Protecting Yields and Preserving Technology

*Helicoverpa zea*, also known as the cotton bollworm, soybean podworm or corn earworm, has shown an uncanny nature to develop resistance to the best technologies science can throw at them. While this pest has a wide host range, the potential main driver of the development of resistance is the adoption of corn production in the southern U.S. Large populations build in the South early in the season and are exposed to various pesticides before moving north where they become harder and harder to control. With Prevathon® insect control powered by Rynaxypyr® active, FMC now has some of the best technology on the market for controlling this difficult pest plus the other worms that often appear in row crop production.

**PERFORMANCE**

Prevathon insect control provides an outstanding protection, stopping feeding fast and providing lasting residual protection to preserve photosynthetic leaf tissue, which drives high yields while simultaneously protecting fruiting structures from bloom to maturity.

**CROP PROTECTION**

Because it quickly stops feeding, Prevathon insect control protects the foliage that generates the energy to produce high yields while also protecting the fruiting bodies i.e., squares, bloom, bolls/pods/ears that are harvested. Below is a great representation of what this looks like from a foliage feeder such as beet armyworm.

% Protection from Feeding by Beet Armyworm

(larvae exposed to treated tomato leaves for 48 hours)

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevathon®</td>
<td>97%</td>
</tr>
<tr>
<td>Intrepid®</td>
<td>65%</td>
</tr>
<tr>
<td>No Insecticide</td>
<td>0%</td>
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</tbody>
</table>

*Source: Field to lab bioassays. Stine Research Center.*
BENEFICIALS – WHY KEEP THEM?

Pollinator safety and beneficial conservation are hot topics these days, and we should all strive to choose the right product, apply the right rate at the right timing. Prevathon insect control provides an option that checks all of those important boxes. It is highly efficacious at low dose rates and has been shown to have low impact to non-target insects once spray residues dry. When cotton, soybean and corn reach economic thresholds, crops are often 3+ feet tall, the middles have lapped and canopies are dense. In cotton, for example, the larvae that escape are often the result of eggs laid deep in the canopy on bloom tags where optimal spray coverage is difficult to achieve and/or where Bt gene expression is inadequate. Mother Nature’s ability to exploit weaknesses results in a few worms slipping through, which begins the process of selection for resistance. THIS is where beneficial predators and parasitoids come in. Conserving other species that feed on eggs and small larvae helps us get closer to that 100 percent control we desire to keep everything running smoothly.

PRESERVING TECHNOLOGY

The Bt events that protect current field crops are shared across multiple commodities (corn, sweet corn, and cotton). This puts tremendous selection pressure on bollworms across multiple generations each growing season. It was reported at the 2017 ESA (Entomological Society of America) meeting that the next Bt technology for sweet corn is approximately seven years from launch. Relying solely on Bt technology will not be enough to get us to the next trait launch in 2024 if this information is correct. Combining highly effective products such as FMC’s Prevathon insect control can help preserve the technologies we currently have when used according to good IPM and IRM practices. Getting a new technology from concept through the regulatory approval process to launch and available to the grower is a long and costly process. Discovery of new modes of action is just as difficult. New technologies are often more expensive so incorporating every available tactic to preserve the technologies we have available now is extremely important for everyone’s long term success.

corn earworm
aka cotton bollworm

beet armyworm

fall armyworm

European corn borer
**PERFORMANCE BACKED BY FIELD RESEARCH - COTTON**

**Prevathon® Insect Control Protects Non-Bt Cotton Yields**

**Damaged Fruit at 4 Rating Intervals & % Cumulative Damage Across All Dates**

- 16 fl. oz./A Prevathon® insect control: 6%
- 6 fl. oz./A Intrepid® Edge insecticide: 13%
- 6 fl. oz./A Brigade® 2EC insecticide/miticide + 12 oz./A Orthene® insecticide: 11%
- No Insecticide: 25%

**Effect of Insecticide Treatments on Seed Cotton Yield**

- 16 fl. oz./A Prevathon® insect control: 2,519 lb./A
- 6 fl. oz./A Intrepid® Edge insecticide: 2,352 lb./A
- 6 fl. oz./A Brigade® 2EC insecticide/miticide + 12 oz./A Orthene® insecticide: 2,205 lb./A
- No Insecticide: 1,311 lb./A

Source: Scott Stewart, Jackson, TN. 2017.

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**Prevathon insect control Protects Bt Cotton Yields AND the Traited Technology**

**Effect of Prevathon Insect Control Application on Cumulative Cotton Bollworm Damage 23 days after application**

- Bollgard II®: 8% (28%)
- TwinLink® Plus: 5% (16%)
- TwinLink®: 7% (30%)
- WideStrike® 3: 6% (11%)
- WideStrike®: 9% (59%)
- non-Bt: 17% (117%)

**Bt-cotton over spray with two applications of Prevathon insect control at 20 fl. oz/A per application. (Unsprayed vs. sprayed)**

- Unsprayed Bollgard II® (655 ± 19 lbs. cotton/A)
- Unsprayed Bollgard III® (982 ± 47 lbs. cotton/A)
- Bollgard II sprayed since 2 weeks after application (990 ± 53 lbs. cotton/A)
- Bollgard III sprayed since 2 weeks after application (975 ± 16 lbs. cotton/A)

**Performance Backed by Field Research - Soybeans**

**Soybean Looper: Control of Mixed Instar Larvae in Soybeans**

3 Days After Application, University of Arkansas, Lorenz - 2017

- **Total Number of Larvae/10 row ft.**
  - Prevathon™ insect control 14 fl. oz./A
  - Besiege® Insecticide 7 fl. oz./A
  - Warrior II w/Zeon Technology™ 1.8 fl. oz./A
  - Untreated Check

- **Yield (bu/A)**
  - Warrior II w/Zeon Technology 1.8 fl. oz./A
  - Besiege® Insecticide 7 fl. oz./A
  - Prevathon™ insect control 14 fl. oz./A

**Control of Mixed Instar Soybean Podworm (Bollworm) Larvae in V8 Soybeans**

7 Days After Application

- **Prevathon™ insect control 14 fl. oz./A**
- **Intrepid® Edge insecticide 6 fl. oz./A**
- **Untreated Check**

- **Larvae Size**
  - Small
  - Medium
  - Large

Pretreatment population was 11.7 soybean podworm per 15 sweeps. Application Date: Aug 10, 2017.


**Brigade 2EC insecticide/miticide and Besiege insecticide is a Restricted Use Pesticide.** Always read and follow all label directions and precautions. Some products may not be registered for sale or use in all states. As of November 1, 2017, the USEPA registration for DuPont™ Prevathon™ insect control with the active ingredient Rynaxypyr® was sold to FMC by E. I. du Pont de Nemours and Company. FMC, Prevathon, Rynaxypyr and Brigade are trademarks and HatchTrak is a service mark of FMC Corporation or an affiliate. Intrepid and WideStrike are trademarks of Dow AgroSciences LLC. Bollgard is a trademark of Monsanto Technology, LLC. TwinLink is a trademark of Bayer. Besiege and Warrior II with Zeon Technology are trademarks of Syngenta Group Company. Orthene is a trademark of OMS Investments Inc. ©2018 FMC Corporation. All rights reserved.