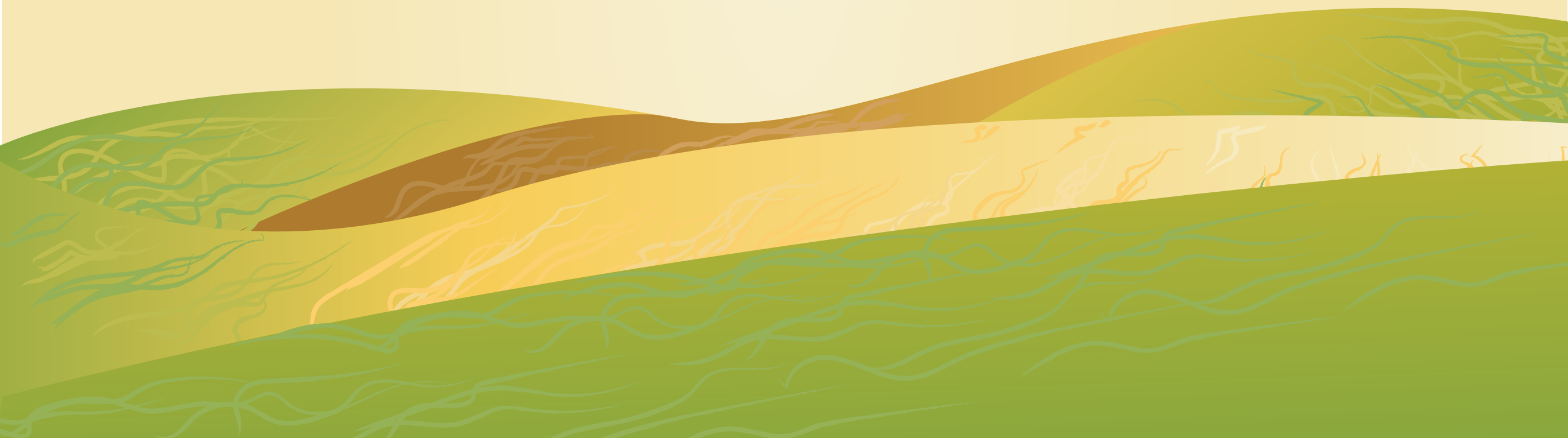


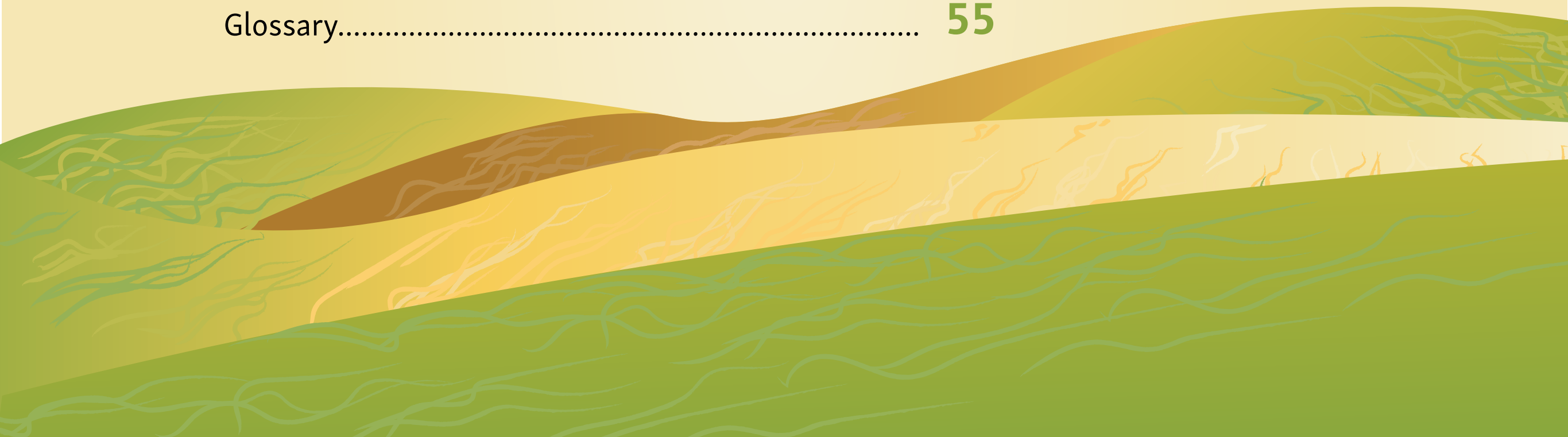


PESTICIDE STEWARDSHIP
of
SPECIALTY CROPS
— *Train the Trainer Handbook* —



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PERSONAL PROTECTIVE EQUIPMENT

J. Sidhu and M.L. Lewis Ivey

Pesticides* can enter the body through the mouth, by inhalation and through the skin or eyes. Ninety-five percent of all exposure to pesticides occurs through direct contact with the skin. The correct use of personal protection equipment (PPE) protects the user from direct or indirect exposure to pesticides. Personal protection equipment is specific to each pesticide. Always consult the pesticide label to determine the proper PPE.

Employers are responsible for providing employees with PPE and for training employees on the proper use of PPE. This chapter focuses on PPE required for handling pesticides. The U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) is an excellent resource for information on PPE for other on-farm hazards. Topics covered in this chapter are as follows:

- A. Types of PPE for handling pesticides.
- B. PPE removal.
- C. PPE cleaning and maintenance.
- D. Module 1 recap.

* Definition in Glossary

A

TYPES OF PPE FOR HANDLING PESTICIDES

Personal protective equipment refers to specialized clothing and equipment that are used to protect the user from exposure to pesticides.

Proper selection of PPE is very important. Personal protection equipment should fit properly, be intact (no holes or tears) and be certified (i.e., respirators) (Figure 1.1).

The [Centers for Disease Control \(CDC\)](#) provides a searchable database to identify types and sources of various PPE. Pesticide labels list the minimum requirements of PPE for each specific pesticide. Always read the user instructions before using PPE, and contact the manufacturer or a state specialist if you are uncertain of how to properly use PPE.

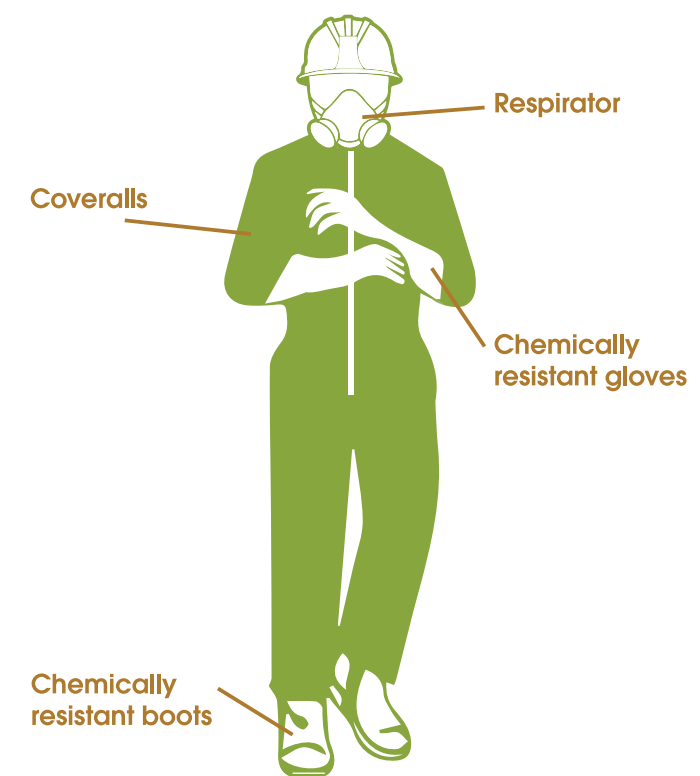


Figure 1.1. Wearing appropriate types of personal protective equipment (PPE) can greatly reduce the risk of pesticide exposure.



TYPES OF PPE FOR HANDLING PESTICIDES

PERSONAL PROTECTIVE EQUIPMENT RECOMMENDED FOR HANDLING PESTICIDES

APRONS

- Wear a chemical-resistant apron when repairing or cleaning spray equipment and when mixing or loading pesticides.
- Aprons protect against spills and splashes of liquid formulations* as well as dry formulations such as wettable powders.
- Aprons should cover the body from the chest to the knees.
- Aprons should be worn over other protective clothing such as coveralls or uniforms.
- Aprons made of nitrile, butyl or neoprene provide the best protection from pesticide exposure.

COVERALLS OR UNIFORMS

- Wear clean and dry cotton coveralls or pants and shirts that cover the entire body from your wrists to ankles.
- Cotton coveralls may be reused if laundered correctly. Do not reuse disposable coveralls, pants or shirts.
- Do not reuse **disposable** coveralls, pants or shirts.
- Cotton coveralls, pants and shirts do not provide barriers against liquids. When handling liquid pesticides, wear an apron over coveralls, pants and shirts.

