



Lesson 1: Pest Management Basics

Assistant applicators must carry out pest management using an Integrated Pest Management (IPM) approach. They are also required to follow a number of government regulations.

Key Learning Points

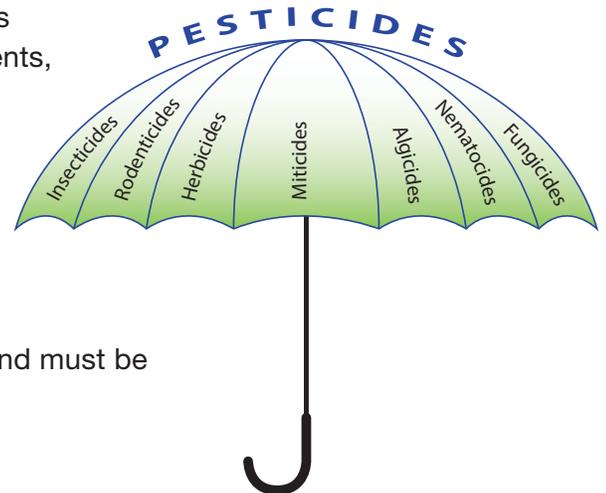
- Describe how pesticides affect target organisms.
- Define Integrated Pest Management (IPM).
- Explain the difference between target and non-target organisms.
- Explain the role and legal obligations of the assistant applicator.

What are Pesticides?

A **pesticide** is anything that is intended to prevent, destroy, repel, attract, or manage a pest. The root word “cide” means kill. A “**pesticide**” is anything that targets pests.

A pest is a harmful, noxious, or troublesome organism. Pests include plants (weeds), insects, fungi, bacteria, viruses, rodents, or other plant or animal pests. This training will use terms for particular types of pesticides. The first part of the term describes the target pest. In the word “**rodenticide**,” for example, the target for elimination is the rodent. In “**herbicide**,” “herb” refers to the Latin word “herba” meaning “grass” or “green plant”. Herbicides target plants.

Pesticides are valuable tools. They can also be dangerous and must be used safely.



Pesticide Use and Handling

Assistant applicators may handle pesticides at many different times including:

- Transporting the pesticide.
- Reading the label.
- Mixing and loading pesticide into the application equipment.
- Operating the application equipment.
- Storing and disposing of the pesticides and their containers.

Pesticides need to be handled safely. Handling pesticides properly minimizes risk to applicators, consumers, bystanders and the environment.



What is Integrated Pest Management (IPM)?

It includes the following steps for dealing with pests that become a problem: identification, establishment of thresholds, monitoring, conducting treatments and evaluating effectiveness.

IPM involves keeping good records, and monitoring and evaluating the results of an application when pesticides are required. Professional applicators consider all treatment methods when they use IPM.

Using IPM, you plan and manage your **ecosystem** to prevent organisms from becoming pests. For example, this tennis court could have been planned to prevent the growth of grass that you see in the photo, which now requires treatment.



If the tennis court had been planned differently, the herbicide would not be needed.

Laws

There are government Acts and Regulations that govern your work. The lessons will tell you about the rules you must follow including provincial and federal laws.

Pesticides must be registered by the federal government (Pest Management Regulatory Agency or PMRA) with Health Canada. Pesticide labels must have certain information. A pesticide label is a legal document. This means you must always follow the directions on the label.

The registration number (or Pest Control Product (PCP) number) of a pesticide is on its label. You can look up a label of a pesticide online at <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php> to get more information about it.

The federal *Pest Control Products Act* and Regulations and the provincial *Integrated Pest Management Act* and Regulation contain the main rules you need to follow. There are other federal and provincial laws that your supervisor should know, but we will focus on these two in this training.



Target and Non-target Organisms

When working with pesticides, you must consider their effects on target organisms—the pests you intend to manage—as well as non-target organisms. Non-target organisms are living things that may also be affected by your application. For example, if you use a herbicide on a lawn to control dandelions, the *dandelions* are your **target organism**—the *grass* is a **non-target organism**.

What's in a Pesticide?

