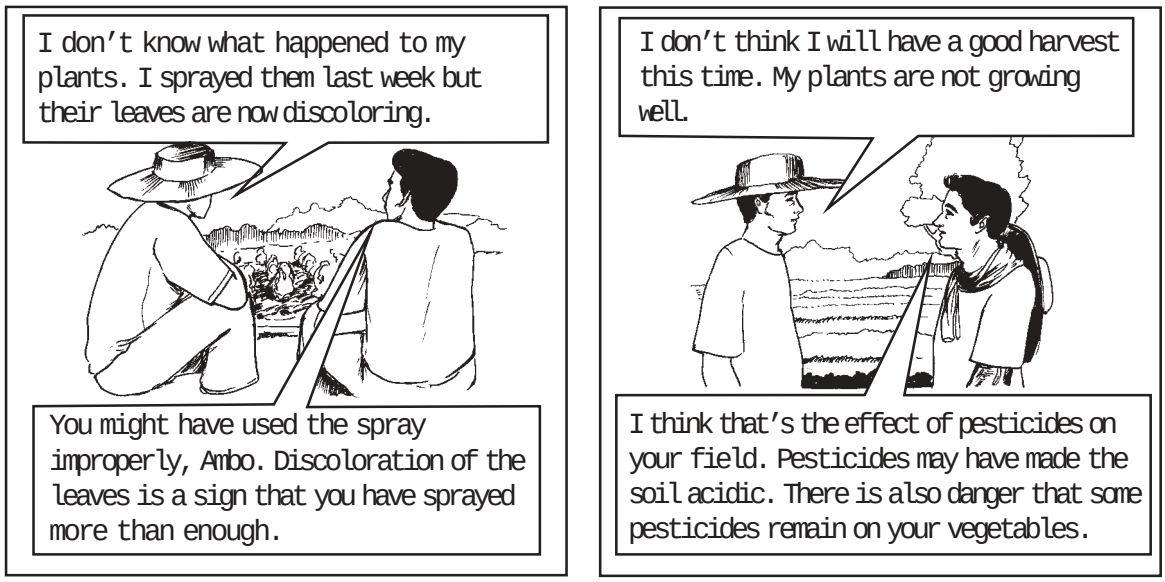
Pesticide (Trade Name)	Uses
Aldrin	Controls ants and pests in cotton plants
Chlordane	Controls ants, termites, grasshoppers and other soil insects
DDT	Controls pests in cotton plants, soya beans, peanut and wood; controls mosquitoes
Dieldrin	Controls termites
Heptachlor	Controls ants, termites, grasshoppers and other soil insects
Lindane	Controls insects found in cotton plant, rice stem borers and wood
Malathion	Controls pests in fruits, vegetables and ornamental plants; controls mosquitoes
Parathion	Controls mosquito larvae and pests found in fruits and vegetables

Do you know other chemical pesticides used in farming? Are you also familiar with their use? Write them down below.

Chemical Pesticides	Uses

Let's Read

Study the dialogue below and then answer the questions that follow.



1. What are the effects of pesticides on Mang Ambo's plants? On his harvest?

   _____
   _____

2. What do you think can be the effect of pesticides on the health of a person if he/she has been eating vegetables treated with excessive pesticides? How can you make such vegetables safe for eating?

   _____
   _____

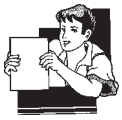
Compare your answers with those in the *Answer Key* on page 31.

Let's Try This

Does your family engage in farming? Do you have relatives or friends who work in the farm? Ask them if they encounter pests in the farm. What was their solution to the problem? Is it effective?

_____
_____
_____
_____

Keep your answers in mind as you read the next sections.



Let's Learn

At present, majority of the farmers use chemical pesticides in their pest management strategies. These are manufactured and marketed commercially as practical solutions in fighting pests and diseases. However, excessive and improper use of pesticides can damage crops, human health and the environment as well.

Chemical pesticides deplete the natural nutrients of the soil. The most common chemical fertilizer used by farmers is **urea**. It is very rich in nitrogen, but too much use of it makes the soil acidic. Plants cannot grow well in this kind of soil, so farmers are then faced with a new problem—unproductive land. This then leads to a drop in production and may make the food grown in the farm unsafe to eat. The acidity of land also affects the bodies of water near it, and may lead to water poisoning. However, solving this problem means another cost to farmers.

A study was conducted abroad linking chemical fertilizers to the "blue baby" cases. This is a heart malformation of a newborn baby that robs the blood of oxygen. However, this study has not yet been proven true in the Philippines.

The most common and proven effect of chemical fertilizers on human health is pesticide poisoning. The farmer who uses pesticide or the people who eat products that carry high amounts of pesticide residue may suffer from this. The **residue** is the amount of pesticide left in the plant.

Let's Study and Analyze

Pesticides are poisonous. This explains why eating foods with high amount of pesticide residues is deadly. But do you know how pesticides are left in plants? Write it down.

_____

_____

_____

Pesticides can harm a person not just through ingestion or the taking in of pesticides through eating or drinking contaminated food. Pesticides are also harmful when inhaled, or when they penetrate the skin in great amounts. Do you know how farmers can be affected by pesticide poisoning? Discuss your answers below.

_____

_____

_____

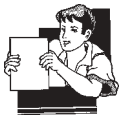
Food poisoning happens when the vegetables or farm products a person eats contain a high amount of pesticide residue. This takes place when a farmer harvests his vegetables before the right harvesting date. In this case, the chemicals sprayed on plants are still active, and therefore poisonous.

On the other hand, pesticide poisoning happens to farmers when they do not follow safety precautions in spraying plants. When using chemical pesticides, a farmer should wear the proper clothes to protect his/her skin from the chemical exposure. He/She should also be very careful in mixing pesticides, and must wash his/her hands and change clothes after spraying. Spraying should be postponed when the weather is windy.

Have you experienced or have you heard cases of pesticide poisoning? What are the symptoms that made you (or the other people involved) realize that it was a pesticide poisoning? Discuss your answers below.

_____
_____
_____
_____

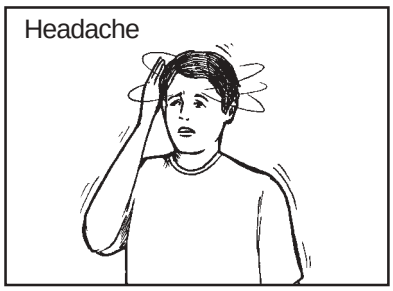
Compare your answers with what you will read in our next discussion.

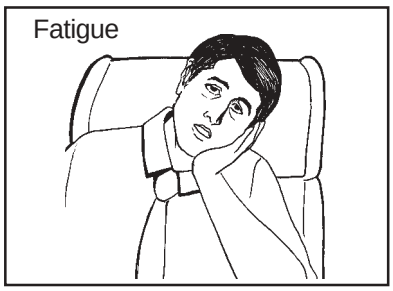


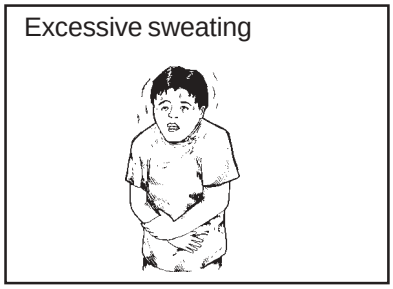
Let's Learn

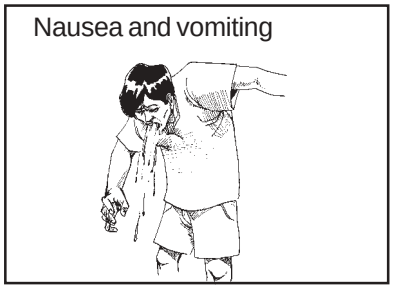
Symptoms of pesticide poisoning may be mild, moderate or severe, depending on the pesticide and the amount absorbed. The following are the signs and symptoms of pesticide poisoning.

