Updates on Western Bean Cutworm Biology & Management

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Crop Production Clinics

Session Goals

• Understand the transgenic Bt trait options and their efficacy against the western bean cutworm
• Know the resources available to determine timing and increase efficiency of scouting corn for western bean cutworm
• Recognize the “good guys” out there- the beneficial insects preying upon western bean cutworm in the field
• Understand recommendations for chemical applications targeting western bean cutworm in corn
Western Bean Cutworm

1. Bt trait selection
2. Scouting
3. Biocontrol
4. Insecticides
5. Evaluate treatments
Western Bean Cutworm

1. Bt trait selection
Bt Trait Updates

- Not all caterpillar traits will affect WBC
- Cry1F: Herculex, SmartStax
  - 88% of NE crop consultants reported that Cry1F Bt corn is providing less control (2014-2016)
  - Confirmed resistance to Cry1F in Nebraska (2017-2018)
  - WBC removed from label of all Cry1F products
- Vip3A: Viptera, Leptra, Trecepta
  - Traits provide very good control, but resistance is always on the horizon

Archibald et al. 2017, Journal of IPM
Coates et al. 2020, Journal of Economic Entomology
Western Bean Cutworm

1. Bt trait selection
2. Scouting
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When to Start Scouting

- Be informed about moth flight predictions from the degree-day model:
  - CropWatch article
  - AgriTools App
- Monitor moth flights through trapping:
  - UNL black light trap data online
  - Green bucket and pheromone
WBC Scouting

- Select 20 plants in 5 different parts of each field (100 plants)
  - Or reduce # of plants using [WBC Speed Scout App](#)
- Examine the surface of corn leaves in the upper third of the plant for egg masses and the tassel, leaf axils, and ear tips for larvae
- Treatment is recommended if 5-8% of plants are infested with eggs or larvae
- If corn is at milk stage (R3) before eggs are laid, no treatment is needed
**WBC Egg Identification**

**ECB:** Underside of leaves, often in the middle third of plant

**WBC:** Top side of leaves in the upper third of plant (prefers late whorl stage corn prior to tasseling)

**FAW:** On immature leaves

**CEW:** On fresh silks

*Stink bug*
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Western Bean Cutworm

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- July-August
- Late June-July
- August-September
- October-June
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The Good Guys At Work!
Spying on Egg Masses in the Field

- Larvae may stay near the egg mass for 12 hours
- Hatching not synchronized, may take 10 h
- Neonates not disrupted by a rainstorm
- Minute pirate bugs feed on egg masses
How Can You Support the Good Guys?

- Plant non-crop, perennial, diverse habitat around crop fields
- Use thresholds to avoid unnecessary insecticide spraying; choose products that are less toxic to beneficials
Western Bean Cutworm

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4. Insecticides

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Insecticides: Timing

- Threshold of >5-8% of plants infested has been met through scouting
- Plants are at ~95% tassel
- Egg masses are purple to hatching
- Peak of moth flight has been reached
- Favorable environmental conditions
North Platte Moth Flight Over Time:

Peak flight
July 21-22, 2020
Insecticides: Product Choice

- Between 2014-2016, 88% of NE crop consultants treated at least once for WBC
- Pyrethroids comprise 80% of insecticides used
  - Bifenthrin and zeta-cypermethrin most common AI’s: Brigade, Hero, Mustang Maxx, generic bifenthrin
- 51% of crop consultants reported decreased pyrethroid efficacy

Archibald et al. 2017, Journal of IPM
Pyrethroid Study Results

- Nebraska WBC less susceptible to bifenthrin than Canadian population
- No differences between NE locations
- Resistance ratios reflect partial resistance or resistance in progress
- No previous baseline data for WBC
- When applications are “ideal” they are effective
- Resistance not the whole story:
  - Application timing and technique
  - Temperature or other environmental conditions
  - Pest and crop phenology
Insecticide Trials: Grant 2018

- Medium pressure (17% egg masses)
- Mixed population of WBC (72%) and CEW (28%) upon assessment of ear damage
• Early: July 17 (<50% tasseled)
• Ideal: July 24 (90% tasseled)
• Late: July 31 (100% tasseled)
Can insecticides kill BC eggs?

- No evidence for ovicidal effects at the low and high label rates of:
  - Mustang Maxx
  - Brigade
  - Hero
  - Prevathon
  - Steward
- But, after hatching larvae died quickly in all treatments but Steward (needs ingestion for higher efficacy)
- Lab conditions were ideal for up to 5 days of insecticide residual
- Lady beetles that ate eggs sprayed with Mustang Maxx did not die, but were severely disoriented compared to eating eggs sprayed by Prevathon
Take Home Points

• Western bean cutworm has evolved resistance to the Cry1F Bt protein (a trait found in Herculex and SmartStax), leaving Vip3A as the sole highly effective protein

• There are many beneficial insects that help out by eating WBC eggs and larvae

• Insecticide applications should be made only when the economic threshold has been met and timing is carefully considered

• Insecticide product choice is important to minimize resistance and risk to beneficial insects