Pesticides contain more than one ingredient. The material in a pesticide **formulation** that controls the pest is called the active ingredient. The active ingredient controls the pest by:

- Killing the pest
- Reducing the numbers of the pest
- Preventing the pest from returning to do damage.

Pesticide active ingredients cannot be used alone. They may not mix well with water, may be chemically unstable and may be difficult to handle or transport. For this reason, the active ingredients are usually mixed with other ingredients into a formulation that makes the final product more stable and more effective. (More information on formulations appears later in this lesson.) Some pesticide products may contain more than one active ingredient.

Pesticide Names

You're probably familiar with products that are essentially the same thing, but have different names. For example: All the products in the picture to the right contain the same active ingredient: acetaminophen.





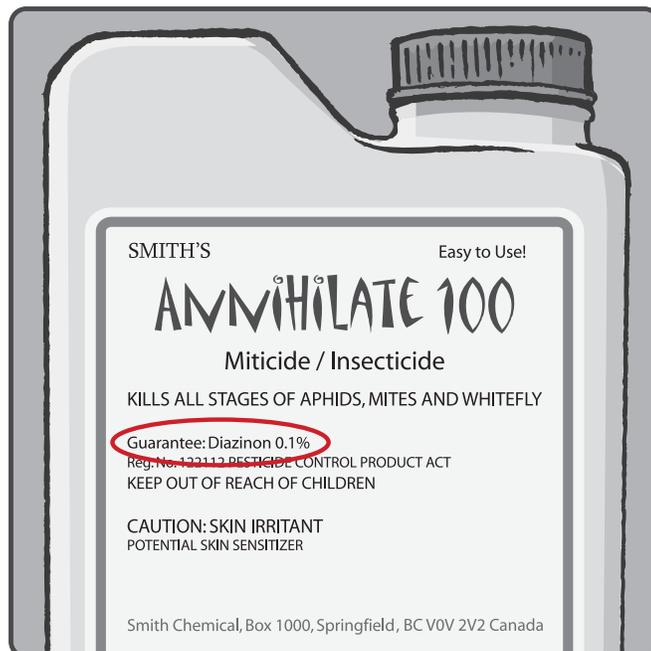
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Pesticides are like that too. Many pesticide products may contain the same ingredient, but have different names. For example: all of the pesticides below contain the same active ingredient—glyphosate. But they all have different product names. **A product name (or trade name) is the name the manufacturer gives the product.** It appears prominently on the pesticide label.



The common name is the name of the active ingredient. Sometimes there's more than one active ingredient in a pesticide product. The common name is found under the “guarantee” on the pesticide label.

The chemical name refers to the chemical structure of the active ingredient. You can find that name on the Material Safety Data Sheet, or MSDS.





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How Pesticides are Grouped

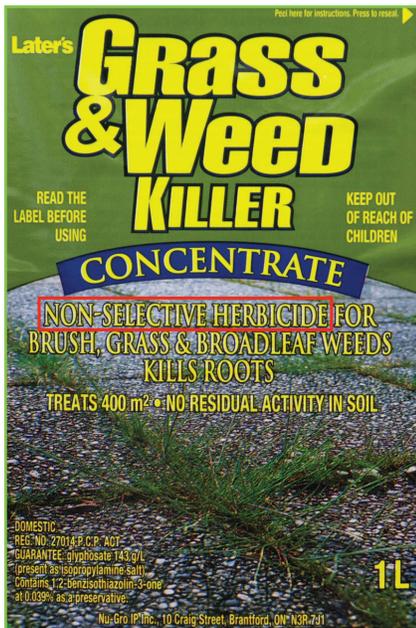
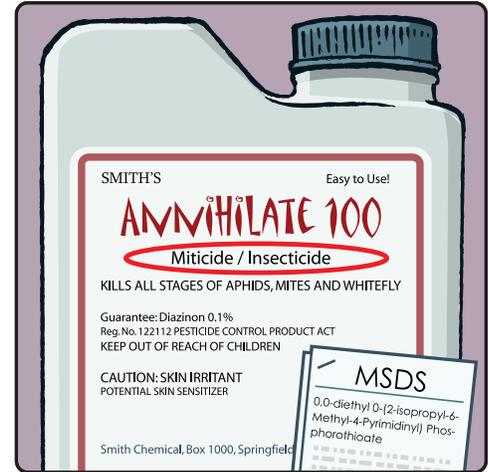
Pesticides have different effects on the target organisms.

