MANAGE RESISTANCE *Now*

Protect your land, one field at a time

HERBICIDE-TOLERANT CROPS 101

WHAT ARE HERBICIDE-TOLERANT CROPS?

Herbicide-tolerant* (HT) crops are a plant science innovation that bring many benefits to growers. Herbicide-tolerant crop hybrids/cultivars have the ability to withstand a particular herbicide, or class of herbicides, allowing growers to chemically control weeds without harming the crop when applied correctly.

Many plants (crops and weeds) have a natural tolerance to certain herbicides. Therefore, when using a conventional herbicide program, growers must carefully select products that will control the target weed only. Herbicide-tolerant crops improve this process by giving the plant tolerance to herbicides that can control all or most weeds while also keeping the crop safe. This can result in fewer herbicide applications and can eliminate the need for tillage, which keeps nutrients and water in the soil, increases soil fertility and reduces soil erosion.

A number of HT crops are grown in Canada, including canola, field and sweet corn, soybean, wheat, sugar beet, alfalfa, lentil and sunflower. These HT crops have tolerance to specific herbicides (see table for key crops).

MULTIPLE-TRAIT RESISTANCE

HT crops can have single or multiple-trait resistance. In this crop system, the HT traits are combined to allow use of diverse herbicides and herbicide mixtures to tailor applications based on field-specific needs. This creates the opportunity for a susceptible weed to be controlled using different or multiple modes of action and reduces reliance on any single herbicide, providing a tool to help manage the development of weed resistance.

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MAJOR HERBICIDE-TOLERANT FIELD CROPS GROWN IN CANADA

Herbicide tolerance	Soybean	Corn	Canola	Wheat
Sethoxydim (Group 1)				•
Imidazolinone (Group 2)		•	•	•
Thefensulfuron-methyl and Tribenuron-methyl (Group 2)			•	
2,4-D (Group 4)	•	•		
Dicamba (Group 4)	•	•		
Glyphosate (Group 9)	•	•	•	
Glufosinate (Group 10)	•	•	•	
Isoxaflutole (Group 27)	•			

BEST MANAGEMENT PRACTICES FOR MANAGING RESISTANCE IN HT CROPS

Best management practices (BMPs) for managing weed resistance in HT crops follow the very same approach used for managing weed resistance in non-HT crops. This includes a combination of cultural, mechanical, biological, and chemical control measures. These have been described **here** and include the following:

1 ROTATE CROPS

- Rotating crops within a field each growing season is essential to managing herbicide resistance. It can also facilitate herbicide rotation.

2 MIX AND ROTATE HERBICIDE GROUPS

- Rotate herbicide modes of action within and between growing seasons. Use herbicide mixtures and rotate the mixture modes of action for even more impact, ensuring each different herbicide controls the same weed for multi mode of action control.
- Also keep in mind which herbicide modes of action are planned for that field in the next five years.

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3 USE LABEL RATE AND TIMING

- Using below-label rates of herbicides can contribute to development of resistance due to sub-lethal doses. Use the full rate, recommended timing and water volume indicated on the label to maximize control of weeds.

When using herbicide-tolerant traits, you also need to:

4 MANAGE VOLUNTEERS IN CROPS SUCCEEDING AN HT CROP

- Expect volunteer plants to emerge in the field in the year(s) following a HT crop. This can be the result of seed loss before or during harvest, or transfer of seed by farm equipment. Consider volunteer plants as weeds and factor them into your weed control plans.
- For specific management strategies, refer to this Managing HT Volunteers Factsheet [insert link].

For more BMPs to manage herbicide resistance, refer to this **factsheet**.

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***Note on terminology:**

The Canadian Weed Science Society (CWSS) and the Weed Science Society of America (WSSA)[1] use the term *'herbicide resistance'* to describe crops where resistance (survival to a dose of herbicide normally lethal) has been induced through breeding or genetic modification. However, for the last 25 years, *'herbicide tolerance'* has been the common term used by growers, industry and government, including the Canadian Food Inspection Agency[2].

[1] https://wssa.net/wssa/weed/resistance/herbicide-resistance-and-herbicide-tolerance-definitions/

[2] https://www.inspection.gc.ca/plant-varieties/plants-with-novel-traits/general-public/herbicide-tolerant-plants/eng/1338136535331/1338136720078