Performance and Potential Value of the New Bt Thrips and Plant Bug Trait

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Gowda et al. 2016
Background

Thrips are bad

Plant bugs are worse

SOMETHING NEW TO HELP CONTROL THEM COULD BE NICE
No Trait + Cruiser Avicta

Lygus Trait + Cruiser Avicta

Bt = Cry51Aa2

Jackson, TN (2014)
Materials and Methods

Experiment Locations (2016 and 2017)
- Jackson, TN – West Tennessee Research and Education Center
- Milan, TN – Milan Research and Education Center

Split-Plot Design with Three Main Effects
- Factor A – 3 Foliar Spray Regimes for TPB
- Factor B – Bt Trait vs. No trait
- Factor C – IST + Foliar Thrips Spray vs. Not Treated
Thrips Ratings

3.5 Leaf Stage

Averaged over 2 years in 2 locations
Thrips Injury in 2-Leaf Cotton

2016, Jackson
Not Treated

Jackson, 2016
Thrips Preference
Thrips (Preference Study)

Total Adult Thrips

P < 0.05

A

44%

B

Non

Bt
Distribution of Adult Thrips

N = 1208 Thrips (Field Study)

Chi² Prob = 0.8415

Total adult thrips over 4 tests in 2 locations in untreated plots
Average Early Season Square Retention

Percent Retention

Averaged over 2 years in 2 locations
TPB Adults – Prior to Bloom

Sweep Net – Average per 25 Sweeps

IST (P=0.6622)

Trait (P=0.0017)

Spray Regime (P<0.0001)

Averaged over 2 years in 2 locations
Season Average Nymphs

Drop Cloth – Numbers per 10 Row Ft

IST (P=0.0156)

<table>
<thead>
<tr>
<th>Trait</th>
<th>None</th>
<th>Aeris</th>
</tr>
</thead>
<tbody>
<tr>
<td>IST*Spray Regime Interaction</td>
<td></td>
<td></td>
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</tbody>
</table>

Trait (P<0.0001)

<table>
<thead>
<tr>
<th>Trait</th>
<th>None</th>
<th>BT</th>
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</thead>
<tbody>
<tr>
<td>Trait*Spray Regime Interaction</td>
<td></td>
<td></td>
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</tbody>
</table>

Spray Regime (P<0.0001)

<table>
<thead>
<tr>
<th>Trait</th>
<th>None</th>
<th>Threshold</th>
<th>Aggressive</th>
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<tbody>
<tr>
<td>IST*Spray Regime Interaction</td>
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Averaged over 2 years in 2 locations
Season Average Nymphs

*Drop Cloth – Numbers per 10 Row Ft*

Averaged over 2 years in 2 locations

![Graph showing the effect of Trait and Spray on nymph numbers.](image-url)
Season Average Large Nymphs

*Drop Cloth – Numbers per 10 Row Ft*

Averaged over 2 years in 2 locations

![Bar chart showing season average large nymphs](chart.png)
Lygus Trait
2017, Plots not treated after 1st bloom

PLANT BUG INJURED (#/25)

<table>
<thead>
<tr>
<th></th>
<th>Dirty Squares</th>
<th>Dirty Blooms</th>
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</thead>
<tbody>
<tr>
<td>Non-Bt</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>Bt</td>
<td>b</td>
<td>b</td>
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</tbody>
</table>

TOTAL PLANT BUGS

<table>
<thead>
<tr>
<th></th>
<th>Non-Bt</th>
<th>Bt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
</tbody>
</table>
Non-BT

- More external marks
- More internal warts
- More lint staining
Yield

Pounds of Seed Cotton per Acre

IST (P=0.0008)

Trait (P<0.0001)

Spray Regime (P<0.0001)

IST * Trait Interaction

Trait * Spray Regime Interaction

Averaged over 2 years in 2 locations
Yield

Pounds of Seed Cotton per Acre

<table>
<thead>
<tr>
<th>Trait</th>
<th>IST * Trait (P=0.0064)</th>
<th>Averaged over 2 years in 2 locations</th>
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</thead>
<tbody>
<tr>
<td>Trait IST</td>
<td>a</td>
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<tr>
<td>Trait Only</td>
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</tr>
<tr>
<td>No Trait IST</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>No Trait No IST</td>
<td>b</td>
<td></td>
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</tbody>
</table>

Averaged over 2 years in 2 locations
Yield

Pounds of Seed Cotton per Acre

Variety*Spray (P=0.0100)

Averaged over 2 years in 2 locations

1.2 fewer sprays (0-3)
Summary

The Bt trait gave as good or better control than the best, alternative thrips control strategy

The Bt trait also:
• Reduced the numbers of plant bugs
• Decreased plant bug injury
• Decreased insecticide applications
• Increased yield ... if no insecticides were applied
• Similar observations in Mississippi
Some other things to consider

Need to treat the Bt trait with insecticides for plant bugs

✓ But appears to a standalone treatment for thrips control
✓ Greatest value appears to be a reduction in the need for insecticide applications (thrips and plant bug)
✓ Current plant bug thresholds appear to work pretty well but we need to follow them strictly to maximize the benefit of the technology

This is still 4+ years in the future, so let’s not get ahead of ourselves

✓ We need more experience, particularly in larger plots
✓ What about cotton fleahoppers, western plant bug, clouded plant bug, stink bugs
✓ How much will it cost?
Acknowledgements

Thanks to
- Monsanto
- Cotton Incorporated
- Dr. Scott Stewart, Sandy Steckel, Matthew Williams, Randi Dunagan, Clay Perkins, and our Summer Crew