* Definition in Glossary

A

TYPES OF PPE FOR HANDLING PESTICIDES

FOOTWEAR

- Wear water-proof and chemical-resistant boots that cover the ankles (Figure 1.2).
- Wear boots with thick soles.
- Wear pant legs over boots to avoid liquids from dripping or running into the boots.
- Wash boots after each use, and dry thoroughly (inside and out) to remove all pesticide residues.
- Replace boots with holes or worn treads immediately.



Figure 1.2. Proper footwear helps protect your feet during pesticide application.

EYE PROTECTION

- Wear shielded, non-fogging safety glasses or a face shield to protect your eyes (Figure 1.3).
- Wear eye protection under head coverings.



Figure 1.3. Tight-fitting goggles help protect your eyes from pesticide exposure.

HEAD PROTECTION

- Wear chemical- and rain-resistant hoods or hats with a wide brim. Hair and skin on the neck and head must be protected.
- Do not wear cotton or felt hats, because they can absorb pesticides.

A

TYPES OF PPE FOR HANDLING PESTICIDES



Figure 1.4. Nitrile and butyl rubber gloves provide good protection for dry and liquid pesticides.

GLOVES

- Wear elbow-length gloves.
- The protective ability of gloves varies with the material and the length of time they are in contact with the pesticide. Materials such as nitrile, butyl and neoprene provide good protection for dry and liquid pesticides (Figure 1.4). Consult the pesticide label for the recommended type of glove material to be worn for a specific pesticide.

RESPIRATORS

- A respirator will protect you from inhaling toxic chemicals (Figure 1.5).
- Always wear a respirator certified by the [National Institute of Occupational Safety and Health \(NIOSH\)](#).
- There are two main types of respirators: 1) powered air purifiers and 2) supplied-air respirators. The type of respirator worn is specific to the pesticide being used and the method of application. Consult the pesticide label for the type of respirator that should be worn.
- Check and fit-test your respirator each time you use it. All respirators come with instructions on how to properly fit and use them. Inhalation and exhalation tests can be done to determine the proper fit. View the “How to Use a Pesticide Respirator” video by the university of Nebraska Lincoln for instructions on how to test-fit a respirator (https://youtu.be/q_aOoxKwT7Q).
- Check the seal on the respirator before each use to ensure the seal has not been compromised.



Figure 1.5. Facemask chemical cartridge and particulate filter protect you from inhaling toxic chemicals.



PPE REMOVAL

Personal Protective Equipment should be removed immediately after completing the application. Always remove protective clothing and PPE outdoors.

REMOVAL PROCESS

- Wash the outside of the gloves thoroughly with soapy water before removing the rest of the PPE.
- Wash other PPE, and remove while still wearing the gloves.
- After removing all other PPE, wash the gloves with warm, soapy water again, and remove them.
- If the PPE has been contaminated by spills of a highly toxic pesticide, remove and place these clothes in a plastic bag, and take them to a landfill site.



PPE CLEANING AND MAINTENANCE

Disposable* PPE is not recommended in most cases. Disposable cotton coveralls, gloves or eye protection may be worn but should never be reused. Maintenance and proper cleaning of nondisposable PPE is required to avoid risk of pesticide exposure on subsequent uses.

CLEANING PRACTICES

- Remove PPE at the site of application and as soon as the pesticide application is done. If a PPE cleaning facility is not nearby, place all PPE in a plastic bag for transport.
- Before removing any PPE, wash your gloves (disposable or reusable) with soap and water (Figure 1.6). While still wearing the cleaned gloves, remove other PPE listed in the section B removal process. After removing all PPE, rewash your gloves with soap and water. Other PPE should be cleaned according to the PPE manufacturer's instructions.
- Always wash PPE separately from regular laundry with hot water and laundry soap. Air-dry PPE if possible (Figure 1.7).
- Always store cleaned PPE in a clean dry area and away from pesticides and other clothing.



Figure 1.6. Washing gloves before taking them off prevents contamination of hands.

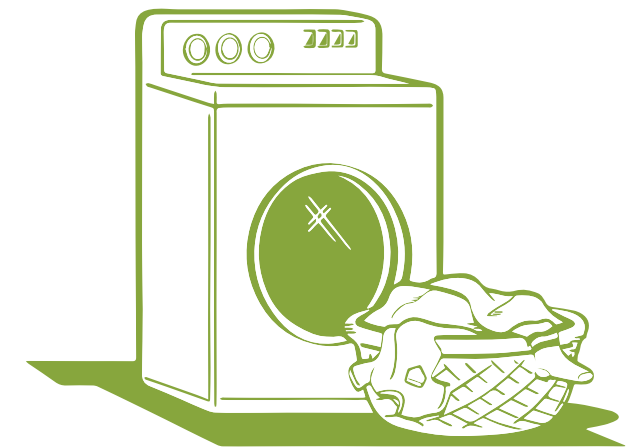


Figure 1.7. Wash PPE after each use and separately from other laundry.

* Definition in Glossary



PPE CLEANING AND MAINTENANCE

MAINTENANCE AND DISPOSAL OF PPE

- Always throw out PPE that is damaged. Damaged PPE should never be reused.
- Always inspect PPE for damage before storing.
- Always buy replacement parts from the original manufacturer, and follow manufacturer's repair instructions. This is especially important for respirators.
- Before final disposal of PPE, clean PPE with soap and water. Used PPE must be disposed of according to the manufacturer's directions and [federal](#), state and local laws. Consult the [Environmental Protection Agency \(EPA*\)](#) and the [Louisiana Department of Agriculture and Forestry](#) for specific laws.

* Definition in Glossary



MODULE 1 RECAP

- Read the pesticide label to determine required PPE when performing tasks with pesticides.
- Use of correct and appropriate PPE protects the user from exposure to chemicals.
- It is very important to read the pesticide label instructions before using PPE.
- There are different types of PPE for each body part for handling pesticides.
- It is very important to remove, clean and maintain PPE to avoid risk of pesticide exposure.

SPRAYER CALIBRATION AND CLEANING

J. Sidhu and M.L. Lewis Ivey

Calibration* is an important step to ensure that the pesticide application equipment is dispensing the pesticide uniformly and at the intended rate. Pesticide application equipment should be calibrated at the beginning of every growing season and frequently during the season.

Growers often find the calibration processes overwhelming. This chapter focuses on ground sprayer calibration procedures. Topics covered in this chapter are as follows:

- A. Pre-calibration procedures.
- B. Calibration procedures.
- C. Equipment cleaning procedures.
- D. Module 2 recap.

* Definition in Glossary

A

PRE-CALIBRATION PROCEDURES

Properly calibrated sprayers will reduce waste and dispense the correct amount of product to the target area. Prior to calibration the following steps should be taken:

1. Determine the ground speed of the sprayer or applicator to which the pesticide will be applied. This is usually measured in miles per hour (mph).
2. Select the spray pressure that will be used to apply the pesticide. Spray pressure will affect flow rate and droplet size.
3. Select the nozzle size and type required to achieve the desired spray pressure.
4. Have a stopwatch, measuring tape, pencil, paper and measuring container handy. (Figure 2.1).
5. Inspect all sprayer parts, including pumps, tanks, lines, hose clamps, nozzles, seals and pressure gauges, for cracks, corrosion or other defects.



Figure 2.1. Supplies needed for calibrating a backpack sprayer.

B

CALIBRATION PROCEDURES

BACKPACK OR HANDHELD SPRAYER CALIBRATION

One of the simplest methods for calibrating the output of a backpack or handheld sprayer is the 128th acre method. Using this method, one ounce of discharge is equivalent to a one gallon per acre output. View the “Backyard Basics- Backpack Sprayer Calibration” video by the LSU AgCenter for instructions on how to calibrate a backpack sprayer.

1. Measure and mark an 18.5- by 18.5-foot area, which equals 128th of an acre.
2. Fill the spray tank with water, and set the spray pressure based on the operating pressure of the selected nozzle(s).
3. Determine the time, in seconds, that it takes to spray 128th of an acre with water at constant speed and pressure. The amount of coverage and product to be applied to optimize product efficacy should be considered. For example, some products may need to be applied to runoff while others may require less coverage. Repeat this step at least three times, and calculate the average amount of time required to cover the entire area.
4. For the average amount of time (seconds) calculated in step 3, spray water into a measuring container and record the number of ounces of water collected.
5. The number of ounces of water collected within the time determined in step 3 is equal to the gallons per acre (GPA) output of the sprayer

B

CALIBRATION PROCEDURES

BOOM SPRAYER CALIBRATION

There are many methods of calibrating a boom sprayer; however, the 1/128th acre method for [backpack sprayers](#) can be modified for boom sprayers, which have multiple nozzles.

1. Measure the distance (inches) between each nozzle along the boom.
2. Determine the optimal distance (feet) to calibrate the sprayer, and mark off this distance using flags, rope or other types of markers. This distance is based on the distance between each nozzle (Table 2.1).
3. Record the tractor gear and/or revolutions per minute (rpm) that will be used to apply the pesticide. Drive the tractor through the measured distance determined in step 2, and record the time it takes to travel this distance in seconds. The tractor should be at the desired speed before you begin to time the application. Repeat this step at least three times and calculate the average spray time.
4. Adjust the pressure and pump speed to the desired settings for applying the pesticide. Without driving, collect water from each nozzle into separate measuring containers for the time calculated in step 3.
5. Calculate the average output per nozzle in ounces. The ounces per nozzle will equal the gallons per acre applied by the sprayer when operated at that set pressure and pump speed.

