Managing caterpillar pests using conventional and OMRI-listed insecticides in sweet corn

December 12, 2018

Processing Sweet Corn, Green Pea, Lima Bean, Table Beet & Carrot Advisory Meeting

Brian A. Nault
Department of Entomology
Cornell AgriTech
College of Agriculture and Life Sciences
Cornell University
Geneva, NY
Major caterpillar pests of sweet corn

- Corn earworm
- European corn borer
- Fall armyworm
- Western bean cutworm
Corn earworm (*Helicoverpa zea*)

- Major pest of sweet corn
- Not known to overwinter in upstate New York
- Migrates consistently south to north
- Late June to Sept. in NY
- About 2000 eggs/female
- 14-20 females/acre, = 100% ear infestation

Photo: D. Olmstead
Corn earworm life stages

- Egg
- Moth
- Pupa
- Larvae feeding on ear
Timing and frequency of foliar sprays

- Females only lay eggs on fresh corn silks; eggs laid on dry silks will not hatch in time for larvae to cause damage before harvest.
- Insecticides must be applied to fresh silks.
- Frequency of applications dependent on moth activity (monitor using pheromone traps).
Corn earworm (*Helicoverpa zea*)

Management has become more challenging

- Populations have been higher
- Arrive earlier in season
- Resistance to pyrethroid insecticides
Conventional insecticides registered for managing corn earworm in sweet corn

- **Besiege** (chlorantraniliprole + lambda-cyhalothrin)
- **Coragen** (chlorantraniliprole)
- **Lannate LV** (methomyl)
- **Mustang Maxx** (zeta-cypermethrin)
- **Radiant SC** (spinetoram)
- **Warrior II w/Zeon tech** (lambda-cy)
Conventional insecticides registered for managing corn earworm in sweet corn

- Besiege (chlorantraniliprole + lambda-cyhalothrin)
- Coragen (chlorantraniliprole)
- Lannate LV (methomyl)
- Mustang Maxx (zeta-cypermethrin)
- Radiant SC (spinetoram)
- Warrior II w/Zeon tech (lambda-cy)

Control failures due to resistance
QUESTIONS

1) How does the performance of Besiege and Coragen compare with Warrior for controlling corn earworm?

2) What is the optimum application frequency of these products that will protect the crop from corn earworm?
OBJECTIVE

- Evaluate combinations of these selected insecticide products and application frequencies to manage corn earworm in processing sweet corn
## Methods

### Treatments and Experimental design

<table>
<thead>
<tr>
<th>Insecticide products*</th>
<th>Application frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Besiege</td>
<td>• one</td>
</tr>
<tr>
<td>• Coragen</td>
<td>• two</td>
</tr>
<tr>
<td>• Warrior II w/Zeon tech</td>
<td>• three</td>
</tr>
<tr>
<td></td>
<td>• four</td>
</tr>
</tbody>
</table>

* All products included Dyne-Amic @ 0.25% v:v

**Experimental design:** 3 x 4 factorial plus untreated control with each treatment replicated 5 times
# Methods

## Treatment list

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product</th>
<th>Rate</th>
<th>Number of applications</th>
<th>Frequency of additional sprays until dry silk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Untreated control</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Warrior II w/Zeon Tech</td>
<td>1.9 fl oz/acre</td>
<td>1</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>Besiege</td>
<td>6 fl oz/acre</td>
<td>1</td>
<td>none</td>
</tr>
<tr>
<td>4</td>
<td>Coragen SC</td>
<td>5 fl oz/acre</td>
<td>1</td>
<td>none</td>
</tr>
</tbody>
</table>
## Methods

