

Lesson C11-4:

Interpreting Pesticide Labels

Unit C. Plant and Soil Science

Problem Area I I. Pesticide Use

Lesson 4. Interpreting Pesticide Labels

Learning Goal: Understand the relationships among science, technology and society in historical and contemporary contexts.

Learning Standard: Know and apply the accepted practices of science.

Learning Benchmark: Estimate and suggest ways to reduce the degree of risk involved in science activities.

Occupational Skill Standard: Spray a 20-acre row crop field with pesticides.

Workplace Skills: Follow written directions. Identify work-related terminology. Identify hazardous substances in the workplace.

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

1. Explain the purpose of the pesticide label.
2. Identify the information that should be included on the pesticide label.
3. Explain when the pesticide label should be read.

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, Chapter 13)

VAS U4081, *Reading Chemical Container Labels*. Urbana, Illinois: Vocational Agriculture Service.

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, Unit 17)

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Copies of student lab sheet

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

Active ingredient
Common name
Establishment number
Formulation
General-use pesticides
Inert
Ingredients
Net contents of container
Notice of limitations
Precautionary statements
Restricted-use pesticides
Signal words
Trade (Brand) name

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 the lesson by handing each student a copy of LS: C11–4A. The only verbal instructions you should give is for them to read and follow the directions on the lab sheet. Allow the students two to three minutes to complete the lab sheet. After each student has completed it, read the directions aloud to the class. Ask how many of them followed the directions by only putting their name, date, and class name at the top of the paper, and how many of them began without reading all of the directions first. Begin a discussion on why it is important to read instructions completely before beginning any project.

Summary of Content and Teaching Strategies

Objective I: Explain the purpose of the pesticide label.

Anticipated Problem: What is the purpose of the pesticide label?

- I. Labels on pesticides provide information about the active ingredient. It is the **active ingredient** that kills the pest. Some products on the market have low amounts of active ingredient. Use this information as a basis for deciding which product to buy. There are three important steps that pesticide users should take into account when dealing with the pesticide label. They are:
 - A. Read the label—All users should discipline themselves to read and reread the label. This is the only way to find proper handling and mixing procedure. The label should be read completely before any handling of the chemical takes place.
 - B. Understand the label—In addition to just reading the label, the pesticide applicator must understand the information it contains. This may require the applicator to receive some special training. If after reading the label, the applicator does not understand some piece of information, the pesticide distributor should be contacted for clarification before the pesticide is applied.
 - C. Follow label directions—Just knowing what should be done is not enough. By law, users must follow label directions. Persons using a pesticide in a manner that conflicts with the labeling can be charged with both civil and criminal penalties.

Many techniques can be used to help students master this objective. Students need text materials to help understand the purpose of the pesticide label. VAS U4081 is recommended. Use TM: C11–4A to highlight the three steps in dealing with pesticide labels. Expand on the importance of these in a class discussion with the students.

Objective 2: Identify the information that should be included on the pesticide label.

Anticipated Problem: What information should be included on the pesticide label?

- II. All pesticide labels must conform to standards set by federal law. The goal is for pesticide labels to include all the information necessary for safe and effective use. The label is made of two panels, a front and a back panel. The following information is found on each:
- A. The front panel of a label provides only basic information about the pesticide. This information includes:
1. **Use Classification**—This indicates if the pesticide is a general-use or restricted-use pesticide. **General-use pesticides** are those products that have been designated as the least hazardous pesticide materials. **Restricted-use pesticides** are given this classification based on toxicity, the way the pesticide is used, and the environmental effect of the pesticide.
 2. **Trade (Brand) Name**—This is the product's name given by the manufacturer. Different manufacturers or even the same manufacturer can give a single chemical compound multiple names. Ex. Round-up is the trade name by Monsanto for glyphosate.
 3. **Formulation**—This is the form in which a pesticide product is offered for sale to the user. Active ingredients usually cannot be used alone in their pure form. Therefore, inactive ingredients such as water, oil, surfactants, emulsifying agents, and other diluents are combined with the active ingredients to make the formulation. Examples of pesticide formulations are liquid emulsifiable concentrates (E or EC), wettable powders (W or WP), dry flowables (DF), solutions (S), granules (G), and dusts (D). Further dilution of the formulation with water or fluid fertilizers, is generally required before use.
 4. **Common Name**—The name assigned to identify the active ingredient in the product. Regardless of the number of trade names a certain pesticide may have, the common name remains the same. It may be compared to the use of scientific names when dealing with plants.
 5. **Ingredients**—This contains the name and concentration of all active ingredients in the product. For the **inert** (inactive) ingredients, only the combined total concentration must be stated.
 6. **Net Contents of Container**—This is the amount of the total product in the container. This may be expressed in gallons, quarts, pints, pounds or other units.
 7. **Signal Words**—Words that are required on every label to indicate the degree of toxicity and the potential danger of using each pesticide. Signal words are based on the LD₅₀ and LC₅₀ values of toxicity for the pesticide. The words Danger or Danger-Poison with a skull and cross-bones (all in red) must appear on the labels of all highly toxic pesticides. Warning is required on the labels of all moderately toxic pesticides. Caution must be printed on the labels of all pesticides with a low or very low toxicity.