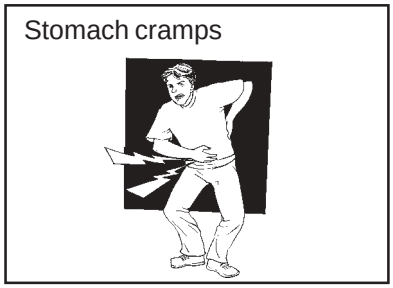
Mild Signs and Symptoms of Pesticide Poisoning

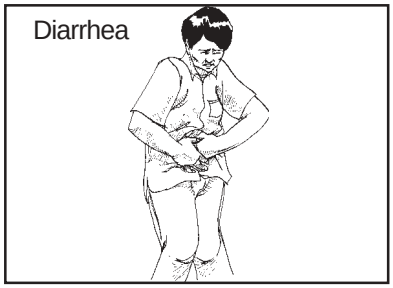












Salivation

Redness or blisters on the skin and burning sensation

Dizziness

Blurred vision

Moderate Signs and Symptoms of Pesticide Poisoning

Inability to walk

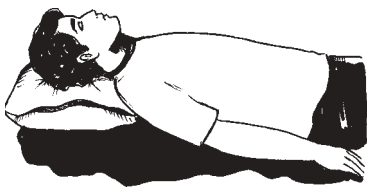
Chest pains

Pinpoint pupils

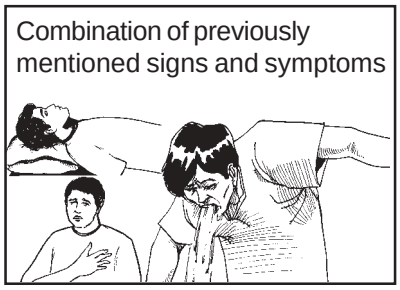
Muscle twitching

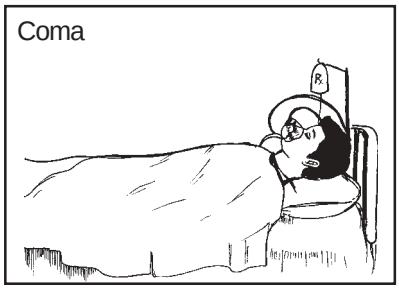
Severe Signs and Symptoms of Pesticide Poisoning

Unconsciousness



Local and generalized convulsions





When a victim encounters these symptoms, keep him calm and bring him immediately to the hospital.

Let's Try This

Go to a farm and ask farmers if they are aware of the harmful effects of pesticides on human health and the environment. Ask them what problems they encounter, if any, after they use chemical pesticides. Ask them what they do to minimize the use of pesticides in the farm.

After you interview the farmers, can you identify the harmful effects of pesticides on the environment based on their answers? Try to name some and list them under the two columns below.

Harmful Effects on the Environment	Harmful

Show your list to your Instructional Manager or Facilitator.

Let's See What You Have Learned

I. Match Column A with Column B. Write the letter of the correct answer on the line before each number.

	A	B
____ 1.	Compounds for controlling pests	a. Pests
____ 2.	Natural components of crop production, some of which are harmful and the others friendly	b. Chemical pesticides
		c. Pesticide poisoning
____ 3.	When pests do not have natural enemies or when natural control agents in the field are destroyed	d. Pesticides
		e. Nature imbalance

____ 4. It depletes the natural nutrients of the soil

____ 5. Common effect of pesticides on human health

II. List down five (5) mild signs and symptoms of pesticide poisoning.

_____
_____
_____
_____
_____

Compare your answers with those in the *Answer Key* on page 31.

Well, how was it? Did you get all the answers right? If you did, very good! If you made some mistakes, don't worry. Review the items that are not clear to you.

Let's Remember

- Pesticides are compounds used to control pests.
- Pests are natural components of crop production; some pests are harmful, others are helpful.
- When harmless pests are eliminated, this leads to an imbalance in nature which damages or affects crop production.
- There also is nature imbalance when pests do not have natural enemies to destroy them or when natural control agents in the field are destroyed.
- Chemical pesticides are a practical solution in fighting pests and diseases. Excessive and improper use of these damages human health and the environment as well.
- Chemical pesticides deplete the natural nutrients of the soil. These can make the land acidic and may also affect bodies of water near the farm.
- The most common and proven effect of pesticides to human health is pesticide poisoning.
- Farmers who use pesticides or people who eat products that carry high amounts of pesticide residue may get poisoned.
- Pesticide residue is the amount of pesticide left in a plant.
- Symptoms of pesticide poisoning may be mild, moderate or severe, depending on the pesticide and the amount absorbed.

Alternatives to Chemical Pesticides

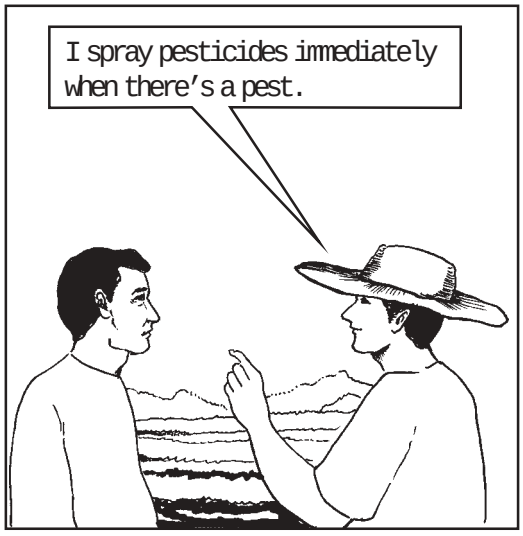
Are there safer ways to fight pests and diseases that will not damage the environment? What are these safe alternatives to pesticides? In this lesson, you will learn the different natural ways of managing pests and diseases in plants.

When you complete this lesson, you should be able to:

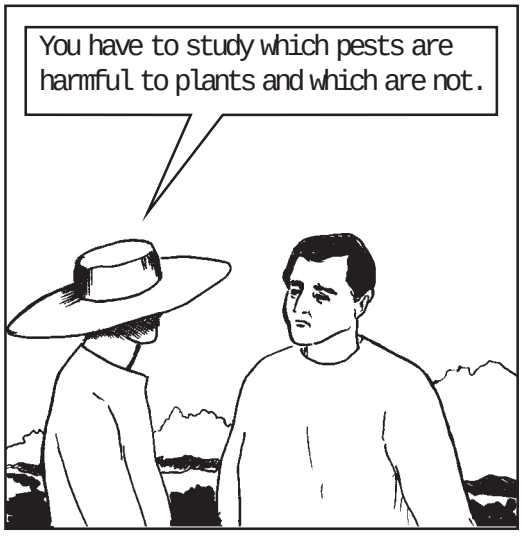
- enumerate Integrated Pest Management (IPM) techniques; and
- explain how to make and use homemade pesticides.

Let's Study and Analyze

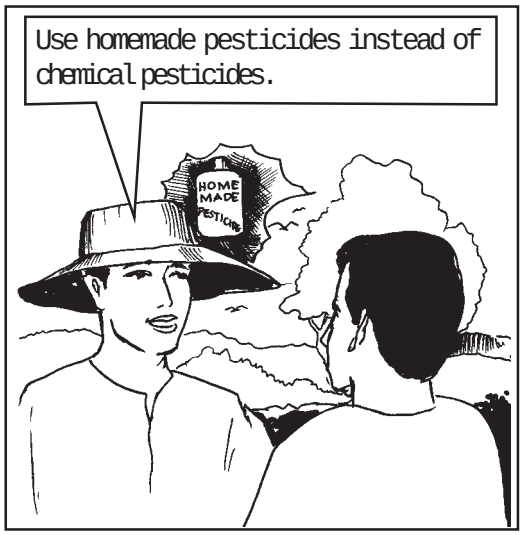
Below are things that Mang Ambo does in order to protect his plants during the planting season. He is now sharing these with Celso, a new farmer. However, not all of his advice is useful. Place an X-mark (8) under the situations that show unhelpful ways of controlling pests.



