Yet Another Thrips Talk...

An Intermountain Perspective

Part III

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Funded by CAGORAB
Frankliniella occidentalis
Reproduces sexually, males and females common

Thrips tabaci
Asexual reproduction by females (parthenogenesis)
Relative Percentage of Onion Thrips vs. Western Flower Thrips 2010
Relative Percentage of Onion Thrips vs. Western Flower Thrips 2011
Relative Percentage of Onion Thrips vs. Western Flower Thrips 2012

Percent

0 10 20 30 40 50 60 70 80 90 100

5-July 19-July 2-Aug 13-Aug 21-Aug 4-Sep

Green: OT

Purple: WFT
Thrips Population Over the Growing Season

Planting Dates:
5/6/2011
4/28/2012
2011 vs. 2012 Max and Min Daily Temperatures

Average Max Temp 78.4 in 2011 and 82.7 in 2012

Average Min Temp 40.8 in 2011 and 41.8 in 2012
Objectives

- Compare effectiveness of a range of insecticides
- Evaluate different strategies for thrips management over the season to compare number of treatments, timing, and different insecticides sequences.
- Determine effect of different thrips populations on onion yield.
Insecticide Comparison Trial

- 3 beds x 25 ft. plots
- Replicated 4 times

Season-Long Thrips Strategy

- 20 x 50 ft. plots
- Replicated 4 times
# Insecticides Evaluated 2012

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Rate/A</th>
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<tbody>
<tr>
<td>Warrior</td>
<td>1.92 oz</td>
</tr>
<tr>
<td>Lannate</td>
<td>3 pt</td>
</tr>
<tr>
<td>Radiant</td>
<td>8 oz</td>
</tr>
<tr>
<td>Radiant + Aza Direct</td>
<td>8 oz + 12 oz</td>
</tr>
<tr>
<td>Movento</td>
<td>5 oz</td>
</tr>
<tr>
<td>Lannate + Movento</td>
<td>5 oz + 3 pt</td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>16 oz</td>
</tr>
<tr>
<td>Radiant + Movento</td>
<td>8 oz + 5 oz</td>
</tr>
<tr>
<td>Torac</td>
<td>24 oz</td>
</tr>
<tr>
<td>Torac + Lannate</td>
<td>24 oz + 3 pt</td>
</tr>
</tbody>
</table>
Insecticide Treatment Effects on Thrips Population

7 Days after 1st Application

Thrips per Plant

Movento + Lannate, Radiant + Movento, Agri-Mek (abamectin), Radiant + Aza Direct, Radiant, Movento, Torac + Lannate, Torac, Lannate, Untreated, Warrior

Treated: 7/12
Insecticide Treatment Effects on Thrips Population

6 Days after 2nd Application

Movento + Lannate
Radiant + Movento
Agri-Mek (abamectin)
Radiant + Aza Direct
Radiant
Movento
Torac + Lannate
Torac
Lannate
Untreated
Warrior

Treated: 7/12 & 7/20
Insecticide Treatment Effects on Thrips Population

14 Days after 2\textsuperscript{nd} Application

- **Treated:** 7/12 & 7/20
Insecticide Treatment Effects on Thrips Population

21 Days after 2nd Application

- **Treated**: 7/12 & 7/20

![Bar chart showing the effects of different insecticide treatments on thrips population 21 days after the 2nd application. The y-axis represents thrips per plant, and the x-axis lists various treatments such as Movento, Radiant, Agri-Mek, Aza Direct, etc. The treatments appear to show varying degrees of effectiveness, with some treatments significantly reducing thrips populations compared to untreated controls.](image-url)
Insecticide Treatment Effects on Thrips Population

19 Days after 2\textsuperscript{nd} Application

Treated: 7/19 & 7/28
Causes for Increased Thrips Population following Applications of Warrior

- Effect on beneficial insects
- *Hormoligosis*: sublethal dose stresses the insect and triggers a response to produce more offspring.
Thrips Control in Fresh Market Onions

Lancaster 1986

Cowboy entomology
Insecticide Sequence
Proposed by Brain Nault Professor, Dept. of Entomology Cornell University

• Product should be used consecutively
  – Reduces the number of generations exposed to same product
  – Thrips can complete the life cycle in 14 to 30 days. Typically 2 – 3 weeks (even shorter high temperatures)
• Movento not effective on adults so should be used early in the season when adult populations are low.
• Radiant can be used later when populations are high
• Do not apply same insecticide more than twice
Example Insecticide Sequence
Proposed by Brain Nault Professor, Dept. of Entomology Cornell University

Need to protect onion crop from thrips for 8 weeks
Example Insecticide Sequence

Need to protect onion crop from thrips for 8 weeks
# Season-Long Thrips Management

## Treatment Strategies 2012

<table>
<thead>
<tr>
<th>1st Application</th>
<th>2nd Application</th>
<th>3rd Application</th>
<th>4th Application</th>
<th>5th Application</th>
<th>6th Application</th>
</tr>
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<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warrior 7/3</td>
<td>Warrior 7/20</td>
<td>Warrior 8/10</td>
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<tr>
<td>Lannate 7/3</td>
<td>Radiant 7/20</td>
<td>Radiant 8/10</td>
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<tr>
<td>Movento 6/26</td>
<td>Movento 7/9</td>
<td>Radiant 7/25</td>
<td>Radiant 8/15</td>
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<tr>
<td>Lannate 7/3</td>
<td>Lannate 7/20</td>
<td>Radiant 8/7</td>
<td>Radiant 8/31</td>
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<td>Movento 6/26</td>
<td>Movento 7/9</td>
<td>Lannate 7/25</td>
<td>Lannate 8/7</td>
<td>Radiant 8/17</td>
<td>Radiant 8/31</td>
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</tbody>
</table>
Season-Long Thrips Management Strategy