### Treatment list

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product</th>
<th>Rate</th>
<th>Number of applications</th>
<th>Frequency of additional sprays until dry silk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Untreated control</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Warrior II w/Zeon Tech</td>
<td>1.9 fl oz/acre</td>
<td>1</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>Besiege</td>
<td>6 fl oz/acre</td>
<td>1</td>
<td>none</td>
</tr>
<tr>
<td>4</td>
<td>Coragen SC</td>
<td>5 fl oz/acre</td>
<td>1</td>
<td>none</td>
</tr>
<tr>
<td>5</td>
<td>Warrior II w/Zeon Tech</td>
<td>1.9 fl oz/acre</td>
<td>2</td>
<td>7 days</td>
</tr>
<tr>
<td>6</td>
<td>Besiege</td>
<td>6 fl oz/acre</td>
<td>2</td>
<td>7 days</td>
</tr>
<tr>
<td>7</td>
<td>Coragen SC</td>
<td>5 fl oz/acre</td>
<td>2</td>
<td>7 days</td>
</tr>
<tr>
<td>8</td>
<td>Warrior II w/Zeon Tech</td>
<td>1.9 fl oz/acre</td>
<td>3</td>
<td>5 days</td>
</tr>
<tr>
<td>9</td>
<td>Besiege</td>
<td>6 fl oz/acre</td>
<td>3</td>
<td>5 days</td>
</tr>
<tr>
<td>10</td>
<td>Coragen SC</td>
<td>5 fl oz/acre</td>
<td>3</td>
<td>5 days</td>
</tr>
<tr>
<td>11</td>
<td>Warrior II w/Zeon Tech</td>
<td>1.9 fl oz/acre</td>
<td>4</td>
<td>3 days</td>
</tr>
<tr>
<td>12</td>
<td>Besiege</td>
<td>6 fl oz/acre</td>
<td>4</td>
<td>3 days</td>
</tr>
<tr>
<td>13</td>
<td>Coragen SC</td>
<td>5 fl oz/acre</td>
<td>4</td>
<td>3 days</td>
</tr>
</tbody>
</table>
Methods

• Planted trial in Geneva on 6 July 2018 with ‘HMX 5389’

• Two-row plots sprayed with a CO$_2$-backpack sprayer (2 flat fan nozzles); 25 gpa; 40 psi

• First application for all treatments was on 28 August when ears were beginning to produce fresh silk
Methods

• ≤ 30 market-sized ears per plot harvested and graded for processing quality on 17 September

Damage within top inch

Damage below top inch

Cornell AgriTech
New York State Agricultural Experiment Station
Methods

• Number, location, size and species of larvae recorded per ear

• Monitored moth activity using pheromone traps
Moth flight activity and timing of insecticide applications in sweet corn – 2018

Geneva, NY 2018

- Corn earworm
- Fall armyworm
- European corn borer-E race
- European corn borer-Z race
- Western bean cutworm

Data points:
- Avg. number moths captured/night
- Dates: 8/27, 9/3, 9/10, 9/17, 9/24
- Events: early silk (8/28), Harvest (9/17)
Moth flight activity and timing of insecticide applications in sweet corn – 2018

ONE APPLICATION

Geneva, NY 2018

Graph showing average number of moths captured per night from 8/27 to 9/24, with peaks and valleys indicating activity. Key dates include early silk (8/28) and harvest (9/17). Species tracked include Corn earworm, Fall armyworm, European corn borer-E race, European corn borer-Z race, and Western bean cutworm.

Cornell AgriTech
New York State Agricultural Experiment Station
Moth flight activity and timing of insecticide applications in sweet corn – 2018

TWO APPLICATIONS

Geneva, NY 2018

- Corn earworm
- Fall armyworm
- European corn borer-E race
- European corn borer-Z race
- Western bean cutworm

Avg. number moths captured/night

Date
8/27
9/3
9/10
9/17
9/24

early silk (8/28)
Harvest (9/17)
Moth flight activity and timing of insecticide applications in sweet corn – 2018

THREE APPLICATIONS

Geneva, NY 2018

Corn earworm
Fall armyworm
European corn borer-E race
European corn borer-Z race
Western bean cutworm

Avg. number moths captured/night

Date

8/27
9/3
9/10
9/17
9/24

early silk (8/28)
Harvest (9/17)

Cornell AgriTech
New York State Agricultural Experiment Station
Moth flight activity and timing of insecticide applications in sweet corn – 2018

Geneva, NY 2018

FOUR APPLICATIONS

Avg. number moths captured/night

- Corn earworm
- Fall armyworm
- European corn borer-E race
- European corn borer-Z race
- Western bean cutworm

Date

8/27 9/3 9/10 9/17 9/24

early silk (8/28)

Harvest (9/17)
Percentage of caterpillar species in all ears

‘HMX 5389’  Geneva, NY  September 17, 2018

- Corn earworm: 98.8%
- European corn borer: 0.5%
- Fall armyworm: 0.7%

Cornell AgriTech
New York State Agricultural Experiment Station
Effect of insecticide products on percent marketable ears (averaged across all applications)

‘HMX 5389’ Geneva, NY (n = 5) September 17, 2018

% Marketable ears for processing

- Untreated
- Beseige
- Coragen
- Warrior

Insecticide

P = 0.0498
Effect of application frequency on percent marketable ears (averaged across all products)