The child hazard warning, Keep Out of Reach of Children must also appear on the label of all pesticides, regardless of the toxicity.

8. **Precautionary Statements**—These include information on first aid treatment, potential environmental and human hazards, and flammability or explosion hazards.
 9. **Establishment Number**—An EPA establishment number is listed to identify the plant where the individual pesticide was manufactured, packaged, or formulated.
 10. **EPA Registration Number**—This is proof that the product is registered with the Environmental Protection Agency (EPA).
 11. **Name and Address of Manufacturer**—The company which manufactures and distributes the pesticide is clearly identified on the label. Normally a phone number is given in the precautionary section, so the company can be reached in case of an emergency.
- B. The side and back panels provide more detailed information on the use of the pesticide. Information found here is as follows:
1. **Hazardous Materials Warning Labels**—Some containers have additional symbols on their labels, as required by the United States Department of Transportation (DOT). These symbols denote the nature of the chemicals. The small number that appears in the lower portion of the symbol indicates which class of hazardous materials is represented.
 2. **Directions for Use**—This section includes specific guidelines for properly using the product. The following is a general setup for the Directions for Use section:
 - a) sites which can be treated with the pesticide
 - b) target pest(s) the product will control
 - c) amount of chemical to use per acre
 - d) type of equipment and application methods that can be used
 - e) proper mixing procedures
 - f) when the pesticides should be applied
 - g) reentry limitations
 - h) guidelines for storage and disposal
 - i) limitations on its use
 3. **Notice of Limitations**—This section includes statements of condition of sale, warranty limitation, inherent risks, and liability limitations.

Many techniques can be used to help students master this objective. Students need text materials to help understand the purpose of the pesticide label. VAS U4081 is recommended. Use TM: C11-4B and TM: C11-4C to highlight the information found on pesticide labels. Expand on the importance of these in a class discussion with the students.

Objective 3: Explain when the pesticide label should be read.

Anticipated Problem: When should the pesticide label be read?

- III. Although most listed information on the label is required by law, certain sections are particularly important to the applicator. Close attention should be paid to the signal words, precautionary statements, and to directions. There are five times when the applicator should read the label. They are:
- A. Before buying the pesticide—Read the entire label before purchasing a pesticide to make sure the chemical you are considering is the best product for the job. Make sure that you have the proper equipment to do the job.
 - B. Before mixing the pesticide—Be certain to note all warnings and first-aid measures. Determine what protective clothing will be needed to handle the pesticide.
 - C. Before applying the pesticide—The label should be checked again for restrictions on use and any special instructions. Determine the application rate for specific use and calibrate equipment accordingly.
 - D. Before storing the pesticide—Storing pesticides safely can prevent unnecessary accidents and breakdown of product.
 - E. Before disposing of excess pesticide or the container—It is always best to plan so that you have as little excess pesticide as possible. All pesticide wastes must be disposed of according to law. Improper disposal of excess pesticides, spray mixture, or rinse water is a violation of federal law.

Many techniques can be used to help students master this objective. Students need text materials to help understand when to read the pesticide label. VAS U4081 is recommended. Use TM: C11-4D to highlight when the applicator should read the pesticide label. Expand on the importance of these in a class discussion with the students.

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 to determine which objectives need to be reviewed or taught from a different angle.

Application. Application can involve the following student activity.

