Novel Seed Treatment and In-Furrow Uses of the Anthranilic Diamides

Midwest Food Processors Association
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Insecticides for Managing Snap Bean Pests

Recently Labeled in Wisconsin:

• Radiant SC (spinetoram)

In the Pipeline:

• Entrust (spinosad)  OMRI approved seed treatment
• Coragen and Dermacor X (chlorantraniliprole)
• Durivo, Voliam Flexi, Voliam Xpress (chlorantraniliprole + thiamethoxam or chlorantraniliprole + lambda-cyhalothrin)
• HGW86 (cyantraniliprole)
• Belt 480SC (flubendiamide)
Anthranilic Diamide Insecticides

- **Active ingredients**: chlorantraniliprole (aka rynaxypyr) and cyantraniliprole (aka cyazypyr) and flubendiamide (Belt 480SC)

- **Class**: anthranilic diamide (IRAC MoA Class 28)

- **Mode of action**: ryanodine receptor modulator
  - Systemic activity
  - Most effective through ingestion
  - Insects stop feeding, become paralyzed and die within 1 to 3 days
  - Applied to soil at planting, drip chemigation and foliar spray (*no data on seed treatment application*)
  - Exceptionally long residual control – xylem mobile
  - Active against Lepidopterans, Coleoptera, and other pests?
Major Snap Bean Pests in Midwest

Seedcorn Maggot (SCM)

Potato Leafhopper (PLH)

European corn borer (ECB)
Objective

- To evaluate the efficacy of chlorantraniliprole and cyantraniliprole when applied as a seed treatment, in furrow spray and foliar spray for managing seedcorn maggot, potato leafhopper and European corn borer
<table>
<thead>
<tr>
<th>Product</th>
<th>Active Ingredient</th>
<th>Type*</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cruiser 5FS</td>
<td>thiamethoxam</td>
<td>ST</td>
<td>1.28 fl oz/cwt of seed</td>
</tr>
<tr>
<td>Dermacor X</td>
<td>chlorantraniliprole</td>
<td>ST</td>
<td>1.28 fl oz/cwt of seed</td>
</tr>
<tr>
<td>Dermacor X</td>
<td>chlorantraniliprole</td>
<td>ST</td>
<td>3.84 fl oz/cwt of seed</td>
</tr>
<tr>
<td>HGW86 60FS</td>
<td>cyantraniliprole</td>
<td>ST</td>
<td>1.28 fl oz/cwt of seed</td>
</tr>
<tr>
<td>HGW86 60FS</td>
<td>cyantraniliprole</td>
<td>ST</td>
<td>3.84 fl oz/cwt of seed</td>
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<tr>
<td>Coragen</td>
<td>chlorantraniliprole</td>
<td>IF</td>
<td>5 fl oz/acre</td>
</tr>
<tr>
<td>Coragen</td>
<td>chlorantraniliprole</td>
<td>IF</td>
<td>7 fl oz/acre</td>
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<tr>
<td>HGW86 60FS</td>
<td>cyantraniliprole</td>
<td>IF</td>
<td>6.75 fl oz/acre</td>
</tr>
<tr>
<td>HGW86 60FS</td>
<td>cyantraniliprole</td>
<td>IF</td>
<td>13.5 fl oz/acre</td>
</tr>
<tr>
<td>Durivo</td>
<td>chlorantraniliprole + thiamethoxam</td>
<td>IF</td>
<td>13 fl oz/acre</td>
</tr>
<tr>
<td>Coragen</td>
<td>chlorantraniliprole</td>
<td>F</td>
<td>5 fl oz/acre</td>
</tr>
<tr>
<td>HGW86 60FS</td>
<td>cyantraniliprole</td>
<td>F</td>
<td>13.5 fl oz/acre</td>
</tr>
<tr>
<td>Hero 1.24 EC</td>
<td>Z-cypermethrin + bifenthrin</td>
<td>F</td>
<td>4 fl oz/acre</td>
</tr>
</tbody>
</table>

*ST = seed treatment; IF = in furrow application; F = foliar
Bone and meat meal to lure SCM flies and concentrate eggs

Prediction of Seed corn maggot oviposition

- 200 DD
- 600 DD
- 1,000 DD

May
July
September
Seedcorn Maggot (SCM)
Percent Snap bean Seedlings Damaged by Seedcorn Maggot

Arlington, WI  2009

Mean % damaged seedlings (25 samples)

Seed treatments

In-furrow spray

Treatments

Groves & Chapman
Percent Snap bean Seedlings Damaged by Seedcorn Maggot

Arlington, WI  2009

Mean % damaged seedlings (25 samples)

Untreated
Cruiser 5FS
Dermacor (low)
Dermacor (high)
HGW86 (low)
HGW86 (high)
Coragen (low)
Coragen (high)
HGW86 20SC (low)
HGW86 20SC (high)
Durivo

Seed treatments

In-furrow spray

N=4

Treatments

Groves & Chapman
Percent Snap bean Seedlings Damaged by Seedcorn Maggot

Arlington, WI 2009

Mean % damaged seedlings (25 samples)

N=4

Seed treatments

Untreated
Cruiser 5FS
Dermacor (low)
Dermacor (high)
HGW86 (low)
HGW86 (high)
Coragen (low)
Coragen (high)
HGW86 20SC (low)
HGW86 20SC (high)
Durivo

In-furrow spray

Treatments

Groves & Chapman
Percent Snap bean Seedlings Damaged by Seedcorn Maggot  
Geneva, NY  2009