‘HMX 5389’ Geneva, NY (n = 5) September 17, 2018

Number of applications

% Marketable ears for processing

P = 0.0135

Untreated 1 2 3 4

Cornell AgriTech
New York State Agricultural Experiment Station
## Effect of insecticide by timing combinations on percent marketable ears – 2018

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product</th>
<th>Total number of applications</th>
<th>Frequency of applications</th>
<th>% marketable ears for processing (±SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Coragen SC</td>
<td>2</td>
<td>7 days</td>
<td>90 ± 8 a</td>
</tr>
<tr>
<td>13</td>
<td>Coragen SC</td>
<td>4</td>
<td>3 days</td>
<td>89 ± 3 a</td>
</tr>
<tr>
<td>10</td>
<td>Coragen SC</td>
<td>3</td>
<td>5 days</td>
<td>87 ± 8 a</td>
</tr>
<tr>
<td>12</td>
<td>Besiege</td>
<td>4</td>
<td>3 days</td>
<td>86 ± 5 a</td>
</tr>
<tr>
<td>9</td>
<td>Besiege</td>
<td>3</td>
<td>5 days</td>
<td>77 ± 9 a</td>
</tr>
<tr>
<td>11</td>
<td>Warrior II w/Zeon Tech</td>
<td>4</td>
<td>3 days</td>
<td>74 ± 8 a</td>
</tr>
<tr>
<td>8</td>
<td>Warrior II w/Zeon Tech</td>
<td>3</td>
<td>5 days</td>
<td>69 ± 12 a</td>
</tr>
<tr>
<td>3</td>
<td>Besiege</td>
<td>1</td>
<td>none</td>
<td>64 ± 13 a</td>
</tr>
<tr>
<td>2</td>
<td>Warrior II w/Zeon Tech</td>
<td>1</td>
<td>none</td>
<td>59 ± 14 a</td>
</tr>
<tr>
<td>6</td>
<td>Besiege</td>
<td>2</td>
<td>7 days</td>
<td>58 ± 7 a</td>
</tr>
<tr>
<td>1</td>
<td>Untreated control</td>
<td>-</td>
<td>none</td>
<td>58 ± 19 a</td>
</tr>
<tr>
<td>4</td>
<td>Coragen SC</td>
<td>1</td>
<td>none</td>
<td>55 ± 10 a</td>
</tr>
<tr>
<td>5</td>
<td>Warrior II w/Zeon Tech</td>
<td>2</td>
<td>7 days</td>
<td>55 ± 18 a</td>
</tr>
</tbody>
</table>

\[ F_{12, 48} = 1.48; P=0.1657; n=5 \]
Effect of insecticide by timing combinations on percent marketable ears – 2018

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product</th>
<th>Total number of applications</th>
<th>Frequency of applications</th>
<th>% marketable ears for processing (±SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Coragen SC</td>
<td>2</td>
<td>7 days</td>
<td>90 ± 8 a</td>
</tr>
<tr>
<td>13</td>
<td>Coragen SC</td>
<td>4</td>
<td>3 days</td>
<td>89 ± 3 a</td>
</tr>
<tr>
<td>10</td>
<td>Coragen SC</td>
<td>3</td>
<td>5 days</td>
<td>87 ± 8 a</td>
</tr>
<tr>
<td>12</td>
<td>Besiege</td>
<td>4</td>
<td>3 days</td>
<td>86 ± 5 a</td>
</tr>
<tr>
<td>9</td>
<td>Besiege</td>
<td>3</td>
<td>5 days</td>
<td>77 ± 9 a</td>
</tr>
<tr>
<td>11</td>
<td>Warrior II w/Zeon Tech</td>
<td>4</td>
<td>3 days</td>
<td>74 ± 8 a</td>
</tr>
<tr>
<td>8</td>
<td>Warrior II w/Zeon Tech</td>
<td>3</td>
<td>5 days</td>
<td>69 ± 12 a</td>
</tr>
<tr>
<td>3</td>
<td>Besiege</td>
<td>1</td>
<td>none</td>
<td>64 ± 13 a</td>
</tr>
<tr>
<td>2</td>
<td>Warrior II w/Zeon Tech</td>
<td>1</td>
<td>none</td>
<td>59 ± 14 a</td>
</tr>
<tr>
<td>6</td>
<td>Besiege</td>
<td>2</td>
<td>7 days</td>
<td>58 ± 7 a</td>
</tr>
<tr>
<td>1</td>
<td>Untreated control</td>
<td>-</td>
<td>-</td>
<td>58 ± 19 a</td>
</tr>
<tr>
<td>4</td>
<td>Coragen SC</td>
<td>1</td>
<td>none</td>
<td>55 ± 10 a</td>
</tr>
<tr>
<td>5</td>
<td>Warrior II w/Zeon Tech</td>
<td>2</td>
<td>7 days</td>
<td>55 ± 18 a</td>
</tr>
</tbody>
</table>

\[ F_{12, 48} = 1.48; P=0.1657; n=5 \]
Effect of insecticide products on corn earworm control (averaged across all applications)

