

Western Bean Cutworm

Scouting and Management in Dry Beans

Tracey Baute, OMAFRA-Ridgetown
Meghan Moran, OMAFRA-Stratford
Chris Gillard, University of Guelph Ridgetown Campus

Emerging Pest of Dry Beans 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 detected in Ontario in 2008. Over the last 10 years, overwintering populations have now established across Ontario and is now considered the primary pest of corn in Ontario. Damage in dry beans first appeared in 2014 and has been found in most dry bean growing areas of Ontario, indicating that it is becoming a new emerging and important pest for this crop.

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. 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. Once in the third instar stage, their heads lighten and bodies change to a tan-pink colour, with subtle longitudinal stripes. Once in the final fifth and sixth instars, two distinctive broad dark brown stripes develop behind their head (Fig. 2).

Eggs are laid in masses of 5-200 eggs, typically on the underside of dry bean leaves, deep in the crop canopy. Eggs are the size of a pin head, pearly white when fresh and are shaped like tiny cantaloupes (Fig. 3). They take 5-7 days to hatch, gradually darkening to tan and then purple, within 1-3 days before hatching.

Damage

Feeding damage in dry beans begins as tiny shot holes in leaves and flower petals by the very young larvae (Fig. 4). Once larvae reach the third instar, they move to feeding on and within the pods. These older larvae only feed at night, spending the day in and on the soil surface. Each night, larvae climb up the plant to feed on a new pod and exit again before morning. Entry holes can be seen on the outside of the pod (Fig. 5).

Seeds can be shriveled or damaged from direct feeding. Yield loss from direct bean feeding is less of a concern than quality issues caused by this feeding. The holes allow for the introduction of pod diseases, which in turn impact seed quality. Damaged bean seed is further docked as “pick” requiring additional screening and cleaning (Fig. 6). Beans exposed to air from WBC holes can discolour, particularly in cranberry beans.



Figures 1-6. From top left to bottom right– 1. WBC adult moth. Photo credit: Jocelyn Smith, UGRC; **2— WBC larva.** Photo Credit: Tracey Baute, OMAFRA; **3– Freshly laid WBC eggs on corn.** Photo Credit: Tracey Baute, OMAFRA; **4—WBC leaf feeding damage on beans.** Photo Credit—Chris DiFonzo, Michigan State University; **5—WBC pod feeding damage.** Photo Credit—Jocelyn Smith, UGRC; and **6—WBC seed damage.** Photo Credit—Chris DiFonzo, Michigan State University

The WBC Life Cycle

Western bean cutworm complete one generation per year (Fig. 7). Through fall to early summer, pre-pupae lie dormant in soil chambers until spring when they pupate (A). Moths climb out of the soil in early July in Ontario (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 do not experience peak flight until the first or second week of August.

Moths are mostly active at night. 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 corn plants (D).

Once corn fields in the area are past the early tassel stages, moths prefer to lay their eggs in dry bean fields or late planted corn fields (E). Eggs in dry bean fields are laid on the underside of the leaves, deep in the crop canopy. 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 (F), the tiny larvae consume their egg shell then feed briefly on the bean leaves and flowers until 3rd instars (G). They then spend most of the day in the soil surface. At night, the larvae crawl up a bean plant, feeding on a new bean pod each night (H). They continue this until the bean pods are ready for harvest (I). The larvae then drop to the ground to burrow down and enter the pre-pupal stage in the fall (J).

