Tarnished Plant Bug and Cotton Aphids
Resistance and Management Options

Jeff Gore
MSU, DREC, Stoneville
Tarnished Plant Bug and Aphid Control

Neonicotinoids
Carbine

Organophosphates
OP + Pyrethroid
Diamond

Organophosphates
Neonicotinoids
+ Pyrethroid
Diamond

DO NOT SPRAY

Planting
1st Square
1st Flower
Peak Flower
Cutout
Cotton Aphid Leaf-Dip Bioassays – 2008-2010
48 HAT

384 Fold

108.6 - 1234

Centric
Overview

- Crop Management
- Insecticide Use Strategies
- “New” Insecticides
- Future Insecticides
Crop Management
Impact of Earliness

- DP 555 BR
- DP 444 BR
- NAWF 5 + 350
- NAWF 5 + 350

Graphs showing Impact of Earliness with data points for different months and categories.
Planting Date x Varietal Maturity
Mr. Brian Adams, M.S. Student

<table>
<thead>
<tr>
<th>Planting Date</th>
<th>Varietal Maturity</th>
<th>Percent Yield Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD1 April 20</td>
<td>DP 0912 B2RF (Early)</td>
<td>27 (3 Apps.)</td>
</tr>
<tr>
<td>PD2 May 6</td>
<td>DP 0912 B2RF (Early)</td>
<td>30 (4 Apps.)</td>
</tr>
<tr>
<td>PD3 May 19</td>
<td>DP 0912 B2RF (Early)</td>
<td>25 (7 Apps.)</td>
</tr>
<tr>
<td>PD4 June 2</td>
<td>DP 0949 B2RF (Late)</td>
<td>39 (7 Apps.)</td>
</tr>
<tr>
<td>PD3 May 19</td>
<td>DP 0949 B2RF (Late)</td>
<td>43</td>
</tr>
<tr>
<td>PD4 June 2</td>
<td>DP 0949 B2RF (Late)</td>
<td>58</td>
</tr>
</tbody>
</table>
Impact of Thrips on Crop Maturity

- **Seed Treatment**: 82.6%
- **Temik**: 80.8%
- **UTC**: 73.8%
Insecticide Use Strategies
Insecticide Application Intervals

Pre-Test Counts

- **4 Days**: 23 nymphs/6 ft.
- **5 Days**: 8 nymphs/6 ft.
- **6 Days**: 100% control
- **7 Days**: 70% control

Note: 4 DAT with Orthene (0.5 lb)
Diamond Application Timing

Percent of Threshold

- Centric
- Diamond

Graph showing the application timing of Centric and Diamond over the period from 6-Jun to 5-Aug.
Diamond Timing and Number of Applications- 2010

Lbs Lint / Acre

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Lbs Lint / Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Wk Sq (6)</td>
<td>1223</td>
</tr>
<tr>
<td>3rd Wk Sq (9)</td>
<td>1223</td>
</tr>
<tr>
<td>3rd Wk Sq (12)</td>
<td>1281</td>
</tr>
<tr>
<td>FF</td>
<td>1154</td>
</tr>
<tr>
<td>3rd Wk Fl</td>
<td>1080</td>
</tr>
<tr>
<td>3rd Sq + FF</td>
<td>1253</td>
</tr>
<tr>
<td>3rd Sq + 3rd Fl</td>
<td>1260</td>
</tr>
<tr>
<td>FF + 3rd Fl</td>
<td>1106</td>
</tr>
<tr>
<td>3rd Sq + FF + 3rd Fl</td>
<td>957</td>
</tr>
<tr>
<td>No Diamond</td>
<td>1316</td>
</tr>
</tbody>
</table>

