

Western Bean Cutworm

Scouting and Management in Field Corn

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The Primary Pest of Corn in Ontario

Native to North America, western bean cutworm, *Striacosta albicosta* had been a long-time resident of the U.S. Great Plains region until it began expanding its range eastward and was first detected in Ontario in 2008. Overwintering populations have established here and WBC has become one of the most significant management challenges for Ontario corn producers.

Identification

Despite its name, western bean cutworm (WBC) is a pest of corn (field, sweet and seed) as well as dry bean. Unlike other cutworms, this pest feeds on the fruit of the plant, i.e., corn ears and bean pods. Adult WBC moths have a white band along the margin of each wing and each wing has a “full moon’ and boomerang-like mark (Fig. 1).

Newly hatched WBC larvae have dark heads and spots along their bodies, somewhat resembling European corn borer larvae. Once in the third instar, their heads lighten and bodies change to a tan-pink colour, with subtle longitudinal stripes. Once in their final fifth and sixth instars, two broad dark brown stripes develop behind their head (pronotum) which distinguishes them from other ear feeding larvae. (Fig. 2)

Eggs are laid in masses of 5-200 eggs, typically on the upper surface of corn leaves close to the tassel. Eggs are the size of a pin head, pearly white when first laid and are shaped like

tiny cantaloupes (Fig. 3). They take 5-7 days to hatch, gradually darkening to tan and then purple, within 2-3 days before hatching.

Damage

WBC larvae begin by feeding on pollen then feed on silks and ear tip kernels but will also feed farther down the ear from within and outside the husk. WBC larvae are very mobile and may disperse from their original plant to a number of plants along and across the corn rows. Multiple larvae can feed within the same ear. Birds may also damage ears while searching for WBC larvae.

Yield loss due to infestation of one WBC larva/ear has been estimated to reach 15 bu/ac. In Ontario, the risk of mycotoxin development in grain, even from small amounts of WBC injury is of greater importance.

Fields with sandy soils located between Thamesville and Strathroy, and Tillsonburg to Simcoe experience economic injury every year. However, WBC infestations are not limited to these regions and can occur in any suitable field in Ontario. High-risk fields include those in late whorl to early tassel stage, close to peak moth flight. Fields with variable crop stage are ideal for prolonged egg laying as they may be attractive to moths over a longer time period. Cool, wet springs that delay planting places many fields at risk as they enter into the ideal crop stages during peak moth flight.



Figure 1. Western bean cutworm adult.
Photo credit: Jocelyn Smith, UGRC



Figure 2. Western bean cutworm larva.
Photo Credit: Tracey Baute, OMAFRA



Figure 3. Freshly laid WBC eggs.
Photo Credit: Tracey Baute, OMAFRA

The WBC Life Cycle

Western bean cutworm complete one generation per year (Fig 4). Through fall to early spring, pre-pupae lie dormant in soil chambers until spring when they pupate (A). Moths emerge from the soil beginning in early July (B) though migratory moths from nearby states (eg. Michigan) can be captured in traps in Ontario as early as the first week of June (C). Average peak moth flight in Ontario occurs during the last week of July, though this timing varies regionally. Southern-most counties tend to peak in the second week of July, while eastern counties don't experience peak flight until the first or second week of August.

Moths are mostly active at night. Individual moths live for about one week. Mated females are attracted to late whorl to early-tassel stage corn to lay their eggs on the top two or three leaves of the plants (D). Eggs take five to seven days to hatch, starting as pearly white when fresh, turning a purple colour within a few days of hatching (E&F). Egg laying can occur in Ontario anytime from mid-June to the end of August.

Once the eggs hatch, the tiny larvae consume their egg shell then climb up to feed on tassel tissue and pollen in the enclosed whorl or the fully emerged tassel (G). After 2-4 days, they move down to feed on silk and enter the ear where they spend the rest of their developmental time (H) before dropping to the ground to burrow down and enter the pre-pupal stage in the fall (I).

