

MANAGE RESISTANCE *Now*

Protect your land, one field at a time



A QUICK GUIDE TO UNDERSTANDING HERBICIDE RESISTANCE

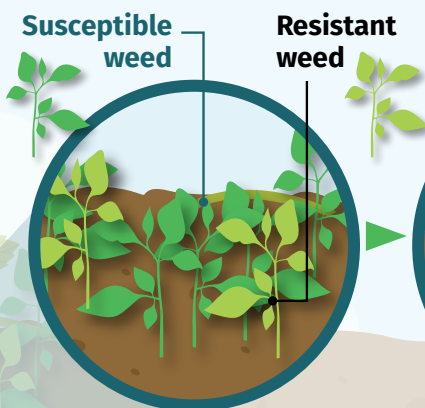
Herbicide resistance doesn't start when you spray, it already exists in the field. A small number of weeds naturally survive due to genetic differences. When a herbicide is applied, it acts like a filter: susceptible weeds die, while naturally resistant ones survive and produce seed.

Over time, repeated use of the same herbicide group allows these resistant weeds to dominate the population.

What this means:

If resistant weeds are already in your field, every herbicide decision influences how quickly they take over, not whether they appear.

Herbicide
applied



Survivors reproduce
over time



Applying herbicides with the same mode of action repeatedly enables the resistant population to multiply.

UNDERSTANDING RESISTANCE

Some weed populations no longer respond to herbicides that once worked well. In certain cases, weeds are resistant to multiple herbicide groups, making them harder and more expensive to control.

Without changes in crop management strategies, herbicide resistance will continue to spread and limit available control options for Canadian farmers.

Why this matters:

Resistance can reduce yield, increase input costs, and limit future herbicide options, sometimes within just a few growing seasons.



HOW RESISTANCE DEVELOPS IN THE FIELD

Herbicide resistance is driven by selection pressure. The more often the same control strategy is used, the more likely resistant weeds are to survive and reproduce.

These systems provide many agronomic benefits, but they also increase dependence on herbicides and accelerate resistance development.

Key factors that increase risk include:

- ▶ Repeated use of the same herbicide group
- ▶ Heavy reliance on herbicides for weed control
- ▶ Cropping system changes such as continuous cropping and reduced tillage

What this means for Canadian farms:

Cropping systems that rely heavily on herbicides, especially with limited rotation of herbicide groups, create the ideal conditions for resistance to develop and spread.



TYPES OF HERBICIDE RESISTANCE

Understanding the type of resistance can help explain why some herbicides stop working. **Herbicide resistance can develop in two main ways:**

1. Cross resistance

Occurs when a single resistance mechanism allows a weed to survive multiple herbicides, often within the same mode of action. In other words, one change in the plant can block several herbicides.

What this means: Switching between herbicides with the same mode of action may not improve control, so be sure to double check active ingredients before applying herbicides.

2. Multiple resistance



Occurs when a weed develops two or more different resistance mechanisms, allowing it to survive herbicides from different groups. This means that multiple changes in the plant block multiple herbicide options.

Why this matters: Multiple resistance can quickly eliminate several herbicide options at once, leaving fewer effective tools for in-crop control.

HOW RESISTANCE WORKS

Resistance develops through two main biological mechanisms:

1. Target-Site Resistance

This occurs when genetic mutations alter the herbicide's target protein inside the weed. When the target site changes, the herbicide can no longer bind effectively, allowing the weed to survive.

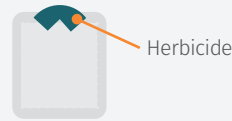
What this means: Increasing herbicide rates will not overcome this type of resistance – once the target site changes, the mode of action can no longer work effectively.

SUSCEPTIBLE WEED

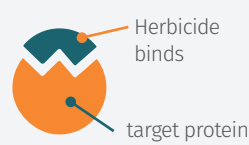
1. Herbicide spray applied



2. Herbicide enter the plant cell



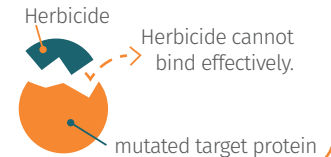
3. Herbicide tries to bind to the target site



= Weed dies



TARGET SITE RESISTANCE



= Resistant weed survives



2. Non-Target-Site Resistance

The weed survives by breaking down or detoxifying the herbicide before it can act. This type of resistance is especially concerning because it can affect multiple herbicide groups, even those the weed has not been exposed to before.



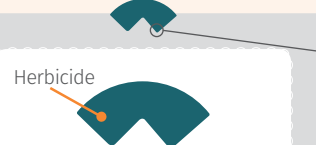
Why this matters: This type of resistance can reduce the effectiveness of multiple herbicide groups at once, making chemical group rotation alone less reliable as a management strategy.

NON-TARGET-SITE RESISTANCE

1. Herbicide spray applied



2. Herbicide enters the weed cell



3. Detoxifying enzyme breaks down herbicide.



4. Transporters pump herbicide out of the weed.




5. Herbicide is removed before it can reach its target and cause damage. **Resistant weed survives.**



WHAT THIS MEANS IN THE FIELD

2 **2**
Repeated use of the **same** herbicide increases resistance risk


Switching herbicide products alone may **not** solve the problem

2 **4** **9**
Some weeds may **survive multiple** herbicide groups

Long-term control requires a **diversified approach**

Using a combination of strategies – not just herbicides – is key to slowing resistance and maintaining effective weed control tools.

Bottom line: Herbicide resistance is a long-term crop management issue. The earlier it's addressed, the more options remain available to growers

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For more information, visit [ManageResistanceNow.ca](https://www.ManageResistanceNow.ca)

This information is brought to you by CropLife Canada.

