

# Module

# 1

## Pesticides

After you have completed this module, you will be able to:

- *Provide a definition of pesticide*
- *Identify different types of pesticide formulations*
- *Understand adjuvants and their purpose*
- *Describe how pesticides work*
- *Understand the symbols and information on a pesticide label*
- *Understand the type of information in Material Safety Data Sheets*
- *Be aware of pesticide compatibility.*

### What is a Pesticide?

A **pesticide** is any device, substance, or mixture of substances intended to prevent, repel, attract, kill, control, or manage pests such as insects, weeds, diseases and other undesirable organisms. Because pesticides may be potentially dangerous, you must follow proper procedures to minimize health risks and potential damage to the environment.

Pesticide misuse can:

- Contaminate water or soil
- Kill fish, birds, bees, livestock, pets or other animals
- Contaminate food
- Destroy desirable plants and crops
- Harm people, etc.

## Use Pesticides in a Professional Manner

As a pesticide applicator, you are required to act in a professional manner while applying pesticides, when interacting with the public and adjacent landowners (including acreage owners and residential owners) and when addressing concerns of the general public.



**Use the following checklist to assess your professionalism:**

- I help others understand the issues associated with farming and enhance credibility of the industry.
- I understand the concerns of the public and work to resolve complaints or difficulties arising from the use of pesticides.
- I am knowledgeable and up-to-date on pesticides, pest management practices and regulations on the use of pesticides.
- I comply with rules and regulations (closely follow label instructions).
- I have concern for human health and safety.
- I look for ways to minimize the effect of my pesticide use on the environment by avoiding applications near water and sensitive areas.
- I work to minimize any negative impact of pesticide applications on adjacent land or avoid applications near livestock or sensitive areas.
- I use clean, well maintained and appropriate equipment.
- I communicate with neighbors and consider their concerns.

## Pesticide Formulation

Pesticides contain one or more active ingredients and formulants.

- The **active ingredient** is the component that causes the desired effect on the pest. This ingredient is often a chemical, but it may also be a living organism such as bacteria in a biological pesticide.
- **Formulants**, also known as inert ingredients, are all the other materials in a pesticide formulation. Formulants do not have an effect on the pest but are often required as a carrier for the active ingredient or to enhance the activity of the active ingredient on the pest.

Most pesticides are sold as prepared formulations in solids, liquids or gases. A pesticide formulation consists of one or more active ingredients and the formulants, which can be inert ingredients and carriers. Formulants improve a pesticide's action, increase shelf life, make pesticides easier to handle and sometimes reduce handling hazards.

Formulants include carriers, wetting agents, extenders and emulsifiers. These are often substances that present no particular health or environmental hazard; however, there are still a small number of pesticides that contain formulants that present a substantial health risk.

The Pesticide Management Regulatory Agency (PMRA) has developed a list of chemicals used in pesticide formulations. Chemicals that presented a high risk were placed on a special list (List I) with the objective to stop renewal of the registration of products that contain such compounds, unless

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the registrant can prove their safety. Currently registered pesticides must indicate on their label the name of any formulant identified on PMRA's List 1, along with an appropriate warning statement.

Furthermore, formulants that are known to cause severe allergic reactions must also be listed on the label along with a warning statement. Such products include milk, eggs, fish, crustaceans, shellfish, peanuts, soy, wheat and any protein-containing derivative of these substances (including hydrolyzed plant protein, starch and lecithin) and sulphites.

When selecting a formulation, consider the following:

Effectiveness in controlling the pest (e.g. an emulsifiable concentrate may be more effective at penetrating the waxy cuticle of a weed than a soluble powder)

- Risk to the applicator, bystander or non-target organisms (e.g. a granular may have less risk to the applicator compared to a liquid formulation)
- Potential environmental damage (e.g. a granular will take longer to have its effect thereby increasing the risk to the environment and especially to wildlife)
- Possibility of injury to the crop especially if the crop is under stress (e.g. emulsifiable concentrates may cause more crop damage when the crop is stressed)
- Availability of safety and application equipment (e.g. fumigants may need specialized safety and application equipment)
- Cost of the pesticide and the application.

Choose the formulation that will be the most effective and minimize potential adverse effects. As you study this course, you will learn how these factors affect you. The table on the next page lists types of formulations and some advantages and disadvantages of each.

