

Lesson C11–2

Determining the Kinds of Pesticides

Unit C. Plant and Soil Science

Problem Area II. Pesticide Use

Lesson 2. Determining the Kinds of Pesticides

New Mexico Content Standard:

Pathway Strand: Plant Systems

Standard: I: Apply principles of anatomy and physiology to produce and manage plants in both a domesticated and natural environment.

Benchmark: I-D. Develop and use a plan for integrated pest management.

Performance Standard: 3. Determine pest management methods.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain plant pests and how they cause losses.
2. Identify the major classifications of pesticides and their use.
3. Identify the major classifications of herbicides and their use.
4. Identify the major classifications of insecticides and their use.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Biondo, Ronald J. and Jasper S. Lee. *Introduction to Plant and Soil Science and Technology*. Danville, Illinois: Interstate Publishers, Inc., 1997. (Textbook and Activity Manual, Chapters 12–15)

Other Resources. The following resources will be useful to students and teachers:

Reiley, H. Edward. And Carroll L. Shry, Jr. *Introductory Horticulture*. Albany, New York: Delmar Publishers, 1997. (Textbook and Lab Manual, Unit 17)

Schroeder, Charles B. et al. *Introduction to Horticulture*. Danville, Illinois: Interstate Publishers, Inc., 2000. (Chapter 8)

Osborne, Edward W. *Biological Science Applications in Agriculture*. Danville, Illinois: Interstate Publishers, Inc., 1994. (Chapter 11)

VAS U4085, *Glossary of Pesticide Terms*. Urbana, Illinois: Vocational Agriculture Service.

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters

Terms. The following terms are presented in this lesson (shown in bold italics):

Contact herbicide
Contact insecticide
Fumigant
Fungicides
Growth regulators
Herbicides
Insect
Insecticides
Miticides
Molluscicides
Nematocides
Nematodes
Non-selective herbicide
Pest
Pesticide

Respiratory insecticide
Rodenticides
Selective herbicide
Soil sterilant
Stomach insecticide

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Begin talking with students about a sports team. Discuss how each individual player has a specific role to play. Explain how no one player can play every position and all of them must work together as a team. An example could be a football team. The quarterback's role is to pass the ball or hand it off to another player. While the lineman's job is to block the other team so the quarterback can do his job. Relate this to the management "team" of pesticides. Each type of pesticide controls a different type of pest. No one pesticide could do the job alone. It requires a balanced attack using several different pesticides in a "team" approach.

Summary of Content and Teaching Strategies

Objective I: Explain plant pests and how they cause losses.

Anticipated Problem: What are plant pests and how do they cause losses?

- I. A plant **pest** is anything that causes injury or loss to a plant. Pests cause losses in different ways. All usually result in a decrease in production. A few examples are:
 - A. Damage plant parts—Some pests attack plants. They may eat holes in leaves, buds, roots, fruit, and other plant structures. This damage makes the plant less productive. Photosynthesis cannot be carried out efficiently in leaves with holes.
 - B. Compete for space and nutrients—Weeds grow in the fields where crop plants grow. They use space and nutrients needed by the crop plant. Weeds use water, fertilizer, and light that the crop plants need to grow.
 - C. Reduce quality of harvested crop—Pests may contaminate the products of plants. Harvested food crops may contain insects. The presence of any impurities lowers the quality of harvested crops. The prices paid to the grower are lowered because of these impurities.
 - D. Increased production cost—Pests reduce yields and lower the quality of harvested products. Thus reducing the amount paid to the grower and increasing the cost per bushel or pound.

Ask students to identify the ways pests causes losses in crop production. Use notes above to supplement the answers provided by students. Chapter 12 in *Introduction to Plant and Soil Science and Technology* is recommended. Use TM: C11–2A to assist in the discussion on this topic.

Objective 2: Identify the major classifications of pesticides and their use.

Anticipated Problem: What are the major classifications of pesticides and their use?

- II. A **pesticide** is any material used to control pests. These materials may be natural or man-made. There are several different types of pesticides. Each is classified according to the type of pest it controls. They are:
- A. **Insecticides** are used to control insects. **Insects** are small, boneless animals with six legs and three body segments. The insects are killed by body contact with the chemical or by swallowing the insecticide.
 - B. **Miticides** are used to control mites and ticks. They are usually killed by coming in contact with the chemical.
 - C. **Fungicides** are used to control fungus disease. Fungicides are used to prevent a plant from becoming infected with the disease. Therefore they are applied before the disease is present.
 - D. **Herbicides** are used to kill unwanted plants.
 - E. **Rodenticides** kill rodents, such as rats and mice. These chemicals are usually applied as bait. Eating the chemical poisons the rodents.
 - F. **Nematocides** kill **nematodes** (tiny hairlike worms that feed on the root of plants). Nematocides are usually applied in the form of a fumigant. A **fumigant** is a substance, which produces a smoke, vapor, or gas when applied.
 - G. **Molluscicides** are used to kill slugs and snails. These chemicals are usually applied as bait, which attracts the slugs and snails and poisons them.