Table 2.1. Calibration chart used to determine the distance required to calibrate the sprayer based on the distance between nozzles.

Nozzle spacing (inches)	Calibration distance (feet)
6	681
8	510
10	408
12	340
14	292
16	255
18	227
20	204
22	186
24	170
26	157
28	146
30	136
If the calibration distance is not listed in the table, divide 340 by nozzle spacing in feet.	



EQUIPMENT CLEANING PROCEDURES

Proper and regular cleaning of sprayers can protect the applicator from unintentional exposure to a pesticide and avoid off-target plant injury. Pesticide residues can build up quickly in sprayer equipment, causing corrosion or blockages in the lines or nozzles. If pesticides are not adequately cleaned out of the equipment, the efficacy of other pesticides can be adversely affected. For example, some insecticides are not compatible with some fungicides and can reduce the efficacy of the insecticide or alter the pH of the insecticide solution. Before beginning the cleaning procedure, review the label to determine:

- How to properly dispose of remaining pesticide.
- Whether a cleaning agent is required and what agents are most effective.
- The required Personal Protective Equipment (PPE) that must be worn during the process.

CLEANING WHEN REUSING PESTICIDES

Though this procedure is not recommended, some applicators will store remaining pesticide in the tank and apply it the next day. In this case, a thorough flushing of the equipment with clean water should be made to prevent the drying and hardening of pesticides. The tank containing the pesticide should be stored according to the directions on the label.

C

EQUIPMENT CLEANING PROCEDURES

CLEANUP AND EQUIPMENT CLEANING

When cleaning a sprayer, always select a site where spilled [rinsate](#)* will not contaminate local water sources or where spill puddles will not be accessible to pets, livestock, children or wildlife. Avoid discharging the leftover pesticide in small areas or in fields that contain [off-target crops](#).* Ideally, equipment should be cleaned on a cement surface with a closed container to catch the rinsate. However, sprayers also can be cleaned around the perimeter of the field in a manner consistent with the label. Having rinse water available in the field, either on the sprayer or support vehicle will facilitate the cleaning process (Figure 2.2). Some pesticides (i.e., herbicides) may require a cleaning agent to effectively remove residue from the equipment. Pesticide labels will indicate if a cleaning agent is recommended. If no specific cleaning instructions are provided on the label the following procedure can be used:

1. Drain all the pesticide solution from the sprayer. Flush the sprayer with clean water.
2. Fill the sprayer tank at least half way with clean water and flush the lines, booms and nozzles.
3. Remove and clean nozzles, screens and filters separately in a bucket of clean water.
4. Rinse the entire system two more times with clean water.

View the video "[Cleaning Your Knapsack Sprayer](#)" by Syngenta for instructions on how to clean a backback sprayer.

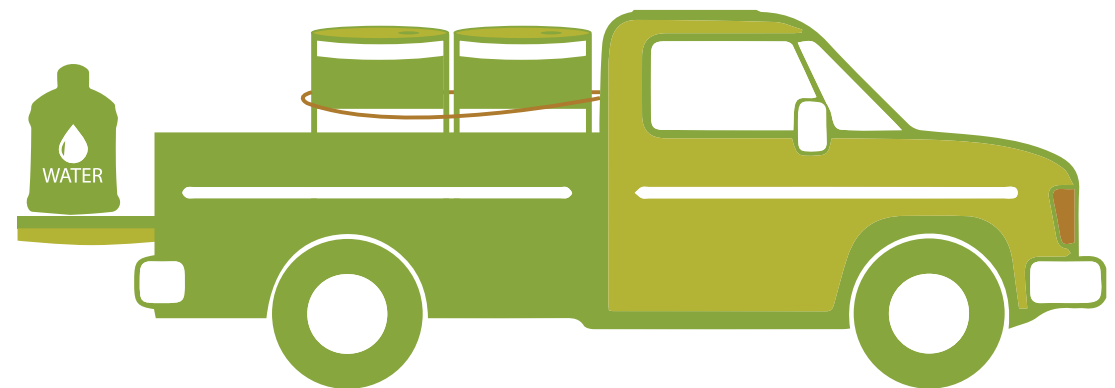


Figure 2.2. Having rinse water available in the field, either on the sprayer or support vehicle will facilitate the cleaning process.

* [Definition in Glossary](#)



MODULE 2 RECAP

- Calibrating spray equipment is necessary to ensure that the correct amount of pesticide is applied evenly over the target area or crop.
- The 128th acre method is the simplest method for calibrating a backpack or a handheld sprayer.
- Proper cleaning of spray equipment is required to avoid unintentional handler exposure, non-target plant injury and pesticide residue buildup in sprayers, which can damage spray equipment.
- Always follow the label directions and wear proper PPE while cleaning spray equipment.

READING A LABEL

J. Sidhu and M.L. Lewis Ivey

A pesticide label is a legal document that provides information on how to mix, apply, store and dispose of a pesticide. Labels also provide information on sites that the pesticide can legally be applied, application rates and target [pests](#)*. To use a pesticide in *any manner* that is inconsistent with its label directions is a violation of federal law. Therefore, anyone who uses a pesticide has the legal responsibility to read, understand and follow the labels directions. The **label is the law**.

This chapter focuses on how to read and understand the content of a pesticide label. Topics covered in this chapter are as follows:

- A. [Information on the first page of a label.](#)
- B. [Other label information](#)
- C. [Where you can access pesticide labels.](#)
- D. [Module 3 recap.](#)

* Definition in Glossary



INFORMATION ON THE FIRST PAGE OF A LABEL

INGREDIENT STATEMENT

Active ingredients are the chemical compounds in the pesticide that control the target pests. The ingredient statement provides the chemical name of each active ingredient, the percentage by weight of each active ingredient and the percentage by weight of all inert ingredients*. Inert* ingredients are compounds that improve the efficacy or safety of a pesticide but do not impact the pest directly. Inert ingredients are listed as “other ingredients” on the label.

FUNGICIDE, INSECTICIDE OR HERBICIDE GROUP NUMBER

All active ingredients used in a pesticide are assigned a group number based on their mode of action. All pesticide within a group have a common mode of action. Therefore, a group number helps the pesticide user determine if two products have the same mode of action.

This classification system is created by FRAC* (Fungicide Resistance Action Committee), IRAC* (Insect Resistance Action Committee) and HRAC* (Herbicide Resistance Action Committee) for fungicides, insecticide and herbicides, respectively. By law, the group number is not required to be on the label. However, most pesticides companies include the group number on the label. If it does not appear on the label users can find the group number on the FRAC, IRAC or HRAC website.

* Definition in Glossary

Brand Name

FUNGICIDE

GROUP

7

FUNGICIDE

Suspension Concentrate

Active Ingredient	By Weight
Penthiopyrad	20.4%
Other Ingredients	79.6%
TOTAL	100.0%

Contains 1.67 pounds of penthiopyrad per gallon of product

EPA Reg. No. 352-834

EPA Est. No. _____

Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by a poison control center or doctor. Do not give anything to an unconscious person. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. **For medical emergencies involving this product, call toll-free 1-800-441-3637.** See Label for Additional Precautions and Directions for Use.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. may be harmful if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.

A

INFORMATION ON THE FIRST PAGE OF A LABEL

BRAND NAME

The brand name, trade name or product name is a unique and trademarked name used by manufacturers to advertise and market their products. Different names are used by different manufacturers even though their products may contain the same active ingredients.

OMRI LISTED PRODUCT LOGO

The [Organic Materials Review Institute](#) (OMRI) listed product logo indicates the product meets USDA criteria for organic production. There is no designated location for the OMRI listed logo on the label but it is generally located below the brand name.

Brand Name

FUNGICIDE



GROUP

7

FUNGICIDE

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Other Ingredients	79.6%
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Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

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CAUTION

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A

INFORMATION ON THE FIRST PAGE OF A LABEL

FORMULATION TYPE

Formulation is listed next to the brand name of the product and provides information on the final physical condition in which a pesticide is sold. A single active ingredient may be sold in several different formulations, depending on the use of the product. Some of the most common formulations and their abbreviations are listed in Table 3.1.