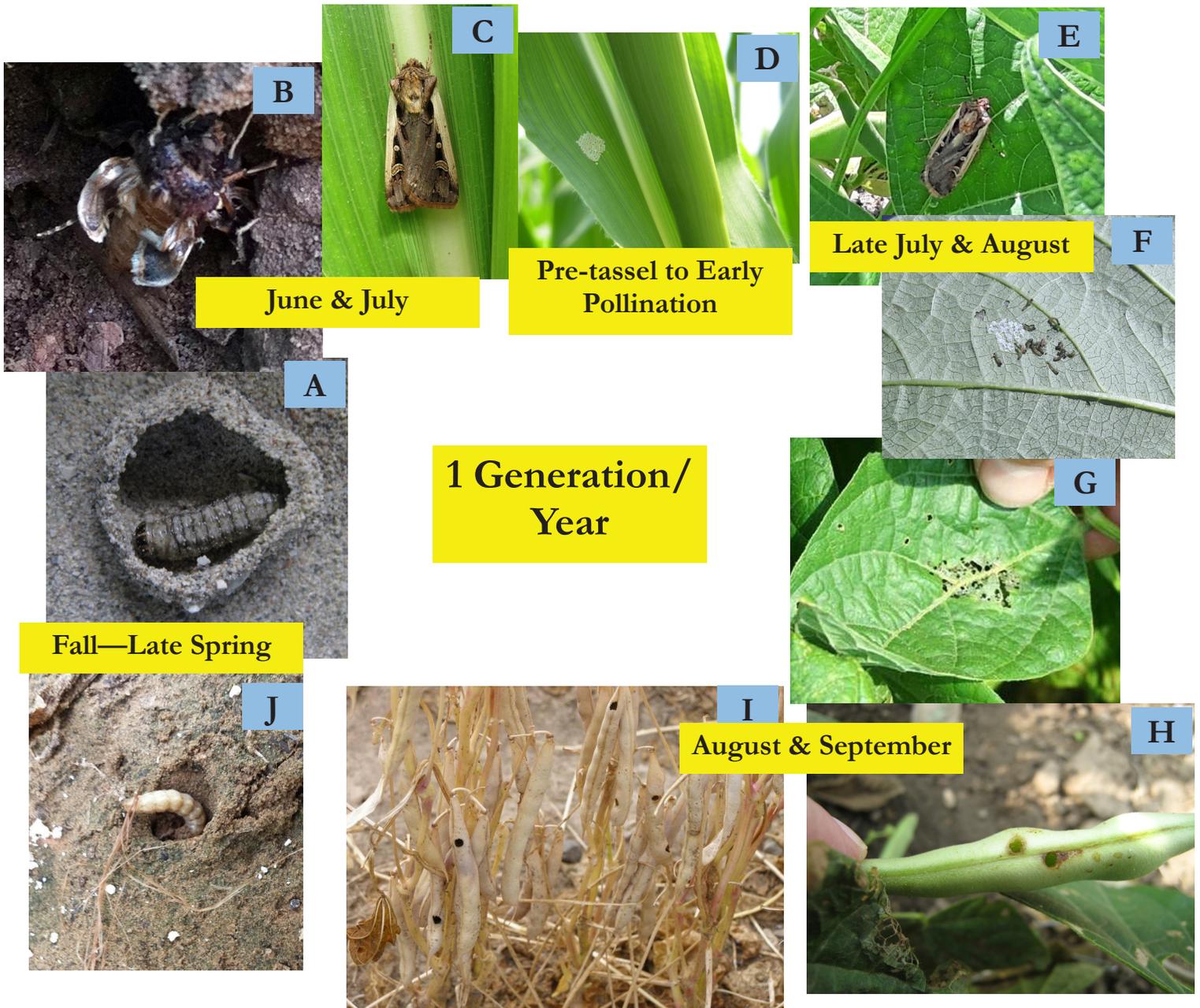


Figure 7. Life cycle of western bean cutworm in dry beans in Ontario.

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

Scouting Guidelines for Dry Beans

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 are not used to determine when to spray, but identify fields at risk and when scouting is required. Average peak flight in Ontario typically occurs in the last week of July but varies by region (Fig. 8). Peak egg laying follows shortly after peak flight. 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.

