



# Corn rootworm

## Resistance

### THREAT

Bt resistant Corn Rootworm (CRW) has been identified in Ontario.

CRW is a serious pest in corn causing significant yield losses upwards of 50 per cent. CRW resistance to Bt hybrids has been found in Ontario corn fields.

Extensive injury by CRW to pyramid Bt rootworm hybrids has been seen in several counties (Huron, Perth, Durham) in 2020. The level of CRW injury in Ontario is where U.S. corn fields were just prior to widespread cross resistance being reported. CRW resistance can easily spread if preventative measures are not taken. •

### IDENTIFICATION

- **Goosenecked corn:** plants with poor root systems due to larval feeding lose the ability to anchor into the soil.
- **Small corn roots or clubbed roots:** caused by larval feeding on root hairs, root pruning, and root tunneling (early June until early August), roots appear dead and broken on the ends.
- **Adult beetles:** feeding on leaves, pollen, and silk.

The adult threshold will indicate the risk of larvae next year. One beetle per plant during August and September indicates rootworm

protection is needed if the field will be planted to corn the next year.

Northern (green beetle) and western (black and yellow striped beetle) CRW are both showing resistance to multiple Bt-root worm proteins.

High risk areas with continuous corn production should consider crop rotation to reduce the rootworm populations and mitigate resistance. If you are in a region where resistance isn't found, a pyramid Bt-RW hybrid is acceptable, but rotate hybrids and scout for signs of resistance. Keep rotation in mind to prevent future resistance.

(A) CORN ROOTWORM, ROOT FEEDING; (B) LODGING; (C) CORN ROOTWORM ON ROOT (D) GOOSENECKING CAUSED BY ROOT DAMAGE BY CORN ROOTWORM (E) NORTHERN AND WESTERN CORN ROOT WORM ADULTS. PHOTO A, B, C & E COURTESY JOCELYN SMITH. PHOTO D COURTESY C DIFONZO MICHIGAN STATE UNIVERSITY.



This research was supported by Grain Farmers of Ontario.



## CONDITIONS

### FAVOURABLE CONDITIONS

- Three or more years of continuous corn
- History of repeated Bt-root worm hybrid use
- Heavy corn production areas
- Volunteer corn the previous year
- Fine-textured soils are typically higher risk of CRW than drier coarse textured soils, however, all soil types may be at risk

## CONTROL

### CONTROL

- Crop rotation, break the life cycle of CRW, grow a different crop after corn
- If you must plant corn on corn, plant a non-rootworm Bt hybrid (above ground for corn borer or western bean cutworm) and use additional root protection tools (soil insecticide or seed treatment)
- Soil applied bio-control nematodes (research trials to be conducted in 2021 in Ontario)

Note that switching to a different pyramid Bt rootworm hybrid (contains two or more proteins targeting CRW) will NOT mitigate the resistance issue. ●

## WHAT YOU CAN DO

- Farmers who plant corn three years in a row in any field are at high risk, those who plant two years in a row are at moderate risk.

**It is imperative to rotate fields. Rotating out of corn can remove the resistant CRW population.**

- Actively scout corn fields for larval feeding, as evidenced by root clipping in July, by digging plants and inspecting roots for damage.
- Report any signs of injury or root clipping to your seed provider and the Ontario Ministry of Agriculture, Food and Rural Affairs. •



More information:

#### Decision Tree

<https://fieldcropnews.com/wp-content/uploads/2020/10/Bt-Resistant-Rootworm-Mitigation-Measures-Decision-Tree-Final.pdf>

#### Mitigation Measures

<https://fieldcropnews.com/wp-admin/Mitigation-Measures-for-Bt-Resistant-CRW-Jan-2021.pdf>

Visit [www.gfo.ca/agronomy](http://www.gfo.ca/agronomy) to download.  
Version: 02-xx-2021.