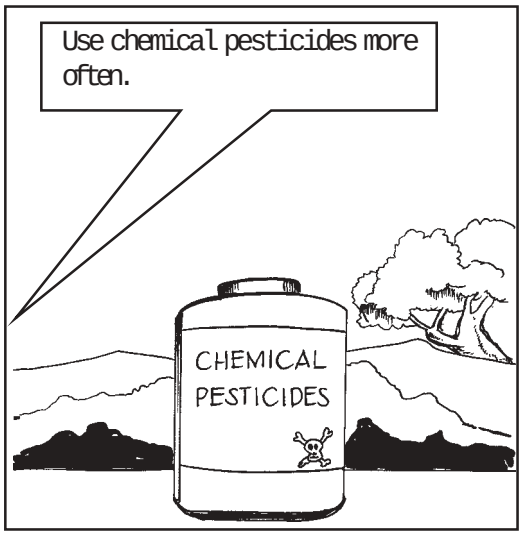
1. _____



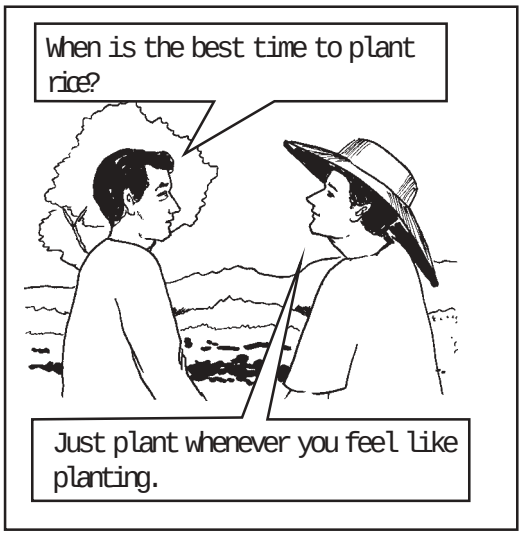
2. _____



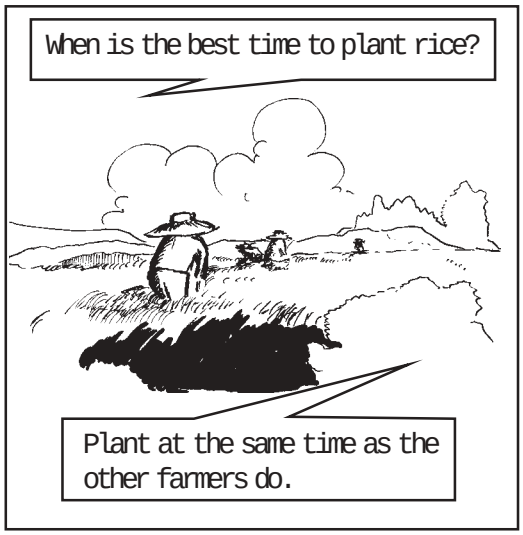
3. _____



4. _____

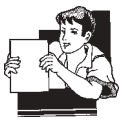


5. _____



6. _____

Compare your answers with those in the *Answer Key* on page 31. Were you able to cross out all the unhelpful ways of controlling pests? If so, very good! If not, don't worry. Read on to learn about the correct ways of managing pests.



Let's Learn

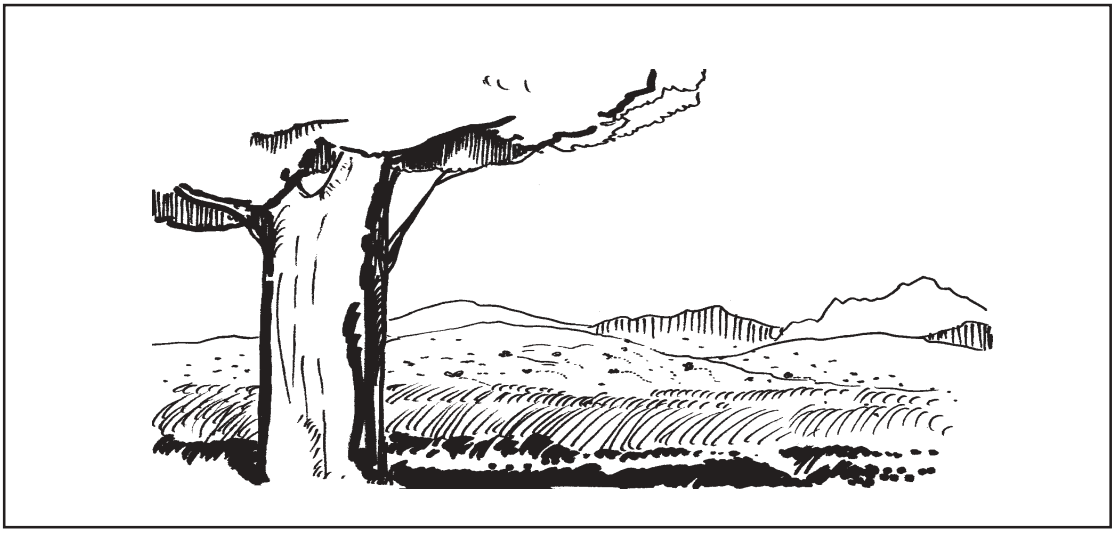
Unsystematic and unsafe use of pesticides led to the development of the **Integrated Pest Management (IPM)** concept. IPM is a natural way of maintaining balance in the environment. It is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.

IPM is not a single pest control method but a series of pest management evaluations, decisions and controls. It studies first the life cycle of pests and their interaction with the environment. Then it combines the most economical and safest means to manage pests, with a minimal or limited use of chemical pesticides.

The IPM approach can be applied to both agricultural and non-agricultural settings, such as the home, garden and workplace.

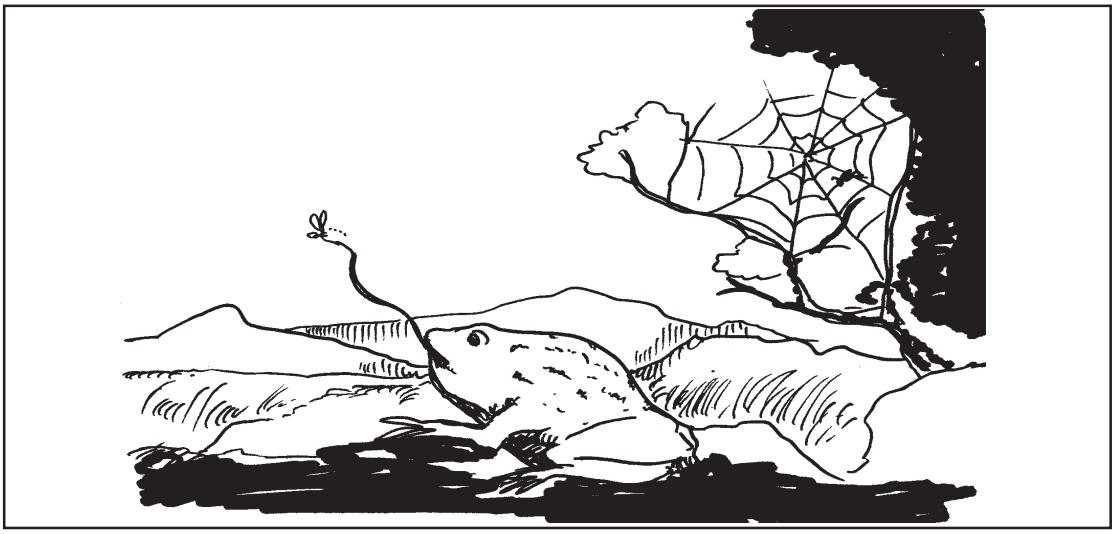
In practicing IPM, there are four steps to follow:

