1) Insecticide options for onion thrips control

2) Role of tank mixing insecticides and surfactants on thrips control and diseases

3) Implementation and performance of the Cornell onion thrips management program
Onion Thrips

Thrips tabaci
Thrips Damage Reduces Bulb Size

Damaged  Undamaged

Damaged  Undamaged
Thrips Transmit/ Spread Pathogens

- *Iris yellow spot virus* (Iris yellow spot)
- *Pantoea ananatis* (bacterial center rot)
- *Alternaria porri* (Purple blotch)
Onion Thrips Life Cycle

1 female lays 63 eggs

Generation completed in 17 days @ 85° F
Multiple Generations of Onion Thrips are Produced in an Onion Field

*Thrips may produce 3 to 4 generations in a field

One generation (~2 wks)

Planting

Thrips

Onions

Harvest

Conventional Approach for Managing Onion Thrips in Onion in the 1990s

Warrior (lambda-cyhalothrin) was sprayed weekly, and thrips were effectively controlled.


Planting Thrips Onions Harvest

Cornell University
College of Agriculture and Life Sciences
Conventional Approach for Managing Onion Thrips in Onion from 2001-2005

Section 24c(s) for Vydate L and MSR, but thrips were still not effectively controlled....

Onion

Planting

Onions

Thrips

Harvest


Vydate L
Lannate LV
Warrior MSR
Penncap-M
Conventional Approach for Managing Onion Thrips in Onion from 2001-2005


CRISIS!

Planting
Thrips
Onions
Harvest

Vydate L  Lannate LV
Warrior MSB  Penncap-M

Cornell University
College of Agriculture and Life Sciences
Conventional Insecticides for Managing Onion Thrips

- Agri-Mek SC (abamectin)
- Exirel (cyantraniliprole)
- Movento (spirotetramat)
- Radiant SC (spinetoram)
- Lannate LV (methomyl)
- Warrior II w/Zeon tech (lambda-cy)
Onion Thrips Control in Onion

Elba, NY 2014 (n = 4) Total after 6 sprays

- Untreated: A
- Warrior II: AB
- Lannate LV: B
- Lannate + Warrior: C
- Radiant SC: D

Mean Total Number Larvae/Plant

P < 0.0001
Conventional Insecticides for Managing Onion Thrips

- Agri-Mek SC (abamectin)
- Exirel (cyantraniliprole)
- Movento (spirotetramat)
- Radiant SC (spinetoram)
- Lannate LV (methomyl)
- Warrior II w/Zeon tech (lambda-cy)

DuPont™ Lannate® LV insecticide
Guidelines for Season-Long Control Using a Sequence of Products

- Planting: 15-Mar to 14-Apr
- Onions: 14-May to 13-Jun
- Thrips: 13-Jun to 13-Jul
- Harvest: 12-Aug to 11-Sep
Guidelines for Season-Long Control Using a Sequence of Products

Spray when threshold exceeds 1 thrips/leaf

1) Movento

Planting  Onions  Thrips  Harvest

Guidelines for Season-Long Control Using a Sequence of Products

Spray when threshold exceeds 1 thrips/leaf

1) Movento
2) Agri-Mek or Exirel

Planting

15-Mar 14-Apr 14-May

Onions

13-Jun 13-Jul 12-Aug

Thrips

11-Sep 11-Oct

Harvest

Cornell University
College of Agriculture and Life Sciences
Guidelines for Season-Long Control Using a Sequence of Products

Spray when threshold exceeds 1 thrips/leaf

1) Movento
2) Agri-Mek or Exirel
3) Radiant

Planting: 15-Mar
14-Apr
14-May
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13-Jul
12-Aug
11-Sep
11-Oct

Onions

Harvest

Thrips

Cornell University
College of Agriculture and Life Sciences
Guidelines for Season-Long Control Using a Sequence of Products

Spray when threshold exceeds 1 thrips/leaf

1) Movento
2) Agri-Mek or Exirel
3) Radiant
4) Lannate + Warrior or Exirel

Planting

Onions

Thrips

Harvest


Cornell University
College of Agriculture and Life Sciences
Result of Following these Guidelines often leads to Reduction in Applications

Spray when threshold exceeds 1 thrips/leaf

1) Movento

2) Agri-Mek or Radiant


Planting

Onions

Thrips

Harvest

Cornell University
College of Agriculture and Life Sciences
Topics Covered

1) Insecticide options for onion thrips control

2) Role of tank mixing insecticides and surfactants on thrips control and diseases

3) Implementation and performance of the Cornell onion thrips management program
Conventional Insecticides for Managing Onion Thrips

- Agri-Mek SC (abamectin)
- Exirel (cyantraniliprole)
- Movento (spirotetratam) 
- Radiant SC (spinetoram)

*Must use with a non-ionic surfactant or MSO to improve efficacy*
How Much Does a Surfactant Improve Thrips Control?

spirotetramat + non-ionic surfactant = ?