Target pest

Some pesticides are grouped by the target pest. This pesticide is grouped as both a miticide that targets mites, and an insecticide that controls aphids and whiteflies.

How They Work

Some pesticides are grouped by how they work. This herbicide is grouped as a **non-selective** herbicide; it will kill most plants.



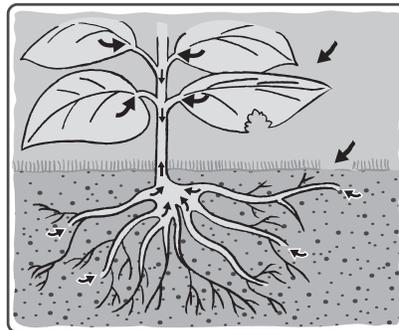
The item below is a **selective** herbicide: it works by killing the target pest, but very few other organisms.



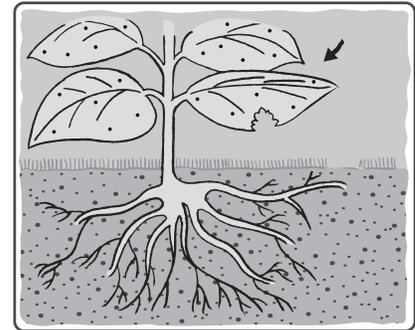
Other properties describe how the pesticide gets onto or into the target pest. Some labels indicate the pesticide works on direct contact with the pest—these are “contact” pesticides.

Systemic pesticides enter the organism and move through it. The following illustration shows how systemic and contact pesticides work:

Systemic: pesticides inside plant



Contact: pesticides on surface of plant





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Other groupings include: **residual** and **non-residual**. Residual means the pesticide will break down slowly and stay a longer time in the environment. Non-residual means that it breaks down quickly in the environment and therefore its ability to affect the pest and non-target organisms does not last as long.

Effect on pest

This pesticide is an **attractant**. The pests are attracted to the **bait** and will feed on treated material. Some others include **feeding stimulants**, defoliants (herbicides that cause plants to lose their leaves), and **growth regulators**.

Commonly Used Pesticides

Common herbicides an assistant applicator may use include:

- 3-way herbicides
- glyphosate
- triclopyr

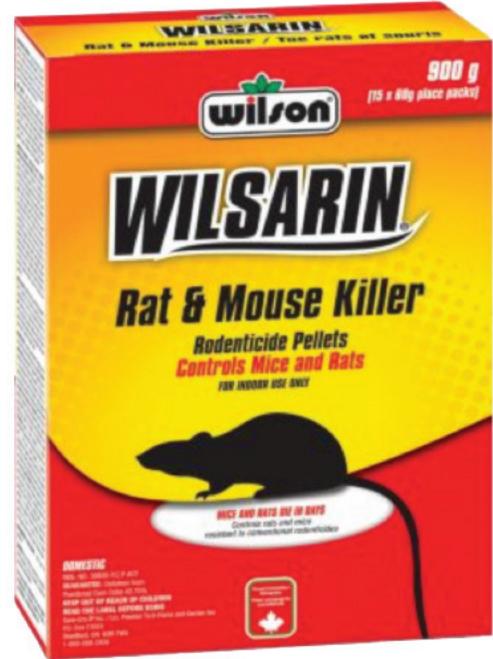
You should know how these pesticides affect both target and non-target organisms.

3-way herbicides

These are herbicide formulations contain three active ingredients: 2,4-D, mecoprop, and dicamba. They are used to treat broadleaf weeds. They are commonly used in landscape turf applications on golf courses, sports fields and lawns. They are post-emergent (control weeds that have already germinated), selective (they kill some broad-leaved plants, but will not kill grass), and are systemic (are absorbed into the weeds and disrupt growth). They have moderate to long residual effects, with dicamba persisting in the environment for up to 12 months. Weeds controlled include: dandelion, plantain, clover, English daisy, chickweed, thistles, and buttercup. Common trade names include Target and Pro Tri-kil.

glyphosate

Glyphosate is a non-selective herbicide (it can kill or harm all plants). It is systemic (absorbed through leaves and moves through stems and roots to kill the entire plant). It breaks down quickly in the environment. Glyphosate is commonly used in landscapes, forestry, industrial vegetation applications and agriculture. Its common trade names include Roundup, Vision, and Vantage.