Legend:
- a, abc, ab, cd, e
# Impact of Diamond on TPB

## LC50

<table>
<thead>
<tr>
<th>Instar</th>
<th>LC50</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>2.8 ug/vial</td>
<td>0.69-4.40</td>
</tr>
<tr>
<td>2nd</td>
<td>28.8 ug/vial</td>
<td>21.4-49.5</td>
</tr>
<tr>
<td>5th</td>
<td>32.4 ug/vial</td>
<td>17.1-44.1</td>
</tr>
</tbody>
</table>

## Eggs laid/F & % Eggs hatched

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Eggs laid/F</th>
<th>% Eggs hatched</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>19.9b</td>
<td>1b</td>
</tr>
<tr>
<td>Weekly</td>
<td>25.0b</td>
<td>3b</td>
</tr>
<tr>
<td>Once</td>
<td>40.3b</td>
<td>12b</td>
</tr>
<tr>
<td>Control</td>
<td>91.3a</td>
<td>48a</td>
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</tbody>
</table>
Overview

- “New” Insecticides

- Fyfanon® PLUS ULV
  Ultra Low Volume Concentrate Insecticide

- BidrinXPII

- Brigadier
  Insecticide

- BELAY
  Insecticide
- **Cheminova**

- Malathion (9.4 lb)  
  Gamma-Cyhalothrin (0.15 lb)

- Cotton

- 8-16 oz

- Bugs  
  Caterpillars
Tarnished Plant Bug Adults and Nymphs Through Flowering

(1=Centric 1.7 oz), (2=Centric 1.7 oz), (3=Bidrin 4 oz + Diamond 5 oz), (4=ULV app), (5=Brigade 5 oz + Acephate .75 lb)
(6= Acephate 1 lb + Diamond 5 oz), (7=ULV app), (8=Brigade 5 oz + Acephate 0.5 lb), (9=Brigade 5 oz + Acephate 0.8 lb)
• **Amvac**

• Dicotophos (4 lb) Bifenthrin (1 lb)

• Cotton

• Bugs

• **No longer a co-pack**

<table>
<thead>
<tr>
<th>Fluid ounces per acre of Bidrin XPII</th>
<th>8.0</th>
<th>10.5</th>
<th>12.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contains dicrotophos (lb ai)</td>
<td>0.250</td>
<td>0.333</td>
<td>0.400</td>
</tr>
<tr>
<td>Contains bifenthrin (lb ai)</td>
<td>0.063</td>
<td>0.083</td>
<td>0.100</td>
</tr>
</tbody>
</table>
• FMC Corporation

• Imidacloprid (1 lb)  
  Bifenthrin (1 lb)

• Cotton, Soybean, Peanut

• 3.8-7.7 oz (Cotton)  
  3.8-6.1 oz (Soybean)  
  3.8-5.6 oz (Peanut)

• Bugs  
  Caterpillars
Tarnished Plant Bug Management - 2010

Nymphs / 5 Ft

Brigadier (5.1)
Brig. (5.1) + Acephate (0.5)
Endigo (5)
Leverage 360 (3.2)
Leverage 360 (3.2) + Acephate (0.5)
Hero (10.3)
Hero (10.3) + Acephate (0.5)
Acephate (0.75)
UTC

5 DAT

2010
• Valent

• Clothianidin

• 2.13 lbs/Gal SC

• Cotton, Soybean

• 3-6 oz/A

• True Bugs:
  tarnished plant bug, stink bugs, cotton aphid
Tarnished Plant Bug Management with Belay
Stoneville, MS - 2010

3 Days After Treatment 1

Nymphs / 5 Ft

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Nymphs / 5 Ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belay (4)</td>
<td>ab</td>
</tr>
<tr>
<td>Belay (6)</td>
<td>bc</td>
</tr>
<tr>
<td>Belay (4) + Bif. (4)</td>
<td>c</td>
</tr>
<tr>
<td>Belay (4) + Ace (4)</td>
<td>c</td>
</tr>
<tr>
<td>Belay (4) + Asana (6)</td>
<td>bc</td>
</tr>
<tr>
<td>Endigo (5)</td>
<td>bc</td>
</tr>
<tr>
<td>UTC</td>
<td>a</td>
</tr>
</tbody>
</table>
Tarnished Plant Bug Management with Belay
Stoneville, MS - 2010