Table 3.1. Different pesticide formulations and their abbreviations	
Formulation	Abbreviation
<u>Aerosols</u> *	A
<u>Baits</u> *	B
<u>Dusts</u> *	D
<u>Emulsifiable concentrates</u> *	E or EC
<u>Flowables</u> *	F or FL
<u>Granular</u> *	G
<u>Pellets</u> *	P or PS
<u>Solutions</u> *	S
<u>Ultra-low-volume concentrates</u> *	ULV
<u>Water-dispersable granules or dry flowables</u> *	WDG or DF
<u>Wettable powders</u> *	W or WP

* Definition in Glossary

Brand Name

FUNGICIDE

GROUP	7	FUNGICIDE
-------	---	-----------

Suspension Concentrate

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EPA Est. No. _____

Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

KEEP OUT OF REACH OF CHILDREN CAUTION

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PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

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INFORMATION ON THE FIRST PAGE OF A LABEL

PRODUCT TYPE

Product type is listed under the brand name and provides general information on the type of pesticide and the target crops and pests. For example:

- **Broad-spectrum fungicide*** for control of plant diseases.
- **For control of nematodes in Crop Groups 8 and 9:** including cucumbers, melons (cantaloupes, watermelon, honeydew), squash, tomatoes, okra, eggplant and peppers (bell and non-bell).
- **Broad-spectrum post-emergence professional herbicide*** for control of industrial, turf and ornamental weeds.

* Definition in Glossary

Brand Name

FUNGICIDE

GROUP	7	FUNGICIDE
-------	---	-----------

Suspension Concentrate

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PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

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INFORMATION ON THE FIRST PAGE OF A LABEL

EPA REGISTRATION AND ESTABLISHMENT NUMBER

The EPA registration number indicates the pesticide has met all Environmental Protection Agency (EPA) testing requirements and is approved for use in the United States. However, it is important to note that EPA approval does not necessarily mean that the product is registered in all states within the U.S.

If no EPA registration number appears on the pesticide label, the product should not be purchased or used in any manner.

- If the label has an EPA establishment number, it will be located below or beside the EPA registration number. It identifies the facility or facilities where the product was manufactured.

Brand Name

FUNGICIDE

GROUP	7	FUNGICIDE
-------	---	-----------

Suspension Concentrate

Active Ingredient	By Weight
Penthiopyrad	20.4%
Other Ingredients	79.6%
TOTAL	100.0%

Contains 1.67 pounds of penthiopyrad per gallon of product

EPA Reg. No. 352-834 EPA Est. No. 56145-LA-001 EPA Est. No. _____

Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

KEEP OUT OF REACH OF CHILDREN CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
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PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

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INFORMATION ON THE FIRST PAGE OF A LABEL

SIGNAL WORDS

A signal word indicates the acute (short-term) toxicity of the formulated product to humans based on the route of exposure that presents the highest level of risk. The three signal words are **CAUTION**, **WARNING** or **DANGER**.

Directly above the signal word is listed the statement “KEEP OUT OF REACH OF CHILDREN.”

The Spanish word for danger, “**PELIGRO**,” and warning, “**AVISO**,” also must appear on the label.

Brand Name

FUNGICIDE

GROUP	7	FUNGICIDE
-------	---	-----------

Suspension Concentrate

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Other Ingredients	79.6%
TOTAL	100.0%

Contains 1.67 pounds of penthiopyrad per gallon of product

EPA Reg. No. 352-834

EPA Est. No. _____

Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

KEEP OUT OF REACH OF CHILDREN
CAUTION / ADVISO / PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by a poison control center or doctor. Do not give anything to an unconscious person. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. **For medical emergencies involving this product, call toll-free 1-800-441-3637.** See Label for Additional Precautions and Directions for Use.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. may be harmful if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.

B OTHER LABEL INFORMATION

FIRST AID STATEMENT

This section of the label explains what to do if someone is accidentally poisoned or exposed to the pesticide. These instructions are meant to provide first aid recommendations only. If the situation is life-threatening, call 911. For cases that are not life threatening, call the Medical Emergency Assistance or Chemical Emergency System Hotline. The phone number is clearly marked on the label.

After providing first aid, take the person to the hospital. It is helpful to take the pesticide label or pesticide container to the hospital with you so that the attending medical person can access information on the chemical(s) quickly.

PRECAUTIONARY STATEMENTS

Precautionary statements provide information on which parts of the body must be protected and what actions should be taken to protect the body from potential hazards. Information on potential hazards to animals, wildlife, fish and the environment (i.e., water or soil) are also provided in this section.

Brand Name

FUNGICIDE

GROUP	7	FUNGICIDE
-------	---	-----------

Suspension Concentrate

<i>Active Ingredient</i>	<i>By Weight</i>
Penthiopyrad	20.4%
<i>Other Ingredients</i>	79.6%
TOTAL	100.0%

Contains 1.67 pounds of penthiopyrad per gallon of product

EPA Reg. No. 352-834

EPA Est. No. _____

Nonrefillable Container

Net: _____

OR

Refillable Container

Net: _____

KEEP OUT OF REACH OF CHILDREN CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by a poison control center or doctor. Do not give anything to an unconscious person. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. **For medical emergencies involving this product, call toll-free 1-800-441-3637.** See Label for Additional Precautions and Directions for Use.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. may be harmful if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.

B OTHER LABEL INFORMATION

PERSONAL PROTECTIVE EQUIPMENT STATEMENTS

Personal protective equipment (PPE) statements are typically listed after the precautionary statements. These statements list the minimum PPE that must be worn when handling and applying the pesticide.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Mixers, loaders, applicators, and other handlers must wear:

- Long-sleeved shirt
- Long pants
- Shoes and Socks

See engineering control statements for additional requirements.

Follow the manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

ENGINEERING CONTROL STATEMENTS:

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

USER SAFETY RECOMMENDATIONS

Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

This product is toxic to fish, aquatic invertebrates, and oysters. For terrestrial uses: Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas.

Surface Water Advisory: This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff several weeks after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of this chemical from runoff water and sediment. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours.

B OTHER LABEL INFORMATION

■ DIRECTIONS FOR USE

It is illegal to use a pesticide in a manner that is inconsistent with the law. Information in the directions for use section provide detailed instructions on the lawful use of the pesticide. The following list shows examples of directions found in this section:

- Mixing, additives* and application instructions.
- Restricted entry intervals (REI)*.
- Pre-harvest intervals (PHI) or days to harvest.
- Plant back* intervals.
- What pests the product is registered to control.
- Where the product can be applied, and what crops it can be used on.
- How to apply the product.
- How much product should be applied.
- How often to apply the product.

Other information that may be in this section include instructions on how to use the product to minimize spray drift and resistance development.

* Definition in Glossary

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protections of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notifications and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on the label about personal protective equipment (PPE), and restricted-entry interval, and notification to works (as applicable). The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the State or Tribal agency responsible for pesticide regulation.

Do not enter or allow worker entry into treated areas during the restriction-entry interval (REI) of 12 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Shoes and socks
- Chemical resistant gloves (made of any waterproof material)



OTHER LABEL INFORMATION

STORAGE AND DISPOSAL

The storage and disposal section explains how to safely store the product and how to legally and safely dispose of any unused portion of the product and its container.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage and disposal.

PESTICIDE STORAGE: Keep container closed when not in use. Always store pesticides in the original container only, away from other pesticides, food, pet food, feed, seed, fertilizers, and veterinary supplies. If a leaky container must be contained within another, mark the outer container to identify the contents. Storage areas must be locked and secure from vandalism, with precautionary signs posted. The storage area must be dry, well-lit, and well-ventilated. Keep pesticide storage areas clean. Clean up any spills promptly. Protect pesticide containers from extreme heat and cold. Store herbicides, insecticides and fungicides in separate areas within the storage unit. Place liquid formulations on lower shelves and dry formulations above. Maintaining a spill kit and fire extinguisher on hand and having emergency phone numbers posted will allow you to be prepared for emergencies. If spill cleanup PPE is stored nearby, but outside the pesticide storage area, it will be accessible when needed.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

CONTAINER HANDLING: Refer to the Net Contents section of this product's labeling for the applicable "Nonrefillable Container" or "Refillable Container" designation.

Nonrefillable Rigid Plastic and Metal Containers (Capacity Equal to or Less Than 5 Gallons): Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and run for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available for puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Rigid Plastic and Metal Containers (Capacity Greater Than 5 Gallons): Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Rigid Plastic and Metal Containers, e.g., Intermediate Bulk Containers [IBC] (Size or Shape Too Large to be Tipped, Rolled or Turned Upside Down): Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying the contents from this container into application equipment or mix tank and before final disposal using the following pressure rinsing procedure. Insert a lance fitting with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

All Refillable Containers: refillable container. *Refilling Container:* Refill this container with BRAND NAME fungicide containing penthiopyrad only. Do not reuse this container for any other purpose. Cleaning before refilling is the responsibility of the refiller. Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn out threads and closure devices. If damage is found, do not use container, contact BRAND NAME at the number below for instructions. Check for leaks after refilling and before transporting. If leaks are found, do not reuse or transport container, contact BRAND NAME at the number below for instructions. *Disposing of Container:* Do not reuse this container for any other purpose other than refilling (see preceding). Cleaning the container before final disposal is the responsibility of the person disposing of the container. To clean the container before final disposal, use the following pressure rinsing procedure. Insert a lance fitted with suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Do not transport if container is damaged or leaking. If the container is damaged, leaking or obsolete, or in the event of a major spill, fire or other emergency, contact BRAND NAME at 1-800-555-5555, day or night.



WHERE YOU CAN ACCESS PESTICIDE LABELS

All pesticides are sold with the label. The label may be attached to the pesticide container or may be included as a separate document. Several free on-line resources to view and download labels are listed below.