**Table 1 Formulation Types**

<b>Liquids</b>				
<b>Type</b>	<b>Description</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Use</b>
Aerosol (PP)	Ready-to-use liquid in pressurized containers.	No mixing required. Low concentration of active ingredient. Provides some penetration of cracks and crevices.	Hazardous if container is punctured or heated.	Household and agricultural buildings, mostly for flying insects.
Emulsifiable Concentrate (EC)	A clear solution with emulsifiers for dilution in water. Spray solution is milky.	Non-abrasive. Good penetration of leaf surface.	Moderate agitation is required.	Agricultural
Micro-encapsulated Suspension (MS)	A suspension with the active ingredient in microcapsules, giving slow release of the active ingredient.	Reduces hazard to the operator; active over a longer period of time.	Moderate agitation is required.	Insecticides
Ready-to-use Formulation (RTU)	Pre-mixed formulations of pour-on and spot-on.	No mixing required. Need small amounts. Simple and easy to apply.	Highly concentrated. Used in systemic control of warbles and blood-sucking insects.	Widely used and popular insecticide class.
Suspension or Flowable (F)	A cloudy liquid composed of solid particles of active ingredient in a liquid.	Easy to store. Safe on plants when formulated as insecticides.	Active ingredient may settle out of formulation sprays.	Agricultural
Solution (SN)	Active ingredient is in solution (usually water). When formulation is mixed with water, spray solution remains clear.	Never clogs nozzles. High concentration requires little agitation. Never separates from the carrier.	Possibly corrosive. Difficult to formulate.	Agricultural
<b>Fumigants</b>				
<b>Type</b>	<b>Description</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Use</b>
Fumigant Tablet	Solids that will react to release a toxic gas when in contact with atmospheric humidity.	Penetrates cracks and crevices.	Area to be fumigated must be sealed. High inhalation hazard. Only works in confined areas.	Grain bins, other structures containers Richardson ground squirrel and rodent burrows.
<b>Solids</b>				
<b>Type</b>	<b>Description</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Use</b>
Dry Flowable (DF)	A wettable powder that is formulated as small pellets.	Less dusty than wettable powder, easier to handle.	Requires agitation in spray tank.	Agricultural
Dust or Powder (DU)	A low-concentration, finely ground dry material with an inert ingredient. No dilution required.	Ready to use. Apply with simple inexpensive equipment.	Dusty, drifts and very visible on surface. Inhalation hazard.	Garden insecticides and seed dressing. Flea or lice control on animals.
Granular (GR)	Dry, large, free flowing particles. Low concentration of active ingredient.	No mixing required, ready to use, minimal drift.	Some dust. Requires special application equipment; may present inhalation hazard.	Soil treatment. For insect or vegetation control.
Impregnated Fertilizer	Granular fertilizer containing low amount of herbicide.	One step application. Low concentration.	Fertilizer is not always required.	Soil application
Wettable Powder (WP)	Finely ground dry solid designed to be suspended in water.	Easy to store and safer to apply to plants than ECs.	Must be continually agitated. Dust poses inhalation hazard. Often plugs nozzles and screens.	Being phased out
Soluble Powder (SP) or Granules	A dry material similar to dust or granules except it is soluble.	Containers empty easily. No liquid spills.	Dusty	General use
Baits	Active ingredient applied on food or in water.	Ready-to-use products. Attracts pests with small amounts in strategic locations, highly effective.	Potential hazard to children, pets, birds and animals.	Used mainly for rodent or predator control. Sometimes used for grasshoppers .

## Adjuvants

Adjuvants are materials added to a spray formulation to improve the safety or effectiveness of the active ingredient. Some adjuvants can be purchased separately. Adjuvants are registered for specific uses with a specific pesticide. Unless a pesticide label recommends using an adjuvant, **never** add one to the spray solution. Improper use of adjuvants can injure crops.

**Table 2 Adjuvants**

Adjuvant	Function
<b>Surfactants</b>	Improve contact with leaf surfaces; also assist mixing wettable powders or dry flowables in water. Distribute spray solution in a uniform layer on the treated surface.
a) <b>Wetting agents</b> b) <b>Spreaders</b>	
<b>Stickers</b>	"Glue" a pesticide to surfaces to improve effective control.
<b>Thickeners</b>	Increase droplet size to reduce drift.
<b>Drift Retardants</b>	Reduce pesticide evaporation to reduce drift.
<b>Anti-foaming Agents</b>	Reduce foaming in mixtures that require vigorous agitation.
<b>Buffers</b>	Lower or raise the pH of spray water to appropriate levels.

## How Pesticides Work

Pesticides kill pests in many different ways. The route of entry and mode of action describe how a pesticide works. The route of entry refers to how the pesticide enters an organism and the mode of action refers to the type of damage inflicted to the pest organism, and may vary between different types of organisms. For example, an insecticide may have a completely different mode of action on vertebrates.

Examples of route of entry into an organism are:

- Absorption through protective cuticles and/or cell membranes
- Ingestion
- Inhalation.

Examples of mode of action are:

- Destruction of tissue on contact (oxidation)
- Inhibition of photosynthesis
- Paralysis of nervous system
- Blocking of cell division
- Inhibition of enzyme activity or synthesis.

Pesticides may be either **contact** or **systemic**.

### Contact Pesticides

Contact pesticides become effective upon contact with the exposed body or plant parts. Their effect is usually immediate and effectiveness depends on the severity of exposure.

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### Contact Pesticide

The herbicide Gramoxone containing paraquat as the active ingredient is an example of a contact herbicide.

### Systemic Pesticides

Systemic pesticides are absorbed and move within the host or pest body to another site where they become effective. Examples are insecticides that are absorbed by foliage and translocated throughout the plant where they kill chewing or sucking insects or seed treatments that are translocated to all parts of the developing plant to protect it from diseases or insects.



### Systemic Pesticide

A rodenticide, such as warfarin, is considered systemic since it has to be absorbed by the digestive tract and translocated to the bloodstream to inhibit coagulation.

## The Pesticide Label

The pesticide label is developed as part of the registration process and is a valuable document. Pesticide companies develop the label after extensive research on product effectiveness, toxicological studies and environmental chemistry.

Important information on a label includes:

- Product name
- Directions for use
- Active ingredients
- Formulation type
- Limitations of use
- Disposal instructions
- Precautions
- Purpose of the pesticide
- Class designation
- Net contents
- Toxicological information
- Hazard symbols
- First-aid instructions
- Manufacturer's name and address.

Occasionally, a manufacturer may provide additional information about a pesticide in a pamphlet, or on wrappers, stickers or tags attached to the container. Ensure you read such additional information before you buy, apply or store any pesticide. The pamphlet, wrapper or stickers must be kept with the rest of the label and the pesticide container.

