Strategies to Optimize Thrips Control in the Klamath Basin

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Funded by CGORAB
Thrips feed by piercing the leaf surface to liberate juices from the plant cells. Thrips release substances that help predigest the onion plant tissue. Using their mouth parts they suck up the plant content.

Extensive damage is silvery patches which can occupy most of leaf surface. Plant cannot adequately photosynthesize and plant pathogens can penetrate.
Objectives

• Compare effectiveness of a range of insecticides

• Evaluate different strategies for thrips management over the season to compare single insecticides, tank mixes, and alternating chemistries.
Onion Thrips
*Thrips tabaci*
Asexual reproduction by females *(parthenogenesis)*

Western Flower Thrips
*Frankliniella occidentalis*
Reproduces sexually, males and females common
Relative Percentage of Onion Thrips vs. Western Flower Thrips 2010

- 2-Jul: OT 44%, WFT 56%
- 8-Jul: OT 89%, WFT 11%
- 15-Jul: OT 102%, WFT 9%
- 22-Jul: OT 73%, WFT 27%
- 24-Aug: OT 37%, WFT 63%
- 31-Aug: OT 98%, WFT 2%
- 7-Sep: OT 59%, WFT 41%
Relative Percentage of Onion Thrips vs. Western Flower Thrips 2011
# Insecticides Evaluated 2010

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Rate</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warrior</td>
<td>1.92 oz/A</td>
<td>Pyrethroid was standard or common treatment in the area.</td>
</tr>
<tr>
<td>Lannate</td>
<td>3 pt/A</td>
<td>Carbamate old insecticide commonly used for lep. control</td>
</tr>
<tr>
<td>Radiant</td>
<td>8 oz/A</td>
<td>Spinosyns. Has both contact and ingestion activity. Attacks nervous system. Locally systemic.</td>
</tr>
<tr>
<td>Radiant + Aza Direct</td>
<td>8 oz/A + 12 oz</td>
<td>Biological insecticide from neem tree insect repellent, antifeedant, and growth regulator.</td>
</tr>
<tr>
<td>Movento</td>
<td>5 oz/A</td>
<td>Systemic insecticide, Inhibits lipid biosynthesis.</td>
</tr>
<tr>
<td>Vydate</td>
<td>4 pts</td>
<td>Carbamate insecticide</td>
</tr>
<tr>
<td>Assail</td>
<td>8 oz dry</td>
<td>Neonicotinoid class of insecticides</td>
</tr>
<tr>
<td>HGW86</td>
<td>20.5 fl oz</td>
<td>Cyazypyr™ Diamide insecticide class</td>
</tr>
</tbody>
</table>
Insecticide Treatment Effects on Thrips Population 2010

Pretreatment
12.9 immature thrips/plant

No. Thrips Nymphs/Plant

Insecticide Treatment

Warrior | Lannate | Radiant | Radiant + Aza-Direct | Movento | Vydate | Assail | Agri-Mek | HGW86 | Check

8/12/2010 | 8/19/2010 | 8/27/2010

Pretreatment
12.9 immature thrips/plant
Effect of Insecticide Treatment on Onion Thrips Injury Symptoms 2010

![Bar chart showing the effect of different insecticides on onion thrips injury symptoms.](image-url)
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<td></td>
</tr>
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Insecticide Treatment Effects on Thrips Population

7 Days after 1st Application

Treated: 7/19
Insecticide Treatment Effects on Thrips Population

5 Days after 2^{nd} Application

Treated: 7/19 & 7/28
Insecticide Treatment Effects on Thrips Population

11 Days after 2nd Application

Treated: 7/19 & 7/28
Insecticide Treatment Effects on Thrips Population

19 Days after 2\textsuperscript{nd} Application

<table>
<thead>
<tr>
<th>Treatment</th>
<th>26-Jul</th>
<th>2-Aug</th>
<th>8-Aug</th>
<th>16-Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lannate/Movento</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movento</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiant + A2a-Direct</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agri-Mek</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lannate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HGW86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warrior</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Treated: 7/19 & 7/28
Thrips Control in Fresh Market Onions

Lancaster 1986

Cowboy entomology
### Season-Long Thrips Management Strategy Treatments

<table>
<thead>
<tr>
<th>1st Application (6/30) or (7/8)</th>
<th>2nd Application (7/29)</th>
<th>3rd Application (8/16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warrior (7/8)</td>
<td>Warrior</td>
<td>Warrior</td>
</tr>
<tr>
<td>Lannate (7/8)</td>
<td>Lannate</td>
<td>Lannate</td>
</tr>
<tr>
<td>Warrior (7/8)</td>
<td>Lannate</td>
<td>Warrior</td>
</tr>
<tr>
<td>Warrior+Lannate (7/8)</td>
<td>Warrior+Lannate</td>
<td>Warrior+Lannate</td>
</tr>
<tr>
<td>Warrior (6/30)</td>
<td>Lannate</td>
<td>Warrior</td>
</tr>
<tr>
<td>Movento (6/30)</td>
<td>Radiant</td>
<td>Radiant</td>
</tr>
<tr>
<td>Untreated</td>
<td>Untreated</td>
<td>Untreated</td>
</tr>
</tbody>
</table>
Effect of Control Strategy on Thrips Population