1. Study the Environment



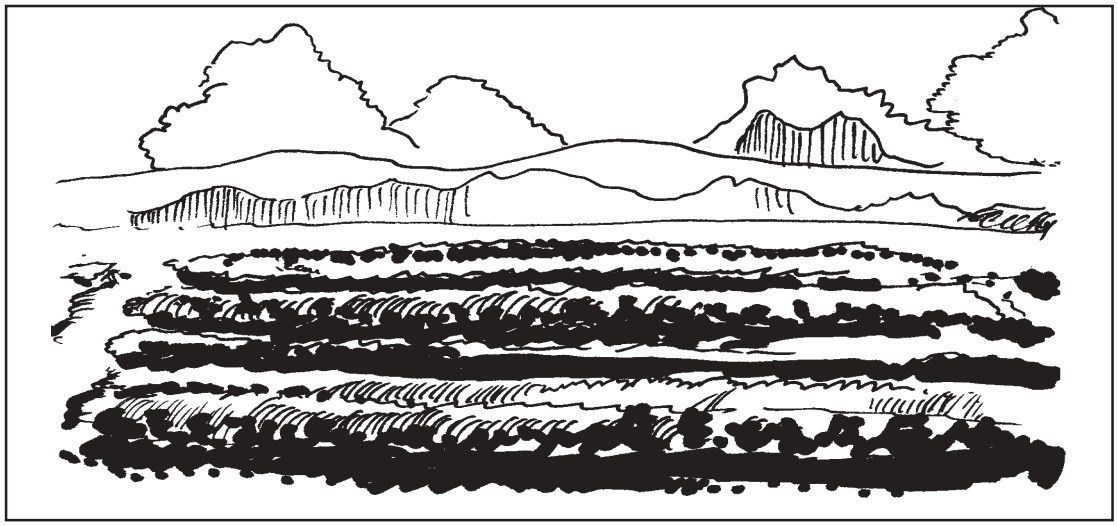
Before taking any pest control action, study first which level of pest populations or environmental conditions indicates that pest control is needed. Finding a single pest does not always mean that control is needed. When a pest population is already posing a threat to crop production, that is the time when control should be introduced.

2. Monitor and Identify Pests



Not all insects, weeds and other living organisms require control. Many organisms are harmless, and some are even helpful. This monitoring and identification remove the possibility of using the wrong kind of pesticides or the impracticality of spraying pesticides.

3. Prevention



The first line of pest control is prevention. You can manage the crop and the field to prevent pests from becoming a threat. This can be done by using cultural methods, such as rotating between different crops, or selecting pest-resistant varieties and planting pest-free rootstock. These control methods can be very effective and affordable, as well as safe for both people and the environment.

4. Control

If preventive methods are no longer effective or available, pest control is required. First, you should choose the less *risky* (dangerous) but effective pest control methods. If less risky controls are ineffective, then additional pest control methods should be employed. The best and least risky pest control method is the use of homemade pesticide, which you will study beginning on page 18.

Do the farmers in your area use the four IPM processes which we discussed? Ask them how they do it.

_____

_____

_____

Let's Review

Identify which IPM approach/step is discussed in each of the statements below. Write your answer on the line before each number. Choose from the answers inside the box.

control	monitor and identify pests
study	prevent

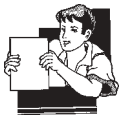
_____ 1. Rotating different crops stops pests from becoming a threat because the cycle of pest attack is disturbed.

_____ 2. Know when the pest population is destructive.

_____ 3. Classify which pests are harmful and which are not.

_____ 4. Prefer homemade to chemical pesticides. When homemade pesticides are ineffective or unavailable, that's the time you should use chemical pesticides.

Check your answers against the *Answer Key* on page 32.



Let's Learn

Below are possible methods of pest management that you can use when you are in Step 3 (Prevention) and Step 4 (Control).

Possible Methods of Pest Management

Read the following methods of pest management and be prepared to use them in solving problems that a farmer may have in the farm.

1. Use resistant varieties. Plant a variety of your crop (e.g. rice, vegetables, fruits, etc.) that is resistant to as many pests as possible. When you know what insects, pests and diseases the variety of your crop is resistant to, you do not need to apply certain pesticides.

2. Practice cultural control. When farmers in the same area plant at the same time, the transfer of pests to other fields is prevented. This cultural practice should be followed within 3 weeks.

3. Harvest at ground level and incorporate residues to the soil to eliminate hosts of pests and diseases. A farmer can do away with the pests that remain in the farm by allowing harvest residues, like rice stalks, to decay on the soil.

4. If possible, leave the field bare for at least 6 weeks, or plant crops other than what you usually plant, to break the life cycle of the pests.

5. Use just enough fertilizer especially nitrogen. Too much of this slows down the growth of plants and makes them prone to pests and diseases.

Fertilizers that contain nitrogen are the following:

a. Urea (46-0-0)

b. Ammonium sulfate (21-0-0)

c. Calcium ammonium nitrate (27-0-0)

d. Ammonium chloride (25-0-0)

e. All combinations of nitrogen, potassium and other complete fertilizers, like 14-14-14-14 and 16-20-0

f. All decaying matters like leaves and animal wastes

6. Prepare the land thoroughly and level it to maintain water level uniformly. Also, control water level.

7. Use the right rate of seeds. Do not sow excessive amount of seeds because this will only overcrowd your farm and will lead to more pests.

8. Keep paddy dikes as small as possible, narrow and low so that rats cannot dig in them.

Let's Try This

Below are some of the problems of Mang Ambo in his farm. Can you help him solve the following?

1. There are many rats in the farm, especially in the dikes. What could be the problem? What is the solution?

   _____
   _____

2. Mang Ambo plants only rice, and it seems that the cycle of pests follows his planting schedule. What should he do?

   _____
   _____

3. The plants grow very slowly. What could be the problem?

   _____
   _____

4. Everytime Mang Ambo plants rice, a certain kind of pest damages his farm. What should he do to get rid of that dreadful pest?

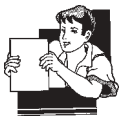
   _____
   _____

5. Mang Ambo uses many combinations of nitrogen and potassium in fertilizers, but he noticed that his plants are more prone to pests. What should he do?

_____

_____

Compare your answers with those in the *Answer Key* on page 32.



Let's Learn

Among the less risky pest control methods you can adopt in connection with Step 4 in practicing IPM is to spray homemade pesticides on your plants. Below are procedures for making and using homemade pesticides. Study them and find out which of them you can easily apply.

Homemade Pesticides

Ingredients	Procedures	Proper Use
Boiled tobacco	Put the small pieces of dried leaves and stem of tobacco in a container. Pour hot water in the container and cover immediately. The mixture is ready to use after 3–4 hours.	Mix one part of the boiled tobacco with one part of water. Spray on plants if the damage is very bad. The mixture kills all kinds of insects.
Atis	Pulverize the seeds and mix with water.	Spray on plant bugs, ants and other insects.
Gas and soap	Mix ¼ cup powdered soap and ¼ tablespoon of gas with one liter of water.	Spray on plant bugs, ants and other insects.
Boiled tomato stem and leaves	Boil the tomato stem and leaves in water. Let it cool.	Spray on worms and red and black ants. This stops the threat of harmful insects.
Red chili	Dry red chili. Grind and pulverize.	Sprinkle on plants.
Boiled garlic, onion and red chili	Boil chopped garlic, onion and red chili in water for 1–2 minutes.	Mix a part of the mixture with 3–4 parts of water. Sprinkle on plants.
Ash from wood	Mix the ashes with water and spray on plants. Sprinkle the ashes around the plants. Mix equal amounts of ashes and powdered lime with soap water.	Spray on beetles and worms. Controls cucumber beetles.