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triclopyr

Triclopyr is a selective herbicide which is used to control many species of woody plants and broadleaf weeds. It does not affect grass or **conifers**. It is systemic and absorbed through the leaves and moves throughout the plant. It has low residual activity, and breaks down relatively quickly in the environment. It is commonly used in forestry and industrial vegetation applications, and can be applied as a foliar spray or through basal bark applications to woody plant stems, or to freshly cut stumps to prevent regrowth. Common trade names include Garlon and Release.

Formulations

Acetaminophen is formulated in different ways. Below we see acetaminophen as a liquid and a solid tablet.

Pesticides, too, come in different **formulations**, including solids and liquids. A formulation mixes the active ingredient with other ingredients. Sometimes, the formulation shows up in the product name, such as “Flowable Antimicrobial Agent,” or “Advantage Herbicide Solution.”

Your supervisor will tell you which pesticide to use. The reasons vary, and include the effect on the pest, and the risk to the applicator, the public, and the environment.



Summary

An assistant applicator’s work is regulated by provincial and federal law. Additionally, you will be applying the principles of Integrated Pest Management (IPM). You learned that an IPM approach helps manage pest problems in an environmentally sound manner.

In this you learned commonly used terms, and where to find information on a pesticide label.

And finally, you learned there are different ways to name pesticides, and they come in different formulations.



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Lesson 1 Practice Activity

Answer the questions to self-test your Lesson 1 knowledge. Check your answers on the key.

1. Every pesticide is registered with _____.
2. Three different ways of naming pesticides are by _____, product name, and common name.
3. On a label, the active ingredient is identified by the _____ name.
4. A miticide is used to control _____.
5. Pesticides that move to different parts of treated plants are known as _____.
6. "ROUNDUP" is an example of a _____ name.
7. A pesticide formulation is a mixture of _____ and other ingredients.
8. On this label, where do you find the product name?



- a. at "A"
- b. at "B"
- c. at "C"
- d. at "D"



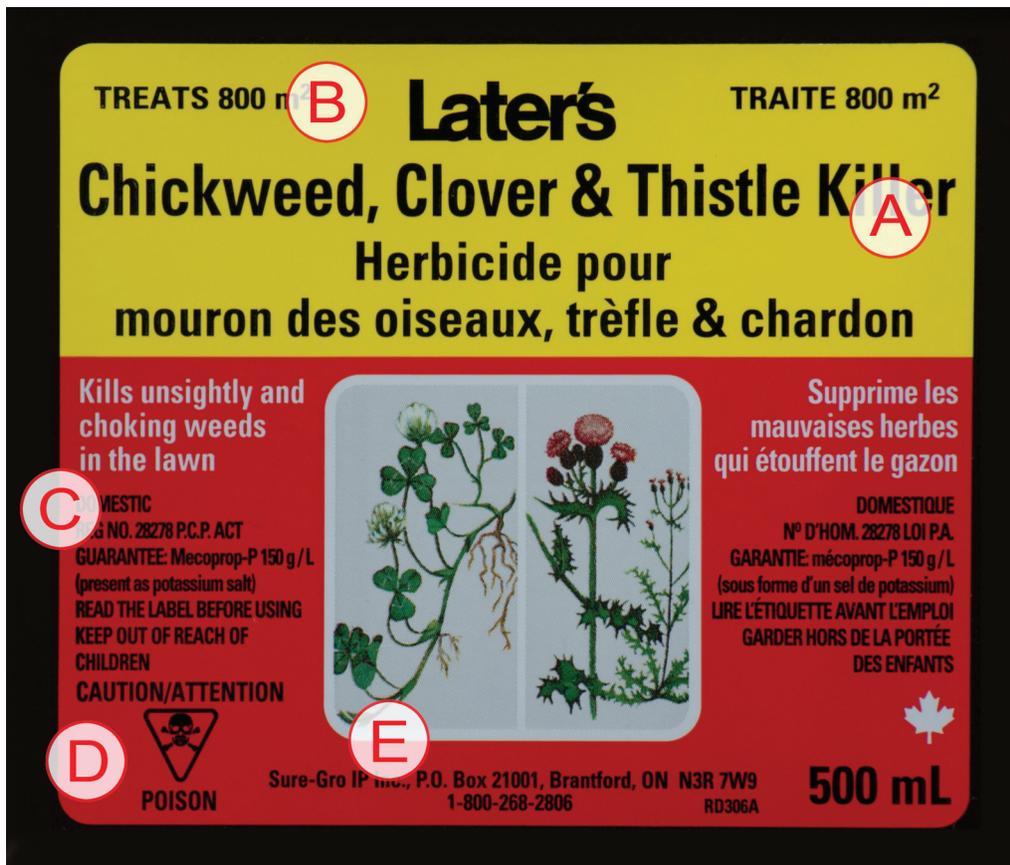
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9. What type of identification is found at “D”?



