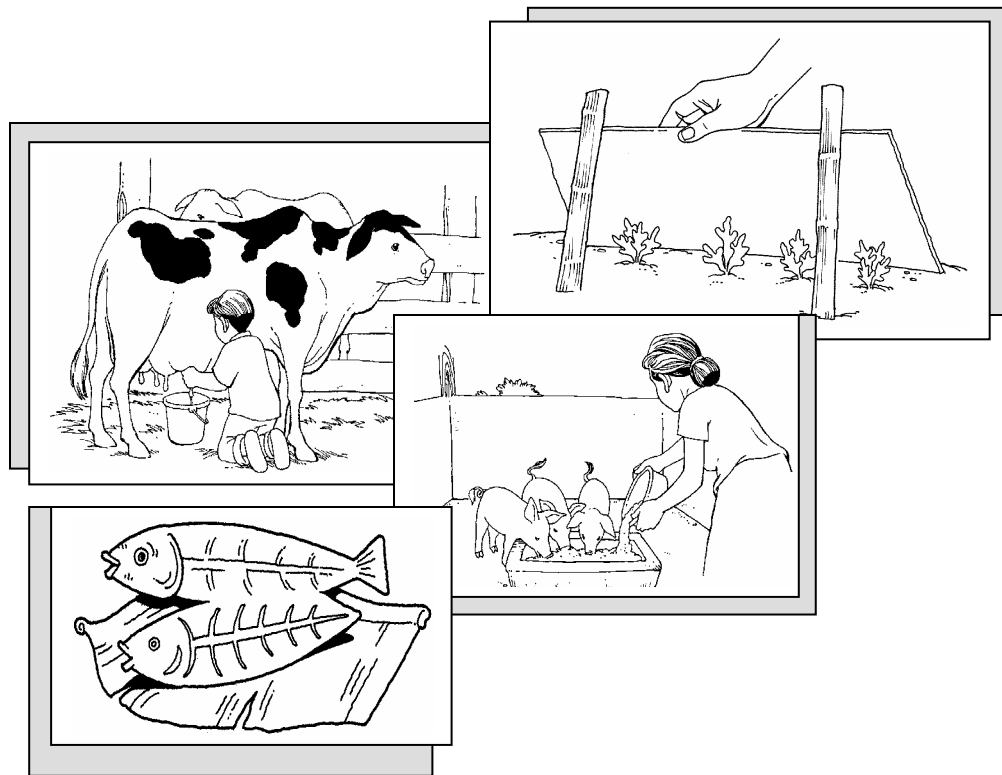


PROJECT EASE

Effective and Affordable Secondary Education

TECHNOLOGY AND LIVELIHOOD EDUCATION

Agriculture and Fishery Arts



MODULE 6

BUREAU OF SECONDARY EDUCATION

Department of Education
DepEd Complex, Meralco Avenue
Pasig City



Plant Crop Production

First Year

Module 6

A Little Bit is Good, Enough is Better



What this module is about

Are you enjoying your lessons in plant production? Fine! Your positive attitude will likely bring you a lot of good in life.

Do you know that all plants get a great number of mineral nutrients from the soil? This is why the soil should be enriched with nutrients. Do you know what makes the soil deficient in mineral elements? This is due to the continuing use of the land which uses up and depletes the nutrients in the soil. To restore the fertility of the soil, some things have to be done.

Have you heard the saying, “a little bit is good, enough is better?” This is very true when it comes to applying fertilizers. Fertilizers enrich the soil to help in the growth and development of plants. Hence, to maintain the nutrients in the soil, fertilizing is needed.



What to learn from this module

In this module, you will learn much about fertilizers. After going through the module, you should be able to:

1. explain the value of fertilizers;
2. differentiate organic from inorganic fertilizers;
3. give examples of organic and inorganic fertilizers;
4. identify elements found in the fertilizers; and
5. discuss the functions of the three major fertilizer elements.



PRETEST

I. Match Column A with Column B. Write only the letter of your answer in your notebook for checking.

- | | |
|--|--------------------------|
| 1. Any material mixed with the soil to promote plant growth. | a. Inorganic fertilizers |
| 2. Fertilizers from animal and plant waste residues. | b. Compost |
| 3. Chemically manufactured fertilizers. | c. Compost pit |
| 4. Animal excreta used as fertilizers. | d. Complete |
| 5. Use of plants as source of organic matter. | e. Organic fertilizers |
| 6. A product of decomposed plant parts, kitchen and garden refuse. | f. Liquid |
| 7. Composting process that rots the underground materials. | g. Fertilizers |
| 8. Inorganic fertilizers which contain three major elements. | h. Manure |
| 9. A popular type of fertilizer which gets results fast. | i. Green manure |
| 10. Very common and widely used commercial fertilizer. | j. Granular form |
| | k. Basket composting |

II. Give the three major elements which plants need.

Lesson 1

Types, Examples, and Value of Fertilizers

In the last module, you learned that weeds are consumers of soil nutrients. Hence, if a garden or farm has plenty of weeds, fertilizers should be applied to the soil before planting. When plants are already growing, fertilizers may be applied as supplement.