'HMX 5389' Geneva, NY (n = 5) September 17, 2018

Avg. CEW larvae/ear

Untreated | Beseige | Coragen | Warrior

Insecticide

P<0.0001
Effect of application frequency on corn earworm control (averaged across all products)

‘HMX 5389’ Geneva, NY (n = 5) September 17, 2018

Effect of application frequency on corn earworm control (averaged across all products)

‘HMX 5389’ Geneva, NY (n = 5) September 17, 2018

**Number of applications**

<table>
<thead>
<tr>
<th>Number of applications</th>
<th>Avg. CEW larvae/ear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>1.86</td>
</tr>
<tr>
<td>1</td>
<td>1.42</td>
</tr>
<tr>
<td>2</td>
<td>1.35</td>
</tr>
<tr>
<td>3</td>
<td>1.17</td>
</tr>
<tr>
<td>4</td>
<td>0.87</td>
</tr>
</tbody>
</table>

*P* < 0.0001

*Significance levels:*

- **a**
- **b**
- **c**
### Effect of insecticide by timing combinations on corn earworm control – 2018

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product</th>
<th>Total number of applications</th>
<th>Frequency of applications</th>
<th>Mean number of CEW per ear (±SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Warrior II w/Zeon Tech</td>
<td>1</td>
<td>none</td>
<td>1.95 ± 0.08 a</td>
</tr>
<tr>
<td>1</td>
<td>Untreated control</td>
<td>-</td>
<td>-</td>
<td>1.74 ± 0.08 ab</td>
</tr>
<tr>
<td>3</td>
<td>Besiege</td>
<td>1</td>
<td>none</td>
<td>1.55 ± 0.18 abc</td>
</tr>
<tr>
<td>5</td>
<td>Warrior II w/Zeon Tech</td>
<td>2</td>
<td>7 days</td>
<td>1.28 ± 0.20 bcd</td>
</tr>
<tr>
<td>8</td>
<td>Warrior II w/Zeon Tech</td>
<td>3</td>
<td>5 days</td>
<td>1.17 ± 0.13 cde</td>
</tr>
<tr>
<td>4</td>
<td>Coragen SC</td>
<td>1</td>
<td>none</td>
<td>1.09 ± 0.17 cde</td>
</tr>
<tr>
<td>6</td>
<td>Besiege</td>
<td>2</td>
<td>7 days</td>
<td>0.92 ± 0.04 de</td>
</tr>
<tr>
<td>7</td>
<td>Coragen SC</td>
<td>2</td>
<td>7 days</td>
<td>0.75 ± 0.08 def</td>
</tr>
<tr>
<td>11</td>
<td>Warrior II w/Zeon Tech</td>
<td>4</td>
<td>3 days</td>
<td>0.77 ± 0.07 def</td>
</tr>
<tr>
<td>9</td>
<td>Besiege</td>
<td>3</td>
<td>5 days</td>
<td>0.77 ± 0.05 def</td>
</tr>
<tr>
<td>10</td>
<td>Coragen SC</td>
<td>3</td>
<td>5 days</td>
<td>0.63 ± 0.17 ef</td>
</tr>
<tr>
<td>12</td>
<td>Besiege</td>
<td>4</td>
<td>3 days</td>
<td>0.36 ± 0.07 f</td>
</tr>
<tr>
<td>13</td>
<td>Coragen SC</td>
<td>4</td>
<td>3 days</td>
<td>0.30 ± 0.07 f</td>
</tr>
</tbody>
</table>

\[ F_{12, 48} = 20.4; P<0.0001; n=5 \]
## Effect of insecticide by timing combinations on corn earworm control – 2018