5 Days After Treatment 2

Nymphs / 5 Ft

Belay (4)  Belay (6)  Belay (4) + Bif. (4)  Belay (4) + Ace (4)  Belay (4) + Asana (6)  Endigo (5)  UTC

2010
Overview

- Future Insecticides
• **Dow AgroSciences**

• **Sulfoxaflor**

• **50% WG**

• **Cotton**

• **0.7-2.88 oz/A**

• **True Bugs:**
  - cotton aphid, tarnished plant bug, stink bugs?

**Transform is not labeled at this time**
Efficacy of Transform Against Plant Bugs

- Transform (0.71)
- Transform (1.44)
- Transform (2.14)
- Centric (2.0)
- Non-treated

Graph showing the efficacy of different treatments against nymphs per 5 ft. with letters indicating significant differences.
Tarnished Plant Bug Management with Sulfoxaflor

Transform (1.45)  
Percent Control

Transform (2.14)  
Percent Control

NS  
P = 0.02

1-4 DAT  
5-8 DAT

2010
Air vs. Ground Transform Test
Glendora, MS 2010

<table>
<thead>
<tr>
<th></th>
<th>Check</th>
<th>Air</th>
<th>Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 DAT1</td>
<td>7.5</td>
<td>3.3</td>
<td>2.5</td>
</tr>
<tr>
<td>5 DAT2</td>
<td>22.9</td>
<td>4.1</td>
<td>1.2</td>
</tr>
<tr>
<td>9 DAT2</td>
<td>31.8</td>
<td>11.5</td>
<td>2.2</td>
</tr>
<tr>
<td>14 DAT2</td>
<td>26.8</td>
<td>15.9</td>
<td>7.8</td>
</tr>
</tbody>
</table>
Stink Bug Management with Transform Cotton

- **Transform (1.44)**
- **Transform (2.14)**
- **Acephate**
- **UTC**

Graph showing Stink Bugs per 5 ft. for 11 DA-B and 3 DA-C. The bars are labeled with letters indicating statistical significance: 'a' and 'b'.
Susceptibility of Cotton Aphids from Non-Treated Fields to Thiamethoxam
Foliar Aphid Control - 2008
Angus Catchot - Grenada, MS

# / 5 Leaves

- Check: 474
- Centric 2 oz + NIS: 281
- Centric 2 oz + 2.5% UAN: 228
- Intruder .8 oz: 130.8
- Carbine 2 oz: 53.5
- Trimax Pro 1.8 oz: 51.3
- Transform 1.45 oz: 11.5

Centric LC50 = 10.71 at 72h
Foliar Aphid Control - 2010
Stoneville, MS

Centric LC50 = 17.71 at 72h
Foliar Aphid Control - 2010
Angus Catchot - Grenada, MS

Centric LC50 = 20.9 at 72h
### Insecticide Rotation Strategy

**Neonicotinoid Seed Trt.**
- **Do not spray (dimethoate)**
- **1st Square**: Neonicotinoids Carbine
- **1st Flower**: Organophosphates OP + Pyrethroid Diamond
- **Peak Flower**: Organophosphates Neonicotinoids + Pyrethroid Diamond
- **Cutout**: DO NOT SPRAY

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**Planting**

- **1-2 Applications**
- **1-3 Applications**
Summary and Conclusions

- Standard insecticides do not provide the same level of control they once did.

- Tank mixes and pre-mixes are important.

- Crop maturity impacts tarnished plant bug management.
Summary and Conclusions

- New information about Diamond, ULV Malathion, and Transform will help.

- An integrated approach that relies on many different tactics in addition to chemical insecticides will be the only way to economically and effectively manage tarnished plant bugs.
Jeff Gore, MSU, Stoneville
(662)820-9969