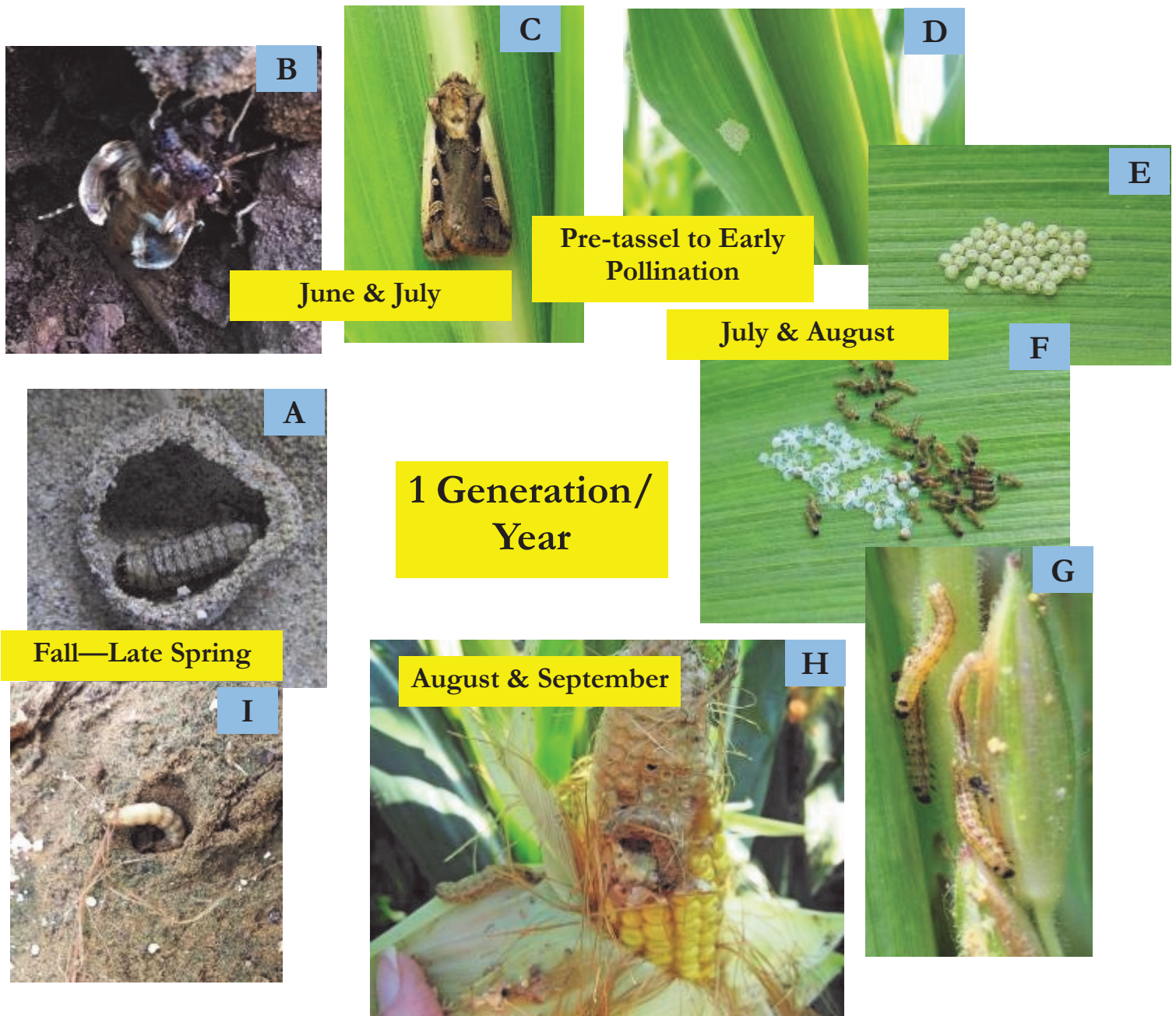


Figure 4. Life cycle of western bean cutworm in corn in Ontario.