- a. Product name
- b. Common name
- c. Chemical name
- d. Registration number.

10. On this label, where do you find the active ingredient?

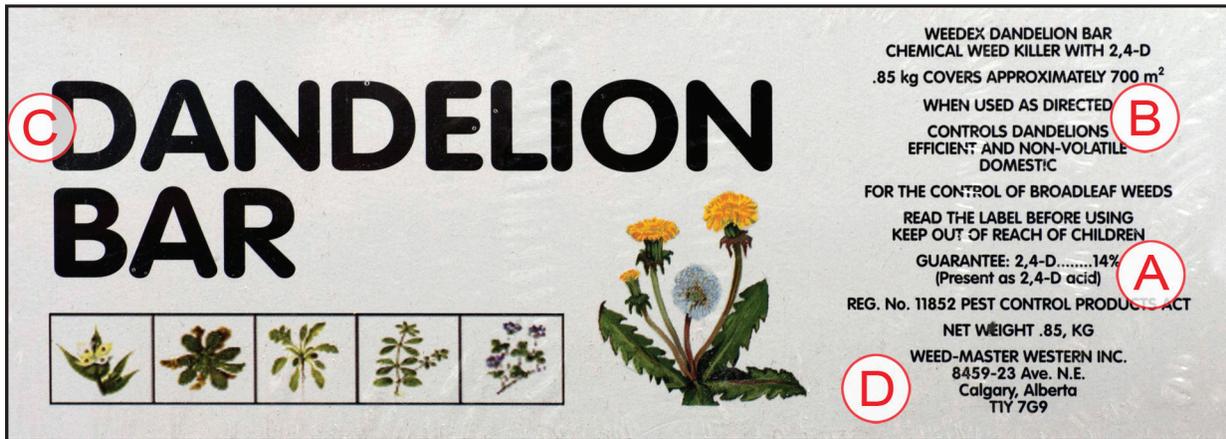


- a. at “A”
- b. at “B”
- c. at “C”
- d. at “D”
- e. at “E”



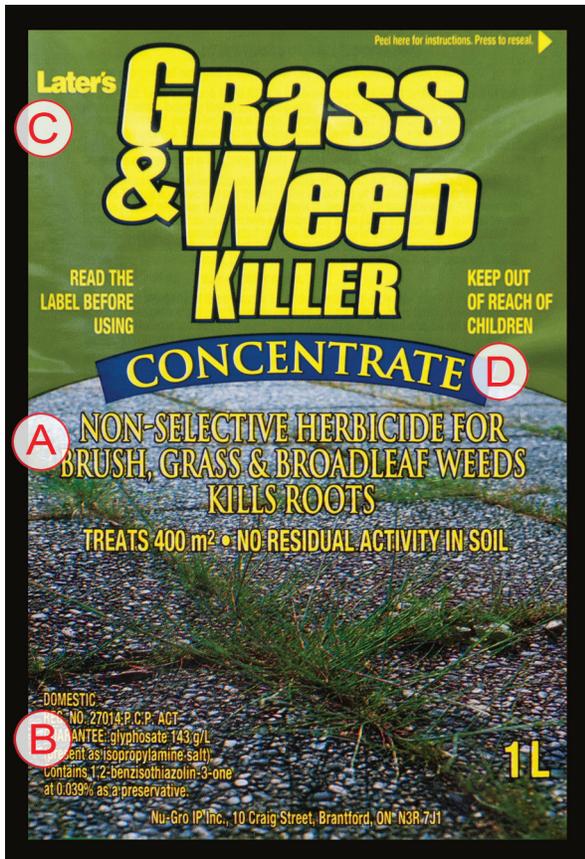
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11. On this label, where do you find the common name?