**The label is a legal document that describes how to apply a pesticide safely and effectively.** It is illegal to apply a pesticide in any way not recommended on a label. Ignoring label instructions may result in reduced control and is potentially dangerous to you and the environment. Residues in soil and food products and crop damage are possible.

There is not enough room on a label to explain why a pesticide should be handled and applied in certain ways; however, much research and thought go into the wording on a label. There is a reason for every statement. If more information is required, contact the manufacturer directly.

As long as you read the label carefully and follow the directions conscientiously, the chance of a problem resulting from a pesticide application is minimal. The information on a label allows you to safely and effectively use the pesticide product.

The pesticide label must be kept on the container and in good condition. If a label becomes illegible, contact the supplier for a replacement label.

The following information is commonly found on a pesticide label.

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### Trade Name of Product

Each manufacturer has a brand or trade name for its products. The product name may also describe the formulation, use or active ingredient. Different manufacturers may use different brand names for the same pesticide active ingredient.



#### Trade Names

The active ingredient glyphosate is formulated by several manufacturers using different trade names: Glyphos®, Maverick®, Renegade®, Roundup®, etc.

Conversely, a manufacturer may use the same basic name with only minor variations to designate additional active ingredients in a formulated product.

#### Trade Name Variations



- DyVel® Herbicide has two active ingredients; dicamba at 84 g/L and MCPA at 336 g/L
- DyVel® DSP Herbicide has three active ingredients and they are more concentrated than the DyVel herbicide. They are dicamba at 110 g/L, 2,4-D at 295 g/L and Mecoprop-P at 80 g/L.

### Use Category

There are four categories of use.

#### 1. Restricted

Because of health and safety concerns for humans, plants, animals or the environment, this product has additional conditions shown on the label regarding display, distribution, use limitations and qualifications of persons who may use the product.

#### 2. Commercial, Agricultural or Industrial

This category is the bulk of pesticides used. Each use category indicates specific site locations where use of the pesticide is allowed. For example, a pesticide in the agricultural use category is intended for use in an agricultural setting only. Companies often register more than one pesticide using the same active ingredient to differentiate the different categories. For example, the same company produces the active ingredient glyphosate and registers it under the trade name Vision® for forestry use (restricted pesticide) and also as RoundUp® for agricultural and industrial applications.

#### 3. Domestic

These products are registered for use in or around the home.

#### 4. Manufacturer

These pesticides are for use by the manufacturer only. They are to be used in formulating other products.








### Formulation

Usually a pesticide's active ingredient is mixed with petroleum solvents or other chemicals and adjuvants before the product is offered for sale. This mix of active and formulant ingredients is called a pesticide formulation. You must choose the right formulation of a product as different formulations have different use patterns and different precautions.

### Precaution Symbols

Almost every label contains signal word warnings and corresponding diagrams to indicate the type and degree of hazard of the formulated product as shown in Table 3. Use these symbols to help you take the proper precautionary measures when handling the product.

**Table 3. Precaution Symbols**

Type of Hazard	
Symbol	Meaning
	Toxic
	Flammable
	Corrosive
	Explosive
Severity of Hazard	
Symbol	Meaning
	Indicates extreme hazard and has the word danger under it.
	Indicates moderate hazard and has the word warning under it.
	Indicates slight hazard and has the word caution under it.

### ***Pest Control Products Act (PCPA) Registration Number***

Health Canada, through the Pest Management Regulatory Agency, assigns a different number to every pesticide product registered in Canada. This



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registration number appears on the container. For example, the active ingredient glyphosate is found in many different pesticide products, but each product has a unique PCP Act Registration Number. Roundup Original has a PCP # of 13644, Roundup Transorb has a PCP # of 25344, Rustler has a PCP # of 19536, and Wrangler has a PCP # of 20862.

The Pest Control Products (PCP) Act Registration Number is an applicator's assurance that the product can be used in Canada. The PCP number is also needed in cases of accidental poisoning, claims of misuse or liability claims. The higher the number, the more recently the product was registered.

### Guarantee

The guarantee statement identifies the common name and the concentration of the active ingredient(s) in the product.

### Net Contents

This statement indicates how much formulated product is in the container. If the product is a dry formulation, the net contents are in dry weight measures. If it is a liquid formulation, then liquid measures are used.

**Precautionary statements appear on the label. Observe all precautions.**

### Name and Address of the Registrant



This information tells you who made or sold the product and is important in cases of accidental poisoning and claims of product failure or crop damage.

### Precautions

These statements indicate the route of entry and type of damage a pesticide would cause upon exposure. For example, "May be fatal or cause blindness if swallowed".

#### Precaution Information

- Dermal (skin) toxicity or irritation statements
- Oral toxicity or irritation statements
- Eye irritation statements
- Chronic toxicity statements
- Inhalation toxicity or irritation statements
- Ingredients in the formulation that may cause severe allergic reactions (e.g., wheat, soy, nuts)
- Safe use and handling statements.

The following types of statements may appear:

- **Specific Action for Protective Clothing**

These would be stated to prevent human poisoning. For example, "Do not breathe vapors or spray mist, and wear goggles when mixing the product."

- **General Precaution**

These are general self-explanatory statements to which the manufacturer wishes to draw attention. For example, "Do not contaminate food or feed, and not for use for storage in and around the home, etc."

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- **Environmental Hazard**

These are statements used to avoid contaminating the environment. For example, “Do not apply when runoff is likely to occur.”

- **Special Toxicity**

If the pesticide is particularly hazardous to contain animals, it will be stated on the label e. g. “This product is highly toxic to bees.”

- **Physical or Chemical Hazard**

These statements will tell you of any special fire, explosion or chemical hazards the product may pose. For example, “Keep away from heat, sparks and open flame.”