Which of the above homemade pesticides can you prepare at home? Choose one. Remember that these pest control methods are not only applicable in farms but also in home gardens. Can you discuss below, in your own words, how you will prepare and use the homemade pesticide you chose?

_____
_____
_____
_____

Are there any other homemade pesticides that you know? Write it down by filling out the table below.

Other Homemade Pesticides

Ingredients	Procedures	Proper Use

There are **farm technicians** or farm experts that the Local Government Units (LGUs) and the Department of Agriculture provide in every town. These farm technicians are graduates of the Rice Specialist Training Course (RSTC) and they are deployed to every town to teach farmers about IPM techniques. Ask for the farm technicians in your area. They can explain to you intensively the techniques you learned in this module.

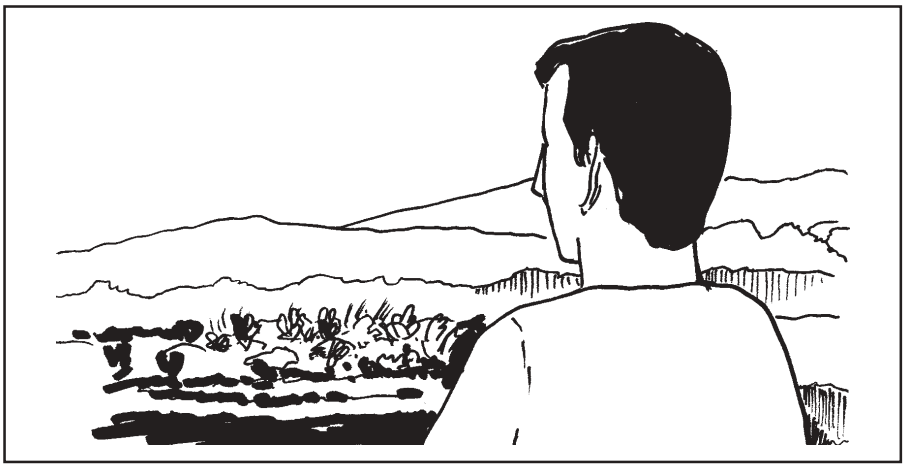
You can also be a farm technician yourself by undergoing the RSTC offered to farmers by the municipal government in cooperation with the Department of Agriculture. You can inquire from your local municipality for their schedule of training.

Let's Try This

In Lesson 1, page 10, you interviewed some farmers in your area and you identified their problems in the field, especially the harmful effects of pesticide use. Now, go back to the same farmers and share with them what you have learned from this module. You may also encourage them to undergo the training course of the Department of Agriculture on how to use pesticides.

Let's See What You Have Learned

Mang Ambo had problems in his farm last year. He did not produce a good harvest because of pests. Now that planting season is near, what are the steps that he must follow so that his bad experience last year will not be repeated?



1. What is the first step that Mang Ambo should take to prepare his farm for planting?

   _____
   _____
   _____
   _____

2. Will you recommend that he use pesticides? Why or why not?

   _____
   _____
   _____
   _____

Compare your answers with those in the *Answer Key* on page 32.

Let's Remember

- The Integrated Pest Management (IPM) concept is a natural way of maintaining balance in the environment. It is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.
- IPM studies the life cycle of pests and their interaction with the environment, and combines the most economical and safest means to manage pests.
- In practicing IPM, there are four steps to follow: (1) study the environment, (2) monitor and identify pests, (3) prevention, and (4) control.
- Conserve biological control agents or friendly organisms. There are more friendly insects than insect pests. Keep the friendly insects alive.
- Use chemical control only when no alternative methods or a combination of measures are applicable or available.
- The IPM approach can be applied to both agricultural and non-agricultural settings, such as in the home, garden and workplace.

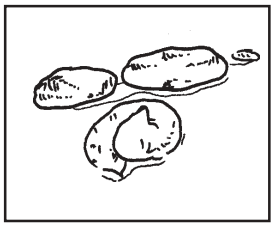
Organic Fertilizer

Why would a farm or field be infested with pests? You learned in Lesson 1 that it may be caused by an imbalance in nature. Lesson 2 taught you how to manage pests so that they will not damage crops. Now, this present lesson will teach you how to keep the soil healthy in a natural way in order to prevent imbalance of nature, which in turn will prevent pests from damaging plants.

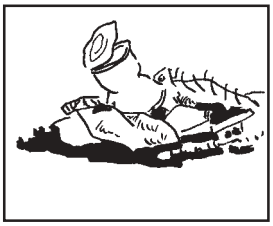
This lesson will also teach you the importance of organic fertilizer and how to prepare and use it.

Let's Try This

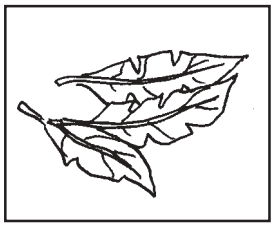
Organic fertilizer comes from decomposing matter. It is made through composting and so it is also called compost. Have you ever heard of compost? Try to guess which among the materials below can be used to make compost.



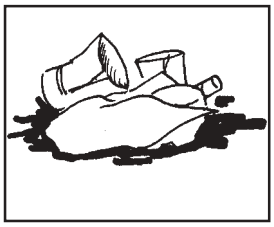
Animal wastes



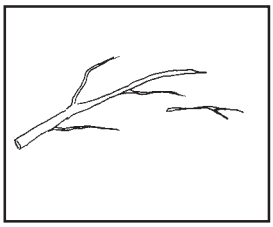
Other natural wastes



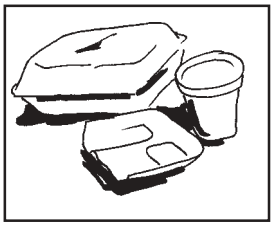
Dry leaves



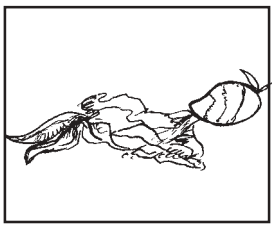
Plastics



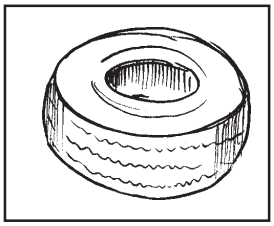
Remains of plants



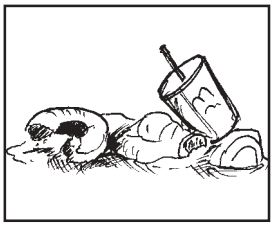
Styropore products



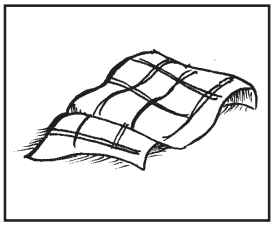
Fruit peelings



Rubbers



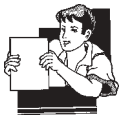
Food scraps



Pieces of cloth

Organic fertilizer is made of decomposing matter like animal and other natural wastes, dry leaves, remains of plants, fruit peelings and food scraps. Materials like plastics, styropore products, rubbers and pieces of cloth do not decay, so these cannot be included in the compost.

As you go through this lesson, you will learn more about compost or organic fertilizer.