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product</th>
<th>Total number of applications</th>
<th>Frequency of applications</th>
<th>Mean number of CEW per ear (±SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Warrior II w/Zeon Tech</td>
<td>1</td>
<td>none</td>
<td>1.95 ± 0.08 a</td>
</tr>
<tr>
<td>1</td>
<td>Untreated control</td>
<td>-</td>
<td>-</td>
<td>1.74 ± 0.08 ab</td>
</tr>
<tr>
<td>3</td>
<td>Besiege</td>
<td>1</td>
<td>none</td>
<td>1.55 ± 0.18 abc</td>
</tr>
<tr>
<td>5</td>
<td>Warrior II w/Zeon Tech</td>
<td>2</td>
<td>7 days</td>
<td>1.28 ± 0.20 bcd</td>
</tr>
<tr>
<td>8</td>
<td>Warrior II w/Zeon Tech</td>
<td>3</td>
<td>5 days</td>
<td>1.17 ± 0.13 cde</td>
</tr>
<tr>
<td>4</td>
<td>Coragen SC</td>
<td>1</td>
<td>none</td>
<td>1.09 ± 0.17 cde</td>
</tr>
<tr>
<td>6</td>
<td>Besiege</td>
<td>2</td>
<td>7 days</td>
<td>0.92 ± 0.04 de</td>
</tr>
<tr>
<td>7</td>
<td>Coragen SC</td>
<td>2</td>
<td>7 days</td>
<td>0.75 ± 0.08 def</td>
</tr>
<tr>
<td>11</td>
<td>Warrior II w/Zeon Tech</td>
<td>4</td>
<td>3 days</td>
<td>0.77 ± 0.07 def</td>
</tr>
<tr>
<td>9</td>
<td>Besiege</td>
<td>3</td>
<td>5 days</td>
<td>0.77 ± 0.05 def</td>
</tr>
<tr>
<td>10</td>
<td>Coragen SC</td>
<td>3</td>
<td>5 days</td>
<td>0.63 ± 0.17 ef</td>
</tr>
<tr>
<td>12</td>
<td>Besiege</td>
<td>4</td>
<td>3 days</td>
<td>0.36 ± 0.07 f</td>
</tr>
<tr>
<td>13</td>
<td>Coragen SC</td>
<td>4</td>
<td>3 days</td>
<td>0.30 ± 0.07 f</td>
</tr>
</tbody>
</table>

\[ F_{12, 48} = 20.4; \ P<0.0001; n=5 \]
SUMMARY

- Historically high level of corn earworm pressure during study caused extreme levels of ear damage.
- General performance of products was follows: Coragen > Besiege > Warrior II w/zeon technology.
- General performance of application frequency: 4 > 3 or 2 > 1.
Managing caterpillar pests using OMRI-listed insecticides in sweet corn
insecticides registered for managing corn earworm in sweet corn

- **Agree WG** *(Bacillus thuringiensis subsp. aizawai)*
- **Javelin WG** *(Bacillus thuringiensis subsp. kurstaki)*
- **Gemstar LC** *(OBs of NPV)*
- **Azera** *(azidirachtin + pyrethrin)*
- **Majestine** *(Heat-killed Burkholderia spp. strain A396)*
- **Entrust** *(spinosad)*
OBJECTIVE

- Evaluate efficacy of selected OMRI-listed products for managing corn earworm in processing sweet corn
products evaluated for corn earworm management in sweet corn – 2018

<table>
<thead>
<tr>
<th>Trt#</th>
<th>Product(s)</th>
<th>Active Ingredient(s)</th>
<th>Rate per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Untreated</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Agree WG</td>
<td><em>B.t. subsp. aizawai</em></td>
<td>2 lbs/acre</td>
</tr>
<tr>
<td>3</td>
<td>Javelin</td>
<td><em>B.t. subsp. kurstaki</em></td>
<td>1.5 lbs/acre</td>
</tr>
<tr>
<td>4</td>
<td>Gemstar</td>
<td>OBs of <em>NPV</em></td>
<td>10 fl oz/acre</td>
</tr>
<tr>
<td>5</td>
<td>Azera</td>
<td>pyrethrin+azadirachtin</td>
<td>40 fl oz/acre</td>
</tr>
<tr>
<td>6</td>
<td>Majestine</td>
<td><em>Heat-killed Burkholderia</em> spp. strain A396</td>
<td>2 qts/acre</td>
</tr>
<tr>
<td>7</td>
<td>Majestine</td>
<td><em>Heat-killed Burkholderia</em> spp. strain A396</td>
<td>4 qts/acre</td>
</tr>
<tr>
<td>8</td>
<td>Entrust SC</td>
<td>spinosad</td>
<td>4 fl oz/acre</td>
</tr>
<tr>
<td>9</td>
<td>Entrust SC</td>
<td>spinosad</td>
<td>6 fl oz/acre</td>
</tr>
<tr>
<td>10</td>
<td>Coragen SC*</td>
<td>chlorantraniliprole</td>
<td>5 fl oz/acre</td>
</tr>
</tbody>
</table>

