

MANAGE RESISTANCE*Now*

Protect your land, one field at a time

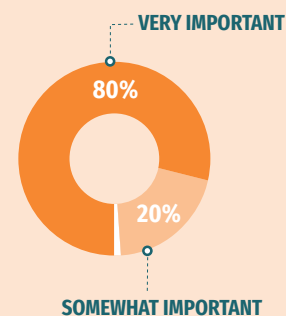


HOW TO MANAGE INSECT RESISTANCE IN YOUR Bt CORN

Bt crops have helped Canadian growers manage insect pests for more than two decades. Unfortunately, the development of resistance to these Bt corn hybrids is inevitable, but growers can slow this from happening and prolong the life of these important tools by practicing Integrated Pest Management (IPM). This approach uses multiple tools, such as cultural, biological and mechanical controls, to manage key pests within a long-term strategy. These strategies are described further in this factsheet. Growers should also work closely with crop experts such as seed company agronomists, provincial extension specialists, or other crop advisors to develop specific plans that work for their farms.

Start today and take it one field at a time.

Almost 80% of growers consider insect resistance management practices to be very important.¹



BEST MANAGEMENT PRACTICES (BMPs)

1 SCOUT FOR PESTS AND INSECT DAMAGE

- Scout your fields to know what pests are present and how much damage they have caused.
- Correct identification and monitoring of corn pests are critical to making effective pest management decisions.
- Know what pests should be controlled by the Bt corn being grown — not all corn pests are controlled by Bt traits.

2 ROTATE CROPS & TRAITS

Rotate crops

- **Best option:** do not plant corn in the same field in consecutive years, grow a different crop entirely in alternating years.

Scouting fields for insect damage, as an IRM requirement, continues to have both low awareness (44%) and the lowest compliance (69%).¹

BEST MANAGEMENT PRACTICES (BMPs) CONTINUED

- **Alternative option:** if planting corn consecutively, avoid planting Bt crops in the same field two years in a row. Use non-Bt varieties. This gives insects less exposure to Bt proteins, thereby slowing resistance developing.

Rotate traits for the target pest

- **Best option:** plant Bt hybrids with multiple modes of action (MOAs) for the target pest whenever possible.
- **Alternative option:** if a multiple-MOA product is not an option, rotate to a different Bt trait hybrid or use a non-Bt hybrid with insecticide.
- Consult the Bt traits table at cornpest.ca for a complete list of traits available in Canada.

3

PLANT A REFUGE

- Refuge planting is mandatory and involves planting part of each field (or adjacent field) with a non-Bt hybrid of the same crop. This allows some non-resistant insects to survive and mate with resistant insects, producing non-resistant offspring.

There are two types of refuge:

- **Integrated refuge:** bag containing Bt seed mixed with non-Bt seed
- **Structured refuge:** a specific area that you plant with a refuge hybrid alongside your Bt hybrid

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MANAGE WITH INSECTICIDES

- Insecticides can be used in place of Bt crops to manage many pests. Before considering this, refer to the factsheet titled [Evaluating the Need for Insecticide Application](#).
- Insects can also develop resistance to insecticides. For this reason, rotation of insecticide groups/MOAs is critical. Refer to the [Follow Insecticide Best Practices](#) factsheet for more information about MOAs and application BMPs. Consider rotation of traited corn and conventional corn with use of insecticides.

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KEEP ACCURATE RECORDS

- Keep accurate records of where traited and conventional corn has been planted and which hybrids were planted. This helps both you and your crop advisors compare the performance of your transgenic and refuge hybrids. It also helps to recognize suspicious feeding activity in the transgenic corn.

Growers should report to their seed company any unexpected damage, based on past performance (e.g. an increase in number of pests).

Mode of Action or MOA is dependent on the specific genes expressed in the plant. Consult the [Bt traits table](#) or your crop advisor for more information.

FOLLOW THESE STEPS WHEN YOU EXPERIENCE INSECT DAMAGE IN YOUR Bt CORN

You can do these steps with the help of your seed company representative, provincial extension specialist, crop advisor, and/or agronomist.

- 1 **SCOUT** – Scout both Bt and non-Bt corn for insect damage to crop.
- 2 **FIELD INVESTIGATION** – Rule out other causes for damage, evaluate pest presence/pressure, verify correct planting and confirm trait presence.
- 3 **CONTACT SEED COMPANY** – If damage exceeds expected thresholds (“unexpected damage”) and other causes are ruled out, your seed company representative must be among the people informed.
- 4 **BEST MANAGEMENT PRACTICES** – Based on the outcome of the evaluation, your seed company will advise on IPM practices to mitigate or reduce pest pressure.
- 5 **COLLECT INSECTS** – Based on the outcome of the evaluation, the seed company may arrange for samples of the insects in the impacted field to be collected for further lab evaluation. The Canadian Food Inspection Agency (CFIA) will also be notified at this time by the original trait developer.
- 6 **RESISTANCE MITIGATION** – If resistance is confirmed, you will be informed of any further mitigation actions that may be needed (see sidebar).

Watch this video to learn more about managing insect resistance in Bt corn: <https://www.youtube.com/watch?v=A5p8EoIX7AQ>

¹ Bt Corn Insect Resistance Management Study, iFusion Research, August/September 2019

MITIGATION ACTIONS

The mitigation strategy is developed by a team of experts and will not be one size-fits-all. Measures will be dependent on which hybrids are impacted, what tools are available to the grower, and the extent of the issue. The trait developer will communicate any needed mitigation measure with the grower and all relevant stakeholders. Some common mitigation practices could include:

CORN ROOTWORM

- Rotate to a non-host crop.
- Scout your fields to know what is there.
- Use a pyramid MOA (i.e., multiple MOAs against the same pest). For more information please see the factsheet: [Bt Corn 101](#).
- If using a single MOA, be sure to plant the appropriate refuge area and rotate the Bt trait.
- Consider use of a foliar insecticide.

EUROPEAN CORN BORER

- Rotate crop or trait.
- Scout your fields to know what is there.
- Use a pyramid MOA.
- Consider an insecticide to reduce population density.
- Destroy corn stalks in the field at the end of the season.

Now is the time to put these practices in place to manage resistance. Keep the long-term value and productivity of your land and help ensure that crop protection tools are still effective for future use. Consult with your crop advisor or visit our website [ManageResistanceNow.ca](https://www.ManageResistanceNow.ca) for more strategies and information.

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

This information is brought to you by CropLife Canada and the Canadian Corn Pest Coalition.