What are fertilizers

Fertilizers are substances applied to the soil to enhance the growth of plants.

A plant grower like you, who wants to grow plants of good quality as well as high yield should know the value of plant nutrition.

If your site used to be a forested area, and it has been turned into a vegetable farm, fertilizers are not necessary. Soil nutrients are still in place. However, if the area has been frequently used for several planting seasons, fertilizer application is necessary.

What is the value of fertilizer to plants? The following statements will tell you:

1. It increases the yield of crops;
2. It improves soil condition. Clayey soil turns porous when mixed with organic fertilizers;
3. It balances the acidity extent of the soil. Bone meal, pulverized eggshell, clamshells, oyster shells or any form of agricultural lime can help neutralize the soil;
4. It helps plants produce flowers, fruits and shoots.
5. It helps develop storage roots in root crops.

You can add more benefits which fertilizers give to plants when you visit your garden. You will be eager to apply your knowledge of fertilizer use.

There are two types of fertilizers. These are organic and inorganic fertilizers.

- a. Organic fertilizers which are derived from decaying plant and animal products such as blood meal, bone meal, manure, plant parts and leftovers.
- b. Inorganic fertilizers which are chemically manufactured, using raw materials such as natural gas and phosphate rock, which are more concentrated compared to organic fertilizers.

Now, let us see if you can tell the difference between inorganic and organic fertilizers.

Activity 1

Differentiate inorganic fertilizer from organic fertilizer through the raw materials they contain.

ORGANIC	INORGANIC
a.	a.
b.	b.
c.	c.
d.	d.

How well did you get it? Good! If not, go over the missed item and try again.

After knowing the two types of fertilizers, you will now identify examples of each type.

A. Organic Fertilizers

1. Animal Manure - These refer to the waste matter of animals such as chicken dung, horse manure, cow manure, carabao manure, hog manure, and bat manure or guano. These manures are dried or decomposed before they are used as fertilizers. This type of fertilizers contains less nutrients and is slow in reaction but it improves the texture of the soil.
2. Green manure - Plants are sources of organic matter. When plants are in the flowering stage, they are plowed under to mix them with the soil for purpose of decomposition before used in planting crops. Examples of plants used as green manure are monggo, peanut , and soybean.
3. Compost - This is a product made up of decomposed plant parts and kitchen and garden refuse piled or buried in a pit and left to decay for a period of time. Following are the methods of composting:
 - a. Compost pit - composting by digging a pit for keeping compost materials underground.
 - b. Compost heap - a compost pile.
 - c. Basket composting - composting home garbage and garden and farm wastes in baskets half buried in garden plots.

B. Inorganic Fertilizers

This type of fertilizers consists of the following:

1. Complete fertilizers - commercial fertilizers which contain the major elements needed by plants. These elements are nitrogen, phosphorus, and potassium.
2. Incomplete fertilizers - inorganic fertilizers which lack one or two major elements.

Some inorganic fertilizers release nutrients fast, others slowly over a period of time. Hence, these two types of fertilizers are known as slow-release and fast-release fertilizers.

Inorganic fertilizers are available in different forms.

- a. Liquid - This type of fertilizer is popular because of ease application and fast response.
- b. Soluble powder - These are fertilizers in powder form which can be dissolved easily in water and applied as liquid fertilizers.
- c. Granular form - It is the most common and widely used fertilizer. The nutrients are compressed into beads. Slow release fertilizers are in this form.

After knowing the types of fertilizers, let us now find out how much you have learned.

Activity 2

Write examples of organic and inorganic fertilizers.

A. Organic fertilizers

- 1.
- 2.
- 3.
- 4.
- 5.

B. Inorganic fertilizers

- 1.
- 2.
- 3.
- 4.
- 5.



Self-check:

Identify what each of the following statements is describing.

