Practices for Improved Thrips Management in the Klamath Basin

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Thrips Control in Fresh Market Onions

Lancaster 1986

Cowboy entomology
Thrips feed by piercing and rasping 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. Patches can occupy most of leaf surface and plant cannot adequately photosynthesize. Plant loses more water than normal through the damaged tissues and plant pathogens penetrate.
Cultural Control Methods

- Nitrogen management
- Mulches
- Trap crops and inter-cropping
  - Carrot, crucifers, cucurbits, some flowers;
  - Disk or treat trap crop
- Sprinkler irrigation
  - Thrips prefer warm and dry conditions
- Field selection
  - Avoid planting adjacent to grain and alfalfa
Not very practical in IM area. If you don’t plant next to an alfalfa or grain fields, not many fields left to plant onions.
Objectives

• Compare effectiveness of a range of insecticides
• Compare efficacy of two insecticide treatments applied via chemigation vs. foliar-applied spray application
• Evaluate the need for an adjuvant when applying insecticides via chemigation
• Evaluate different strategies for thrips management over the season to compare single insecticides, tank mixes, alternating chemistries and application timing.
My Predictions

• **Insecticide Comparison**
  – Warrior would be ineffective
  – Radiant would be one of most effective
  – Movento would be effective because everyone wants a Section 18

• **Chemigation would be more effective than spray application due to coverage**

• **Adjuvant would have no effect with chemigation treatment**

• **Season-long Strategy**
  – Rotating insecticides would be best approach
  – Early start date would be preferable strategy
  – Plots untreated for entire season would yield significantly lower with noticeable but minor differences among other treatments
10 whole plants collected from each plot and stored in plastic bag
Onion leaves pulled apart and left to soak for in solution with water, bleach and dish detergent
After 10 minutes shaken and then soak for 10 more minutes. Rinsed and poured into pots with fine screens. Backwash thrips from fine screen with ethanol into vials.
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

Sampling Date

- 2-Jul: 47%
- 15-Jul: 43%
- 20-Jul: 50%
- 24-Aug: 14%
- 31-Aug: 6%
- 7-Sep: 14%

Legend:
- Onion
- Flower
## Insecticides Evaluated

<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 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>New DuPont insecticide. Diamide insecticide class</td>
</tr>
</tbody>
</table>
Insecticide Treatment Effects on Thrips Population

No. Thrips Nymphs/Plant

Insecticide Treatment

Pretreatment 12.9 nymphs/plant
Insecticide Treatment Effects on Thrips Population

Pretreatment
12.9 nymphs /plant
Insecticide Treatment Effects on Thrips Population

Pretreatment: 12.9 nymphs/plant
Insecticide Treatment Effects on Thrips Population

Pretreatment 12.9 nymphs/plant
Effect of Insecticide Treatment on Onion Thrips Injury Symptoms

The chart shows the injury ratings for various treatments compared to a check sample. The treatments include Warrior, Lannate, Radiant, Radiant + Aza-Direct, Movento, Vydate, Assail, Agri-Mek, HGW86, and a check sample. The injury ratings are indicated on a scale from 0 to 6.
Adjuvant Effect with Chemigation
Chemigation vs. Spray Application

<table>
<thead>
<tr>
<th>Date</th>
<th>Radiant Chem</th>
<th>Radiant Spray</th>
<th>Lannate + Warrior Chem</th>
<th>Lannate + Warrior Spray</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-Aug</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-Aug</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27-Aug</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 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>
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<tbody>
<tr>
<td>Warrior (7/8)</td>
<td>Warrior</td>
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</tr>
<tr>
<td>Lannate (7/8)</td>
<td>Lannate</td>
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</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>
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</table>
Effect of Control Strategy on Thrips Population

The graph shows the change in thrips population per plant over time, with application dates indicated as arrows. The untreated line indicates a steady increase in thrips population, suggesting that the control strategy is effective in managing the thrips population.
Effect of Control Strategy on Thrips Population

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

Application Dates:
- 8-Jul
- 15-Jul
- 22-Jul
- 29-Jul
- 5-Aug
- 12-Aug
- 19-Aug
- 26-Aug
- 2-Sep

Thrips/Plant

or
Effect of Control Strategy on Thrips Population

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

Thrips/Plant vs. Application Dates

Application Dates:
- 8-Jul
- 15-Jul
- 22-Jul
- 29-Jul
- 5-Aug
- 12-Aug
- 19-Aug
- 26-Aug
- 2-Sep

or

Graph showing the effect of different control strategies on thrips population over time.
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## Season-Long Thrips Management Effect on Onion Yield

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<th>3rd Application (8/16)</th>
<th>Yield (Tons/A)</th>
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<tbody>
<tr>
<td>Warrior (7/8)</td>
<td>Warrior</td>
<td>Warrior</td>
<td>23.5</td>
</tr>
<tr>
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<td>Lannate</td>
<td>Lannate</td>
<td>24.6</td>
</tr>
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<td>Warrior</td>
<td>23.5</td>
</tr>
<tr>
<td>Warrior+Lannate (7/8)</td>
<td>Warrior+Lannate</td>
<td>Warrior+Lannate</td>
<td>24.2</td>
</tr>
<tr>
<td>Warrior (6/30)</td>
<td>Lannate</td>
<td>Warrior</td>
<td>23.2</td>
</tr>
<tr>
<td>Movento (6/30)</td>
<td>Radiant</td>
<td>Radiant</td>
<td>23.6</td>
</tr>
<tr>
<td>Untreated</td>
<td>Untreated</td>
<td>Untreated</td>
<td>23.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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NS
Onion Thrips Damage in New York State

Control 341 cwt/acre

Treated with Insecticides 529 cwt/acre

30 to 50% yield loss
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
**Example Insecticide Sequence**

Proposed by Brain Nault Professor, Dept. of Entomology, Cornell University

Need to protect onion crop from thrips for 8 weeks
Conclusions

• Mix of thrips species in Klamath Basin
  – predominantly onion thrips
• Thrips sampling protocol problematic
• Need to sample sooner after application to determine initial knockdown?
• Thrips extremely difficult to control with spray application or chemigation
• No clear-cut consistent advantage for chemigation or spray
• Adjuvant did not have consistent effect
  – However, may not be able to detect small differences in control with sampling variability
• Warrior used alone repeatedly spike in thrips population
• In agreement with other studies, Radiant appears to be one of most effective treatments
Conclusions (cont.)

- Treatment had no effect on yield in this study
  - Never achieved acceptable thrips control?
  - Needed another application in early August?
  - Population too low this year to cause significant yield decrease?
  - Sprinkler irrigation kept thrips population below level that impacts yield?
  - Thrips population from adjacent alfalfa and wheat field overwhelmed treatment effects?
Next Year???

• Go back to working with alfalfa?
• Insecticide comparison trial
  – Start 1st application with materials to evaluate
  – Back-to-back applications with same material
• No clear-cut difference in efficacy with chemigation or spray application
  – Growers do one or other based on irrigation system and convenience, timeliness, etc.
  – Since thrips control so poor may be difficult to discern differences due to application method or adjuvant
• Impact of thrips on yield not well understood for Klamath Basin
  – Season-long trial--fewer treatments. (3 or 4 treatments and weekly sampling)
  – Focus on number of applications and strategy
• Sampling protocol
  – Return to cowboy entomology?