Recommendation Changes for Potato Leafhopper Management (in Alfalfa)

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Or, Are we there yet?
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POTATO LEAFHOPPER
POTATO LEAFHOPPER IMPACTS ON ALFALFA

• Yield & Quality: immediate vs. carryover effects
• Stand persistence
• New seedings particularly vulnerable
ECONOMIC IMPACT OF PLH ON ALFALFA IN WISCONSIN (WDATCP Estimates)

1984: $32.5 million
1985: $23.8 million
1986: $14.5 million
1989: $2.2 million
PLH Life History Characteristics

1. Long range migration/locally dispersive
2. Wide range of host plants
3. Explosive growth potential

Management Implications for Alfalfa:
• At the mercy of “regional” population
• Must monitor and spray when necessary
# POTATO LEAFHOPPER “CONVENTIONAL” THRESHOLDS

<table>
<thead>
<tr>
<th>Stem Ht. (in.)</th>
<th>PLH per sweep</th>
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<tbody>
<tr>
<td>&gt; 3</td>
<td>0.2</td>
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<tr>
<td>6</td>
<td>0.5</td>
</tr>
<tr>
<td>8 - 10</td>
<td>1.0</td>
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<tr>
<td>12 - 14</td>
<td>2.0</td>
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Glandular Haired Alfalfa

• History
  – early development in public sector
  – commercial development & ultimate release (1997)
  – trait from “exotic” Medicago, but not GMO

• Mechanism of resistance?
Mechanisms of Plant Resistance to Insects

- ANTIBIOSIS: plants are “toxic”
- NON-PREFERENCE: insect will go elsewhere when given choice
- TOLERANCE: plants can withstand more injury without yield loss
Three “Snapshots” from Arlington, Wisconsin, in the Evolution of Glandular Haired Resistance

• 1997, 1st production year (part of 4 state trial)
• 2000, seeding year
• 2003, seeding year
Arlington (4 State Trial) - 1997

Yield

Varieties: NS NS * (-) *
Insecticide: ** ** * **
Yield Benefit of PLH Resistance (1997, Untreated)

Tons/A

OH: 0.5 **
IN: 1.0 **
MN: 0.0
WI: -0.2 *
Conclusions from 1997

- Overall performance of GH varieties in WI was disappointing (variable but “low” levels of resistance)
- Resistance to hopperburn was apparent, and GH varieties supported fewer PLH, but this did not translate into a yield advantage
- GH varieties also showed yield “lag” in absence of PLH
PIioneer 5454 (no resistance)

DK 131 HG (53% resistance)

Evergreen (79% resistance)

Arlington 2000
2000 YIELDS (Tons/acre)

[Plots cut July 19]

- 5454
- DK131HG
- Evergreen

- Warrior
- Warrior 0.5
- No Spray
Conclusions from 2000

• Performance of GH varieties definitely improved
• Clear yield advantage of GH varieties in untreated plots, and no yield lag in absence of PLH
• But GH varieties still lost yield when not protected
2003 YIELDS (Tons/acre)

[Plots cut July 30]

Thresholds:

- **1X**
- **20X**
- **No Spray**
Conclusions from 2003

- Performance of GH varieties further improved
- Yield responses similar to 2000, but yield loss gap narrowing in unprotected plots*
  * plus this was under the most extreme conditions – new seeding with heavy PLH pressure
OVERALL CONCLUSIONS

• GH-based PLH resistance has improved substantially since its (premature?) commercial release in 1997
  – % resistance has increased from 30’s to > 80
  – agronomic traits, disease resistance also improved

• We may be to the point of stand-alone PLH control in established stands

• Monitoring still needed for PLH in new seedings
  – thresholds?
  – timing might be the more important issue