![Graph showing the effect of control strategy on thrips population](image)

The graph illustrates the thrips population over time, with application dates marked from 8th July to 2nd September. The untreated condition is represented by a red line, showing a gradual increase in thrips population as the application dates approach 2nd September.
Effect of Control Strategy on Thrips Population

- Lan/Lan/Lan
- W+L/W+L/W+L
- Mov/Rad/Rad
- Untreated

Thrips/Plant


or

Effect of Control Strategy on Thrips Population

The graph shows the effect of different control strategies on thrips population over time. The x-axis represents application dates from 8-July to 2-Sep, while the y-axis represents thrips/plant. Different strategies are represented by different colors:

- War/War/War (blue)
- Lan/Lan/Lan (red)
- War/Lan/War (green)
- W+L/W+L/W+L (purple)
- War/Lan/War Early (teal)
- Mov/Rad/Rad (orange)
- Untreated (red)

The graph illustrates how each strategy affects the thrips population over the specified period.
Insecticide Sequence
Proposed by Brain Nault Professor, Dept. of Entomology Cornell University

(when registered)

• **Movento** not effective on adults so should be used early in the season when adult populations are low.
• **Agri-Mek** must be used early due to 30 day PHI
• **Radiant** can be used later when populations are high
• Do not apply same insecticide more than twice
• 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)
Example Insecticide Sequence
Proposed by Brain Nault Professor, Dept. of Entomology Cornell University

Need to protect onion crop from thrips for 8 weeks

- Planting
- Onions
- Thrips
- Harvest
- Agri-Mek
- Lannate
- Radiant
- Movento
Example Insecticide Sequence
Proposed by Brain Nault Professor, Dept. of Entomology Cornell University

Need to protect onion crop from thrips for 8 weeks
# Season-Long Thrips Management
## Treatment Strategies 2011

<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>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warrior</td>
<td>Lannate</td>
<td>Warrior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>Lannate</td>
<td>Radiant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lannate</td>
<td>Lannate</td>
<td>Radiant</td>
<td>Radiant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>Agri-Mek</td>
<td>Lannate</td>
<td>Lannate</td>
<td>Radiant</td>
<td>Radiant</td>
</tr>
<tr>
<td>Radiant</td>
<td>Radiant</td>
<td>Radiant</td>
<td>Radiant</td>
<td>Radiant</td>
<td>Radiant</td>
</tr>
</tbody>
</table>
Season-Long Thrips Management Strategy

Effect on Thrips Population

The graph illustrates the effect of different management strategies on thrips population over a season long period. The strategies include Control, War/Lan/War, Agri-Mek/Lan/Rad, Lan/Lan/Rad/Rad, Agri-Mek/Agri-Mek/Lan/Lan/Rad/Rad, and Rad/Rad/Rad/Rad/Rad/Rad. The y-axis represents the number of thrips per plant, and the x-axis represents dates from 21st July to 15th September.
Season-Long Thrips Management Strategy

Effect on Thrips Population
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 us treatment thresholds
Season-Long Thrips Management Strategy

Effect on Onion Injury Rating

![Bar graph showing the effect of different management strategies on onion injury rating. The strategies include Control, War/Lan/War, Agri-Mek/Lan/Rad, Lan/Lan/Rad/Rad, Agri-Mek/Agri-Mek/Lan/Rad/Rad, Rad/Rad/Rad/Rad/Rad. The injury rating is measured on a scale from 0 to 6.]
Onion Thrips Damage in New York State

30 to 50% yield loss

Control
341 cwt/acre

Treated with Insecticides
529 cwt/acre
## Season-Long Thrips Management
### Treatment Strategies 2011

<table>
<thead>
<tr>
<th>1st Applic.</th>
<th>2nd Applic.</th>
<th>3rd Applic.</th>
<th>4th Applic.</th>
<th>5th Applic.</th>
<th>6th Applic.</th>
<th>Yield Tons/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17.9</td>
</tr>
<tr>
<td>Warrior</td>
<td>Lannate</td>
<td>Warrior</td>
<td></td>
<td></td>
<td></td>
<td>18.5</td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>Lannate</td>
<td>Radiant</td>
<td></td>
<td></td>
<td></td>
<td>18.3</td>
</tr>
<tr>
<td>Lannate</td>
<td>Lannate</td>
<td>Radiant</td>
<td>Radiant</td>
<td></td>
<td></td>
<td>16.8</td>
</tr>
<tr>
<td>Agri-Mek</td>
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<td>Lannate</td>
<td>Lannate</td>
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<td>Radiant</td>
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<td>Radiant</td>
<td>Radiant</td>
<td>Radiant</td>
<td>19.0</td>
</tr>
</tbody>
</table>

NS
Conclusions

• Mix of thrips species in Klamath Basin
  - Predominantly onion thrips
  - More WFT early in season
• Counting thrips on plants better than rinsing technique
• Repeat applications of same insecticide superior method to evaluate performance
• Warrior initially knocked down population but caused subsequent spike (Role of beneficials in controlling thrips?)
• Movento very effective over two applications
• Movento plus Lannate extremely effective
• Aza-Direct plus Radiant lower thrips population than Radiant alone
• Brian Nault program may have merit
• Effect of thrips on yield in Klamath Basin???
  - Thrips may not be most damaging insect in Klamath Basin