

# Western Corn Rootworm

September 2018

Western Corn Rootworm (WCRW) *Diabrotica virgifera* is a major corn pest native to the Americas. It was first detected in the Fraser Valley in August 2016. Populations reached record levels in local forage and sweet corn fields during the 2017 season. Surveying efforts have found WCRW throughout the Fraser Valley, from Delta to Laidlaw, near Hope, with the highest populations in Abbotsford and Chilliwack corn growing areas.

This pest has been an issue in the U.S. Mid-West for over 50 years, and is present in Ontario and Quebec. Although WCRW is not a quarantine pest, it is the single greatest contributor to economic loss and shifting management practices in corn growing regions in North America. It is estimated that rootworm species cause over \$1 billion in corn yield loss and control costs in the U.S. each year.

## Identification

**Larvae:** Thin, white or cream coloured, up to 10 mm long, with a tan head and a dark patch at the end of the abdomen. Larvae have 6 legs, but these may be difficult to see without magnification.

**Adults:** Very active 6 mm long yellow and black beetle. Females have 3 black longitudinal stripes, and their yellow abdomens protrude beyond their wing covers (elytra). The males' stripes coalesce and appear more like a black patch.



Western Corn Rootworm larvae in corn roots (July): brace roots completely destroyed



Western Corn Rootworm adult beetles on squash flowers (July-August)

## Damage

Adult beetles feed on corn foliage and silks of developing corn ears which can negatively affect pollination and fill of the cobs as well as be a contaminant at harvest for fresh market sweet corn.

Rootworm larvae are the most damaging stage. They feed on corn roots, compromising plant growth and stability, resulting in tipping plants, lodging, and poor yields in both sweet and forage corn. Plants may not lodge or tip over, but may look weak and drought-stricken.



*Lodging, tipping over, instability or 'goose necking' are signs of rootworm larvae feeding*



*Severe feeding damage on corn leaves from adult beetle feeding: leaves look 'bleached'*



*Severe rootworm larvae damage to roots on the 2 plants on the right. Western Corn Rootworm adult beetles snipping off corn silks*



## Biology

Corn is the only significant host of WCRW larvae. While larvae can feed on some other grasses, studies have shown that corn is required to sustain a population. WCRW overwinters as eggs scattered in the soil of corn fields. Eggs survive freezing and in fact require cold temperatures in order to complete their development and hatch in the spring and early summer. Eggs hatch in late May or June, depending on soil moisture and temperature. If corn is growing where the eggs hatch, the larvae will feed on brace roots of corn, complete their growth by early-mid July, and pupate in the soil around the corn plants. After pupating for about a week, adult beetles emerge and begin to feed on above-ground foliage, flowers, and silks. Beetles are very mobile, and seek pollen sources outside of the corn fields. Beetles can be seen on many flowers and other plants besides corn. Beetles are attracted to and can destroy melon flowers. Male beetles are more apt to fly outside the corn fields they emerged from. Females are less likely to stray too far from corn fields, and they do return to lay their eggs at the base of corn plants in the soil. Peak beetle activity is late July to mid August, although beetles can be found into October. There is one generation per year.

## Monitoring

Monitoring for larvae in corn plant roots and crowns is useful to determine if the insect is present in a field. To scout for larvae, look for weak, drought stressed, or tipping plants in July. Tug on these plants and if the plant is easily pulled up, inspect the roots for presence of the thin white larvae, and damaged or absent brace roots. Small 1 mm diameter boring holes may be evident in the roots. Brown or discoloured root areas indicate that decay organisms are colonizing the larvae-damaged roots. For fields where whole plants are missing, the cause is more likely due to wireworm or birds, and not WCRW larvae. If compromised plants and rootworm larvae are readily found, management steps need to be taken in the field next season.

Adult beetles can be monitored for in July-August, and it is useful to determine if the insect is present in a field and if management efforts should be taken either in the current year or in the next year. Visually scout for beetles, either with yellow sticky cards attached to corn plants checked once per week, or field scouting. If scouting fields, visually check 20-60 plants per field, walk along the field edges and into the field and record the number of beetles per plant or damaged plants. Alternatively, spend a certain amount of time per field looking (i.e. 10 minutes per field). Carefully check ears and leaf axils for beetles. Beetles are easily disturbed and will fly or drop quickly, and are especially active during the evening.



*Yellow sticky trap used for monitoring Western Corn Rootworm beetles in corn*

## Management

**Sweet corn:** In late-planted sweet corn, where at least 5-10 beetles per plant are counted at pollination time, a foliar spray for adults may be necessary to prevent incomplete pollination and poor cob filling. Beetles can also be a cob contaminant at harvest so may need to be managed for this reason. If beetles are found in significant numbers (more than one per plant on average or 1-2 per trap per day on average) rotate out of corn next year if possible, or take further steps at planting.

**Forage corn:** Beetle numbers are not likely to be high enough to warrant spraying for adult beetles in July-August.

In any type of corn, finding more than one beetle per plant while scouting in the summer (or on average 1-2 beetles per yellow sticky trap per day), or if there is damage to the plants such as lodging, tipping, or evidence of brace root damage from feeding larvae, then take steps the following season at planting.

- The most helpful tool is to rotate out of corn where possible every 3-4 years, for 1-2 years. There are no other significant host plants for corn rootworm, so this will break the life cycle and the pest will decrease in this field.
- Plant as early as possible. Fields planted early can withstand some rootworm feeding because eggs don't hatch until June, after plants are well established.
- Seed treatments normally done for other pests that damage corn seed may help manage corn rootworm but cannot be relied on.

If rotation out of corn is not an option, choose one or both of the following tools, depending on the severity of damage seen and population level of rootworm in the field.

- Insecticide application at the time of planting will kill larvae hatching from the overwintering corn rootworm eggs in the soil before they can feed on and damage the corn roots.
- Plant a corn hybrid with resistance to corn rootworm. Talk to your seed supplier about the best choice for your area.
  - Refuges of rootworm-susceptible corn need be incorporated into the field, either at 5 or 20% depending on the resistant hybrid chosen. These refuges should ideally be treated with insecticide at planting to prevent rootworm damage.
  - Resistant corn hybrids should only be used for 2-3 year in a row before rotating out of corn or shifting to a rootworm-susceptible variety with an insecticide applied at planting.

## For Further Information

- Canadian Corn Pest Coalition: <https://www.cornpest.ca/photo-gallery/corn-rootworm/>
- Ontario Ministry of Agriculture: <http://www.omafra.gov.on.ca/IPM/english/sweet-corn/insects/corn-rootworm.html>
- Penn State: <https://ento.psu.edu/extension/factsheets/corn-rootworm>

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