- [Pesticide Product Label System](#) (PPLS).
- [Crop Data Management Systems Inc.](#) (CDMS).
- [Greenbook Data Solutions](#)



MODULE 3 RECAP

- The pesticide label provides the most important steps for safe and effective use of pesticides.
- The label is the law.
- The pesticide label provides information on the type of pesticide, formulation, brand name, active ingredients, first aid, precautionary statement, application methods, personal protective equipment, storage and disposal of pesticide.
- Pesticide product labels can be accessed online from several reliable resources.

PESTICIDE DISPOSAL AND SPILL CLEANUP

J. Sidhu and M.L. Lewis Ivey

Storage of pesticides must be according to the product label. Pesticides need to be disposed of properly to prevent accidental human, animal and wildlife exposure and to protect the environment. All pesticide users are responsible for the proper disposal of pesticide wastes*.

Pesticides classified as hazardous wastes* must comply with all state-regulated rules. For detailed information on pesticides grouped in the hazardous waste category in Louisiana, contact the Louisiana Department of Agriculture.

Three types of pesticide wastes that require proper disposal are (1) unused chemicals that remain in the original container, (2) unused pesticide mixtures that are left over from an application and (3) empty pesticide containers or equipment.

When dealing with pesticide spills, follow the three C's – control, contain and cleanup. This module focuses on the three C's for the safe storage and disposal of nonhazardous waste pesticides and spill cleanup. Topics covered are as follows:

- A. Tips to reduce the amount of pesticide waste.
- B. Disposal of unused pesticides in the original container.
- C. Disposal of unused pesticide mixtures.
- D. Disposal of empty pesticide containers.
- E. Safe transport of pesticides.
- F. Pesticide spill cleanup procedures.
- G. Module 4 recap.

* **Definition in Glossary**

A

TIPS TO REDUCE THE AMOUNT OF PESTICIDE WASTE

Take action to stop or minimize the quantity of chemical being released. Store pesticide containers safely (Figure 4.1). Before handling a pesticide, read the label in its entirety. Product labels provide general information on storage as well as disposal.

Basic knowledge of the pest and following an integrated pest management (IPM) program can significantly reduce the need for pesticides. Here are a few tips for reducing pesticide waste.

- Develop and adopt an IPM program to reduce the need for pesticides.
- Identify the pest, and check that the product is registered for the target crop and pest.
- Use stored chemicals first. Always check that the pesticide is still under registration in Louisiana and that the product has not passed its expiration date before using it
- Buy only what is needed for one season.
- Mix only what you need for the current application.

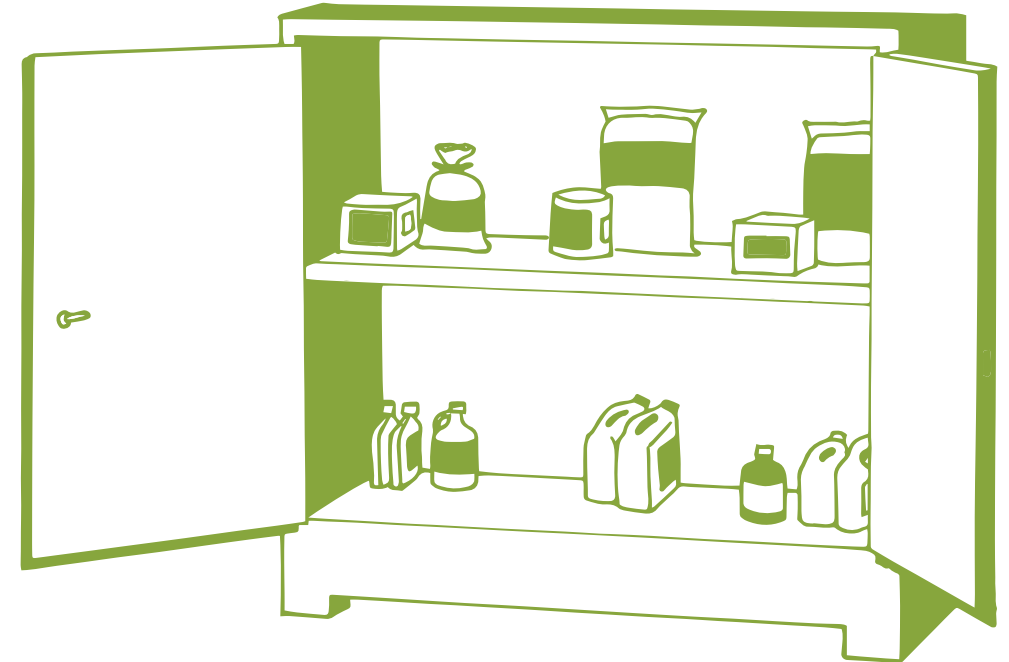


Figure 4.1. Store pesticides on metal shelving, with the heaviest containers and liquids stored on the lower shelves. Never extend beyond the edge of the shelving.

B

DISPOSAL OF UNUSED PESTICIDES IN THE ORIGINAL CONTAINER

RETURN THE PRODUCT TO THE DEALER OR MANUFACTURER

Some pesticides can be returned to the dealer or manufacturer if the container is unopened and has not been damaged. Contact the dealer or manufacturer directly to determine if unused product can be returned. The manufacturer also should be contacted if a product registration is canceled. Contact information for manufacturers is provided on the last page of the product label.

GIVE TO A PESTICIDE COLLECTION PROGRAM

Contact your city council or parish officials to learn if there is any collection program in your city or parish. There is no collection program at the state level.

SHARE PRODUCT WITH OTHER FARMERS

Farmers may share pesticides but may not repack or resell a pesticide. Pesticides must be transported in a manner that is consistent with the label.



DISPOSAL OF UNUSED PESTICIDE MIXTURES

The best way to dispose of unused pesticide mixtures is to use all of the mixed pesticide on an area in accordance with the label instructions. Make sure that application rates and amounts are not exceeded.



DISPOSAL OF EMPTY PESTICIDE CONTAINERS

Empty containers should be rinsed three times with clean water before disposal. Collect each rinsate and spray them on sites as per label directions. Containers should be cut or punctured to prevent re-use of the containers. Unless the pesticide is classified as a hazardous material, cleaned containers may be put into the trash.

View the “[How to Perform Triple Rinsing?](#)” video by CropLife Latin America for instructions on rinsing empty pesticide containers.

E

SAFE TRANSPORT OF PESTICIDES

The safest way to transport pesticides is to secure them in the back bed of a truck (Figure 4.2). Transport them in their original containers with readable labels. Before transporting, inspect containers to ensure that the lids are tightly closed. Properly secure containers to avoid leakage or spills. While transporting, protect pesticides from temperature extremes.

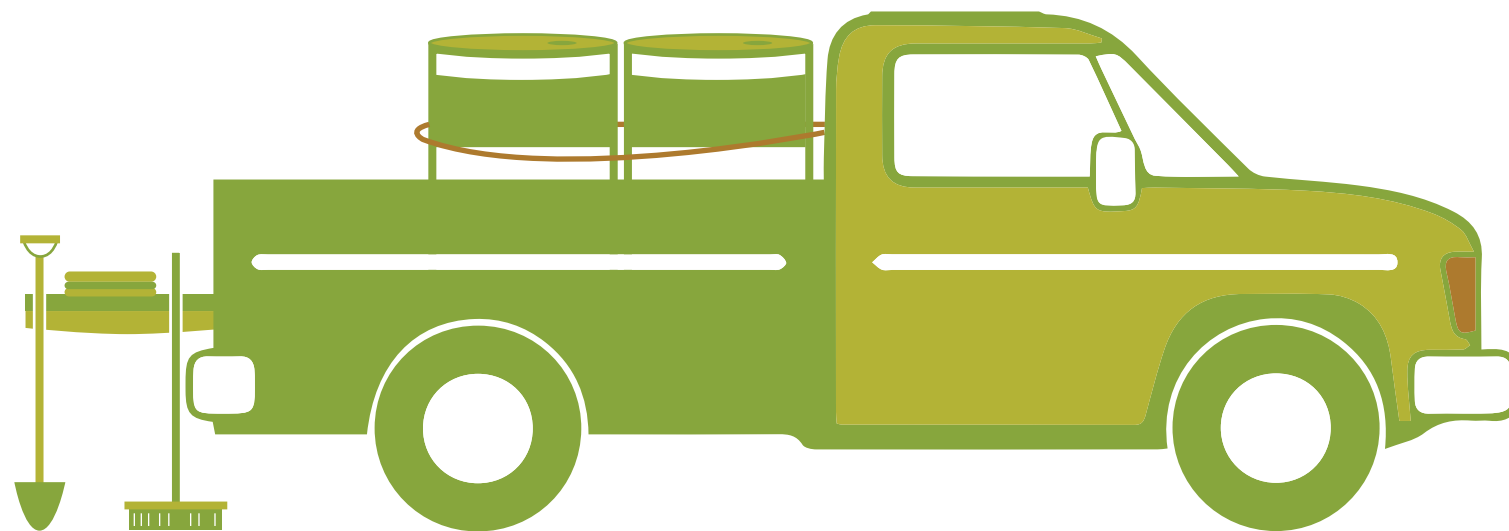


Figure 4.2. Always secure the load and carry in the truck a spill kit that includes a broom and shovel.