Cornell University
College of Agriculture and Life Sciences
Surfactant Improves Thrips Control

Elba, NY 2011

Mean Total Number Larvae/Plant

- Untreated
- Induce@0.5% only
- Movento only
- Movento+Induce@0.05%
- Movento+Induce@0.1%
- Movento+Induce@0.25%
- Movento+Induce@0.5%

F= 30.99
df= 6, 18
P < 0.0001

70% reduction!

Cornell University
College of Agriculture and Life Sciences
Will Tank Mixing with Chlorothalonil Products Impact Thrips Control?

abamectin + non-ionic surfactant + chlorothalonil = ?

Cornell University
College of Agriculture and Life Sciences
Performance of Agri-Mek with and w/o Bravo WS

Cumulative number of larvae per plant (4 weeks)

- Untreated
- Agri-Mek + Induce
- Agri-Mek + Induce + BWS

Visual thrips damage rating

- Untreated
- Agri-Mek + Induce
- Agri-Mek + Induce + BWS

Insecticide treatment

Cv. ‘Gunnison F1’ Elba, NY 2015
N=4

+ 35%

Cornell University
College of Agriculture and Life Sciences
Do Surfactants Make Onions More Vulnerable to Diseases?

- Botrytis leaf blight
- Purple blotch
- Downy mildew
- Stemphylium leaf blight
- Center rot
## Evaluating Co-Applications of Insecticides and Surfactants for Thrips Control and Disease Incidence - 2015

<table>
<thead>
<tr>
<th>Product</th>
<th>Surfactant Type</th>
<th>Rate (amount/acre)</th>
<th>Manufacturer</th>
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<tr>
<td>Induce</td>
<td>non-ionic</td>
<td>0.5% v:v</td>
<td>Helena Chem. Co.</td>
</tr>
<tr>
<td>MSO</td>
<td>methylated seed oil</td>
<td>0.25% v:v</td>
<td>Helena Chem. Co.</td>
</tr>
<tr>
<td>JMS Stylet oil</td>
<td>mineral oil</td>
<td>1.5% v:v</td>
<td>JMS</td>
</tr>
<tr>
<td>Silwet L-77</td>
<td>organosilicone</td>
<td>0.25% v:v</td>
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All treatments received the same weekly sequence of insecticides: Movento, Movento, Agri-Mek, Agri-Mek (=M M A A A)
Evaluation of Insecticides Co-applied with Surfactants on Onion Thrips

N=4  cv. ‘Gunnison F1’  Elba, NY 2015

Cumulative number of larvae per plant (4 weeks)

- Untreated
- M M A A Only
- M M A A + Induce
- M M A A + MSO
- M M A A + JMS oil
- M M A A + Silwet

with surfactants

Insecticide Treatment
Evaluation of Insecticides Co-applied with Surfactants on Botrytis leaf blight

N=4 cv. ‘Gunnison F1’ Elba, NY
July 24, 2015

with surfactants

Mean Number of BLB Lesions/Leaf

Insecticide Treatment

- Untreated
- M A A Only
- M A A + Induce
- M A A + MSO
- M A A + JMS oil
- M A A + Silwet

Correlating with surfactants.
Evaluation of Insecticides Co-applied with Surfactants on Downy Mildew

N=4  cv. ‘Gunnison F1’  Elba, NY 2015

Percent Plants with Symptoms

Insecticide Treatment

- Untreated
- M M A A Only
- M M A A + Induce
- M M A A + MSO
- M M A A + JMS oil
- M M A A + Silwet

with surfactants
Evaluation of Insecticides Co-applied with Surfactants on Target Spot Lesions

N=4  cv. ‘Gunnison F1’  Elba, NY 2015

Mean Number of Lesions/Leaf

Insecticide Treatment

- Untreated
- M M A A Only
- M M A A + Induce
- M M A A + MSO
- M M A A + JMS oil
- M M A A + Silwet
Evaluation of Insecticides Co-applied with Surfactants on Bacterial Bulb Rots

N=4  cv. ‘Gunnison F1’  Elba, NY 2015

Insecticide Treatment

- Untreated
- M M A A Only
- M M A A + Induce
- M M A A + MSO
- M M A A + JMS oil
- M M A A + Silwet

