Onion Insect Management: Seed Maggots and Onion Thrips

Wisconsin Fertilizer, Aglime and Pest Management Conference

Vegetable Crop Management

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I. Problem and associated pest(s)...
Seed (corn) maggot, Host range

- **Wide host range**
- **Can develop on organic matter**

### Crop Susceptibility

<table>
<thead>
<tr>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cucurbits (squash, cucumber, melon)</td>
<td>Peas</td>
<td>Corn</td>
</tr>
<tr>
<td>Beans (lima, snap)</td>
<td>Beans (soy, kidney)</td>
<td></td>
</tr>
<tr>
<td>Brassica roots (radish)</td>
<td>Brassica (broccoli, cauliflower)</td>
<td></td>
</tr>
<tr>
<td>Onions (dry bulb)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Seed maggots: Seedling damage

**Occurrence**

- Overwinter in soil as pupa
- Adults emerge in spring
- 4-5 generations/year. 2nd adult peak in May/June is usually most serious

**Damage**

- Tunnel germinating seeds
- Severely distort plant.
- Cool weather, delays plant emergence increases severity
Seed maggot: Management

Cultural

- Prevent egg laying with row cover
- Speed up germination: pre-sprout, mulch, warm soil
- Avoid green manure

Biological

- Predacious soil beetles
- Fungal epidemics

Chemical

- In-furrow, insecticides (Lorsban)
- Commercial seed treatments (Poncho)
II. Second problem and pest...

Onion Thrips Damage

Protected with insecticides

Not protected

Onion Thrips, *Thrips tabaci* Lindeman
Biological attributes that make onion thrips a pest

- Short developmental time
- Highly mobile
- Wide host range
- Overwinter adjacent to onion
- Capability of developing resistance to insecticides
Onion thrips: Management

**Cultural**
- Crop rotation
- Overhead irrigation
- Sanitation (culls & field borders)

**Biological**
- Predacious thrips
- Minute pirate bugs

**Chemical**
- Foliar sprays
- Commercial seed treatments
## 2007 Insecticide Seed Treatment Evaluations¹,²

<table>
<thead>
<tr>
<th>Product</th>
<th>Active Ingredient</th>
<th>Rate (amnt/unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigard</td>
<td>cyromazine</td>
<td>5.0 g [a.i.] / 100 g</td>
</tr>
<tr>
<td>Lorsban 15G</td>
<td>chlorpyrifos</td>
<td>476 g [a.i.] / 1,000</td>
</tr>
<tr>
<td>Entrust</td>
<td>spinosad</td>
<td>0.3 mg [a.i.] / seed</td>
</tr>
<tr>
<td>Mundial 500</td>
<td>fipronil</td>
<td>2.5 g [a.i.] / 100</td>
</tr>
<tr>
<td>Poncho 600</td>
<td>clothianadain</td>
<td>0.2 mg [a.i.] / seed</td>
</tr>
<tr>
<td>UTC</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: Products highlighted in yellow were labeled on onion in WI in 2007

¹Experiment arranged as RCBD with 5 replicates.
²Experimental seed treatments supplied by Seed Dynamics (Salinas, CA) and Incotec (Salinas, CA).

Note: All are systemic when delivered as seed treatments.
**Seed Treatment Insecticides for Maggot Control (Onion & Seed Corn)**

**Note:** Plots rated on 4/25, 5/1, 5/8, 5/22 and 5/29.

- **WI Registration**
- **Non-registered**

### Mean percent stand loss

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Percent Stand Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTC</td>
<td></td>
</tr>
<tr>
<td>Lorsban</td>
<td></td>
</tr>
<tr>
<td>Trigard</td>
<td>c</td>
</tr>
<tr>
<td>Entrust (I)</td>
<td></td>
</tr>
<tr>
<td>Entrust (SD)</td>
<td></td>
</tr>
<tr>
<td>Poncho (I)</td>
<td>a</td>
</tr>
<tr>
<td>Poncho (SD)</td>
<td>a</td>
</tr>
<tr>
<td>Mundial (I)</td>
<td>a</td>
</tr>
<tr>
<td>Mundial (SD)</td>
<td>a</td>
</tr>
</tbody>
</table>

**Legend:**
- c: Significant difference
- b: Significant difference
- a: Significant difference

**Non-registered**
Onions were best protected from maggot damage using Entrust, Poncho 600, or Mundial 500.

Negligible differences between seed trt companies

Trigard (cyromazine) provided nearly adequate levels of protection (seed corn maggot).