- **Training Requirement**

These statements list the training required for all users of the pesticide. For example, “For use by qualified pesticide applicators only.”

- **Ventilation Requirement**

Pesticides that are hazardous if inhaled sometimes require special ventilation practices. For example, “Use in areas of adequate ventilation.”

If you suspect poisoning, telephone the Poison Centre as soon as possible **(1-800-332-1414)**.

### Toxicological Information

This area indicates the types of poisoning symptoms usually associated with the product. It also indicates the treatment and antidote (if known) a physician should use in case a poisoning has occurred. If you suspect poisoning, take the label to the doctor or hospital.

### First Aid

First-aid statements indicate the treatments to perform immediately upon exposure to the pesticide. These statements indicate actions to follow in case of swallowing, inhalation, eye or dermal (skin) exposure.

### Directions for Use

This section indicates how to use the pesticide and includes:

- The pest that the manufacturer claims the product will control
- The use area including the crop, animal or site for which the product is intended
- Method and rate of application
- Compatibility with other products or pesticides
- Phytotoxicity or other injury or staining problems
- Mixing and loading instructions
- Application limitations (re-entry, buffer zones or pre-harvest intervals)
- When to apply.

### Storage, Disposal, Spill Cleanup, Transportation and Other Information

This section of the label usually states specific directions for storage and disposal of the product and its container. As these functions are usually further regulated by provincial and municipal governments, make sure you know local regulations.

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### Notice to the User

If you do not understand a term or instruction, contact the manufacturer or the Pest Management Regulatory Agency at 1-800-267-6315 for an interpretation before proceeding with an application using that product.

This statement indicates that the pesticide must be used as indicated on the product label. A typical statement is: “This control product is to be used only in accordance with the directions on the label” which means:

- Follow application rates as indicated on the label
- Do not use more frequent applications than the frequency stated (less frequent applications are allowed)
- Do not apply to crops, pests or sites not listed on the label.

### Notice to the Buyer



This statement is optional on labels. When present, it is in the form of a Seller’s Guarantee, and states, “The seller’s guarantee is limited to the instructions on the label and the buyer accepts the risks associated with the use of the product.”

### Label Terminology

If you understand and consider all areas of label information, you can make effective and environmentally sound decisions regarding pest control products. Understanding these terms will help you get the best results from the pesticide.

#### Using the Pesticide Label

Locate the label of a pesticide you have used. Check off the following as you find them: See appendix for label example.

- Product name
- Active ingredient
- Use category
- Formulation type
- Precautions
- PCPA number
- Net contents
- Toxicological information
- First-aid instructions
- Directions for use
- Disposal and storage
- Manufacturer’s name and address.

### Material Safety Data Sheets

A Material Safety Data Sheet (MSDS) provides additional information about a pesticide product. The MSDS gives information about health hazards, personal safety and environmental protection.

The MSDS is organized into various sections. The order in which the sections appear varies from company to company. The general sections are identified below.

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### Product Identification

- Trade name, chemical name and primary use of the product
- Name, address and emergency telephone numbers of the manufacturer and supplier.

### Hazardous Ingredients

- Active ingredient
- Other ingredients included in the product
- Chemical designation numbers
- Transportation classification as specified by the *Transportation of Dangerous Goods Act*.

### Physical Data

- Appearance
- Odor
- Specific gravity
- Boiling point
- Other physical characteristics.

### Occupational Procedures/Preventative Measures

- Personal protective equipment that must be used for eye, skin and respiratory protection
- Safe handling and storage procedures.

### First-Aid and Emergency Procedures

- Instructions if someone is exposed to the product
- Reminder to always call for medical help.

### Fire and Explosion Hazard

- Flash point
- Ignition point
- Procedures to use when fighting a fire.

### Toxicity/Health Effects (Toxicological Data)

- LD<sub>50</sub>
- Product effects on humans.

### Reactivity Data

- Special chemical properties of the product (i.e., maximum and minimum storage temperatures).

### Preparation Date and Group

- Who prepared the MSDS
- When it was prepared (MSDS are updated every three years).

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MSDS may be obtained from the supplier or may come with the pesticide product at the point of sale. In most cases you will be able to download the MSDS from the web site of the manufacturer.

### Pesticide Mixtures

Different pesticide products may or may not be compatible with each other. They are considered compatible if the mixture maintains desirable physical properties and is at least as effective as if the products had been applied separately. Pesticide mixtures have to be registered with the PMRA and must be listed on the label. The use of unregistered pesticide mixtures is an infraction under the *Pest Control Products Act*.

### Sources of Information

There are many reliable sources of information on pesticides and their safe and effective use:

- Pesticide label (can be obtained from manufacturer's web site if damaged)
- Material Safety Data Sheet (MSDS)—available from the distributor and from the manufacturer
- Manufacturer
- Federal government
  - Pest Management Regulatory Agency: [www.pmra-arla.gc.ca](http://www.pmra-arla.gc.ca)
- Provincial government
  - Alberta Agriculture and Rural Development
    - Publications (Crop Protection 2008—Agdex 606-1, How Herbicides Work—Agdex 606-2, etc.): [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/ipc5962?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/ipc5962?opendocument)
    - Alberta Agriculture and Rural Development's Ropin' the Web Internet site at: [www.agric.gov.ab.ca](http://www.agric.gov.ab.ca)
    - Alberta Ag-Info Centre at 310-3276 or 1-866-882-7677.

### Review Checklist

Check your understanding of the material in Module 1.

