Status of Tarnished Plant Bug Control Strategies

Jeff Gore – USDA-ARS, Stoneville
Pyrethroid Resistance

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>33.5</td>
</tr>
<tr>
<td>2001</td>
<td>44.9</td>
</tr>
<tr>
<td>2002</td>
<td>43.5</td>
</tr>
<tr>
<td>2003</td>
<td>49.8</td>
</tr>
<tr>
<td>2004</td>
<td>35.1</td>
</tr>
<tr>
<td>2005</td>
<td>37.8</td>
</tr>
<tr>
<td>2006</td>
<td>60.3</td>
</tr>
</tbody>
</table>
Acephate Resistance Survey

2005 – 6 of 20 locations resistant
2006 – 17 of 20 locations resistant
Sprayed 10 - 12 times

Centric, Diamond 21 oz., Bidrin, Orthene, Capture, Trimax, Vydate

1 person, 2 hrs ~500 Adults

3 people, 1.5 hrs ~500 Adults

3 people, 45 min. ~1500 Adults
Vance Mississippi

Acephate LC50 = 22.14 µg, RR = 7.1

Percent Mortality

Orthene (0.5) 33
Orthene (1.0) 23
Bidrin (0.5) 88
Centric 95
Non-treated 5
Rolling Fork, MS

- Pyrethroid: 18, RR: 25
- Bidrin: 7
- Orthene (0.5): 3.6
- Orthene (1.0): 3.6
- Vydate (0.33): 4.8
- UTC: 0, RR: 8

Percent Mortality: 7, 39, 48
Acephate Resistance Survey

Did not lose resistance during the winter

Mean LC50

Aug-Sept 2005: 6.8
May-06: 8.5
Aug-Sept 2006: 16.1
Inheritance of Resistance

Inheritance is NOT Recessive
What does this mean?

- **Recessive**
  - RR = Resistant
  - Rr = Susceptible
  - rr = Susceptible

- **Dominant**
  - RR = Resistant
  - Rr = Resistant
  - rr = Susceptible
<table>
<thead>
<tr>
<th></th>
<th>Recessive</th>
<th>Dominant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RR</strong></td>
<td>= Resistant</td>
<td><strong>RR</strong> = Resistant</td>
</tr>
<tr>
<td><strong>Rr</strong></td>
<td>= Susceptible</td>
<td><strong>Rr</strong> = Resistant</td>
</tr>
<tr>
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<td>= Susceptible</td>
<td><strong>rr</strong> = Susceptible</td>
</tr>
</tbody>
</table>
What does this mean?

Recessive
RR = Resistant
Rr = Susceptible
rr = Susceptible

Dominant
RR = Resistant
Rr = Resistant
rr = Susceptible

Insecticide
What does this mean?

Recessive
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- rr = Susceptible

Dominant
- RR = Resistant
- Rr = Resistant
- rr =Susceptible

Insecticide

RR  →  RR

RR

Rr

rr
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rr = Susceptible

Dominant

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Insecticide

RR
Rr
rr

Overwinter

RR
Rr
rr

×

×

×

×
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- RR → Rr
- Rr → RR

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Insecticide

Overwinter

RR → RR

Insecticide

RR

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Insecticide → Overwinter
- RR → RR
- Rr → *
- rr → *

Insecticide
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Insecticide
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Overwinter
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Rr
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Insecticide → Overwinter

Insecticide → Overwinter

RR → RR

Rr → RR

Rr → Rr

rr → rr

Rr → Rr

rr → rr
Examples of early-spring broadleaf hosts of tarnished plant bug

- Buttercup
- Evening Primrose
- Butterweed
- Annual Fleabane
- Sourdock
- Vetch
- Crimson Clover
- Cutleaf Primrose
Area-wide Plant Bug Management

One herbicide application from late-Feb. through March.
No. Plant Bug Applications

<table>
<thead>
<tr>
<th>Year</th>
<th>Treated</th>
<th>Untreated</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>0.9</td>
<td>1.7</td>
<td>1.3</td>
</tr>
<tr>
<td>2000</td>
<td>3.1</td>
<td>3.8</td>
<td>3.4</td>
</tr>
<tr>
<td>2001</td>
<td>5.5</td>
<td>7.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Average</td>
<td>3.2</td>
<td>4.2</td>
<td></td>
</tr>
</tbody>
</table>
Treated with Roundup at Burndown
Plant Bugs in DP 444 vs 555

Nymph per 6 ft.