Mean % Bulb Rot with surfactants
1) Insecticide options for onion thrips control

2) Role of tank mixing insecticides and surfactants on thrips control and diseases

3) Implementation and performance of the Cornell onion thrips management program
Onion Thrips Management Program

**Key Elements**

- Scout fields
- Apply insecticide only if population exceeds action threshold of 1 thrips/leaf
- Limit number of applications of each product
  - no more than 2 apps. per crop per season
- Use insecticides in a recommended sequence
- Use a surfactant with insecticides (non-ionic, oil)
- Avoid tank mixing with Bravo WeatherStik or OLF
Onion Thrips Management Program

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Onion Thrips Management Program

Pilot Program in Elba in 2014

- Hoepting (CCE\(^1\)) worked with 5 onion growers
- Scouted onion fields/made control recommendations based on an action threshold
- Average number of applications reduced by 74% compared with a standard weekly spray program
- Growers collectively saved approximately $33,200 in insecticide costs on 166 acres (=67 ha)

\(^1\)CCE= Cornell Cooperative Extension
**Implementation of Onion Thrips Management Program in 2015**

- Provided weekly scouting and recommendations:

<table>
<thead>
<tr>
<th>Region</th>
<th># of Growers</th>
<th>Total # of Fields</th>
<th>Scouting provided by:</th>
<th>Recommendations provided by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elba Muck</td>
<td>5</td>
<td>5</td>
<td>Christy Hoepting(^1)</td>
<td>Christy Hoepting(^1)</td>
</tr>
<tr>
<td>Wayne</td>
<td>4</td>
<td>4</td>
<td>John Gibbons(^1)</td>
<td>Christy Hoepting(^1)</td>
</tr>
<tr>
<td>Oswego</td>
<td>4</td>
<td>4</td>
<td>Ashley Leach(^2)</td>
<td>Brian Nault(^2)</td>
</tr>
<tr>
<td>Orange</td>
<td>3</td>
<td>3</td>
<td>Kevin Besler(^1)</td>
<td>Brian Nault(^2)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16</strong></td>
<td><strong>16</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Cornell Cooperative Extension  
\(^2\)Cornell Entomology
Criteria for Adoption Categories

1. **Complete adoption** – only sprayed when thrips were at or above an action threshold of 1 thrips per leaf (accepted >0.6 thrips per leaf because of lag between sampling and spraying)

2. **Partial adoption** – sprayed when thrips were at or above the action threshold, except for 1 spray applied below threshold

3. **No adoption** – typically sprayed when thrips were below threshold; applied 2 or more sprays below threshold

Note: Only focused on spraying when advised, not on the other elements of the Onion Thrips Management Program (OTMP)
Implementation of Onion Thrips Management Program in 2015

Growers who Completely/Partially adopted OTMP

NY State Average: 67%

- Elba Muck: 100%
- Oswego Co.: 0%
- Wayne Co.: 75%
- Orange Co.: 67%
Implementation of Onion Thrips Management Program

Yellow Transplanted Onions in Elba, NY

- **Complete Adoption:** 6 sprays made out of possible 10 = 40% reduction
- Average per season (No. OT per leaf): 1.1
- **Spray Program Cost:** $199.39

**Number Thrips per leaf**

- **Radiant SC** + Dyne-Amic
- **Movento** + Dyne-Amic
- **Agri-Mek SC** + Dyne-Amic
- **Movento**
- **Agri-Mek SC**
- **Radiant SC**
- **Harvest**

**Momentum of Movento! 5 weeks control**

Spray threshold = 1.0 OT per leaf

Date

### Implementation of Onion Thrips Management Program in 2015

<table>
<thead>
<tr>
<th>Degree of Implementation of Cornell OTMP</th>
<th>Average No. Insecticide Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>5</td>
</tr>
<tr>
<td>Partial</td>
<td>4</td>
</tr>
<tr>
<td>None</td>
<td>7</td>
</tr>
</tbody>
</table>

Reduction in number of insecticide applications (2-3) for those who completely and partially followed the OTMP
Implementation of Onion Thrips Management Program in 2015

n = 16 fields

Insecticide application cost

<table>
<thead>
<tr>
<th>Standard Program</th>
<th>Onion Thrips Management Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>$201.17</td>
<td>$149.97</td>
</tr>
</tbody>
</table>

Saved $50 per acre (= $20/ha)
IPM Program for Onion Thrips

Plant Resistance  Chemical Control

Cultural Control  Biological Control
Acknowledgements

Christy Hoepting – CCE Veg Prog. & Ashley Leach – Cornell Univ. Mortellaro Farms – Matt Mortellaro

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New York Farm Viability Institute