Lorsban 15 G failed to control seed maggots

Highly efficacious insecticides must be registered soon in WI to:

1. slow resistance
2. control seed corn maggot
Insecticide Seed Treatments:
Early Season Onion Thrips Control

Treatments

- Trigard
- Lorsban 15G
- Entrust
- Poncho 600
- Mundial 500

Nondestructively sampled

3, weekly sample dates:

- 15, 22, & 29 June
Onion Thrips ‘Suppression’ Using Insecticide Seed Treatments

- UTC
- Lorsban 15G
- Entrust
- Trigard
- Poncho 600
- Mundial 500

Mean larvae / plant

Action threshold = 5 larvae / plant

15 June 22 June 29 June
Early Season, Onion Thrips Ecology

- Colonize onion in late June to July
- Four to six generations per season

![Graph showing mean number of adults per trap over time with intervals for thrips suppression marked on 5/22, 6/5, 6/19.]
Onion Thrips Suppression Summary

- Immature onion thrips populations did not exceed established thresholds.
- Trigard and Lorsban 15G failed to provide thrips suppression compared with UTC.
- Thrips suppression extended over 2 out of 3 successive weeks (Entrust, Mundial).
- Suppression level was insufficient to maintain populations below damaging levels.
## Foliar-Applied Insecticides 2007 Product Evaluations

<table>
<thead>
<tr>
<th>Product</th>
<th>Active Ingredient</th>
<th>Rate (amt/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warrior</td>
<td>lambda-cyhalothrin</td>
<td>1.9 and 3.8 fl oz</td>
</tr>
<tr>
<td>Mana - Silencer</td>
<td>lambda-cyhalothrin</td>
<td>1.9 and 3.8 fl oz</td>
</tr>
<tr>
<td>Lannate LV</td>
<td>methomyl</td>
<td>48 fl oz</td>
</tr>
<tr>
<td>SpinTor 2SC</td>
<td>spinosad</td>
<td>4 and 6 fl oz</td>
</tr>
<tr>
<td>*Radiant SC</td>
<td>spinetoram</td>
<td>5 and 7 fl oz</td>
</tr>
<tr>
<td>**Carzol SP</td>
<td>formetanate hydrochloride</td>
<td>0.75, 1 and 1.5 lbs</td>
</tr>
<tr>
<td>Movento</td>
<td>spirotetramat</td>
<td>5 and 8 fl oz</td>
</tr>
<tr>
<td>Agri-Mek 0.15EC</td>
<td>abamectin</td>
<td>8 and 10 fl oz</td>
</tr>
</tbody>
</table>

**Note:** Products highlighted in yellow were labeled on onion in WI in 2007;
*Radiant received a Section 3c label use in November, 2007.
**Carzol was permitted for use in WI under a Section 18.
Foliar-Applied Insecticides for Onion Thrips Control

Note: Plots sprayed on 7/18 and 7/24 @ threshold of 3 thrips/leaf.

Action threshold = 8 larvae / plant

Mean number of larvae/plant

WI Registration
Section 18
Non-registered

Treatment
Reduced Risk Foliar Options
New Registration 2007

- Radiant® SC (spinetoram)
  - Macrocyclic lactone (spinosad: MoA group 5)
    - Use rate 4.5 - 6 oz a.i./a (CPB)
    - Control of onion thrips
  - 10-14 days persistence (photostability)
  - Very low impact on beneficials
  - Low mammalian toxicity
Movento® (spirotetramat):

- Tetramic acid class (MoA Group 23)
  - Use rate 8 – 16 fl oz (Thysanoptera)
  - Fully systemic movement (2 directions)
- 10 - 14 days persistence
- Very low impact on beneficials
- Very low mammalian toxicity
- Section 3 Registration (mid – late, 2008)
Reduced Risk Foliar Options
New Registrations 2008-09

- **Agri-Mek® 0.15 EC (abamectin):**
  - Chlorine channel activators (MoA Group 6)
    - Use rate 5 – 8 fl oz (Thysanoptera)
  - 7-10 days persistence
  - Very low impact on beneficials
  - Very low mammalian toxicity
  - Section 3 Registration (2009-2010)
Populations in Wisconsin may be resistant, similar to populations in other locales.

- Environmental conditions become hot and dry.
- Spray coverage may be inadequate.
- Application threshold adjustments.
Expose thrips to insecticides in the lab to avoid issues such as:

1. inadequate spray coverage
2. environmental conditions that could affect control

TIBS Survey for Insecticide Resistance

Water + sugar

20 larvae

Insecticide
Insecticide Control Options

- Rotate insecticides (classes if possible)
  - e.g., spinosad, (spinetoram), carbamate, spiroteramat, abamectin, carbamate, pyrethroid

- Two successive applications of one product to control a generation

- Time applications based on most appropriate threshold

- Avoid tank mixing insecticides
Insecticide control failures could be reduced by:

1. Monitoring onion thrips populations for resistance
2. Using a nozzle and gallonage that provides better coverage
3. Using insecticides belonging to new classes
4. Adopting insecticide resistance management – rotating classes of chemistry
Questions?