*NOT OMRI listed
Methods

• Planted trial in Geneva on 6 July 2018 with ‘Obsession’

• Two-row plots sprayed with a CO$_2$-backpack sprayer (2 flat fan nozzles); 25 gpa; 40 psi

• First application for all treatments was on 31 August when ears were beginning to produce fresh silk and then a 3-d schedule (5 sprays)

• ≤ 30 market-sized ears harvested per plot and graded on 24 September

• Number, location, size and species of larvae recorded per ear

• Monitored moth activity using pheromone traps
Moth flight activity and timing of insecticide applications in sweet corn – 2018

Geneva, NY 2018

- Corn earworm
- Fall armyworm
- European corn borer-E race
- European corn borer-Z race
- Western bean cutworm

Dates:
- Early silk (8/31)
- Harvest (9/24)
Moth flight activity and timing of insecticide applications in sweet corn – 2018

FIVE APPLICATIONS @ 3-day intervals

Geneva, NY  2018

- Corn earworm
- Fall armyworm
- European corn borer-E race
- European corn borer-Z race
- Western bean cutworm

Avg. number moths captured/night vs. Date

- 8/27: Early silk (8/31)
- 9/3, 9/10, 9/17: Five applications
- 9/24: Harvest (9/24)

Cornell AgriTech
New York State Agricultural Experiment Station
Percentage of caterpillar species in all ears

‘Obsession’     Geneva, NY   September 24, 2018

- Corn earworm: 96%
- European corn borer: 2.2%
- Fall armyworm: 1.8%
Effect of OMRI-listed products on ear marketability

‘Obsession’ Geneva, NY (n = 5) September 24, 2018

**F**<sub>9, 36</sub> = 1.88; **P** = 0.0864

- Untreated
- Agree
- Javelin
- Gemstar
- Azera
- Majestine (2 qts)
- Majestine (4 qts)
- Entrust (4 fl oz)
- Entrust (6 fl oz)
- Coragen*

*NOT OMRI listed*
Effect of OMRI-listed products on corn earworm

‘Obsession’ Geneva, NY (n = 5) September 24, 2018

Mean number larvae/ear

<table>
<thead>
<tr>
<th>Product</th>
<th>Mean</th>
<th>LOWER CASE</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td>abc</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
<td>abc</td>
<td></td>
</tr>
<tr>
<td>Javelin</td>
<td></td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>Gemstar</td>
<td></td>
<td>c</td>
<td></td>
</tr>
<tr>
<td>Azera</td>
<td></td>
<td>abc</td>
<td></td>
</tr>
<tr>
<td>Majestine (2 qts)</td>
<td></td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>Majestine (4 qts)</td>
<td></td>
<td>abc</td>
<td></td>
</tr>
<tr>
<td>Entrust (4 fl oz)</td>
<td></td>
<td>bc</td>
<td></td>
</tr>
<tr>
<td>Entrust (6 fl oz)</td>
<td></td>
<td>bc</td>
<td></td>
</tr>
<tr>
<td>Coragen*</td>
<td></td>
<td>c</td>
<td></td>
</tr>
</tbody>
</table>

*NOT OMRI listed

$F_{9,36} = 5.83; P < 0.0001$
SUMMARY

- Historically high levels of corn earworm pressure during study caused extreme levels of ear damage
- No product (including Coragen) provided acceptable protection of crop
- Numerically fewer corn earworm larvae in Entrust and Gemstar (including Coragen) than the untreated control
Future Research – corn earworm control

- Repeat insecticide by application frequency study with same products and application frequencies
- Repeat evaluation of OMRI-listed products
Acknowledgements

People:

Nault Lab
Riley Harding
Kellie Damann
Dylan Doeblin
Mason Clark
Lindsy Iglesias
Ashley Leach
Erica Moretti

NYS IPM Program
Abby Seaman
Marion Zuefle

FRU
Matt Christiansen
Matt Hall

Horticulture
Jim Ballerstein
Floyd

Funding:

• NY Vegetable Research Council/Association
• Federal Capacity Funds