Let's Learn

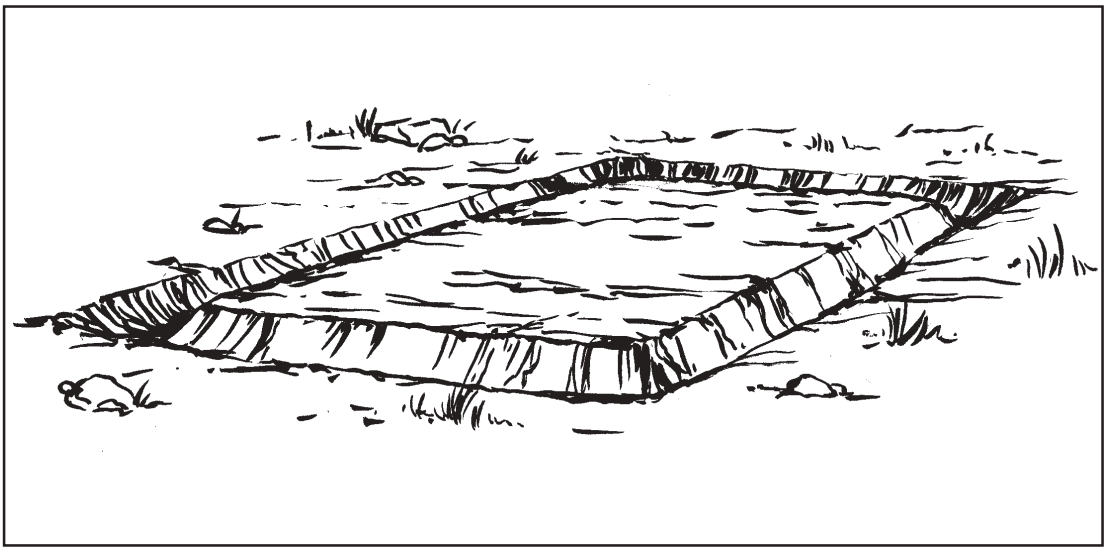
If a farm or a piece of land does not have enough nutrients, it will be infested with harmful pests. It is like the human body. When it does not have enough nutrients, its immune system is overtaken by germs and it can easily yield to diseases. There is a need to keep the soil healthy by using fertilizers. Organic fertilizer is the best and safest to use. It does not only provide the nutrients needed by the plants but it also protects the environment from possible side effects of chemical fertilizers.

Organic fertilizer is made of decomposing matter like remains of plants, animal and other natural wastes that carry an average amount of nitrogen, phosphorous and potassium.

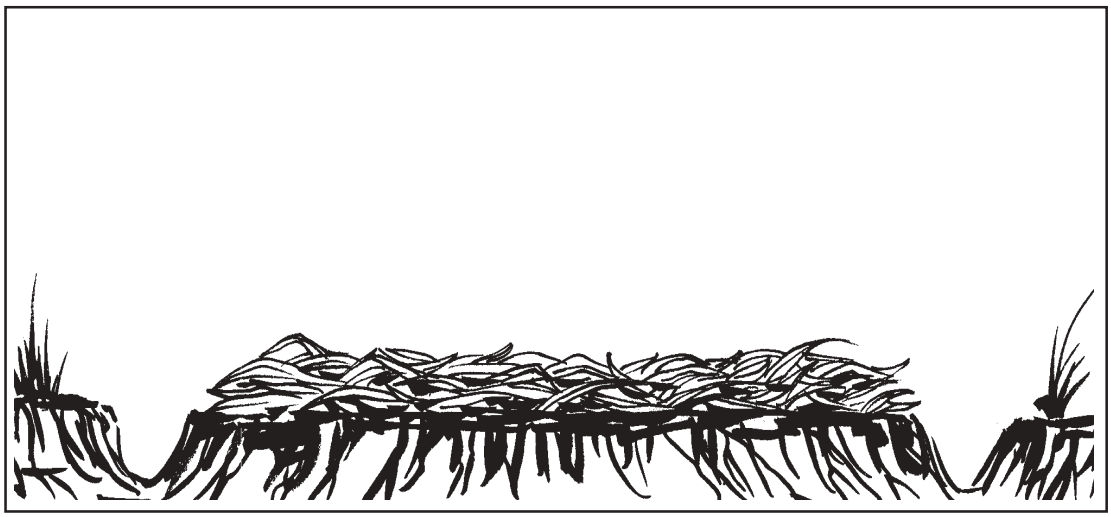
Read on to learn how to make organic fertilizer.

How to Make Organic Fertilizer (Compost)

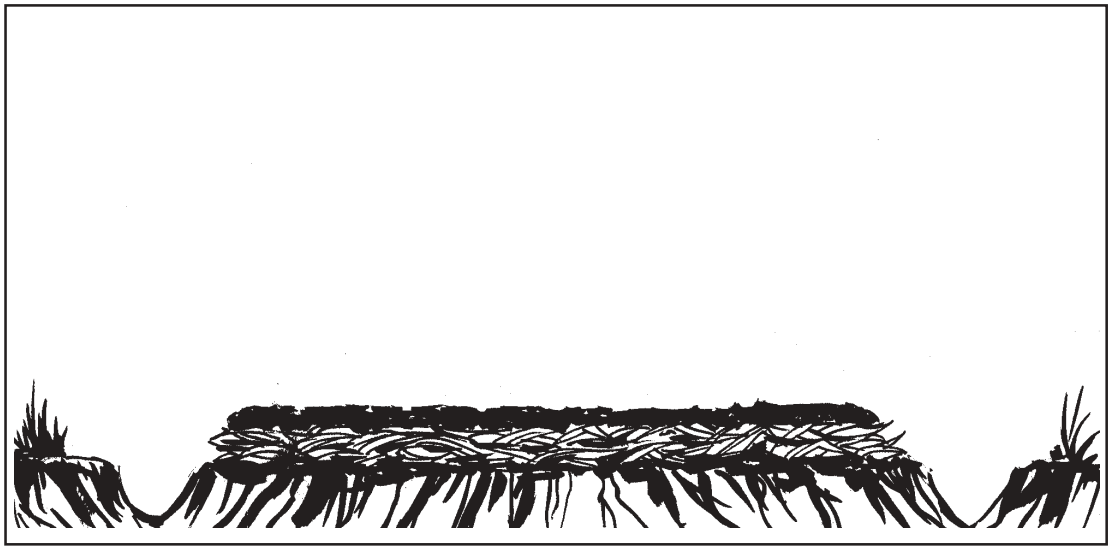
1. Level or flatten the soil for compost, using an area that measures about 2 meters wide and 6 meters long. Dig out a canal around it to prevent water from seeping in.



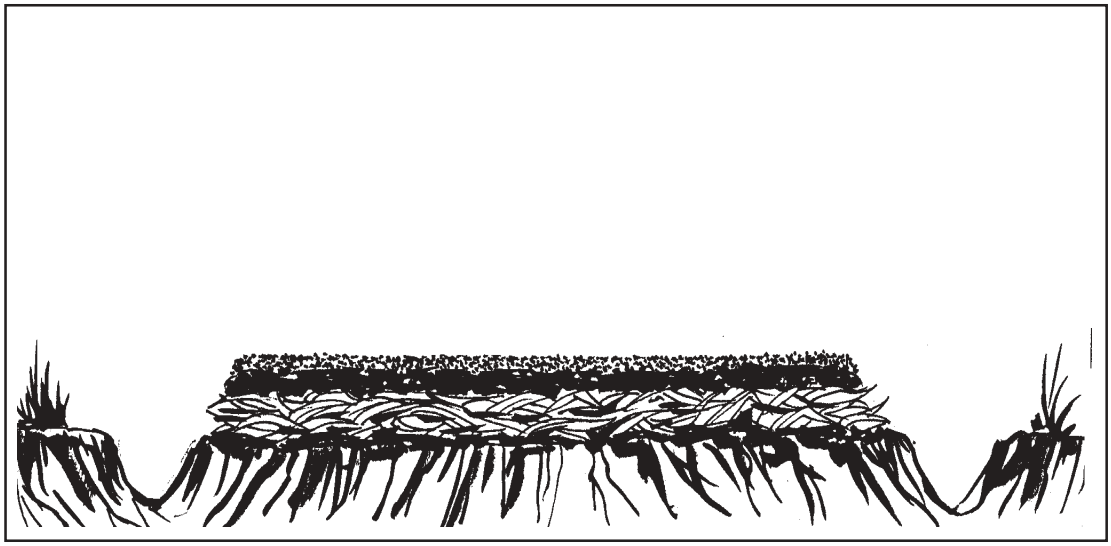
2. Pile up *dayami* (rice stalks) about 6 inches thick on the leveled soil.