- I know the types of products considered pesticides under the law.
- I have a general understanding of how pesticides work.
- I understand the purpose of the different types of adjuvants.
- I can describe the formulations available and some of their advantages and disadvantages.
- I know the type of information found on pesticide labels.
- I know the meaning of the hazard symbols found on pesticide labels.
- I understand the purpose of the PCPA number.
- I know the type of information on the MSDS.
- I know that pesticides can only be mixed with products listed on the label for this purpose.

If you can not check off the above items, review the appropriate sections.

## Exercises

### Exercise 1.1

Mark each statement True (T) or False (F).

1. Herbicides are not pesticides. They are called agricultural chemicals because they are less toxic than pesticides.
2. Any product sold to control pests must be registered under the *Pest Control Products Act*.
3. The mode of action describes how pesticides are absorbed.
4. An emulsifiable concentrate is usually a powder.
5. A pesticide that kills a plant by stopping cell division could have an entirely different effect on an animal.
6. A systemic pesticide is able to move within the plant, insect or other organism from the initial point of contact.
7. All ingredients in a formulation appear on a pesticide label.
8. Inert ingredients are never toxic and present no risk to human health or to the environment.
9. Farmers have access to pesticide formulations that are generally much more hazardous than pesticides sold for domestic use.
10. A user must read the label even if he or she is an experienced applicator.

### Exercise 1.2

For the following exercise, refer to the label provided in the [appendix](#).

#### 1. Product Name

Different brands of the same chemical may carry different instructions. The name is followed by the formulation type and description of its use.

*\*Find this information on the specimen label and mark it 1.*

#### 2. Classification

This tells you how the product is used and how dangerous it is.

- Domestic products are used in and around the home. They come in small packages of low toxicity.
- Commercial products are used in farming, forestry or industry. They are stronger and of low to medium toxicity.
- Restricted products are dangerous to people, plants, animals or the environment. They have special labels that show how to handle them safely. A provincial permit is required.

*\* Find the classification of the product and mark it 2.*

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### 3. Net Contents

This tells you how much of the product is in the package.

*\* Find this information and mark it 3.*

### 4. Warning Symbols and Words

The label uses both symbols and words to indicate the danger level. Their meaning is covered in Module 3. Learn to recognize them, to know the hazard level and to take precautions. The symbol on this label is a skull and crossbones inside a hexagon. This indicates a dangerous product due to high toxicity.

*\* Find this information and mark it 4.*

### 5. Guarantee

The guarantee tells you the name of the active ingredient. It also shows the concentration.

Concentration may be measured by:

- The weight per unit volume. This label shows the concentration in this way. The product contains 215 g/L.
- Percentage by weight. A guarantee of 10% carbaryl would mean that in each 100 parts of a pesticide, 10 parts are the active ingredient carbaryl. The hazards increase with more concentrated pesticides.

*\* Find this information and mark it 5.*

### 6. Pest Control Products Act Registration Number

This number identifies the product and shows that it has been approved by the federal government. It also identifies the manufacturer. In emergencies, it tells a doctor or poison control center exactly the product involved. This information is critical for the administration of proper treatment.

*\* Find this information and mark it 6.*

### 7. Name and Address

The name and address of the registrant must be on the label. The registrant will provide more information about the product to anyone who asks.

*\* Find this information and mark it 7.*

### 8. Directions for Use

The directions for use include information about:

- What pest it can be used on
- Application method
- What crops it can be used on
- Protection of the crop
- Application rate and mixing instructions
- Restrictions

*\* Find this information on the specimen label and mark it 8.*

### 9. Precautionary Statements

This section tells you the hazards involved in using the product and how to use it safely.

*\* Find the major precautions to be observed and mark it 9.*

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### **10. First Aid**

This section tells what to do if someone is poisoned or injured. What would you do if a person swallowed the pesticide and breathing had stopped?

*\* Find this information and mark it 10.*

### **11. Toxicological Information**

This section gives information on the signs and symptoms of poisoning. It tells a doctor what antidote to use and any ingredients that may influence treatment. Give this information to a doctor in case of an accident.

*\* Find this information and mark it 11.*

### **12. Notice to User**

This section tells the user to follow the label directions. It is unlawful to use a pesticide in an unsafe manner. The only safe way to use a product is in accordance with the label.

*\* Find this information and mark it 12.*

### **13. Notice to Buyer**

This section says that the buyer is responsible for the safe use of the pesticide. This notice is also called a "Limitation of Warranty Statement". If you use the product in any way contrary to or outside of label direction, it is your liability.

*\* Find this information and mark it 13.*

### **14. Disposal Information**

Many older products say to crush and bury the empty container. In Alberta you must triple rinse the container and place it in a designated container collection site. This is the only portion of a label you should not follow to the letter. if it differs from provincial regulations

*\* Find this information and mark it 14.*



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### Exercise 1.3

From the specimen label, find the following information:

- a. If this product is spilled and comes in contact with clothing and skin, do the following at once (check the correct answers):

- 1. Call 911.
- 2. Wipe off as much and possible and let it dry.
- 3. Take the label and seek medical attention.
- 4. Remove all contaminated clothing and wash skin with soap and water.

- b. Could this product be used to control lygus bugs in alfalfa?

- Yes
- No

- c. Do you need to wear a respirator (with carbon filter cartridge) to use this product?

- Yes
- No

- d. Can this product be used on broccoli?

- Yes
- No

- e. Is this product suitable for use on cabbage up to two days before picking?

- Yes
- No

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### Exercise 1.4

Mark each statement True (T) or False (F).

