

# MANAGE RESISTANCE*Now*

Protect your land, one field at a time



## MANAGING HERBICIDE-TOLERANT VOLUNTEERS

Volunteer weeds are derived from the seed of previous crops, and when previous crops include herbicide-tolerant\* (HT) traits, growers may need to pay particular attention to how they will be controlled.

Volunteer HT plants are the result of seed that was missed, spilled or shelled out at harvest or spread by farm equipment from a previous season. Seed that remains in the field can overwinter and germinate, producing volunteers that carry the HT trait. Control is necessary to prevent continued reproduction.

Volunteers can also cause management problems in following growing seasons if the volunteers are resistant to the same herbicide being used in that crop. All volunteer plants should be considered weeds as they will threaten crop yield and quality if left uncontrolled. Controlling volunteers is critical because they will compete with the crop for light, water and nutrients, and can be an alternate host for diseases and other pests.

### GENERAL PRACTICES FOR MANAGING VOLUNTEERS

There are specific management recommendations for each species of volunteer, but these are general practices that apply to all:

- Take steps to limit seed loss at harvest, such as careful equipment set-up and proper harvest timing and speed.
- Thoroughly clean equipment after planting and harvesting a HT crop to remove all remaining seed or grain and limit transfer to other fields.
- Rotate crops and herbicide modes of action.

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- Contact your seed company representative/retailer, provincial extension specialist, crop advisor, agronomist and/or manufacturer representative for specific solutions. Also refer to provincial crop protection guides to determine the appropriate herbicides for control of volunteer plants (see sidebar). For further details on appropriate rates and optimum application timing, refer to the product label(s).

## STRATEGIES TO MANAGE VOLUNTEERS IN SUBSEQUENT CROPS

There are specific strategies to manage volunteer canola, corn, soybean and wheat in crops planted in subsequent seasons.

### Volunteer Canola

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Volunteer canola plants can be numerous and may emerge for several years after growing the HT crop. In addition to reducing yield and quality, volunteer canola may increase the risk of disease such as clubroot in a field.

#### Prevent harvest losses

To minimize volunteer canola, it is important to reduce harvest losses. If swathing, proper timing is critical to minimize pod shatter and the spread of seeds. Harvest of desiccated canola crops should commence as soon as the crop can be combined to reduce losses.

At harvest, be sure the combine is properly adjusted and consider using a drop pan to measure how much grain is lost out the back. Combine speed can play a role in seed losses, where a slower speed results in reduced seed losses. Though not yet readily available, weed seed destructors are a valuable tool that will destroy most canola seed that comes out of the back of the combine.

#### Timely tillage

Early fall soil disturbance, shortly after canola harvest, can promote seed-to-soil contact resulting in germination of a large portion of canola seed lost during harvest. Harsh winter environments in Western Canada result in winterkill of canola seedlings that emerge in the fall, thereby depleting the volunteer canola seed bank before planting the subsequent crop. This can be achieved even with light soil disturbance (e.g., tine harrow). Burying canola seeds too deep (>12 cm) could induce seed dormancy and prolong persistence of the volunteer canola seed bank.

## PROVINCIAL CROP PROTECTION GUIDES

### Alberta:

Blue Book (Crop Production Manual)

### Saskatchewan:

Guide to Crop Protection

### Manitoba:

Guide to Field Crop Protection

### Ontario:

Guide to Weed Control - Field Crops

### Quebec (website):

[www.sagepesticides.qc.ca](http://www.sagepesticides.qc.ca)

**To minimize volunteer canola, it is important to reduce harvest losses.**

In the spring, volunteer canola may be encouraged to germinate with early season light tillage. Sometimes referred to as a “Stale Seedbed,” this practice includes early pre-plant tillage to stimulate germination of weeds, which are then controlled with herbicides or a second tillage operation immediately before seeding. Alternatively, low-disturbance seed-row openers can be used to mitigate volunteer seedling emergences in no-till production systems.

### Herbicide control

Use of a herbicide with an alternate mode of action (either tank mixed or applied separately) at least once per growing season will help control volunteer HT canola. Growers should take advantage of pre-seed herbicide options in the fall or spring utilizing a different mode of action to the HT herbicide alone or in combination with other actives. Some products provide control of multiple flushes of volunteer canola. Target volunteer canola prior to the four-leaf stage for optimum control.