PESTICIDE SPILL CLEANUP PROCEDURES

A pesticide spill* is an unwanted leakage or spill that occurs during storage, mixing, application, transport or disposal. Pesticide spills can cause direct contamination of the environment by polluting water resources, including aquifers, wells and soil. Spills pose a threat to plants and animals as well as humans. Before handling or using pesticides, you must have a written spill action plan in place. Components of an action plan include:

- Telephone numbers of people to contact in case of emergencies.
- Safety data sheet (SDS) and product label for all products.
- Handling and repair procedures for equipment.
- Updated pesticide inventory.
- Information on spill containment and disposal.
- Spill kits.
- A map of the facility, surrounding water sources, drainage system, location of spill kits and equipment.

In case of a pesticide spill, the primary goal must be to protect human health and the environment. If necessary, first aid should be delivered and nonessential employees, or persons must leave the spill area to protect them from further exposure.

* Definition in Glossary



PESTICIDE SPILL CLEANUP PROCEDURES

In Louisiana, all spills of more than one gallon of liquid or four pounds of dry weight pesticide must be reported by phone (225-925-3760) within 24 hours of the spill to the Director of Pesticides and Environmental Programs at the Louisiana Department of Agriculture and Forestry (LDAF). Written notice must also be given within three days of the spill. Commercial applicators are responsible for all cleanup costs due to the spill.

There is also a 24-hour emergency hotline sponsored by the LDAF for reporting pesticide emergencies such as spills and health-related incidents.

24 Hour LDAF Emergency Hotline

Pesticide Emergencies

1-855-452-5323

F

PESTICIDE SPILL CLEANUP PROCEDURES

SPILL KITS

Always have a spill kit available and accessible (Figure 4.3). Contents of a spill kit should be contained in a sealable non-breakable container to prevent the loss of items. The contents of the spill kit should be clearly labelled on the outside of the container. A spill kit should contain the following items: Contact numbers for product manufacturer, local emergency agencies, LDAF emergency hotline and poison control hotline.

- Contact numbers for product manufacturer, local emergency agencies, LDAF emergency hotline and poison control hotline.
- Copy of your spill action plan.
- Product labels and safety data sheets (SDS).
- Broom and dustpan.
- Absorbent materials.
- Personal protective equipment.
- Plastic tarp.
- Cleaners.
- Disposable containers.
- First aid kit.

The Center for Integrated Pest Management (CIPM) provides a detailed list of components for a vehicle spill kit and a shop or facility spill kit.



Figure 4.3. Always have a spill kit available and accessible.

F

PESTICIDE SPILL CLEANUP PROCEDURES

STEPS FOR CLEANING UP A DRY PESTICIDE SPILL

1. Wear appropriate personal protective equipment (PPE).
2. Cover the spill with plastic tarp to prevent the material from being blown away by the wind.
3. Roll back the plastic tarp to expose small areas of the spill, and collect the pesticide using a broom and dust pan.
4. Place the spilled pesticide into a container, and seal the container.
5. For solid surfaces, clean the area with a commercial cleaning product using disposable absorbent materials (Figure 4.4).
6. Dispose of the contained pesticide and cleaning materials according to the product label.
7. Dispose of or clean PPE according to the product label.



Figure 4.4. Use an absorbent material to help clean up a spill.



PESTICIDE SPILL CLEANUP PROCEDURES

STEPS FOR CLEANING UP A LIQUID PESTICIDE SPILL

1. Wear appropriate personal protective equipment (PPE).
2. Contain the liquid (Figure 4.5).
3. Cover the liquid with an absorbent material to soak up the spilled liquid. Start from the outer edge of the spill to minimize spread of the spilled pesticide.
4. Place all the contaminated materials, including soil (top 2-3 inches), in a sealable container.
5. For solid surfaces, clean the area with a commercial cleaning product using disposable absorbent materials.
6. Dispose of the contained pesticide and cleaning materials according to the product label.
7. Dispose of or clean PPE according to the product label.



Figure 4.5. Take action to prevent spills from spreading. In this case, an absorbent spill tube is used to contain the spill.



MODULE 4 RECAP

- Safe disposal and proper transport of pesticides is necessary to prevent accidental human, animal and wildlife exposure and to protect the environment.
- Remember the three C's – control, contain and cleanup – while dealing with pesticide spills.
 - Control: Take action to stop or minimize the quantity of chemical being released.
 - Contain: Keep the spilled material from spreading farther by covering it with an absorbent material for a liquid spill or a plastic tarp for a dry spill.
 - Clean up: Clean up the spill immediately and dispose of the contaminated materials properly. After the area has been cleaned, dispose of the pesticide contaminated materials carefully.

STORAGE

J. Sidhu and M.L. Lewis Ivey

Proper storage is important in preventing vandalism, theft, misuse and accidental release of pesticides. Correct storage, safety and security of pesticides are the responsibility of the applicator from the time of possession of the chemicals until they are used or disposed of. Storage of pesticides must be according to the product label. View “[10 Tips for Pesticide Storage](#)” by the University of Nebraska Lincoln Extension for tips on properly storing pesticide.

This module focuses on procedures for the safe and secure storage of pesticides and application equipment. Topics covered are as follows:

- A. [Storage location.](#)
- B. [Facility construction and environmental conditions.](#)
- C. [Security and signage.](#)
- D. [Safe storage practices.](#)
- E. [Module 5 recap.](#)



STORAGE LOCATION

Select a storage site that meets these criteria:

- The storage site should be located in an area that is not prone to flooding.
- The facility should be located at least 100 feet away from surface waters.
- The site should be downhill from wells, animal feeding stations or shelters, food or feed storage and homes.
- The site should be easily accessible to emergency and delivery vehicles.

B

STORAGE FACILITY CONSTRUCTION AND ENVIRONMENTAL CONDITIONS

Storage facilities should be designed with these features in mind:

- The storage facility should be 12 inches above ground level to prevent moisture from being absorbed into stored products.
- Construction materials should be nonflammable to reduce fire hazards.
- Floors should be made of nonporous materials, sealed to allow for easy cleanup in case of a spill and have a 2- to 4-inch lip or curb to prevent spills from moving out of the facility (Figure 5.1).
- Shelving material should be nonabsorbent and strong enough to hold the quantity and weight of all of the containers (Figure 5.2).
- Storage units must be kept dry and well-ventilated.
- A temperature between 40 and 90 F should be maintained within the storage facility. Extreme cold or hot temperatures should be avoided.
- Facilities should be well-lit on both the inside and outside.
- Facilities should have potable running water.
- Containers should not be stored in direct sunlight.

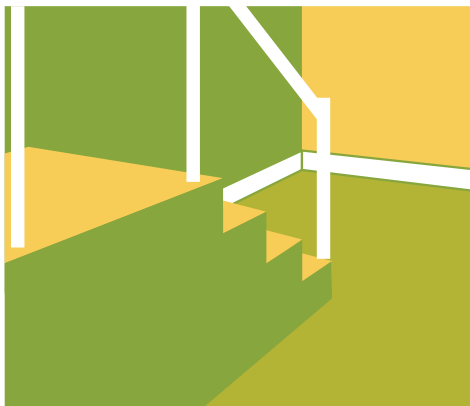


Figure 5.1. Be sure the floor of the pesticide containment site is made of nonporous materials such as sealed cement. A recessed floor helps control spills or leaking pesticides.

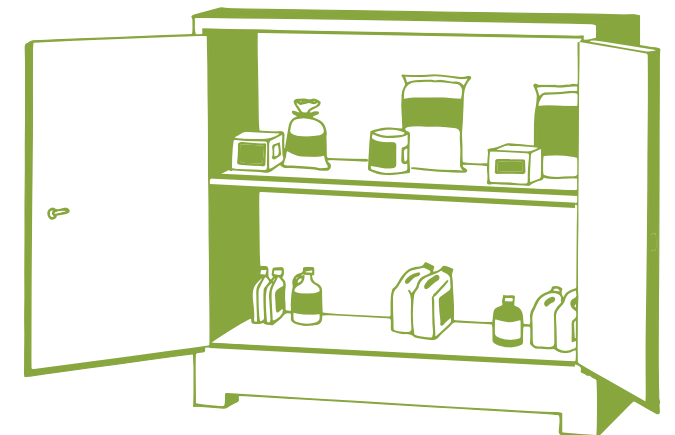


Figure 5.2. Store pesticides on metal shelving, with the heaviest containers and liquids stored on the lower shelves. Never extend beyond the edge of the shelving.