- a. Guarantee: 2,4-D
- b. Non-Volatile Domestic
- c. Dandelion Bar
- d. Weed-Master Western Inc.

12. On this label, where do you find the product name?

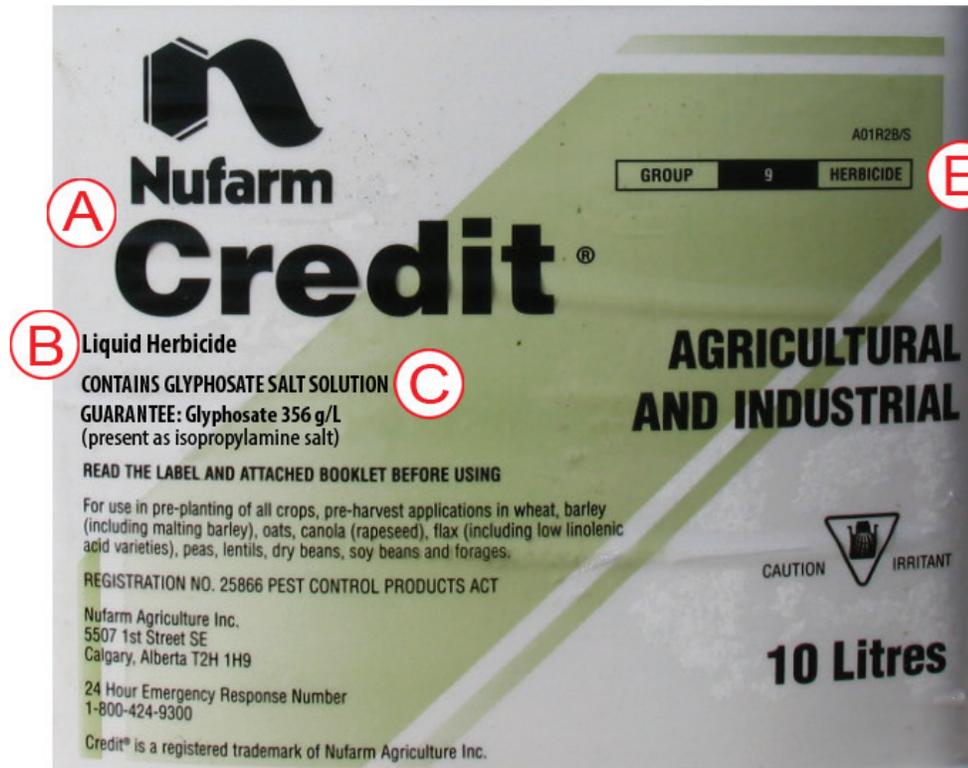


- a. Non-Selective Herbicide
- b. Guarantee: glyphosate
- c. Later's Grass and Weed Killer
- d. Concentrate



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13. For this pesticide, where do you find the chemical name?



- A. Nufarm Credit
- B. Liquid Herbicide
- C. Glyphosate 356 g/L
- D. Material Safety Data Sheet (MSDS)
- E. Group 9 Herbicide

MATERIAL SAFETY DATA SHEET

Nufarm Credit®



D

For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident,
 Call CHEMTREC Day or Night: 1-800-424-9300.
 For Medical Emergencies Only, Call 1-877-325-1840.