DP 555 BR
DP 444 BR
NAWF 5 + 350
NAWF 5 + 350
Nectariless Cotton

Line A Untreated

- Nectaried: 355
- Nectariless: 378

Line A Treated

- Nectaried: 525
- Nectariless: 585
Foliar Plant Bug Control

Percent Control

- Carbine: 71%
- Bidrin: 70%
- Orthene: 70%
- Trimax: 65%
- Centric: 61%
- Capture: 17%
Plant Bug Control With Experimentals

Percent Control

- Experimental A: 34%
- Experimental B: 57%
- Experimental C: 41%
- Experimental D: 50%
Insecticide Application Intervals

4 Days 5 Days 6 Days 7 Days

Pre-Test Counts Percent Control

4 Days: 23
5 Days: 8
6 Days: 100
7 Days: 70

4 DAT with Orthene (0.5 lb)
Insecticide Rotations

Pre-treatment

Nymphs/6 ft.

0 5 10 15 20 25

4 DAT with Orthene (0.5 lb)

7 DAT 2

Orthene (0.5) + 6 oz Diamond

Orthene (1.0) Trimax (1.8 oz)

Centric (2 oz) Vydate (0.33)

Carbine (2.8 oz) Bidrin (0.5)
Insecticide Rotations

Pre-Test Counts 9 DAT

- Orthene (0.5)
- Orthene (1.0)
- Trimax (1.8 oz)
- Vydate (0.33)
- UTC
- Orthene (0.5) + 6 oz Diamond
- Centric (2 oz)
- Carbine (2.8 oz)
- Bidrin (0.5)

4 DAT with Orthene (0.5 lb)

- Pre-treatment Nymphs/6 ft.
  - 23
- 9 DAT 2 Nymphs/6 ft.
  - 4
  - 4
  - 4
  - 4
  - 10

UTC
Insecticide Rotations

- Orthene (0.5)
- Orthene (1.0)
- Trimax (1.8 oz)
- Vydate (0.33)
- UTC
- Orthene (0.5) + 6 oz Diamond
- Centric (2 oz)
- Carbine (2.8 oz)
- Bidrin (0.5)

Pre-Test Counts 3 DAT 3

4 DAT with Orthene (0.5 lb)

Nymphs/6 ft.

- Pre-treatment
- 8

Nymphs/6 ft.

- 2.3
- 2.3
- 2.3
- 2.3
- 1.8
- 1.8
- 1.8
- 1.5
- 1.3
- 3.5
Insecticide Rotations

Number/6 ft.

- Untreated
- Orthene (0.5)
- Centric

5 days 11 days

Tarnished Plant Bug Control

1.7
2.3
3

0.6
1
2

0.9
1
1.5

0
0.5
1
1.5
2

Orthene (0.5) + Diamond (6)

Nymphs per 6 ft.


1st Application 7-14-05
Impact of Leaf Type on TPB Control
4 DAT1 with Orthene (0.5 lb) + Diamond (6 oz.)

![Graph showing the impact of leaf type on TPB control with Orthene and Diamond. The graph compares the nymphs per 6 ft. for Okra Leaf and Normal Leaf under sprayed and non-sprayed conditions. The sprayed conditions show significantly higher control compared to the non-sprayed conditions.]
Hollow Cone (TX-12) vs. Air Induction (AI 11002)

Impact of Nozzle Type on Insect Control
Plant Bug Control, Orthene (0.5 lb)

Percent Mortality (48 HAT)

40 psi, 5 mph, 9.4 GPA
Impact of Nozzle Type on Insect Control
Plant Bug Control, Centric (2 oz.)

Percent Mortality (48 HAT)

Hollow Cone (TX-12): 96.4
Air Induction (AI 11002): 75.8

40 psi, 5 mph, 9.4 GPA
Temik Side Band Applications

- Non-treated
- Temik 5 lbs.
- Temik 8 lbs.

<table>
<thead>
<tr>
<th>No. Nymphs per 6 row ft.</th>
<th>5 DAT</th>
<th>10 DAT</th>
<th>20 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-treated</td>
<td>3.9</td>
<td>11.9</td>
<td>9.8</td>
</tr>
<tr>
<td>Temik 5 lbs.</td>
<td>2</td>
<td>4.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Temik 8 lbs.</td>
<td>2.3</td>
<td>2.3</td>
<td>6.8</td>
</tr>
</tbody>
</table>

5 DAT: 20-31%
10 DAT: 60-80%
20 DAT: 10-31%
TPB Impact on Yields

![Graph showing the impact of TPB initiation and termination on yields.](image)

- **Initiate**
- **Terminate**

Week of Flowering at Initiation/Termination of Control

Pounds (lint per acre)
Summary and Conclusions

• Resistance is Dominant and not going to go away.

• Control with insecticides will become less consistent.

• Spray intervals and rotations will be important.

• Spray only when absolutely necessary and use accurate scouting methods and thresholds.

• DON’T CUT RATES!!!!
Summary and Conclusions

• No alternatives are coming in the near future.

• Other factors that reduce plant bug numbers will need to be considered.

  — Variety selection:
    short season vs. long season
    nectaried vs. nectariless

  — Plant bug sources:
    wild hosts
    other crops