- a. The user only needs to read the entire label if he/she has never used this product before.
- b. In the case of a severe infestation, the user may increase the application rate up to two times of the highest rate given on the label.
- c. A label that was detached from its container would tell you what chemical it came from, but you would not know if it was a liquid or a powder.
- d. In the event of an emergency, the PCP number plus the manufacturer's name and address can be used to obtain very specific and accurate information.

### Exercise 1.5

1. List four reasons why you must precisely follow the instructions on a pesticide label.

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2. What is the one exception in Alberta to following label instructions exactly?

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## MODULE 1 PESTICIDES

### Answers

#### Answer 1.1

- |          |          |
|----------|----------|
| 1. False | 6. True  |
| 2. True  | 7. False |
| 3. False | 8. False |
| 4. False | 9. True  |
| 5. True  | 10. True |

#### Answers 1.3

- |        |        |
|--------|--------|
| a. 4   | d. Yes |
| b. Yes | e. No  |
| c. Yes |        |

#### Answers 1.4

- |          |          |
|----------|----------|
| a. False | c. False |
| b. False | d. True  |

#### Answer 1.5

1. Legal liability (it is a federal and provincial offense to do otherwise),  
crop damage,  
food residues,  
lack of control,  
environmental damage  
and poisoning risk.
2. The exception involved disposal of pesticide containers. Farmers should  
triple-rinse containers, puncture them and then take them to a pesticide  
collection site.

# Appendix

GROUP	<b>3</b>	INSECTICIDE
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**INXEC® 5 EC**

FOR SALE FOR USE IN PRAIRIE PROVINCES AND PEACE RIVER REGION OF BRITISH  
COLUMBIA ONLY

COMMERCIAL



SEVERE EYE AND SKIN IRRITANT

TRIPLE RINSE

READ THE LABEL AND PAMPHLET BEFORE USING

KEEP OUT OF REACH OF CHILDREN

REGISTRATION NO. **00001** PEST CONTROL PRODUCTS ACT

GUARANTEE: DELTAMETHRIN.....50 GRAMS PER LITRE

NET CONTENTS: 10.0 Litres

**INXECTOCIDE CO.**

1000 – 13<sup>th</sup> Avenue  
Pesticidia, AB T0X 1C0  
1-(888) 444-2222

FOR SALE FOR USE IN THE PRAIRIE PROVINCES AND THE PEACE RIVER REGION  
OF BRITISH COLUMBIA ONLY

GENERAL INFORMATION

INXEC 5 EC Insecticide is not a systemic product. It controls insects through contact and/or ingestion. For maximum efficacy, it is necessary to:

- keep crop and pest under observation to be able to spray at the right moment.
- ensure that insects are contacted during spraying, especially if they are found on the underside of leaves or if the foliage is very dense.

The volumes of water may vary greatly, depending on the equipment, the crop, and cultural conditions. Actual volumes of water to be used will vary between 11 and 550 litres per hectare.

The distribution of the product over plant surfaces must be as uniform as possible where the insects are moving and/or feeding.

NOTE TO BUYER: The Buyer and User assume all liability arising from the use of this product, and agree to hold INXECTOCIDE CO. harmless from any claim(s) based on efficacy and/or phytotoxicity in connection with the use(s) described on this label.

PRECAUTIONS:

KEEP OUT OF REACH OF CHILDREN. Severely irritating to the eyes and skin. Fatal if swallowed, if absorbed through the skin, or if inhaled. Avoid contact. Avoid breathing vapour or spray mist. Wash thoroughly after using and before eating, drinking or smoking. Wear protective clothing including long-sleeved shirt and long pants (or coveralls), chemical resistant gloves, goggles and respirator when handling or spraying. Keep in original container during storage. Do not contaminate or store near feeds, seeds or foodstuffs. Keep away from fire, open flame, or other sources of heat.

ENVIRONMENTAL PRECAUTIONS

TOXIC TO FISH AND AQUATIC ORGANISMS. Do not apply where streams, lakes, ponds or water used by livestock or for domestic purposes may be contaminated. This product contains petroleum distillates which are moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning of equipment.”

TOXIC TO BEES AND OTHER BENEFICIAL INSECTS. Avoid spraying when bees are foraging.

UNTREATED BORDERS SHOULD ALWAYS BE LEFT AROUND ENVIRONMENTALLY SENSITIVE AREAS (e.g. wetlands, sloughs, houses, farm buildings). The depth of the border depends on the method of application.

Read the portions of this label pertaining to the intended method of application carefully and completely BEFORE APPLYING DURING PERIODS OF EXCESS HEAT (for example, daytime temperatures greater than 25° C) as a reduction in control will result. Best control will be achieved when INXEC 5 EC Insecticide is applied during the cooler portions of the day (for example early morning or at dusk).

## FIRST AID

THIS PRODUCT CONTAINS XYLENE.

**IF SWALLOWED**, contains petroleum distillates. DO NOT induce vomiting. Do not give anything by mouth to an unconscious person. Contact a poison control centre or doctor immediately. Keep patient prone, warm and quiet. Transport to nearest physician, or contact a poison control centre IMMEDIATELY.

**DANGER - CORROSIVE TO EYES.** If eyes are splashed, wash with plenty of water for 15 minutes and see a physician, or contact a poison control centre.

**DANGER - SKIN IRRITANT.** If product comes in contact with skin and clothes, remove all contaminated clothing, wash skin with soap and water and dress in clean clothing.

**INHALATION** - In case of inhalation, remove patient from site of exposure to fresh air. Take container, label or product name and Pest Control Product registration number with you when seeking medical attention.

