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* has 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. As they enter 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 eaves 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 initially feed on silk 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 up 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 WBC injury leading to increased mycotoxin development in grain 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 (mid-late July). Fields with variable crop stage and plant height are ideal for prolonged egg laying within the same field as they may be attractive to moths over a long time period.

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

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Life Cycle

Western bean cutworm complete one generation per year (Fig 4). Through fall to early summer, pre-pupae lie dormant beneath the soil in chambers until spring when they pupate (A). Adult moths climb out of 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). Peak moth emergence in Ontario typically occurs during the last week of July, though some counties may peak one week earlier or later than that.

Moths are mostly active at night, searching for mates and nectar to feed. Mated females are preferentially 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 are white when fresh but turn to 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 and pollen tissue either enclosed in the whorl or when the tassel is fully emerged (G). After 2-4 days, the larvae then move down the 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).

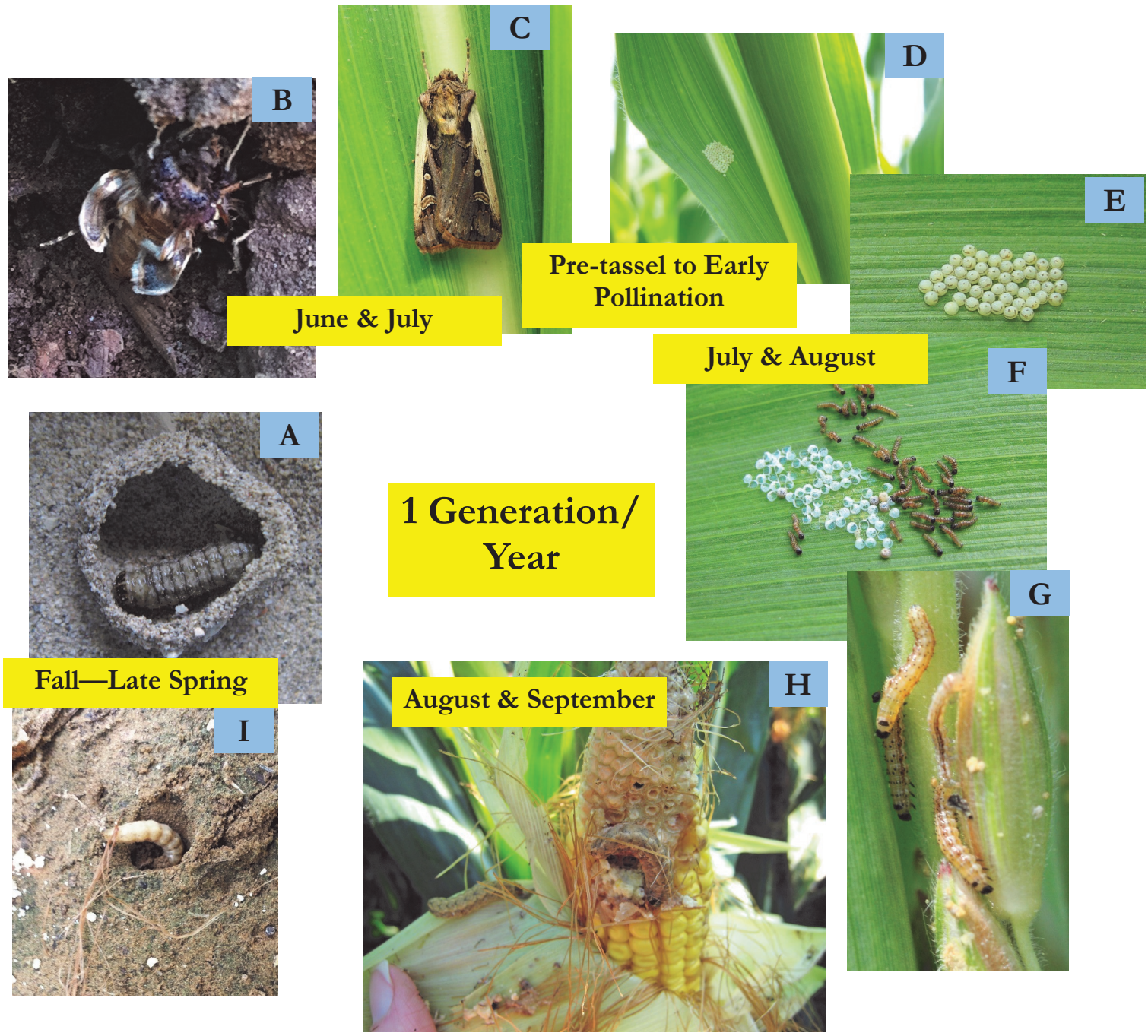

Figure 4. Life cycle of western bean cutworm in corn in Ontario.
Photo Credits: Jocelyn Smith, UGRC for A, C and I; Tracey Baute, OMAFRA for D, E, F and H; Chris DiFonzo, Michigan State University for G and OMAFRA for B.