![Graph showing mean % damaged seedlings (25 samples) for various treatments. N=5](image)

- **Seed treatments**
  - Untreated
  - Cruiser 5FS
  - Dermacor (low)
  - Dermacor (high)
  - HGW86 (low)
  - HGW86 (high)
  - Coragen (low)
  - Coragen (high)
  - HGW86 20SC (low)
  - HGW86 20SC (high)
  - Durivo

- **In-furrow spray**

**Treatments**

Nault & Hessney
Potato Leafhopper (PLH)
Number of Adult Potato Leafhoppers per 25 sweeps (avg. for 4, 11 and 19 June)  Arlington, WI  2009

Mean number of PLH per 25 sweeps

Seed treatments

In-furrow spray

Treatments

N=4

Cruiser 5FS
Dermacor (low)
Dermacor (high)
HGW86 (low)
HGW86 (high)
Coragen (low)
Coragen (high)
HGW86 20SC (low)
HGW86 20SC (high)
Durivo

Groves & Chapman
European Corn Borer (ECB)
Infested 10 row ft with ~ 1,000 ECB larvae
Percent Snap Bean Pods Damaged by European Corn Borer

Arlington, WI  2009

Mean % damaged pods

Seed treatments

In-furrow spray

Foliar spray

Treatments

Groves & Chapman

N=4
Percent Snap Bean Pods Damaged by European Corn Borer  

Arlington, WI  2009

Mean % damaged pods

- Untreated
- Cruiser 5FS
- Dermacor (low)
- Dermacor (high)
- HGW86 (low)
- HGW86 (high)
- Coragen (low)
- Coragen (high)
- HGW86 20SC (low)
- HGW86 20SC (high)
- Durivo
- Hero 1.24EC

Seed treatments:
- a
- cde
- ef
- c
- efg
- cd
- def
- fg
- g

In-furrow spray
- ab

Foliar spray
- N=4

Treatments

Groves & Chapman
Percent Snap Bean Pods Damaged by European Corn Borer

Arlington, WI  2009

Mean % damaged pods

- Seed treatments
  - Untreated
  - Cruiser 5FS
  - HGW86 (low)
  - HGW86 (high)
  - Coragen (low)
  - Coragen (high)
  - HGW86 20SC (low)
  - HGW86 20SC (high)
  - Durivo
  - Hero 1.24EC

- In-furrow spray
  - Dermacor (low)
  - Dermacor (high)

- Foliar spray

Treatments

N=4

Groves & Chapman
### Percent Snap Bean Pods Damaged by European Corn Borer

**Geneva, NY 2009**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Seed treatments</th>
<th>In-furrow spray</th>
<th>Foliar spray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cruiser 5FS</td>
<td>a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermacor (low)</td>
<td>cde</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermacor (high)</td>
<td>de</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGW86 (low)</td>
<td>bcd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGW86 (high)</td>
<td>cde</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coragen (low)</td>
<td>bcd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coragen (high)</td>
<td>cde</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGW86 20SC (low)</td>
<td>bcd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGW86 20SC (high)</td>
<td>cde</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durivo</td>
<td></td>
<td>de</td>
<td></td>
</tr>
<tr>
<td>Coragen 10 OD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGW86 10 OD</td>
<td></td>
<td></td>
<td>e</td>
</tr>
<tr>
<td>Hero 1.24 EC</td>
<td></td>
<td></td>
<td>e</td>
</tr>
</tbody>
</table>

**Mean % damaged pods**

- N=5

- **Treatments:**
  - Untreated
  - Cruiser 5FS
  - Dermacor (low)
  - Dermacor (high)
  - HGW86 (low)
  - HGW86 (high)
  - Coragen (low)
  - Coragen (high)
  - HGW86 20SC (low)
  - HGW86 20SC (high)
  - Durivo
  - Coragen 10 OD
  - HGW86 10 OD
  - Hero 1.24 EC

- **Nault and Hessney**
Percent Snap Bean Pods Damaged by European Corn Borer

Geneva, NY 2009

Seed treatments

Untreated
Cruiser 5FS
Dermacor (low)
Dermacor (high)
HGW86 (low)
HGW86 (high)
Coragen (low)
Coragen (high)
HGW86 20SC (low)
HGW86 20SC (high)
Durivo
Coragen 10 OD
HGW86 10 OD
Hero 1.24 EC

Mean % damaged pods

In-furrow spray

abcd
cde

dede
cdedede

Foliar spray

eee

N=5

Treatments

Nault and Hessney
Percent Snap Bean Pods Damaged by European Corn Borer
Geneva, NY 2009

Mean % damaged pods

Seed treatments

In-furrow spray

Foliar spray

Treatments

N=5

Untreated
Cruiser 5FS
Dermacor (low)
Dermacor (high)
HGW86 (low)
HGW86 (high)
Coragen (low)
Coragen (high)
HGW86 20SC (low)
HGW86 20SC (high)
Durivo
Coragen
HGW86 10 OD
Hero 1.24 EC

Nault and Hessney
Summary

• Chlorantraniliprole and cyantraniliprole have activity against seedcorn maggot, potato leafhopper and European corn borer

• Chlorantraniliprole and cyantraniliprole were effective against the target pest when applied as a seed treatment, in-furrow spray and foliar spray
Future Research

• Repeat experiments in 2010 in WI, NY and VA and generate efficacy data for major pests

• Refine rates of chlorantraniliprole and cyantraniliprole, especially for seed treatments
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