## TOXICOLOGICAL INFORMATION

Medical personnel should contact the INXECTOCIDE CO. medical information services toll-free 1-888-001-1000. The treatment of intoxication should be symptomatic and supportive. Where the product has been ingested, carry out gastric lavage with care to prevent aspiration. This product contains petroleum distillates. Vomiting may cause aspiration pneumonia.

## STORAGE

**CANNOT BE STORED BELOW FREEZING.** If stored for one year or longer, shake vigorously before using. Store the tightly closed container away from feeds, seeds, fertilizer, plants and foodstuffs. Keep in original container during storage.

## RECYCLABLE CONTAINER DISPOSAL AND DISPOSAL OF UNWANTED PRODUCT

Do not reuse this container for any purpose. This is a recyclable container and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2. Make the empty, rinsed container unsuitable for further use.

If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill and for cleanup of spills.

## DISPOSAL OF UNUSED SPRAY SOLUTION

If any spray solution remains in the tank after spraying is finished, it should be sprayed on the perimeter of the area just sprayed, away from water supplies, ditches and irrigation canals.

**NOTICE TO USER:** This pest control product is to be used only in accordance with the directions on the label. It is an offence under the Pest Control Products Act to use this product in a way that is inconsistent with the directions on the label. The user assumes the risk to persons or property that arises from any such use of this product.

## DIRECTIONS FOR USE

Where a rate range is given in the Directions For Use, the higher rate should be utilised:

1. when the crop canopy is dense and foliage is inhibiting spray penetration.
2. when a number of insect growth stages are present (for example 1st through 5th nymphal stages of grasshoppers).
3. when insect populations are very high.

Unless otherwise stated, apply INXEC 5 EC Insecticide when insects first appear and repeat as required to maintain control. Use sufficient water to ensure thorough coverage. More water may be required when dense foliage is present and depending on the type of spray equipment used. Thorough wetting of all plants is essential for good results. It is suggested that provincial spray calendar recommendations be followed.

When using ground application equipment, ensure that a 15-metre border is left around environmentally sensitive areas (e.g. wetlands, sloughs, rivers, houses, farm buildings). Refer to AERIAL APPLICATION section of this label for appropriate cautions when using aerial application equipment.

Use the rates listed below for both ground and aerial application. INXEC 5 EC Insecticide may be applied by air only on crops specified for aerial use. See AERIAL APPLICATION section of this label for adjustment of water volumes.

## SPECIAL INSTRUCTIONS FOR USE OF INXEC 5 EC Insecticide ON HIGH ORGANIC (MUCK) SOILS:

In soils with high organic content (muck soils), special care in the application of INXEC 5 EC Insecticide is necessary. Apply no more than 200 mL of product per hectare. INXEC 5 EC Insecticide should be applied only ONCE during each crop year on muck soil prior to August 1.

## AERIAL APPLICATION:

INXEC 5 EC Insecticide may be applied by aircraft to Range land and Pastures.

Apply only by fixed-wing or rotary aircraft equipment which has been functionally and operationally calibrated for the atmospheric conditions of the area and the application rates and conditions of this label. Label rates, conditions and precautions are product specific. Read and understand the entire label before opening this product. Apply only at the rate recommended for aerial application on this label. Where no rate for aerial application appears for the specific use, this product cannot be applied by any type of aerial equipment. Ensure uniform application. To avoid streaked, uneven or overlapped application, use appropriate marking devices.

#### USE PRECAUTIONS:

Apply only when meteorological conditions at the treatment site allow for complete and even crop coverage. Apply only under conditions of good practice specific to aerial application as outlined in the Basic Knowledge Requirements for Pesticide Education in Canada: Applicator Core and Aerial Module, developed by CAPCO. Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed. Coarse sprays are less likely to drift, therefore, avoid combinations of pressure and nozzle type that will result in fine particles (mist). Do not apply during periods of dead calm or when wind velocity and direction pose a risk of spray drift. Do not spray when the wind is blowing towards a nearby sensitive crop, garden, terrestrial habitat (such as shelter-belt) or aquatic habitat.

#### OPERATOR PRECAUTIONS:

Do not allow the pilot to mix chemicals to be loaded onto the aircraft. Loading of premixed chemicals with a closed system is permitted. It is desirable that the pilot has communication capabilities at each treatment site at the time of application. The field crew and the mixer/loaders must wear chemical resistant gloves, coveralls and goggles or face shield during mixing/loading, cleanup and repair. Follow the stringent label precautions in cases where the operator precautions exceed the generic label recommendations on the existing ground boom label. All personnel on the job site must wash hands and face thoroughly before eating and drinking. Protective clothing, aircraft cockpit and vehicle cabs must be decontaminated regularly.

#### PRODUCT SPECIFIC PRECAUTIONS:

When applying INXEC 5 EC Insecticide by aircraft, uniform spray coverage is essential. To achieve uniform spray coverage, the use of spray nozzle tips and spraying pressures which provide a small droplet size (150-250 micron range) is recommended.

Apply INXEC 5 EC Insecticide in 11 - 22 litres of water per hectare at a pressure of no less than 200 kPa. For best results, use sufficient water to ensure complete coverage. **DO NOT USE RAINDROP NOZZLES.** Follow directions elsewhere on label for correct rate, timing of application and harvest restrictions.

Note: Ensure that all circuits (pipes, booms, etc.) have the correct INXEC 5 EC Insecticide/water concentration before application is started.