Scouting Guidelines In Corn

Pheromone Trapping

Pheromone traps are used to monitor moth activity and detect peak flight. Traps also determine if WBC are active outside of the known hotspots in Ontario. Trap counts are not used to determine when to spray, but identify fields at risk and when scouting is required. Peak flight in Ontario typically occurs in the last week of July but can be one week earlier or later depending on weather and other factors. Peak egg laying follows shortly after peak flight.

Traps should be monitored at least weekly in early July until late August. Count and discard any moths captured within the bucket. Ensure that the moths counted are WBC. Other moths including large yellow underwing moths and yellow striped armyworm are also attracted to these traps. 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

One trap per corn field is recommended. Mount the trap to hang from a stake 4 feet (1.2 metres) above the ground. Each trap will need 5 WBC pheromone lures (1 for every 3 weeks of monitoring) and 1-2 insecticide vapour strips per season. The lure is placed inside the small cage area suspended below the trap lid. Lures must stored in the freezer and changed every 3 weeks. Discard old lures off site away from the trap. Plastic vapour strips impregnated with insecticide are placed in the 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.

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.

Trap participants are encouraged to join the WBC Trap Network at www.cornpest.ca 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 be found at OMAFRA's AgMaps site at: http://ontarioca11.maps.arcgis.com/apps/MapSeries/index.html?appid=66f543e8df17462cb6eae35aa04c0341

Scouting

Scout 100 plants (20 plants in 5 areas of the field) every five days from mid July to mid August, particularly when the crop is in the pre-tassel to full tassel stages. Focus on the top three-to-four upper leaves of the plant. Look for egg masses or young larvae on the upper surface of the leaves or larvae on the tassel. Use the sun to your advantage and look for shadows of egg masses showing through the leaves (Fig 6) Turn the leaves over to confirm that it is a WBC egg mass.

Figure 6. 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

If egg masses are found but are still white (newly laid), flag the plant and return in a few days to determine if the eggs are turning purple indicating that they are ready to hatch. Eggs hatch one or two days after turning purple. It is important to observe egg hatch to know when young larvae will be active since this is the stage that insecticide application is most effective on. Infestations are very spotty within a field. Pay close attention to those areas that have variable plant height and crop stage.

Scout fields in the pre-tassel stage first. Late-planted corn is at lower risk early in the season; without tassel tissue to feed on, the larvae will die. Early-planted corn that has tasseled during moth flight may still be attractive to moths if pre-tassel stage corn or dry bean fields are not available in the area. Pay close attention to fields with variable plant height and crop stage.

Once the crop is in late-tassel/pollination stage and beyond, moths prefer to lay their eggs in in dry beans or in later planted corn fields.

Action Threshold for Corn

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

It is important to target newly hatched or young larvae before they enter the silks on ears. Young larvae take approximately 1 day to find the tassels, where they feed for 3-4 days followed by 1-2 days for them to find silks. This gives a spray window of 5-7 days, post egg hatch. Time application according to when more than 50% of eggs have hatched.

To reduce the risk of quality concerns from mycotoxins, the threshold should be lowered, particularly if conditions are ideal for ear mold development. Though research has not yet determined what the threshold should be followed for mycotoxin risk, use a threshold of 1 to 2 % of plants with egg masses as a guideline.

Management Strategies

Bt corn

- Only hybrids containing Vip3A Bt provide protection against WBC damage.
- Prioritize hybrid selection based on tolerance to ear rot pathogens (eg. Fusarium) and mycotoxins.
- WBC in Ontario are not controlled by Cry1F hybrids.
- Scout all hybrids not containing Vip3A hybrids and spray if threshold is reached.
- All Bt corn fields are at risk of resistance development by WBC. Scout and report any unexpected damage found in Vip3A fields.

Insecticides

- Several foliar insecticides are registered for western bean cutworm control in corn.
- Foliar insecticide timing is critical. Once the larvae enter the corn ear, insecticides are no longer effective. Timing of application must coincide with egg hatch when young larvae are feeding.
- To reduce the risk of resistance, rotate between chemical families for each application and each year.
- Follow label restrictions regarding application timings to protect pollinators. Avoid spraying insecticides at tassel during daily bee flight time periods.
- 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.
- 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 may be 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 :
www.cornpest.ca

Interactive WBC Trap Maps for Ontario, Michigan and Quebec:
http://www.arcgis.com/apps/webappviewer/index.html?id=a9e6a076b6cf4ff281cdff460d3ffdad&extent=-9583093.8975,4846692.5603,-8017663.5582,5969399.6318,102100&muraadminpreview&mobileformat=false

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/pub811/13corn.htm#wbcutworm

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
@TraceyBaute
@Jocelynlsmith
@JenniferBruggem

Any further questions can be directed to:
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