3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS NO.	% BY WEIGHT
Glyphosate, N-(phosphonomethyl) glycine, in the form of its ammonium salt	114370-14-8	17.86
Glyphosate, N-(phosphonomethyl) glycine, in the form of its potassium salt	70901-12-1	16.26
Other Ingredients Including: Ethoxylated Tallowamines	61791-26-2	65.88



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14. Where is the Common Name on this label?



- a. PathClear
- b. Grass & Weed Killer
- c. Herbicidal Soap
- d. Ammonium soaps of fatty acids
- e. Reg. no.

15. On the label above, what is found at the place marked “A”?

- a. Product name
- b. Common name
- c. Active ingredient
- d. Chemical Name



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16. 3-way herbicides have the following properties (Select all that apply)

- a. post-emergent
- b. systemic
- c. non-selective

17. Glyphosate has the following properties (Select all that apply)

- a. non-selective
- b. breaks down quickly
- c. contact

18. Triclopyr is used commonly in forestry.

- a. true
- b. false

19. Glyphosate has the common trade name of Garlon.

- a. true
- b. false



Practice Activity Answer Key

1. Health Canada, Pest Management Regulatory Agency (PMRA)
2. chemical name
3. common
4. mites
5. systemic
6. product
7. the active ingredient
8. a
9. d
10. c
11. a
12. c
13. d
14. d
15. a
16. a and b
17. a and b
18. a, true
19. b, false (Glyphosate includes the common trade names of Roundup and Vision.)



Glossary

3-way herbicide: Selective, systemic, post-emergent herbicide formulation containing a mixture of the three active ingredients: 2,4-D, mecoprop and dicamba. Commonly used to treat broadleaved turf weeds in landscape settings including lawns, golf courses and sports fields. Three-way herbicides have moderate to long residual activity.

active ingredient: An active ingredient (a.i.) is the part of a pesticide formulation that produces the desired effects.

attractant: A chemical that lures pests to a selected location where they may be destroyed, sterilized or trapped.

bait: A food or other material that will attract a pest to a pesticide or to a trap where it may be killed or trapped.

chemical name: The name of the chemical structure of the active ingredient.

common name: The name of the active ingredient.

conifer: A tree or shrub that bears cones and evergreen, needle-like or scale-like leaves.

feeding stimulant: A substance added to insecticides that causes pest insects to feed on the treated material.

formulation: A mixture of active ingredient with carriers, diluents or other materials, to make it safe and easy to store, transport, dilute and/or apply.

glyphosate: Non-selective, systemic, post-emergent herbicide used to treat all types of vegetation in agriculture, forestry, industrial and landscape settings. Glyphosate has low mammalian toxicity and low residual activity.

growth regulators: Products used to modify the normal development of an organism.

herbicide: A pesticide used to control or manage weeds.

MSDS: Material Safety Data Sheet—this is legislated under Workplace Hazardous Materials Information System (WHMIS). An MSDS provides information on health hazards, personal safety and environmental protection for hazardous products. MSDS is not a legal document. It may not be available for some domestic pesticides.



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non-residual pesticide: Non-residual pesticides affect pests at the time of application but not for long afterwards. (They break down quickly in the environment.)

non-selective: A non-selective pesticide is toxic to a wide range of pests, or toxic to more than one plant or animal, e.g., a non-selective herbicide is one which kills many plant species.

non-target organism: Any plant or animal organism which is not the object of a pesticide application.

pesticide: A substance that is intended to prevent, destroy, repel, attract, or manage a pest.

product name: The name that the manufacturer gives to a pesticide product (also referred to as a trade name). This name may include the manufacturer's name, a brand name or trademark, the formulation, the use, the active ingredient and the concentration of the active ingredient.

residual: To continue to have a killing effect over a period of time after application.

selective: Selective pesticides are more toxic to some organisms than others, e.g., a selective herbicide may kill crab grass in a cornfield without injury to the corn.

target organism: Any plant or animal organism that is the object of a pesticide application.

triclopyr: Selective, systemic, post-emergent herbicide used to treat woody plants and broadleaved weeds in mainly forestry and industrial settings. Triclopyr does not affect grass or conifers.