Insecticide Performance for Tarnished Plant Bug in Cotton
Variability in Plant Bug Susceptibility to Pyrethroids

Patterns of Tarnished Plant Bug (Hemiptera: Miridae) Resistance to Pyrethroid Insecticides in the Lower Mississippi Delta for 2008-2015: Linkage to Pyrethroid Use and Cotton Insect Management
Parys KA, Luttrell RG, Snodgrass GL, Portilla MR
MSEWG Plant Bug Efficacy Trials

- Data from 232 efficacy trials
- 4 Locations
  - Marianna, AR 2005 - 2019
  - Glendora, MS 2013 - 2019
  - Stoneville, MS 2008 - 2019
  - Jackson, TN 2012 - 2019
- All applications 10 GPA by ground
Insecticide Efficacy in AR, MS, TN 2012 - 2019

2-7 DAT, first app only

% Control

- Acephate
- Acephate + Bifenthrin
- Intruder
- Bifenthrin
- Bifenthrin + Bidrin
- Bidrin
- Carbine
- Imidacloprid
- Diamond
- Vydate
- Transform
Acephate 0.75 lbs/a AR, MS, TN

% Control

Year


85.5 86.4 65 58.8 71.1 67.8 85.4 61.1 48.8 67.6 71.7 78.1 61.4 69.0
Who has the tougher plant bugs?
2 oz Centric Across Years by State

<table>
<thead>
<tr>
<th>Year</th>
<th>AR</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>69.6</td>
<td>38.5</td>
</tr>
<tr>
<td>2016</td>
<td>66.5</td>
<td>55.3</td>
</tr>
<tr>
<td>2017</td>
<td>71.9</td>
<td>52.6</td>
</tr>
<tr>
<td>2018</td>
<td>62.5</td>
<td>17.1</td>
</tr>
<tr>
<td>2019</td>
<td>68.1</td>
<td>51.9</td>
</tr>
</tbody>
</table>
1.5 oz Transform Across Years by State

<table>
<thead>
<tr>
<th>Year</th>
<th>AR</th>
<th>MS</th>
<th>TN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>82</td>
<td>76.8</td>
<td>46.6</td>
</tr>
<tr>
<td>2015</td>
<td>86.5</td>
<td>61.5</td>
<td>76.6</td>
</tr>
<tr>
<td>2016</td>
<td>84.6</td>
<td>69.9</td>
<td>77.6</td>
</tr>
<tr>
<td>2017</td>
<td>86.8</td>
<td>67.4</td>
<td>83.4</td>
</tr>
<tr>
<td>2018</td>
<td>83.4</td>
<td>62.5</td>
<td>81.8</td>
</tr>
<tr>
<td>2019</td>
<td>85</td>
<td>71.8</td>
<td>83.7</td>
</tr>
</tbody>
</table>
Acephate + Bifenthrin Efficacy

2-7 DAT, first app only

% Control

1
0.75
0.75 + 0.1
0.13
0.1
0.1 + 0.4
0.5
0.088
0.061
0.039
0.384
0.047

Acephate
Acephate + Bifenthrin
Intruder
Bifenthrin
Bifenthrin + Bidrin
Bidrin
Carbine
Imidacloprid
Diamond
Vydate
Transform
### Acephate Bifenthrin, Variation Between States

<table>
<thead>
<tr>
<th></th>
<th>Arkansas</th>
<th>Mississippi</th>
<th>Tennessee</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>81.4</td>
<td>71.4</td>
<td>62</td>
</tr>
<tr>
<td>0.75</td>
<td>70.4</td>
<td>63.4</td>
<td>75</td>
</tr>
<tr>
<td>0.75 + 0.1</td>
<td>89.2</td>
<td>66.3</td>
<td>85.2</td>
</tr>
<tr>
<td>0.1</td>
<td>52.6</td>
<td>28.1</td>
<td>49.7</td>
</tr>
</tbody>
</table>

- In Arkansas, Acephate alone is 81.4%, while Acephate with Bifenthrin is 89.2% and Bifenthrin alone is 52.6%.
- In Mississippi, Acephate alone is 71.4%, with a 3% increase when combined with Bifenthrin.
- In Tennessee, Acephate alone is 62%, with a 10% increase when combined with Bifenthrin.
Acephate Bifenthrin, Variation Between States

Arkansas
- Acephate: 81.4%
- 0.75 Acephate: 70.4%
- 0.75 + 0.1 Acephate: 89.2%
- 0.1 Acephate: 52.6%

Mississippi
- Acephate: 71.4%
- 0.75 Acephate: 63.4%
- 0.75 + 0.1 Acephate: 66.3%
- 0.1 Acephate: 28.1%

Tennessee
- Acephate: 62%
- 0.75 Acephate: 75%
- 0.75 + 0.1 Acephate: 85.2%
- 0.1 Acephate: 49.7%
Acephate, Bidrin, Transform Efficacy 2017

% Control

<table>
<thead>
<tr>
<th>State</th>
<th>Acephate</th>
<th>Dicrotophos</th>
<th>Sulfoxaflor</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR</td>
<td>81.7</td>
<td>72.8</td>
<td>86.8</td>
</tr>
<tr>
<td>MS</td>
<td>70.9</td>
<td>78.0</td>
<td>62.8</td>
</tr>
<tr>
<td>TN</td>
<td>89.0</td>
<td>76.7</td>
<td>83.4</td>
</tr>
</tbody>
</table>

Trt
- Acephate
- Dicrotophos
- Sulfoxaflor
Bidrin
Tends to not flair mites and aphids