**DO NOT** apply INXEC 5 EC Insecticide by aircraft when the wind speed exceeds 8 kph.



Leave a 100- metre buffer between the edge of the treated field and environmentally sensitive areas (for instance wetlands, sloughs, rivers, houses, farm buildings). If a 100-metre buffer zone cannot be maintained, then application by ground must be followed. In these cases, the 15-metre buffer zone must be observed. 5 EC Insecticide is very toxic to aquatic organisms and fish and overspray or drift into these areas must be avoided.

**AVOID APPLICATION WHEN TEMPERATURE INVERSIONS ARE PREVAILING OR DURING PERIODS OF EXCESS HEAT** (for example daytime temperatures greater than 25°C) as a reduction in control will result. Best control will be achieved when INXEC 5 EC Insecticide is applied during the cooler portions of the day (for example early morning or at dusk).

INXEC 5 EC Insecticide can be tank mixed with a number of herbicides for the control of insect pests (specified on this label) and annual grassy and broadleaf weeds (see list of susceptible weeds on the respective herbicide labels). Carefully read respective labels for proper use. The following herbicides are compatible:

HOE-S I	PAGONE	BATVEL	3,4-A
HOE-S II	BUCTROL	START	MPCA

INXEC 5 EC Insecticide can be tank mixed with PAGONE for the control of grasshoppers and annual grassy weeds.

Spray mixture must be constantly agitated throughout application. Do not allow the spray mixture to stand in the spray tank for more than 4 hours after mixing.

When a tank mix is used, the labels of the tank-mix partners are to be consulted and the largest (most restrictive) buffer zone of the products involved in the tank-mix is to be observed.

#### RESISTANCE MANAGEMENT RECOMMENDATIONS:

For resistance management, please note that INXEC 5 EC Insecticide contains a Group 3 insecticide. Any insect population may contain individuals naturally resistant to INXEC 5 EC Insecticide and other Group 3 insecticides. The resistant individuals may dominate the insect population if this group of insecticides are used repeatedly in the same field. Other resistance mechanisms that are not linked to site of action, but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance-management strategies should be followed.

- Where possible, rotate the use of INXEC 5 EC Insecticide or other group 3 insecticides with different groups that control the same pests in a field.
- Use tank mixtures with insecticides from a different group when such use is permitted.
- Insecticide use should be based on an integrated pest management (IPM) program that includes scouting, record keeping and considers cultural, biological, and other chemical control practices;
- Monitor treated pest populations for resistance development.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance-management and/or IPM recommendations for the specific site and pest problems in your area.

For further information or to report suspected resistance, contact Insecticide Co. at 1-888- 444-2222.

CROPS	INSECTS	METHOD OF APPLICATION AND RECOMMENDATIONS	RATE
Alfalfa(seed production only)	Alfalfa Weevil, Lygus Bugs	GROUND Apply when insects are present or when Provincial Letters recommend spraying. Use the higher rate when the Alfalfa Weevil is present.	200-250 mL/ha in 100-300 L of water per ha.
DO NOT MAKE MORE THAN 1 APPLICATION PER YEAR. DO NOT APPLY WITHIN 20 DAYS OF HARVEST.			
Broccoli, Brussels Sprouts, Cabbage, Cauliflower	Cabbageworm, Cabbage Looper, Diamondback Moth	GROUND Apply when insects are present or signs of insect feeding are visible. Repeat every 10 days as necessary.	150-200 mL/ha in 350-550 L of water per ha.
DO NOT APPLY WITHIN 1 DAY OF HARVEST TO BRUSSELS SPROUTS. DO NOT APPLY WITHIN 3 DAYS OF HARVEST TO BROCCOLI, CABBAGE OR CAULIFLOWER. MAY BE USED ONCE PER SEASON ON HIGH ORGANIC (MUCK) SOILS. TO MINIMIZE RESIDUES, APPLY BEFORE AUGUST 1. See instructions above.			
Field Corn	European Corn Borer	GROUND Apply when egg masses begin to hatch, but no later than when the first pinhole feeding is seen on the leaves. Direct spray into the whorl of the plant. Repeat at 5-8 day intervals. For control of second generation, direct spray at ear zone.	250-300 mL/ha in at least 240 L of water per ha.
DO NOT APPLY MORE THAN 3 TIMES PER YEAR. See instructions above.			

CROPS	INSECTS	METHOD OF APPLICATION AND RECOMMENDATIONS	RATE
Rangeland, Pastures Roadsides*	Grasshopper	<p><b>GROUND</b> Apply when insects are young or signs of insect damage are evident. Apply when the grasshoppers are in the 2-4 nymphal stage. Best control will be achieved when application is made prior to wing development. <b>DO NOT APPLY TO ADJACENT UNREGISTERED CROPS.</b> The higher rate should be used when the proportion of mature and late nymphal stages in the population are high and/or spray penetration is inhibited by dense crop canopy. *Under severe insect pressure application should also be made to fence row and roadsides as a 15 metre strip.</p> <p><b>AERIAL</b> Use as directed and follow special instructions maintaining 100 metre setback from sensitive zones.</p>	<p>100 – 150 mL/ha in 100-200 L of water per ha.</p>
Rangeland, Pastures			<p>150 mL/ha in 11 – 22 L of water per ha.</p>
<p>DO NOT APPLY MORE THAN TWO TIMES PER YEAR BY AIR. DO NOT USE MORE THAN 3 APPLICATIONS OF INXEC 5EC INSECTICIDE PER YEAR. FOR EXAMPLE, 3 GROUND APPLICATIONS OR 2 GROUND/1 AIR OR 2 AIR/1 GROUND.</p>			

FOR MORE INFORMATION CONTACT:

**INXECTOCIDE CO.**

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1-(888) 444-2228