SECURITY AND SIGNAGE

Follow these security and signage guidelines:

- Keep the storage facility locked at all times.
- Always lock pesticide storage cabinets, closets or rooms.
- Keep windows closed and locked unless they are being used for ventilation.
- Limit access to storage facilities to essential employees only.
- Report any thefts of pesticides or equipment and any suspicious activity to the proper authorities.
- Post signs on facility entry doors that state “Authorized Persons Only!” (Figure 5.3).
- Post signs on doors, buildings or fences that indicate pesticide storage (i.e., “Danger, Pesticides”).
- Post emergency response numbers and the location of the nearest telephone.



Figure 5.3. Maintain a well-designed, secure pesticide storage facility with highly visible warning signs. Keep it well-ventilated and located where water damage is not likely to occur.

D SAFE STORAGE PRACTICES

Follow these safe storage practices:

- Do not eat, drink or smoke in the storage area. Post signs that indicate no eating, drinking or smoking.
- Always store pesticides in their original containers. Never use food containers to store pesticides (Figure 5.4.).
- Keep the storage area and cabinets clean and organized.
- Routinely inspect the storage area and cabinets for cracks, leaks, rust or other abnormalities.
- Keep safety data sheets (SDS) for all stored pesticides on file and accessible to applicators.
- Do not store personal protective equipment (PPE) in the pesticide storage area.



Figure 5.4. Do not store pesticides in food containers.



MODULE 5 RECAP

- Proper maintenance and storage of pesticides is essential to avoid pesticide damage and accidental exposure.
- A properly maintained pesticide storage facility should protect pesticides from temperature extremes and excess moisture and prevent unauthorized use of pesticides.
- It is important to follow the label directions for proper and safe storage of pesticides.

PEST IDENTIFICATION

C. Hollier, J. Sidhu and M.L. Lewis Ivey

A pest* refers to an organism (insect/weed/disease) that causes damage to crops by direct feeding or interfering or competing for resources. Proper identification of a pest is critical for an effective management program. Failure to make a correct identification often leads to wasting resources and adversely affecting the environment. When a pest is misidentified, management practices will be ineffective. Pest identification can be very difficult because many pests share similar traits, which makes identification extremely difficult. Before controlling a pest, it is necessary to ascertain that the injury or damage is actually due to the identified pest and not to other factors.

Topics covered in this chapter are as follows:

- A. Scouting/Monitoring.
- B. Identification.
- C. Module 6 recap.

* Definition in Glossary

A

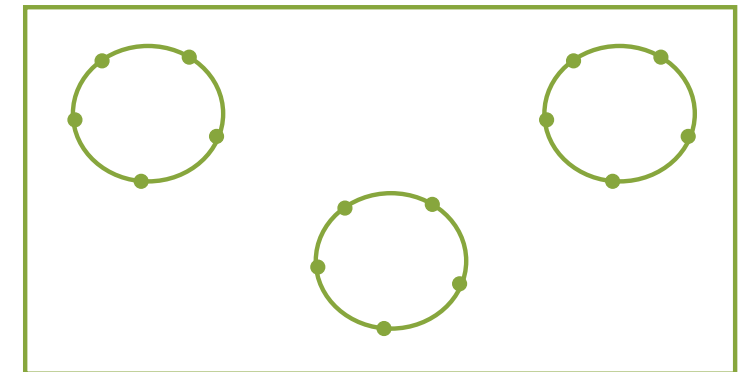
SCOUTING/MONITORING

Scouting (or monitoring) is a simple and effective technique for detection of pests before they reach damaging levels. Primary goals of scouting are to locate, identify and observe the severity of pest infestations. Although scouting helps in making a management decision it also helps in evaluating the success or failure of a control/management strategy.

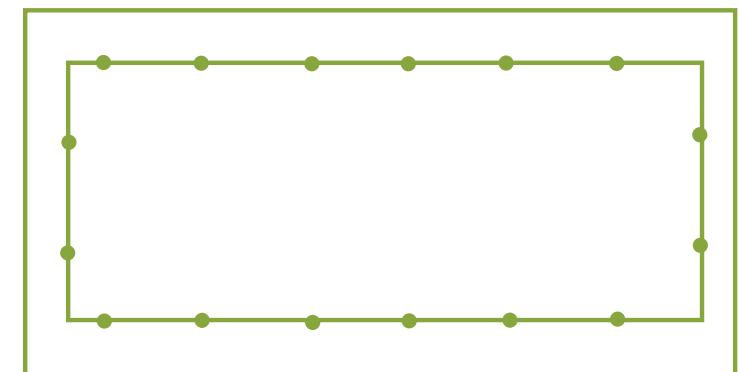
Scouting procedures are site and pest specific (Figure 6.1). During the growing season, scouting should be done at least once a week and then once a month during dormant periods. While scouting, carefully examine all plant parts. Look for symptoms of plant stress and damage like wilting, stunting of plants, yellowing of leaves, defoliation or distortion of leaves, shot holes in leaves, webbing and dead plant material. Examine plants closely for any signs of insect pests or pathogens (i.e. fungi) or symptoms of disease on leaves, underside of leaves, stems or flower buds. The LSU AgCenter factsheet, “Plant Disease and Pest Diagnostic Guidelines for Extension Agents,” details how to identify a pest. Various types of traps also can be helpful in catching and identifying pest problems. These traps include pheromone traps, yellow sticky traps and pitfall traps. View the LSU AgCenter video, “[Using a Sweep Net for Insect Scouting](#),” on how to use a sweep net to scout for insects in a field crop.



Pattern 1: The zig-zag pattern, also called the “W” or “M” pattern, is used for pests that are generally uniformly distributed throughout the field. Examples of pests that would be scouted using this pattern are aphids, alfalfa weevil, corn borer and foliar pathogens.



Pattern 2: This pattern is used to scout pests that are commonly unevenly distributed through the field. Targeted spots or “hot spots” are scouted for pests such as nematodes, soilborne pathogens (i.e., root rots, bacterial wilts) and thistles.



Pattern 3: This pattern is used to scout for pests that commonly found around the edges fields, ditches or fence lines. Examples include flea, cereal leaf and cucumber beetles and winged aphids.

Figure 6.1. Pest scouting patterns.

B

IDENTIFICATION

Identification is very important for pest management. Accurate pest information helps implement a successful management program. Once the pest is identified, significance and need for the control/management measure can be determined. Depending on a pest's impact on a plant, some pests do not require immediate control/management; others may require immediate attention.

Pests may be classified as one of the following:

- **Key pests.** These pests are capable of causing major economic damage frequently if not controlled. Key pests vary with a region and crop. Based on [action thresholds](#)^{*}, a certain insect may be considered a key pest on one crop in a region, but not on another where tolerance to damage is greater. For example, aphids in a wheat crop are not considered a key pest, but aphids on a lettuce crop are a key pest. The same is true for disease organisms that are important in some areas but less so in others, generally based on environmental requirements for disease development.
- **Occasional pests.** These pests are not always present but become damaging only once in a while because of favorable environmental factors or human activities. For example, white flies can be considered as occasional pest on field produced vegetable crops.
- **Secondary pests.** These pests occur as results of measures taken to control a key pest or abiotic stresses such as sunscald or herbicide drift damage. For example, the use of pyrethroids has been associated with outbreak of secondary pests like spider mites.

^{*} [Definition in Glossary](#)

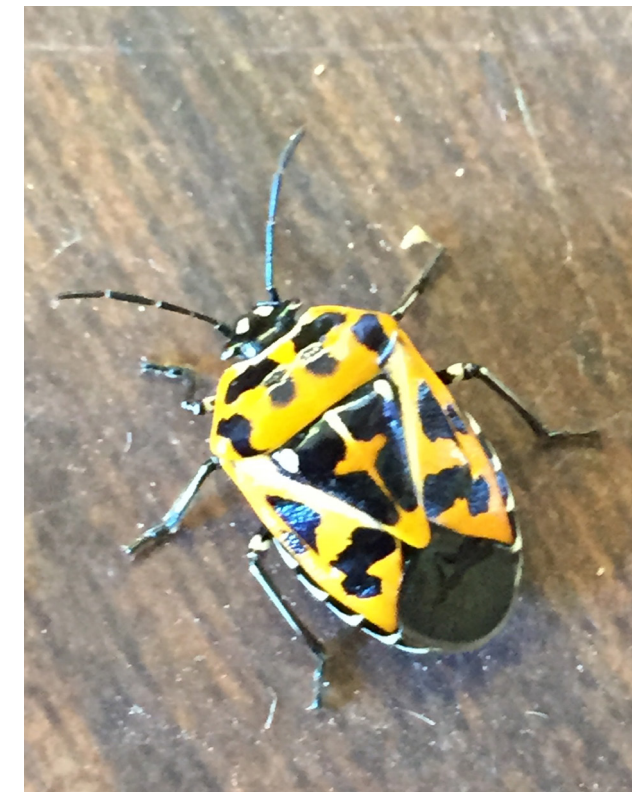


Figure 6.2. The Harlequin Bug is an important pest of vegetable crops in Southern United States.

B

IDENTIFICATION

Numerous resources, including reference books, Cooperative Extension publications, field guides, websites and social media sites are available on plant and pest identification. When selecting a resource, always check that the information is from a reliable source.