- _____ 1. Materials which when added to the soil, promote plant growth.
- _____ 2. Fertilizers derived from animal manure.
- _____ 3. Chemically manufactured fertilizers.
- _____ 4. A product of decomposition from the garden, plants and kitchen refuse.
- _____ 5. Composting method that is done by digging a pit and allowing materials to rot in it.
- _____ 6. The method of decomposition by forming a pile of compost materials and allowing them to rot for a certain period of time.
- _____ 7. Composting home garbage in baskets half-buried in the garden plots.
- _____ 8. Commercial fertilizers containing the three major elements.
- _____ 9. Inorganic fertilizers that contain one or two major elements.
- _____ 10. An inorganic fertilizer, that is popular because of ease of application and quick response or result.

Lesson 2

Elements of Fertilizers and their Functions

After knowing the different types of fertilizers and their examples, your next lesson focuses on elements found in these fertilizers.

Since plant nutrients are mineral elements mostly found in soil, it is important to know what these elements are and how they relate to plant growth.

Plants need sixteen (16) nutrient elements. Thirteen of which come direct from the soil as mineral elements. These elements are not all needed by all plants, but are found to be essential. These essential elements may be required in small quantities or amounts.

Mineral elements needed by plants in large amounts are called macroelements. These are nitrogen, phosphorus, and potassium (NPK) sulfur, calcium and magnesium. Microelements are boron, copper, chlorine, manganese, molybdenum, zinc and iron.

Carbon, hydrogen and oxygen are obtained from carbon dioxide and water. They are not mineral nutrients. .

Macroelements and their effects on Plants

1. Nitrogen - plants grow vigorously. They are deep green, particularly the shoots and leaves. However, excessive use prolongs the growth period and delays crop maturity.
2. Phosphorus - this element enhances flowering, fruiting, root development and disease resistance.
3. Potassium - it is needed in starch formation, the movement of sugar in the plant, the formation of chlorophyll, the growth of flower and fruit coloring.

You may wonder why commercial fertilizers are labeled with three groups of numbers separated by hyphens. These standard numbers refer to the percentage of a particular nutrient in the fertilizer. Example is 15-10-20.

The first number always refers to the percentage of nitrogen (N); the second, to the percentage of phosphorus (P) in chemical form called phosphorus pentoxide (P_2O_5); and the third number refers to the percentage of potassium (K) in chemical form called potash (K_2O). This fertilizer sample label shows the representation of macro-elements in fertilizers.

Now, work on the activity below to check your comprehension of the lesson presented.

Activity 3

Collect a sample label of fertilizer from magazines and newspapers. Then, identify the macroelements found on the labels of fertilizers.



Self-check:

Enumerate the following:

1. The first three macro or major elements
2. At least 7 microelements

Lesson 3

Methods of Fertilizer Application

After learning the mineral elements in fertilizers, I am pretty sure you gained a lot of knowledge on mineral elements as nutrients needed for plant growth and development.

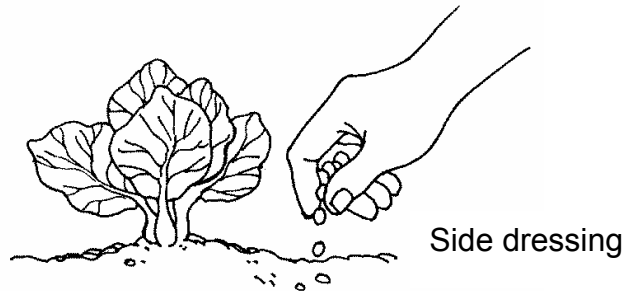
Your next lesson focuses on how fertilizers are to be applied in plants.

Remember, as human beings, you need to see a physician to know what medicine your body needs before taking it. Taking medicine without any prescription is not advisable. The same is true with plants. You need to know what mineral elements are needed, considering their physical appearance before applying fertilizers. The pechay plant for example, is stunted in growth and its leaf petiole is violet in color. This shows that it needs nitrogenous fertilizer.

Have you ever experienced applying fertilizer? Read further and find out how it is done.

Fertilizer Application

There are many ways of applying inorganic fertilizer on your plants, as follows:



Foliar Spray



Broadcast Application

1. Top dressing - The fertilizer is applied on growing crops. It should reach the roots through rainfall or irrigation.

2. Side dressing - This is surface fertilizer application used on rows of plants such as corn or vegetable crops. The fertilizer is applied along one side or on both sides of the row over the root area of the plants. The fertilizer should be at a distance from the base of the plant because it can cause burning by contact. Application should be done before cultivation in order to cover the fertilizer with soil.
3. Broadcasting - the fertilizer is scattered uniformly and mixed with the soil before planting. This is done manually or through mechanical spreaders.
4. Foliar spray - the fertilizer is diluted in water and sprayed over the foilage/leaves of the growing plants. Plants absorb nutrients in small quantities through the leaves and stem.
5. Drill method- another effective technique of applying fertilizers which is done by drilling holes in the root zone of a tree. The holes are then filled with the granular fertilizer, following the recommended rate, and then covered with soil.