Acephate
Some moth control
Cheaper

Both
OP’s
Comparable plant bug control
Acephate vs Dicrotophos by Year in AR

% Control

Year


66.7 85.5 77.7 85.2 72.8 59.1 67.2 64.9 78.2 73.1 76.3 81.7 69.8 70.9 85.7

Trit Acephate Dicrotophos
Acephate vs Dicrotophos by year in AR

<table>
<thead>
<tr>
<th>Year</th>
<th>Acephate</th>
<th>Dicrotophos</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>52.3</td>
<td>68.7</td>
</tr>
<tr>
<td>2007</td>
<td>68.7</td>
<td>77.7</td>
</tr>
<tr>
<td>2008</td>
<td>56.8</td>
<td>85.2</td>
</tr>
<tr>
<td>2010</td>
<td>72.8</td>
<td>67.2</td>
</tr>
<tr>
<td>2017</td>
<td>81.7</td>
<td>73.8</td>
</tr>
<tr>
<td>2019</td>
<td>70.9</td>
<td>85.7</td>
</tr>
</tbody>
</table>
COTTON – FOLIAR

<table>
<thead>
<tr>
<th>Pests Controlled</th>
<th>Rate fluid ounces/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton aphid</td>
<td>Green stink bug</td>
</tr>
<tr>
<td>Cotton fleahopper</td>
<td>Southern green stink</td>
</tr>
<tr>
<td>Bandedwinged whitefly</td>
<td>bug</td>
</tr>
<tr>
<td>Plant bugs (excludes Lygus hesperus)</td>
<td>Ballworm/Budworm</td>
</tr>
<tr>
<td></td>
<td>(ovicidal effect)</td>
</tr>
</tbody>
</table>

Pests Suppressed

Lygus bug (Lygus hesperus)
Whiteflies (other than Bandedwinged whitefly) 1.3 – 1.7

Cotton – Foliar Applications

Apply ADMIRE PRO SYSTEMIC PROTECTANT through properly calibrated ground or aerial application equipment.

Cotton – Foliar Application Restrictions

Pre-Harvest Interval (PHI): 14 days
Minimum interval between foliar applications: 7 days
Maximum foliar applied ADMIRE PRO SYSTEMIC PROTECTANT allowed per year: 8.7 fluid ounces/Acre (0.31 lb Al/Acre)

Regardless of formulation or method of application, apply no more than 0.5 lb active ingredient per acre per year, including seed treatment, soil and foliar uses. Do not graze treated fields after any application of ADMIRE PRO SYSTEMIC PROTECTANT. Please see Resistance Management section of this label.
Rate Study of Admire Pro for Control of Tarnished Plant Bugs, 2016

UTC = 71 plant bugs

% Control

Admire Pro 1.7 oz/a  Admire Pro 2.0 oz/a  Admire Pro 2.5 oz/a  Admire Pro 3 oz/a  Acephate 0.75 oz/a  Transform 2.0 oz/a

bcd  bcd  bcd  bcd  bcd  bcd

3 DA-A
Rate Study of Admire Pro for Control of Tarnished Plant Bugs, 2016

UTC = 69 plant bugs

<table>
<thead>
<tr>
<th>Product</th>
<th>% Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admire Pro 1.7 oz/a</td>
<td>b</td>
</tr>
<tr>
<td>Admire Pro 2.0 oz/a</td>
<td>b</td>
</tr>
<tr>
<td>Admire Pro 2.5 oz/a</td>
<td>b</td>
</tr>
<tr>
<td>Admire Pro 3 oz/a</td>
<td>b</td>
</tr>
<tr>
<td>Acephate 0.75 oz/a</td>
<td>c</td>
</tr>
<tr>
<td>Transform 2.0 oz/a</td>
<td>c</td>
</tr>
</tbody>
</table>

3 DA-B
Novaluron (Diamond®) acts only on immature plant bugs and should be tank-mixed with a labeled adulticide. Use of novaluron (Diamond®) during the third week of squaring or peak migration of adult plant bugs into cotton has shown benefits in protecting yield.

DO NOT USE PYRETHROIDS BEFORE FIRST FLOWER

DO NOT USE OPs

Bollworm/Tobacco Budworm

Prevathon, Besiege, Blackhawk, Steward, Radiant, Belt, etc.

DO NOT SPRAY

Diamond®
Get more with Diamond.
Effect of Novaluron on Tarnished Plant Bug Adults
Fred Musser and Beverly Catchot

• Oviposition rate affected when female is exposed to novaluron within 1 day of adult emergence.
• Egg hatch rate impacted by novaluron whenever female is exposed and lasts rest of life.
• Novaluron has a detrimental physiological effect on early egg development.
• Novaluron reduces yolk protein storage in ovaries.
• Field exposure to residues within 24 h of application reduces hatch rate.
• Impact from open field application variable, but some reduction in nymph production mostly observed (ave. 20% reduction).
Acephate + Diamond Residual

% Control vs. DAT
Effect of Lygus Trait on Resistance?

- Lygus trait very good on thrips, good for 1 or 2 sprays a year on plant bugs
- Parys found as pyrethroid use declined so did resistance
- A overall decrease in use may improve efficacy for our current insecticides

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Conclusion

• Plant bug insecticide efficacy can vary drastically from year to year and between locations even with good applications
• Stick to the labeled rates
• Diamond works, use it in medium to high populations
• Pay attention to the amount of control you are receiving from your insecticides and change if necessary