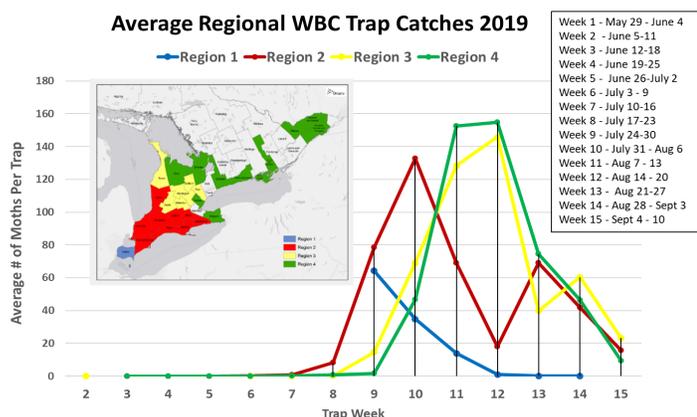


Figure 8. Peak WBC Moth Flight by Region in 2019. Peak flight was delayed in 2019 with peak occurring the 4th week of July (Week 10) in the southwestern counties, while central and eastern Ontario did not peak until the second and third week of August (Week 11 and 12). Flight was also prolonged with moths still actively flying the first week of September.

Green bucket or universal traps (uni-traps) are the preferred traps to use for monitoring WBC (Fig. 9). Each dry bean site requires two traps per field. Mount each trap to hang from a stake four feet (1.2 metres) above the ground. Place each trap on opposite sides of the field, with one of them along the prevailing wind side to carry the pheromone plume into the field to give a better indication of moth activity for that field. The traps can be within the first few rows of the beans or along the field's edge above low lying weeds.



One pheromone lure is placed inside the small cage area suspended from the trap roof. One insecticidal vapour strip is placed inside the

Figure 9. All green bucket traps used for WBC monitoring. Photo credit: Jen Bruggeman.

bucket part of the trap. Some prefer to tape them to the side so they don't fall out while counting moths each week. One vapour strip will last for approximately 2 months.

Each trap will need four WBC pheromone lures per season, and 1-2 insecticide vapour strips per season. Lures must be stored in the freezer when not being used. Change the lure in the trap every 3 weeks. Discard old lures off site away from the trap. Use gloves when handling the lures and vapour strips. Trap supplies can be purchased at a number of supply companies listed on the Great Lakes and Maritimes Pest Monitoring Network tab on the Field Crop News website.

Trap participants are encouraged to join the Great Lakes and Maritimes Pest Monitoring Network and provide their weekly trap counts during the season. In return, interactive maps and user dashboards are created to help identify those areas at risk that require scouting: <https://arcg.is/0aWqr0>

Scouting

WBC displays different behaviour in dry beans than in corn. Unlike in corn, WBC are nearly impossible to find in dry bean fields until pod feeding begins. Fortunately, since WBC exit and enter new pods each night, foliar insecticides are still quite effective at controlling the larvae if used when early signs of pod feeding are observed.

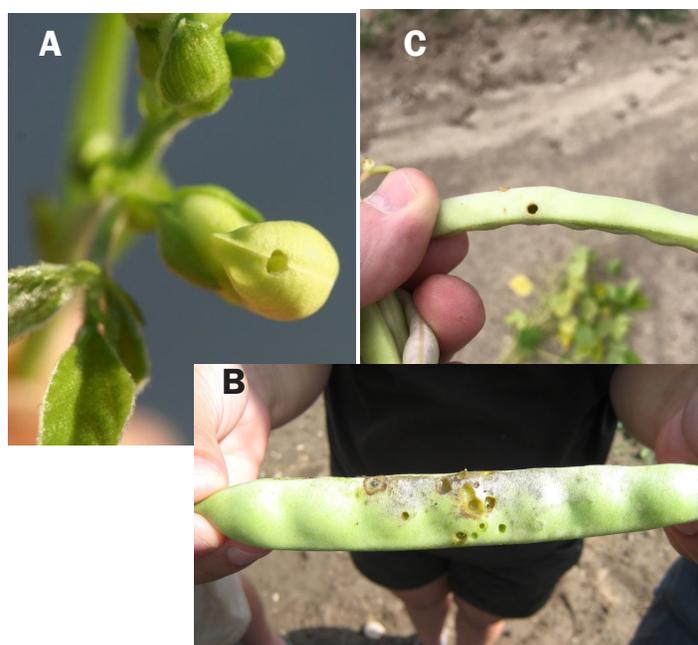


Figure 10. Signs of feeding by young WBC. Young larvae may feed on flowers (A) or graze on the surface of the pod (B). Older, larger larvae are able to mine directly into the pod (C) Photo Credit: Chris DiFonzo, MSU (A); Tracey Baute, OMAFRA (B); Jim Barclay, Hensall Co-op (C).