Reading a Pesticide Label—pgs. 98–100 of *Plant and Soil Science and Technology Activity Manual*

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=d, 2=e, 3=g, 4=c, 5=h, 6=a, 7=f, 8=b

Part Two: Completion

1. Net contents of container
2. Warning
3. Notice of Limitations
4. United States Department of Transportation (DOT)

Part Three: Short Answer

1.
 - a) Before buying a pesticide
 - b) Before mixing a pesticide
 - c) Before applying a pesticide
 - d) Before storing a pesticide
 - e) Before disposing of excess pesticide or the container

Test

Lesson C11–4: Interpreting Pesticide Labels

Part One: Matching

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

- | | |
|----------------------|--------------------------|
| a. active ingredient | e. general-use pesticide |
| b. common name | f. establishment number |
| c. signal words | g. trade name |
| d. formulation | h. inert |

- _____ 1. Form in which a pesticide product is offered for sale to the user.
- _____ 2. Product that has been designated as the least hazardous pesticide material.
- _____ 3. Product's name given by the manufacturer.
- _____ 4. Words on label that indicate degree of toxicity.
- _____ 5. Inactive.
- _____ 6. Part of pesticide responsible for killing the pest.
- _____ 7. Identifies the plant where the product was made.
- _____ 8. Name assigned to identify the active ingredient.

Part Two: Completion

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

1. _____ is the amount of the total product in the container.
2. _____ is required on the labels of all moderately toxic pesticides.
3. The _____ section includes statements of condition of sale, warranty limitation, inherent risks, and liability limitations.
4. Hazardous Materials Warning Labels found on some containers are required by the _____.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. List the five times when the applicator should read the pesticide label.
 - a)
 - b)
 - c)
 - d)
 - e)

STEPS IN DEALING WITH PESTICIDE LABELS

- **Read the label**
- **Understand the label**
- **Follow directions**

SAMPLE PESTICIDE LABEL (BACK)

DIRECTIONS FOR USE

It is a violation of federal law to use this restricted use product in a manner inconsistent with its labeling

Do not enter area within 2 days after application.

Storage: Store in original container. Do not store near food or other articles intended for consumption by humans or animals. Do not store next to other pesticides in a closed room.

Disposal: Puncture, triple-rinse, and destroy empty container. Bury in a safe place. Never reuse.

or

Contact state or regional federal authority for local instructions on disposal.

This product intended for use by commercial grower or applicator in conventional hydraulic sprayers, ground applicators, or airplane sprayers.

Ground Application: Use recommended amount in sufficient water for thorough coverage.

Air Application: Use recommended amount in 2 to 10 gallons of water, unless otherwise specified.

Not for use in or around the home.

For use on Corn and Soybeans.

Crop	Insect	Pounds/Acre
Corn* <small>*(yield, sweet, pop)</small>	Armyworm Chinch bugs Corn earworm Corn rockworm adults European corn borer Fall armyworm	1 1/4 to 1 1/2
	Flea beetles Japanese beetles Sap beetles Southwestern corn borer Leafhoppers	
	Western bean cutworm	2 1/2
Soybeans	Bean leaf beetle Cucumber beetles Green cloverworm	2/3
	Corn earworm	2/3 to 1 1/4 to 1 7/8
	Blister beetles Grape colaspis Mexican bean beetle	2/3 to 1 1/4

Specific Directions:
Apply every 5 days or as needed by air or ground. use sufficient water to obtain full coverage of foliage. Do not apply more than 0.8 lbs. a.i. per acre per season. Do not apply within 1 day of harvest.

Restrictions on use →

Pest controlled →

Crop treated →

Directions for use

Reentry statement

Storage and disposal directions

Directions for applications

Recommended amount to use

Frequency and time of application

WHEN SHOULD THE LABEL BE READ?

- **Before Buying a Pesticide**
- **Before Mixing a Pesticide**
- **Before Applying a Pesticide**
- **Before Storing a Pesticide**
- **Before Disposing of Excess Pesticide or the Container**

Lab Sheet

Interpreting Pesticide Labels — Introductory Exercise

Directions:

Read all instructions to yourself completely before beginning the exercise. When you have completed the exercise, turn your paper over and sit quietly until the rest of the class has finished.

1. Draw a square in the blank space at the bottom of this page.
2. Connect the opposite corners of the square with straight lines.
3. Write the name of the person sitting to your right on the right side of the square, if no one is sitting there, write “blank”.
4. Write the name of the person sitting to your left on the left side of the square, if no one is sitting there, write “blank”.
5. Draw three triangles around the square.
6. In one triangle, write a number between 1 and 1,000
7. In another triangle, write your middle initial
8. In the last triangle, draw a picture of a dog
9. Ignore all previous steps, only place your name, date, and class name on top of the paper.