You have just learned how to apply fertilizers in various ways. Let us now see how much you have learned in this lesson.



Self-check:

Match Column B with Column A. Write only the letter of the correct answer on your notebook.

Column A

1. A method of fertilizer application which applies fertilizers over growing plants.
2. Surface application of fertilizers on rows of plants.
3. Applying fertilizer by diluting it with water and spraying over growing plants.
4. A hole is formed and then filled with granular fertilizer based on the recommended rate.
5. Throwing the fertilizer uniformly or incorporating this with soil before planting.

Column B

- a. Side dressing
- b. Broadcasting
- c. Drill method
- d. Perforated hose
- e. Top dressing
- f. Foliar



LET'S SUMMARIZE

❖ Importance of fertilizers

1. It helps increase the yield of farm crops.
 2. It improves soil condition.
 3. It balances the acidity value of the soil.
 4. It helps plants produce flowers, fruits and shoots.
 5. It helps develop storage roots in root crops.
-
- ❖ There are two types of fertilizers. These are the organic and inorganic fertilizers.
 - ❖ Organic fertilizer are derived from decaying plant and animal products such as bone meal, blood meal, manure, plant parts leftovers.
 - ❖ Inorganic fertilizer are chemically manufactured using raw materials such as natural gas, phosphate rock, which are more concentrated compared to organic fertilizers.
 - ❖ Macroelements found in fertilizers are nitrogen, phosphorus, potassium, sulfur, calcium, and magnesium.
 - ❖ Microelements found in fertilizers are boron, copper, chlorine, manganese, molybdenum, zinc and iron.
 - ❖ Methods of applying fertilizers are as follows:
 1. Top dressing
 2. Side dressing
 3. Broadcasting
 4. Foliar spray
 5. Drill hole



POSTTEST

- I. Encircle the letter of the correct answer.
1. A material that is added to the soil to promote plant growth.
 - a. chemical
 - b. composting
 - c. fertilizer
 - d. inorganic

 2. Fertilizers derived from animals and plants.
 - a. liquid
 - b. organic
 - c. manure
 - d. compost

 3. Chemically produced fertilizers.
 - a. inorganic
 - b. organic
 - c. natural
 - d. compost

 4. Animal excreta used as fertilizers.
 - a. liquid
 - b. green manure
 - c. manure
 - d. granules

 5. The practice of fertilizing in which legumes are used.
 - a. foliar
 - b. drill hole
 - c. green manure
 - d. basket composting

 6. A material not needed in composting.
 - a. manure
 - b. weeds
 - c. kitchen refuse
 - d. Styrofoam

 7. The process of composting underground where materials rot.
 - a. pit
 - b. heap
 - c. basket
 - d. biological

8. It is not a macroelement.
 - a. Nitrogen
 - b. Phosphorus
 - c. Potassium
 - d. Manganese

9. Which of these fertilizers is popular due to ease of its application and quick response?
 - a. granules
 - b. liquid
 - c. powder
 - d. slow release

10. The most common and popularly used commercial fertilizer?
 - a. fast release
 - b. compost
 - c. organic
 - d. granules

II. Enumerate the three major elements in fertilizers needed by plants.

- 1.
- 2.
- 3.



ANSWER KEY

Pretest

I.

1. g
2. e
3. a
4. h
5. i
6. b
7. c
8. d
9. f
10. j

II.

1. nitrogen
2. phosphorus
3. potassium

Activity 1

Organic

- a. Manure
- b. bone meal
- c. plant parts
- d. blood meal
- e. kitchen waste

Inorganic

- a. chemicals
- b. concentrated
- c. natural gas
- d. phosphate rock

Activity 2

A. Organic

1. Manure
2. Compost
3. Green Manure
4. Basket Compost
5. Guano

B. Inorganic

1. Complete
2. Incomplete
3. Liquid
4. Granular
5. Powder

Lesson 1: Self-check

1. Fertilizer
2. Manure
3. Inorganic

4. Compost
5. Compost pit
6. Compost heap
7. Basket composting
8. Complete
9. Incomplete
10. Liquid

Lesson 2: Self-check

I.

1. Nitrogen
2. Phosphorous
3. Potassium

II.

1. Boron
2. Zinc
3. Manganese
4. Molybdenum
5. Copper
6. Chlorine
7. Iron

Lesson 3: Self-check

1. e
2. a
3. f
4. c
5. b

Posttest

I.

1. c
2. b
3. a
4. c
5. c
6. d
7. a
8. d
9. b
10. d

II.

1. Nitrogen
2. Phosphorus
3. Potassium