Pheromone traps help indicate which fields are at greater risk.

Traps at dry bean fields that capture an accumulation of 50 or more moths/trap are likely at greater risk and require scouting for pod feeding.

Pod feeding is expected to begin 10 to 20 days after peak moth flight has occurred, as indicated when trap counts begin to decline after weeks of steady increase. Prior to pods being present on the plants, scouting for egg masses in adjacent cornfields can also help determine what the local WBC populations are like. If any of the corn fields in the immediate area are past early tasseling, the dry bean fields will be more attractive for the moths. If an adjacent corn field reached the corn egg mass threshold and required spraying, the dry bean field is also likely at risk.

Action Threshold for Dry Beans

Thresholds are currently not available for WBC in the Ontario dry bean crop. Trapping thresholds established in western U.S. have not been found to be effective for dry beans grown in the Great Lakes region. It is best to focus on determining when peak flight has occurred in the area and focus efforts on scouting for signs of pod feeding and management 10 to 20 days after peak flight.

Research indicates that control is still very effective when done shortly after pod feeding is found. A dry edible bean field that is adjacent to a corn field that has reached threshold for WBC will likely need to be sprayed once pods are present and pod feeding is found (approx. 10 to 20 days after peak flight).

Spraying too early when pods are not present on the plants will not protect the crop from damage. Spraying too late, when pod feeding has been taking place for some time will not reduce the risk of seed damage and disease incidence. The key is to protect the plants when the larvae are feeding on the young pods.

Management Strategies

- To reduce the risk of resistance, rotate between chemical families each year.
- Several insecticides are registered for WBC control on the dry beans. Select insecticides that have some residual and pay attention to pre-harvest intervals.
- Spot treatments may be effective if injury is concentrated in one area of the field.
- Follow label restrictions regarding application timings to protect pollinators. Avoid spraying insecticides in flowering fields during the daylight hours when bees are in flight.
- Follow buffer zone requirements to minimize spray drift in pollinator and beneficial habitats.
- Deep tillage can help disturb and kill larvae overwintering in soil chambers, though is unlikely to significantly reduce populations. Larvae can be at different depths in the soil and the negative impact of tillage may outweigh the benefits. Moths also fly into Ontario from other regions which can negate attempts to suppress local overwintering populations.
- Several natural enemies feed on egg masses and young larvae, including lady beetles, lacewing larvae and others.

Other WBC Resources

Great Lakes and Maritimes Pest Monitoring Network:
<https://fieldcropnews.com/2020/04/2020-great-lakes-and-maritimes-pest-monitoring-network/>

WBC Trapping Instructions and Resources:
<https://fieldcropnews.com/wp-content/uploads/2020/04/2020-WBC-Trap-Set-Up-and-Monitoring-Instructions.pdf>

WBC Biology and Management Information:
Ecology and Management of the WBC in Corn and Dry Beans—Revision With Focus on the Great Lakes Region (Journal of IPM— free online):
<https://academic.oup.com/jipm/article/10/1/27/5558144>

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#wbcworm>

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](https://twitter.com/TraceyBaute)
[@megnmoran](https://twitter.com/megnmoran)
[@JocelynSmith](https://twitter.com/JocelynSmith)

Any further questions can be directed to:
Tracey Baute
Entomologist—Field Crop
Ontario Ministry of Agriculture, Food & Rural Affairs
120 Main Street East Ridgetown, Ontario N0P 2C0
T: 519-360-7817
E: tracey.baute@ontario.ca