Photo Credits: Jocelyn Smith, UGRC for A, C and I; Tracey Baute, OMAFRA for D, E, F and H; Chris DiFonzo, Michigan State University for G and OMAFRA for B.

Scouting Guidelines In Corn

Pheromone Trapping

Pheromone traps are used to monitor moth activity and detect when peak flight occurs. Traps also determine if WBC are active outside of the known hotspots in Ontario. Trap counts do not determine when to spray, but identify fields at risk that require scouting to determine if threshold has been reached. Peak egg laying follows shortly after peak flight which therefore indicates when to scout for eggs.

Traps should be monitored at least weekly in early July until late August. As peak flight approaches, plan to monitor the traps more frequently so that there are fewer moths to count at one time and the moths are less likely to be deteriorated and difficult to identify.

Green bucket or universal traps (uni-traps) are preferred for WBC (Fig. 5). Milk jug traps are more labour intensive, often drying out of their antifreeze in hot weather, rendering the trap useless.



Figure 5. All green bucket traps used for WBC monitoring.
Photo credit: Jen Bruggeman, UGRC

bottom of the trap to kill moths so they don't escape when the trap is opened. One strip will last for approximately 2 months. Use gloves when handling the lures and vapour strips. Trap supplies can be purchased at a number of supply companies listed on the WBC Trap Network website (see last page for link).

Position the trap along the edge of the field on the prevailing wind side. This will help carry the pheromone plume into the field being monitoring and give a better indication of moth activity for that field.

Trap participants are encouraged to join the WBC Trap Network and provide their weekly trap counts during the season. In return, interactive maps are created to help identify those areas at risk that require scouting. Weekly maps can also be found on the WBC Trap Network at:

<https://www.cornpest.ca/wbc-trap-network/>

Scouting

Prepare to scout fields at risk during the weeks prior, during and after peak flight for your region (Fig. 6). Scout at least 100 plants (20 plants in 5 areas of the field) every five days and target fields or areas within each field that are in the pre-tassel to full tassel stages. Focus on the top three-to-four upper leaves of the plant looking for egg masses or young larvae on the upper surface of the leaves or larvae on the tassel.

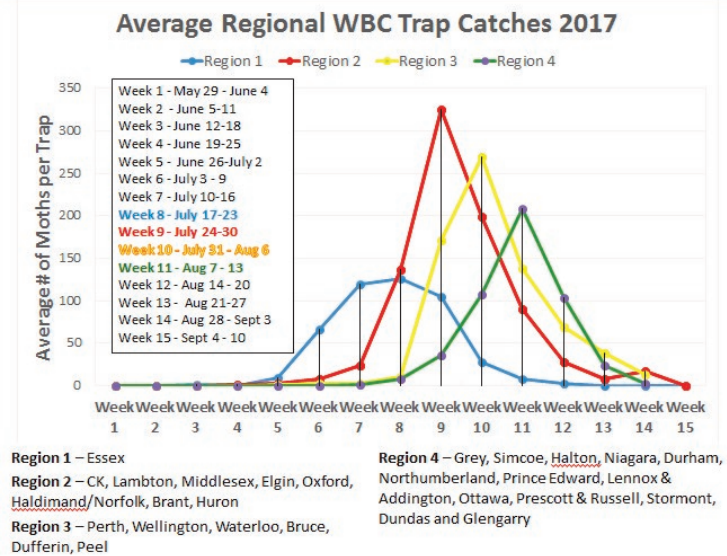


Figure 6. Peak WBC Moth Flight by Region in 2017. Peak begins in the 3rd week of July in southwestern counties, advancing eastward each week until the 2nd week of August for central and eastern Ontario.

Use the sun to your advantage and look for shadows of egg masses showing through the leaves (Fig. 7). Turn the leaves over to confirm that it is a WBC egg mass.