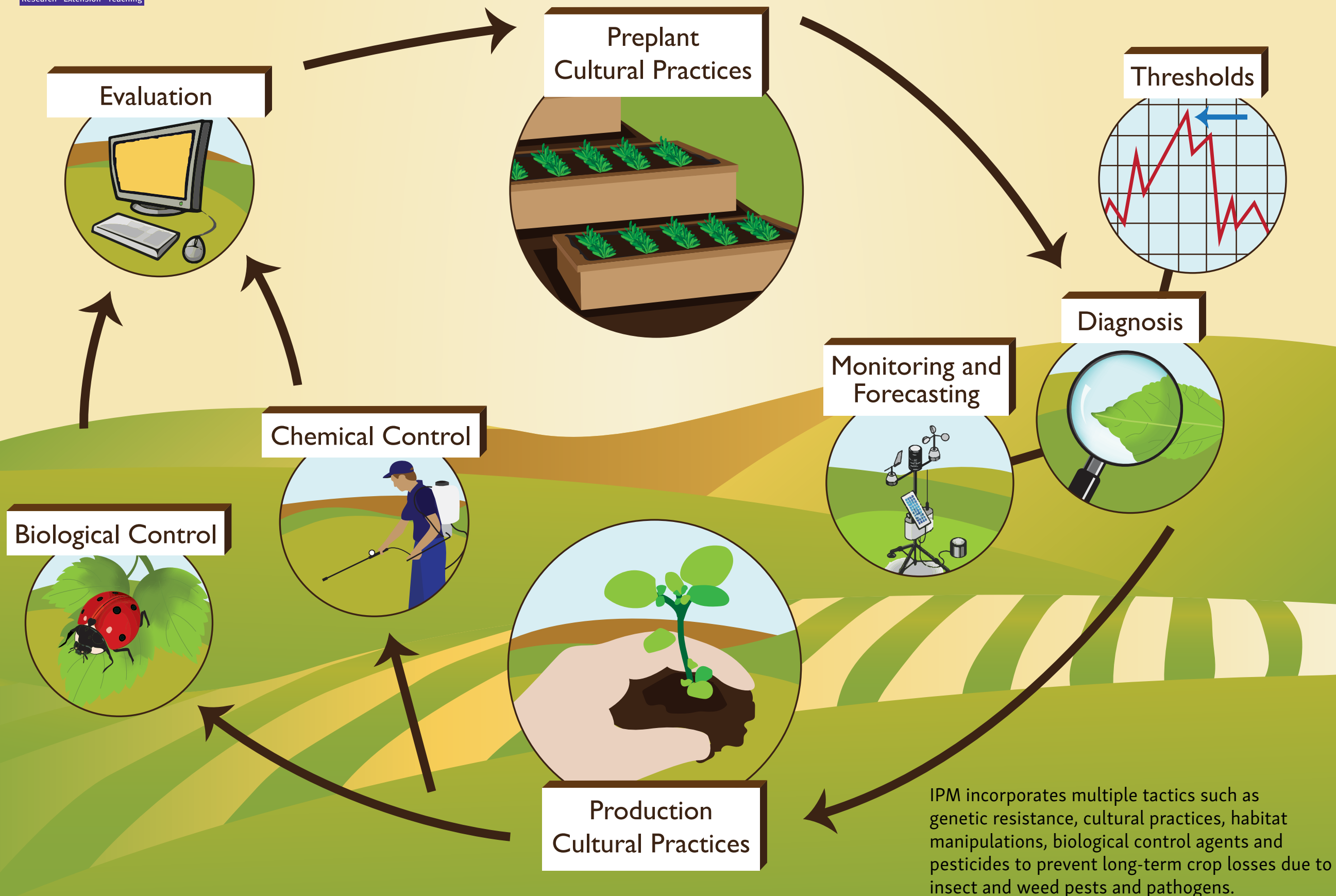
Additional help can be obtained by contacting your state plant pest diagnostic center. Extension agents in [Louisiana](#) can submit samples to the [LSU AgCenter Plant Diagnostic Center](#) on the Baton Rouge campus. The clinic can assist with plant disease, insect and mite, nematode and weed identification. Details on how to collect and submit a sample as well as diagnostic fees are available by contacting the center directly (225-578-1464) or going to their [website](#).



MODULE 6 RECAP

- Proper pest identification is key to sound management programs.
- Scouting/monitoring helps determine the seriousness of the problem.
- Action thresholds are very important while making management decisions.
- Local Cooperative Extension Service and LSU AgCenter Plant Diagnostic Center personnel can help in pest identification.

The Integrated Pest Management Cycle



GLOSSARY

Action threshold: The population level for a specific pest at which some control measure is justified in order to avoid economic loss or aesthetic damage to a crop.

Additives: Chemicals that help agricultural pesticides adhere to their target during spraying such as penetrants, antifoams, emulsifiers, dispersants, etc.

Aerosols: Liquids that contain the active ingredient in solution and are packaged in a pressurized container.

APRs (Air-purifying respirators): Remove air contaminants by filtration or absorption.

Baits: A bait formulation is an active ingredient mixed with food or another attractive substance.

Broad spectrum fungicide: Fungicide effective against a large variety of fungi, including some that are beneficial.

Broad spectrum pesticides: Pesticides that kill a variety of organisms, including some that are beneficial, in addition to the target pest.

Calibration: The process of measuring and adjusting the output of application equipment to apply the correct amount of pesticide uniformly over a given area.

Caution (signal word on label): Pesticide product is slightly toxic if eaten, absorbed through the skin, inhaled, or it causes slight eye or skin irritation.

Danger (signal word on label): Pesticide product is highly toxic by at least one route of exposure.

Disposable: Intended to be used once and then thrown away.

Dry flowables: Small, easily measured granules that are mixed with a liquid but do not dissolve in water. Also called water dispersible granules.

Dusts: Finely ground active ingredients that are used dry.

EPA (Environmental Protection Agency): An agency of the federal government with the mission to protect human and environmental health.

Emulsifiable concentrates: Liquid formulations with the active ingredient dissolved in one or more petroleum solvents.

FRAC (Fungicide Resistance Action Committee): Works to prolong the effectiveness of fungicides liable to encounter resistance problems and to limit crop losses should resistance appear.

Flowables: Formulations that consist of finely ground solid particles suspended in a liquid carrier. The solid in a flowable is similar to the active ingredient in a wettable powder, except it is formulated to stay suspended in liquid.

GLOSSARY

Granules: Course particles of clay, corncob or walnut shells that are coated or impregnated with the active ingredients.

HRAC (Herbicide Resistance Action Committee): An international body founded by the agrochemical industry to support a cooperative approach for the management of herbicide resistance.

Hazardous waste: Poses substantial or potential threats to public health or the environment.

Highly toxic: A chemical with a low lethal dose, which is determined based on body weight and method of exposure.

IPM (Integrated Pest Management): Management strategies that focus on pest prevention using multiple tactics such as genetic resistance, cultural practices, habitat manipulations, biological control agents and pesticides.

IRAC (Insecticide Resistance Action Committee): Works on prolonging the effectiveness of insecticides, acaricides, and traits by implementing insecticide resistance management strategies, countering the development of resistance.

Inert ingredients: Compounds that improve the efficacy or safety of a pesticide but do not impact the pest directly.

Liquid formulations: Generally mixed with water, but sometimes the label may permit the use of crop oil, diesel fuel, kerosene or other light oils as a carrier.

Off-target crops: Crops to which the pesticide application is not intended.

PHI (preharvest interval): A function of a pesticide's use pattern and of the amount of pesticide residues allowed on the crop at harvest.

Pellets: Very similar to granular formulation, but all the particles or granules are same weight and size.

Pest: Any destructive insect, disease, weed or other animal that attacks crops, food, livestock, etc. causing damage to crops by direct feeding or interfering or competing for resources.

Pesticide: Any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest.

Pesticide spill: Any unplanned spill or leakage into the environment that occurs during storage, use, transport or disposal of a pesticide.

Pesticide waste: Any material containing any concentration of pesticides that has been declared a waste.

Postemergence herbicides: Herbicides designed to attack weeds that are already established and growing.

REI (restricted-entry interval): The time immediately after a pesticide application when entry into the treated area is restricted.

GLOSSARY

Rinsate: A mixture of pesticides diluted by water, solvents, oils, commercial rinsing agents or any other substances. It is produced from cleaning pesticides application equipment or pesticides containers.

SARs (supplied-air respirators): Provide clean air from a compressed air tank or through an air line. This air is not from the workroom area. The air supplied in tanks or from compressors must meet certain standards for purity and moisture content.

Solutions: Pesticide ingredients that dissolve readily in a liquid carrier such as water or a petroleum based solvent. Solutions cannot be mechanically separated.

Ultra-low-volume: Liquid concentrate that contains a very high level of active ingredient.

Warning (signal word on label): Pesticide product is moderately toxic if eaten, absorbed through the skin, inhaled, or it causes moderate eye or skin irritation.

Water-dispersible granules: See dry flowables.

Wettable powder: Finely ground formulations of pesticides that look like dust but do not dissolve in water.



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