If volunteer control requires an in-crop application, growers have good herbicide options. Specific attention must be taken to ensure that a different mode of action herbicide is used as compared to the HT volunteers. Pre-harvest weed control applications may also be utilized if volunteer plants were not completely controlled in-crop to reduce seed production.

### Volunteer Corn

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Corn kernels left on the ground during harvest can overwinter and germinate in the next crop. In addition to reducing yield and quality, volunteer corn can also provide a bridge for pests like corn rootworm to survive a soybean crop and pose insect resistance concerns for the following corn crop. (Volunteer corn does not express the same level of Bt for corn rootworm control as hybrid seed corn).

### Herbicide control

Early-season control of volunteer corn is essential. Volunteer plants are controlled by a number of Group 1 and 22 herbicides provided they are applied prior to the six-leaf stage. Refer to provincial crop protection guides to determine the appropriate herbicides for control of volunteer

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plants (see sidebar). For further detail on appropriate rates and optimum timing of application, always refer to the product label(s).

### Tillage prior to planting

Tillage is also an option for some operations. Fall moldboard plowing buries the seed and provides effective control. Spring tillage will control emerged volunteer corn plants.

### Follow proper application techniques

Volunteer corn often grows in clumps when multiple kernels germinate from an ear. In denser clumps, some plants may be shielded by others during post-emergence spraying operations. Reduce this problem by using higher spray volumes (as indicated on the label) with correct nozzle types and proper alignment to provide good spray coverage.

## Volunteer Soybean

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Volunteer soybean is usually not a concern for several reasons. For the most part, seeds that are left in the field will germinate within a few weeks after harvest and will be killed by freezing with the onset of winter or from fall or spring tillage.

### Herbicide control

If volunteer soybean appears in a field in the spring at significant levels, growers should review their herbicide program to ensure that the volunteer soybean will be controlled.

## Volunteer Wheat

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Volunteer wheat is primarily the result of grain lost during harvest operations due to improper mechanical set-up, spillage or hail. Wheat seed is also spread in areas of the field where lodging occurs. Three factors commonly associated with lodging are poor weather conditions later in the growing season, disease pressure and late harvest. High nitrogen rates and higher seeding rates (which are used to help combat Fusarium head blight) can also increase chances of lodging.

Tall cultivars are susceptible to lodging as well. When any of these factors exist, it indicates that volunteer wheat should be considered in any weed control program.

**If volunteer soybean appears in a field in the spring at significant levels, growers should review their herbicide program to ensure that the volunteer soybean will be controlled.**

## Minimum tillage

Minimum tillage is an excellent management practice for the control of volunteer wheat. Fallen seed should be left in the stubble in the fall. To help minimize the volunteer pressure, it is best to leave the wheat seeds near the soil surface after harvest. Maximum germination of wheat seed left on the surface will occur prior to seeding the following spring. The seed that germinates in the fall is often controlled by frost. The volunteer cereal that germinates in the spring can easily be controlled by spring tillage, burndown, or pre-seed herbicide application.

## Herbicide control

There are also many other options available for in-crop herbicide applications to control volunteer wheat.

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## UNEXPECTED VOLUNTEERS

Growers should not be surprised to find HT volunteers in fields that were not previously planted to HT crops. This can occur due to commingling in seeding and harvesting equipment or adventitious presence in seed or seed that has been dormant for more than a year. In the case of canola, outcrossing may also be the cause (i.e., two crops beside each other with different HT traits can cross and some volunteers can be multiple HT).

To minimize the presence of unexpected HT volunteer plants:

- 1** Review the choice of herbicide mode of action for burndown prior to seeding.
- 2** Integrate the use of post-harvest cultivation into field maintenance (if suitable to the conditions in your region).
- 3** Utilize control measures that may be considered in non-crop areas.
- 4** Grow Certified Seed to reduce the chance of unwanted plants from growing.

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For more information, visit **ManageResistanceNow.ca**

This information is brought to you by CropLife Canada.



## **\*Note on terminology:**

The Canadian Weed Science Society (CWSS) and the Weed Science Society of America (WSSA)<sup>1</sup> 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<sup>2</sup>.

<sup>1</sup> <https://wssa.net/wssa/weed/resistance/herbicide-resistance-and-herbicide-tolerance-definitions/>

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