3. Put the animal wastes evenly above the rice stalks about 2 inches thick. A little amount of urea or *ammosul* can be added.



4. Cover it with soil that contains ashes of wood about 1 inch thick.

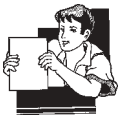


5. Repeat steps 2, 3, and 4 until the compost is about 1 ½ meters or five feet tall. Bury bamboo stems around the compost so that air can circulate.
6. After 3 weeks, take out the bamboo stems and rearrange the compost upside down.
7. Sprinkle the compost with water to keep it moist.
8. After 5 weeks, put the compost in its original position (like that before in Step 6). Leave it for another 4 weeks, after which the compost can be used as fertilizer.

Let's Try This

Discuss with your family members and friends how you can make organic fertilizer at home for your plants in the backyard. Then lead them in preparing a compost.

Note that the steps described in the last section are only one way of preparing compost. There is another method described in the module ***Composting***. You can also study this module for additional knowledge on composts.



Let's Learn

Now that you know how to prepare compost, do you know how to use it? Below are two simple steps in using it on your plants as fertilizers. Study them carefully so that you can do them yourself.

How to use organic fertilizer

1. Apply 2 to 3 tons of organic fertilizer (compost) for every hectare of soil. When you use it in your backyard, just approximate the amount of fertilizer you need. A kilo of organic fertilizer may be enough for about 5 plots of *pechay* in your backyard.
2. Applying organic fertilizer is best 3 weeks before planting to give time for the compost to blend well with the soil.

Let's See What You Have Learned

Below are the steps in making compost. Rearrange them in their proper order. Write only the letters in the blanks provided.

a. Repeat steps 2, 3, and 4 until the compost is about 1 ½ meters or five feet tall. Bury bamboo stems around the compost so that air can circulate.

b. Pile up *dayami* (rice stalks) about 6 inches thick on the leveled soil.

c. Put the animal wastes evenly above the *dayami* about 2 inches thick. A little amount of urea or *ammosul* can be added.

d. Level or flatten the soil for compost, using an area that measures about 2 meters wide and 6 meters long. Dig out a canal around it to prevent water from seeping in.

e. After 5 weeks, put the compost in its original position (like before in Step 6). Leave it for another 4 weeks, after which the compost can be used as fertilizer.

f. Cover it with soil that contains ashes of wood about 1 inch thick.

g. After 3 weeks, take out the bamboo stems and rearrange the compost upside down.

h. Sprinkle the compost with water to keep it moist.

Now write your answers below (letters only).

Step 1.	_____	Step 5.	_____
Step 2.	_____	Step 6.	_____
Step 3.	_____	Step 7.	_____
Step 4.	_____	Step 8.	_____

Compare your answers with those in the *Answer Key* on pages 32–33.

Let's Remember

- Organic fertilizers are made of decomposing matter like remains of plants, animal and other natural wastes that carry an average amount of nitrogen, phosphorous and potassium.
- Organic fertilizers give the plants the nutrients they need and protect the environment from possible side effects that chemical fertilizers can cause.
- Organic fertilizers are made by making compost.
- Organic fertilizers are best used 3 weeks before planting because this will allow the soil to completely absorb the compost.

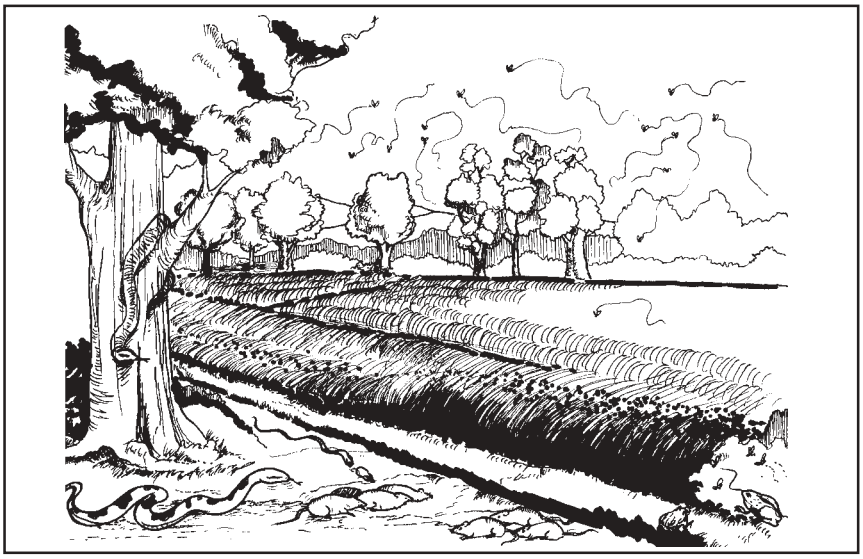
Congratulations! You have finished studying the lessons in this module. You have been a hardworking and patient learner. To review the important points you have learned, read the module summary on the next page. If you find that some items are not very clear to you, you can review the relevant parts or sections of the module. Afterwards, answer the post-test following the module summary. Good luck!

Let's Sum Up

- Pesticides are compounds used to control pests.
- Chemical pesticides are practical solutions in fighting pests and plant diseases. However, their excessive and improper use is harmful to human health and the environment as well.
- Chemical pesticides drain the natural nutrients of the soil. They make the soil acidic, and they poison bodies of water near the acidic soil. This also causes pesticide poisoning in people and animals.
- Pests are natural components of crop production. Some pests are harmful, while others are friendly. When the balance of nature is destroyed, populations of pests cause damage to crops.
- There is an imbalance in nature when pests do not have natural enemies or when natural control agents in the field are destroyed.
- The Integrated Pest Management (IPM) method is an effective and natural way of maintaining balance in the environment. It uses a combination of common-sense practices.
- IPM studies the life cycle of pests and their interaction with the environment. It then combines the most economical and safest means to manage pests. Its approach can be applied to both agricultural and non-agricultural settings, such as in the home, garden and workplace.
- Four steps to follow in IPM: (1) study the environment, (2) monitor and identify pests, (3) prevention, and (4) control.
- Conserve biological control agents or friendly organisms. There are more friendly insects than insect pests. Keep the friendly insects alive.
- Chemical control should only be used when no alternative methods or a combination of measures are applicable or available.
- Organic fertilizers are made up of decomposing matter like remains of plants, animal and other natural wastes that carry an average amount of nitrogen, phosphorous and potassium. They give plants the nutrients they need and protect the environment from the possible side effects of chemical fertilizers.
- Organic fertilizer is made by making compost. It is best used 3 weeks before planting to allow the soil to completely absorb the compost.

What Have You Learned?