Use a variety of techniques to help students master this objective. Students should use text materials to help understand the types of pesticides and their uses. Unit 17 in *Introductory Horticulture* is recommended. Use TM: C11–2B to assist in discussion on this topic.

Objective 3: Identify the major classifications of herbicides and their use.

Anticipated Problem: What are the major classifications of herbicides and their use?

- III. Herbicides are classified based on how they kill plants. The selectivity of a herbicide is also considered within each classification. A **selective herbicide** is a compound that kills only certain plant species and not others. A **non-selective herbicide** kills all plants regardless of species. The three classifications of herbicides are:
- A. A **contact herbicide** is a weed control chemical that kills plants by exposure. Only the parts of the plant that come in contact with the chemical are killed.

- B. **Growth regulators** kill weeds by altering growth or metabolic processes. The roots, stems, or leaves of the plant absorb the chemical. Response to the herbicide may require a week or more.
- C. A **soil sterilant** is a compound that prevents the growth of plants in the soil. No plants can be growing in the area of application when a soil sterilant is used. They are most commonly used along ditch banks and fence rows.

Many techniques can be used to help students master this objective. Students need text materials to help understand the major classifications of herbicides and their use. Chapter 15 in Introduction to Plant and Soil Science and Technology is recommended. Complete the Effects of Herbicides on Crops and Plants laboratory activity found in Chapter 11 of the Biological Science Applications in Agriculture textbook.

Objective 4: Identify the major classifications of insecticides and their use.

Anticipated Problem: What are the major classifications of insecticides and their use?

- IV. Insecticides are classified by how they enter an insect's body. Three general groups of insecticides are:
 - A. A **contact insecticide** is absorbed through the skin or exterior of an insect. The chemical must be applied directly on the insect. This type of insecticide is normally used with sucking insects.
 - B. A **stomach insecticide** is effective when eaten. The chemical is applied to the plant parts, which are eaten by the insect. This type of insecticide is most effective on chewing insects.
 - C. A **respiratory insecticide** are insecticides that enter the respiratory system of the insect. They are commonly called fumigants. This type of insecticide is used in enclosed places.

A variety of techniques can be used to help students master this objective. Students need text material to help understand the major classifications of insecticides and their use. Chapter 13 of Introduction of Plant and Soil Science and Technology is recommended. Use TM: C11–2C to assist students in identifying insects as either chewing or sucking.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary.

Application. Complete the Effects of Herbicides on Crops and Plants laboratory activity found in Chapter 11 of the *Biological Science Applications in Agriculture* textbook.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. A sample written test is attached

Answers to Sample Test:

Part One: Matching

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

Part Two: Completion

1. growth regulators
2. production
3. rodenticides
4. non-selective herbicides
5. respiratory insecticides

Part Three: Short Answer

1. a) damage plant parts
b) compete for space and nutrients
c) reduce quality of harvested crop
d) increase production cost

TEST

Lesson C11–2: Determining the Kinds of Pesticides**Part One: Matching**

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | |
|----------------------|------------------------|-------------------|
| a. pest | e. fungicides | i. soil sterilant |
| b. insect | f. pesticides | j. molluscicides |
| c. nematocides | g. contact insecticide | |
| d. growth regulators | h. selective herbicide | |

- _____ 1. Pesticide that controls nematodes
- _____ 2. Absorbed through skin or exterior of an insect
- _____ 3. Used to control fungus disease
- _____ 4. Compound that kills only certain plant species but not others
- _____ 5. Any materials used to control pests
- _____ 6. Herbicide that kills weeds by altering growth or metabolic processes
- _____ 7. Anything that causes injury or loss to a plant
- _____ 8. Used to kill slugs and snails
- _____ 9. Small, boneless animal with six legs and three body segments
- _____ 10. Compound that prevents the growth of plants in the soil

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. _____ kill weeds by altering growth or metabolic processes.
2. Pests cause losses in different ways. All usually result in a decrease in _____.
3. _____ kill rodents, such as rats and mice.
4. A _____ kills all plants regardless of species.
5. _____ are insecticides that enter the respiratory system of the insect.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. Identify the four ways pests can cause damage.
 - a.
 - b.
 - c.
 - d.

HOW PESTS CAUSE LOSSES

- **Damage plant parts**
- **Compete for space and nutrients**
- **Reduce quality of harvested crop**
- **Increase production cost**

PESTICIDES AND THE PESTS THEY CONTROL

PESTICIDE	PEST CONTROLLED
Insecticide	Insects
Miticide	Mites
Acaricide	Ticks and Spiders
Molluscicide	Snails and Slugs
Fungicide	Fungi
Avicide	Birds
Rodenticide	Rodents
Nematicide	Nematodes
Bactericide	Bacteria
Herbicide	Weeds
Piscicide	Fishes
Predacide	Predatory Animals

MOUTHPARTS OF CHEWING AND PIERCING-SUCKING INSECTS