Effect on Thrips Population

![Graph showing the effect of different management strategies on thrips population over time. The x-axis represents dates from 3rd July to 28th August, and the y-axis represents thrips per plant. Different lines represent various management strategies, such as Control, War/War/War, Lan/Rad/Rad, Mov/Mov+Lan, Mov/Mov/Rad/Rad, Lan/Lan/Rad/Rad, Mov/Mov/Lan/Lan/Rad/Rad. The graph shows a peak in thrips population on 14th August, with a significant decrease by 21st August.]
Season-Long Thrips Management Strategy

Effect on Thrips Population

- Control
- Lan/Rad/Rad
Season-Long Thrips Management Strategy

Effect on Thrips Population

Thrips per Plant

Control
Lan/Rad/Rad
Mov/Mov+Lan


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140
Season-Long Thrips Management Strategy

Effect on Thrips Population

Thrips per Plant

- Control
- Lan/Rad/Rad
- Mov/Mov+Lan
- Mov/Mov/Rad/Rad

Dates:
- 3-Jul
- 10-Jul
- 17-Jul
- 24-Jul
- 31-Jul
- 7-Aug
- 14-Aug
- 21-Aug
- 28-Aug
Season-Long Thrips Management Strategy

Effect on Thrips Population

![Graph showing the effect of different management strategies on thrips population over time. The x-axis represents dates from 3-Jul to 28-Aug, and the y-axis represents thrips per plant. Different strategies are indicated by different colors: Control (blue), Lan/Rad/Rad (green), Mov/Mov+Lan (purple), Mov/Mov/Rad/Rad (teal), and Lan/Lan/Rad/Rad (orange).]
Season-Long Thrips Management Strategy

Effect on Thrips Population

![Graph showing the effect of different management strategies on thrips population over a season-long period. The x-axis represents dates from 3 July to 28 August, and the y-axis represents thrips per plant. Different lines represent control, Lan/Rad/Rad, Mov/Mov+Lan, Mov/Mov/Rad/Rad, Lan/Lan/Rad/Rad, and Mov/Mov/Lan/Lan/Rad/Rad treatments. The graph illustrates the variation in thrips population across different treatments and dates.]
Season-Long Thrips Management Strategy

Effect on Thrips Population

<table>
<thead>
<tr>
<th>Date</th>
<th>Control</th>
<th>War/War/War</th>
<th>Lan/Rad/Rad</th>
<th>Mov/Mov+Lan</th>
<th>Mov/Mov/Rad/Rad</th>
<th>Lan/Lan/Rad/Rad</th>
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</table>

Thrips per Plant

Resistance Management Principles
Brain Nault Professor, Dept. of Entomology Cornell University

• Products should be rotated across generations
  – Minimize exposure of the same generation to multiple active ingredients
  – Don’t use product more than twice per season
• Apply insecticide consecutively, 7 – 10 days apart
• Do not tank mix two effective insecticides
• Do not use same chemistry class more than on time per season and use treatment thresholds
### Season-Long Thrips Management

#### Effect on Yield 2012

<table>
<thead>
<tr>
<th>1st Application</th>
<th>2nd Application</th>
<th>3rd Application</th>
<th>4th Application</th>
<th>5th Application</th>
<th>6th Application</th>
<th>Yield Tons/A</th>
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Planter issues, irrigation uniformity, white rot
### Season-Long Thrips Management

#### Treatment Strategies 2011

<table>
<thead>
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<th>1st Applic.</th>
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<th>3rd Applic.</th>
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<td>Agri-Mek</td>
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<td>Radiant</td>
<td>Radiant</td>
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<td>Lannate</td>
<td>Lannate</td>
<td>Radiant</td>
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<td></td>
<td>NS</td>
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</tbody>
</table>
Onion Thrips Damage in New York State

Control
341 cwt/acre

Treated with Insecticides
529 cwt/acre

30 to 50% yield loss
Yet Another Thrips Talk...
An Intermountain Perspective Part III
Things We Know (or think we know)

• Thrips population can vary greatly between years
• Mix of thrips species in Klamath Basin
  – Predominantly onion thrips
  – More WFT early in season in some years
• Insecticides vary in their effectiveness
  – Warrior initially knocked down population but caused subsequent spike
  – Movento very effective over two applications
  – Radiant and Agri-Mek also effective
  – Aza-Direct plus Radiant lower thrips population than Radiant alone
  – Movento plus Lannate most effective treatment
  – Lannate alone may not be good choice in season-long strategy
Things We Don’t Know
(but wish we did know)

- Why thrips populations vary so much from year to year
- What causes thrips populations to crash in some years?
- Why are back-to-back applications of Movento much more effective
- Back-to-back applications of other insecticides superior?
- Why is Movento effective in Klamath Basin?
- Why do thrips populations surge after some insecticide applications?
Things We Don’t Know (but wish we did know)

- Effect of thrips on onion yield?
- Economic threshold (maintain pop. below what level)?
- Threshold based on...
  - Thrips per plant? Thrips per leaf? Thrips per unit area?
- Should economic threshold vary with different insecticides?
- How many insecticide applications are needed for maximum profit?
- If three applications needed...
  - Treat early to cap off population
  - Treat later because resurgence from early applications but higher population more difficult to control
  - At what growth stage are thrips most damaging
Thank You

This research is supported by CA Garlic and Onion Research Advisory Board