European Corn Borer Management in Peppers

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European Corn Borer

- Key pest of bell peppers
- Bore into fruit
- Quality loss
- Yield loss
European Corn Borer

- Also infests non-bell peppers

jalapeño  cayenne  cherry
Controlling borers in peppers

- **Target of insecticide:**
  - young larvae
  - cap end of fruit
- **Insecticide efficacy affected by:**
  - timing
  - coverage
  - choice of material
## When does European corn borer damage peppers?

<table>
<thead>
<tr>
<th>Month</th>
<th>Fruit present?</th>
<th>Moths present?</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>June</td>
<td>no</td>
<td>yes (1\textsuperscript{st} gen.)</td>
</tr>
<tr>
<td>July</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td><strong>August</strong></td>
<td><strong>yes</strong></td>
<td>yes (2\textsuperscript{nd} gen.)</td>
</tr>
<tr>
<td>September</td>
<td>yes</td>
<td>no/yes (if 3\textsuperscript{rd} gen.)</td>
</tr>
</tbody>
</table>
European corn borer: generations per year

- Blacklight trap for moths
- Fremont, northwest Ohio
- 15 year period, 1990 - 2004
  - 9 years (60%) with 2 generations
  - 6 years (40%) with 3 generations
2 vs 3 generations

Fremont 1995

Number of moths per week

Week

Fremont 1996

Number of moths per week

Week
Trap to Monitor European Corn Borer

- Pheromone lure
- Attracts male moths
Insecticide timing for borer control in pepper

• First spray:
  – within 1 week of surge in trap catch
  – when >1 moth/night in trap
  – usually late July

• Spray schedule:
  – spray every 7 days (range 5 - 14 days)
  – during time moths active, 4 - 6 weeks

• Stop spraying:
  – once trap catch falls (usually early Sept.)
  – or until harvest if other pests active
# Insecticides for borer on peppers

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>PHI</th>
<th>efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthene</td>
<td>7</td>
<td>E</td>
</tr>
<tr>
<td>Mustang</td>
<td>1</td>
<td>G</td>
</tr>
<tr>
<td>Pounce/Ambush</td>
<td>3</td>
<td>G</td>
</tr>
<tr>
<td>Warrior</td>
<td>5</td>
<td>G</td>
</tr>
<tr>
<td>Baythroid</td>
<td>7</td>
<td>G</td>
</tr>
<tr>
<td>Capture</td>
<td>7</td>
<td>G</td>
</tr>
<tr>
<td>SpinTor</td>
<td>1</td>
<td>G</td>
</tr>
<tr>
<td>Intrepid</td>
<td>1</td>
<td>G</td>
</tr>
<tr>
<td>Confirm</td>
<td>7</td>
<td>G</td>
</tr>
<tr>
<td>Asana</td>
<td>7</td>
<td>F</td>
</tr>
<tr>
<td>Sevin</td>
<td>3</td>
<td>F</td>
</tr>
<tr>
<td>Lannate</td>
<td>3</td>
<td>F</td>
</tr>
<tr>
<td>B.t.</td>
<td>0</td>
<td>F</td>
</tr>
</tbody>
</table>
European Corn Borer on Peppers

• In summers with average temperature:
  — Only 2 generations likely
  — Need 4 to 6 sprays total

• In summers with very hot weather
  — 3 generations likely
  — Need 8 to 10 sprays total

• In late July, grower needs to decide whether 2 or 3 generations most likely
European Corn Borer on Peppers

In summers with average temperatures:

- Only 2 generations likely
- Spray late July - early Sept.
- Need 4 to 6 sprays total
- Spray 1: non-Orthene
- Sprays 2 & 3: Orthene (7-day interval)
- Sprays 4, 5, 6: non-Orthene
- Non-Orthene alternatives:
  - Mustang (1-day PHI)
  - SpinTor (1-day PHI)
  - Intrepid (1-day PHI)
  - Pounce/Ambush (3-day PHI)
European Corn Borer on Peppers

In summers with very hot weather
- 3 generations likely
- Need 8 to 10 sprays total

- Option 1:
  - Treat 2nd generation as on previous slide including 2 sprays of Orthene
  - For 3rd generation, use only non-Orthene products

- Option 2:
  - Use Orthene once for 2nd generation & once for 3rd generation, followed by other products
B.t. on peppers

• *Bacillus thuringiensis* products:
  – Javelin, CryMax, Agree, Deliver, (Certis)
  – DiPel, XenTari, Biobit (Valent)

• Controls caterpillars:
  – European corn borer
  – hornworms

• Apply twice per week
B.t. for borer control on peppers
Massachusetts, 1996

B.t. = MVP 3 qt/A + Surfix 1.5 pt/A

Bells, B.t.  Bells, untreated  Cherry, B.t.  Cherry, untreated

Fruit damage

Mean % of fruit damaged

Harvest date
8/23/96  9/10/96

a  b  b  A  B  BC

Number of borers per fruit

Mean no. larvae per fruit

Harvest date
8/23/96  9/10/96

a  b  b  B  A  B

b  b  b
European Corn Borer

- 100% control rare
- Due to **canopy**:
  - Dense
  - Hard to cover thoroughly
- Due to **borer location**:
  - Entry on stem often oriented down
  - Protected inside fruit
- Processors demand <3% damage
European Corn Borer

• Spray coverage
  – Less critical for pesticides with **systemic** activity
  – More critical for pesticides with **contact or residual** activity

• Application technology becoming more important as most new pesticides are not systemic
Spray Technology Trial

- **Sprayer type**
  - Standard hydraulic boom
  - Air Assist
  - Electrostatic

- **Nozzle type**
  - TwinJet
  - Air induction

- **Speed**
  - 4 mph
  - 8 mph

- **Pesticide rate**
  - Full
  - Half
Bell Pepper Insecticide Application Trial, 2004

Yield of uninfested fruit (kg)

- Untreated
- Electrostatic, half-rate, 4mph
- AirAssist, half-rate, 4mph
- NozzleTwin, half-rate, 8mph
- AirAssist, half-rate, 8mph
- NozzleAI, full-rate, 4mph
- NozzleAI, half-rate, 4mph
- NozzleTwin, half-rate, 4mph
- NozzleAI, half-rate, 8mph

Legend:
- Harvest2
- Harvest1

Comparisons:
- a
- ab
- abc
- bc
- d
Insecticide Efficacy Trial: European Corn Borer Control in Red Bell Peppers, 2004

- Fremont, Ohio
- 10 insecticides plus check
- 8 weekly applications, late July to early September
- 2 harvest evaluations