A. Below is a picture of a pest-infested field. Analyze it and answer the questions that follow.



1. Give possible reasons why a farm or a piece of land becomes infested with pests.

_____
_____
_____
_____
_____

2. Name ways to solve this problem.

_____
_____
_____
_____
_____

B. What alternative methods can we use to control pests in the farm instead of using pesticides? (2 points)

_____
_____
_____
_____
_____
_____

C. What are some of the materials that can be used in making an organic fertilizer? (6 points)

_____
_____
_____
_____
_____
_____

Well, how was it? Were you able to answer all the questions correctly? Compare your answers with those in the *Answer Key* on page 33.

If you scored:

10	Very good! You have learned a lot from this module. You may now study the next one.
8 – 9	Good! All you need to do is to review the answers that you missed.
6 – 7	Review the items in the module that you don't fully understand.
0 – 5	You should study the entire module one more time.

Answer Key

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

1. **(a)** Pesticides control pests.
2. **(b)** Pesticides have both harmful and useful effects on the environment and on human beings.
3. **(c)** Pests are both helpful and harmful to plants.
4. **(b)** When you see a pest, you should monitor the situation so that you will know when it becomes harmful. Only when you learn that it is harmful to plants should you take action to control it.
5. **(d)** Snakes eat rats, therefore helping maintain balance in the environment. When their population becomes dangerous to humans and plants, that is the time to kill them.
6. **(a)** Homemade pesticides are safer and more effective to use.
7. **(a)** Chemical control should only be used when the alternative methods to control pests are not applicable and unavailable.
8. **(a)** Organic fertilizer is made of decomposing matter like remains of plants, animal and other natural wastes that carry an average amount of nitrogen, phosphorous and potassium.
9. **(a)** Plastics should not be included in the compost because they do not decompose.
10. **(d)** The Integrated Pest Management (IPM) concept is an effective and natural way of maintaining balance in the environment. It studies the life cycle of pests and their interaction with the environment and combines the most economical and safest means to manage pests.

B. Lesson 1

Let's Study and Analyze (page 4)

1. Environment 2 is an example of balanced nature, because there is a balance in the numbers of pests that are harmful and that are harmless. The pests themselves are natural enemies of each other, so they control the other's population naturally.
2. Environment 1 may need to be treated with pesticides because it shows an imbalanced nature. Some pests have multiplied rapidly because there are not enough natural enemies or other pests to kill them. This means that the pests are too many in number, becoming a threat to the farm.

Let's Read (page 6)

1. Pesticides burned the leaves of Mang Ambo's plants, and so they got discolored. Overuse of pesticides greatly used up the nutrients of the soil, making it acidic. This resulted in unproductive land, and therefore low harvest. A poor harvest means low income for Mang Ambo.

2. If a person keeps eating food that is sprayed with too much pesticides, he/she will have health problems. Vegetables should be washed thoroughly with clean water to protect people who will eat them from being poisoned.

Let's See What You Have Learned (pages 10–11)

I. 1. **(d)** Pesticides are compounds that control pests.

2. **(a)** Pests are natural components of crop production. Some of them are harmful but others are friendly.

3. **(e)** When pests do not have natural enemies or when natural control agents in the field are destroyed, "nature imbalance" exists.

4. **(b)** Chemical pesticides deplete the natural nutrients of the soil.

5. **(c)** Pesticide poisoning is an effect of pesticides on human health.

II. Your answers must be similar to these:

1. Headache
2. Salivation
3. Dizziness
4. Blurred vision
5. Diarrhea

Other possible answers include:

- excessive sweating
- stomach cramps
- fatigue
- nausea and vomiting
- redness or blisters on the skin and burning sensation

C. Lesson 2

Let's Study and Analyze (pages 12–13)

You should have placed an X-mark (8) on Nos. 1, 4 and 5.

When you (1) spray pesticides immediately when there's a pest, (4) use chemical pesticides more often, and (5) just plant whenever you feel like planting—all these will make your field less productive because these are incorrect ways of managing pests.

Let's Review (page 16)

1. Prevent
2. Study
3. Monitor and identify pests
4. Control

Let's Try This (pages 17–18)

1. The dikes might be too deep and big. He has to make them as small as possible to prevent the rats from digging into them.
2. Mang Ambo should leave the field bare for at least 6 weeks or plant other crops to disrupt the cycle of pests that damage his rice.
3. Mang Ambo might have used too much fertilizer containing an excessive amount of nitrogen. Nitrogen slows down the plants' growth.
4. Mang Ambo, if possible, should leave his field bare for at least 6 weeks to disrupt the life cycle of the pest. He can also plant crops other than rice, or he can use resistant varieties of rice (if he is constrained to rice planting).
5. Mang Ambo should use just enough fertilizer, especially nitrogen, because too much of it makes the plants prone to pests.

Let's See What You Have Learned (page 20)

1. Mang Ambo should analyze which pests infested his farm last year. Then he should plant another type or variety this year that is resistant to the kind of pests that his farm had. Or if not, he should leave his farm bare for some time to break the cycle of pests.
2. If the pests still infest his farm despite preventive measures, Mang Ambo can still use pesticides. But I recommend that he use homemade pesticides first. Only when these are ineffective should he use chemical pesticides.

D. Lesson 3

Let's See What You Have Learned (pages 25–26)

Step 1. (**d**). Level or flatten the soil for compost, using an area that measures about 2 meters wide and 6 meters long. Dig out a canal around it to prevent water from seeping in.

Step 2. (**b**). Pile up *dayami* (rice stalks) about 6 inches thick to the leveled soil.

Step 3. (**c**). Put the animal wastes evenly above the *dayami* about 2 inches thick. A little amount of urea or *ammosul* can be added.

Step 4. (**f**). Cover it with soil that contains wood ashes about 1 inch thick.

Step 5. (**a**). Repeat Steps 2, 3, and 4 until the compost is about 1 ½ meters or five feet tall. Bury bamboo stems around the compost so that air can circulate.

Step 6. (**g**). After 3 weeks, take out the bamboo stems and rearrange the compost upside down.

Step 7. (**h**). Sprinkle the compost with water to keep it moist.

Step 8. (**e**). After 5 weeks, put the compost in its original position (like in Step 6). Leave it for another 4 weeks, after which the compost can be used as fertilizer.

What Have You Learned? (pages 28–29)

A. 1. A farm becomes infested with pests when there is an imbalance in nature. This means that the pests do not have natural enemies or the natural control agents in the field are destroyed. When their population multiplies fast and there are no other pests that attack them, they damage the crops. A farm is also susceptible to pests and diseases when the fertilizers used in it have more than enough amount of nitrogen, or when the farm is unhealthy because of loss of nutrients.

2. The farmer should first study and monitor the pests that infest his farm. Afterwards, he can employ some prevention techniques like planting one crop after another to disrupt the cycle of pests. He can also use organic fertilizers to make his soil healthy so that pests will not attack it immediately. He can also try to spray homemade pesticides.

B. Your answers must be similar to this:

Instead of using pesticides in eliminating pests, we can do the following methods.

1. Use homemade pesticides made from boiled tobacco, atis seeds, red chili and others.

2. Use the Integrated Pest Management (IPM) where you will monitor and study the environment and apply preventive and control measures.

C. Some of the materials that can be used in making organic fertilizers include:

1. dry leaves
2. fruit peelings
3. food scraps
4. animal wastes
5. natural wastes
6. remains of plants

Glossary

Dike A channel dug to take water away from an area. Also, a wall built to prevent the sea or a river from flooding an area.

Fertilizer Substance used to make soil fertile or capable of abundant plant growth

Integrated Pest Management (IPM) Natural way of maintaining balance in the environment

Organic fertilizer Fertilizer made from decomposing matters

Pesticides Compounds used to control pests

Prone Tending to suffer from a disease or negative condition

Residue Something that remains after a part is taken or separated

Variety Different forms or types of a particular class

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