Early-planted corn can sometimes escape WBC damage if the crop has tasseled a few weeks before peak moth flight. Delayed spring planting results in many fields being at risk, reaching the ideal crop stages during peak moth flight. Once the crop is in late-tassel/pollination stage and beyond, moths prefer to lay their eggs in dry bean fields or in later planted corn fields.



Figure 7. Sun shining through the leaves helps to spot WBC egg masses. Turn the leaf over to confirm that they are WBC. Photo credit: Tracey Baute, OMAFRA

Action Threshold for Corn

Use cumulative counts to determine if threshold has been reached. When there is an accumulation of 5% of the plants with fresh egg masses or small larvae over the two to three week scouting period, threshold has been reached. For example, if during the first scouting trip 2% of the plants have egg masses on them, then five days later during the second scouting trip there were 3% of the plants with fresh egg masses, then threshold has been reached.

Time the insecticide application to when fresh silks (R1) are present, but prior to silks turning brown (R2). Direct the spray at the ear zone for maximum effectiveness. Spraying during the pre-tassel to early tassel stage is pre-mature, as there will be a week or two of egg laying and hatching and insecticides lack residual to provide protection for that long of a period.

Tankmixing with fungicides for fusarium ear moulds during fresh silks can help reduce the risk from mycotoxins, particularly if conditions are ideal for ear mould development. Hybrids susceptible to fusarium development may require a lower WBC threshold.

Management Strategies

Bt corn

- Prioritize hybrid selection based on tolerance to ear rot pathogens (eg. Fusarium) and mycotoxins.
- WBC in Ontario are no longer controlled by Cry1F (Herculex and SmartStax)
- Only hybrids containing Vip3A (Viptera) provide protection against WBC damage however, there is a risk of resistance developing since this is the only trait now providing control. Scout and report any unexpected damage found in Vip3A fields.
- All other Bt corn fields need to be treated as conventional hybrids, following thresholds and spray guidelines.

Insecticides

- Several foliar insecticides are registered for western bean cutworm control in corn.
- To reduce the risk of resistance, rotate between chemical families each year.
- Foliar insecticide timing is critical. Time application to when fresh silks are present, as all larvae present on the plant will make their way to the silks before entering the ear.
- Follow label restrictions regarding application timings to protect pollinators. Avoid spraying insecticides during daily bee flight time periods if tassels are present.
- Follow buffer zone requirements to minimize spray drift in pollinator and beneficial habitats close to the application site.

Insecticides and Fungicides

- Fungicides targeting Fusarium infection do not protect from WBC damage but can protect against ear mould development.

- Insecticide and fungicide tank mixes should be applied to target the R1 stage (full silk emergence, before silk browning) and when the majority of WBC egg masses have hatched. Application at R2 is too late for effective WBC control.
- Always check the product labels for information on compatibility.

Cultural and Biological Control

- Deep tillage can help disturb and kill larvae overwintering in soil chambers, though is unlikely to significantly reduce populations.
- Several natural enemies feed on egg masses and young larvae, including lady beetles, lacewing larvae and others.

Other WBC Resources

Western Bean Cutworm Trapping Network:

<https://www.cornpest.ca/wbc-trap-network/>

Interactive WBC Trap Maps for Ontario, Michigan and Quebec:

<http://www.arcgis.com/apps/webappviewer/index.html?id=a9e6a076b6cf4ff281cdf460d3ffdad&extent=-9536825.4859,4865123.8334,-7971395.1466,5987830.9048,102100>

WBC Biology and Management Information:

Pest Manager:

<http://gfo.ca/apps>

OMAFRA Publication 811, Agronomy Guide for Field Crops:

<http://www.omafra.gov.on.ca/english/crops/pub811/pub811ch15.pdf>

OMAFRA Publication 812, Field Crop Protection Guide for Field Crops:

<http://www.omafra.gov.on.ca/english/crops/pub812/p812toc.html>

In-Season Activity and Alerts:

Field Crop News/Baute Bug Blog

<http://fieldcropnews.com/category/bautebugblog/>

Twitter Feeds

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