ArkLaMiss Emergency Forum on Redbanded Stink Bug
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Redbanded Stink Bug: Biology and Injury Potential

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Redbanded Stink Bug Injury Potential
- **Common name:**
  redbanded stink bug (RBSB)

- **Scientific name:**
  *Piezodorus guildinii* (Westwood)

- **Most damaging species**
  - Deeper seed damage
  - Greater enzyme activity
    - Salivary pectinases
  - Larger food and salivary canals

K. Kamminga 2009
3 stink bugs per 25 sweeps
12 stink bugs per 25 sweeps
Delta Grow 5565

Yield (bu/A)

2 RBSB per 25 sweeps for 3 weeks

14.7 bu/A reduction

Protected

UTC
Screening current high yielding varieties for RBSB tolerance  
2013 and 2014

<table>
<thead>
<tr>
<th>Variety</th>
<th>Sprayed</th>
<th>Unsprayed</th>
<th>Diff. (bu/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terral REV 4753</td>
<td>69.2</td>
<td>53.8</td>
<td>+15.4</td>
</tr>
<tr>
<td>Dyna-Gro 31RY45</td>
<td>67.9</td>
<td>61.5</td>
<td>+6.4</td>
</tr>
<tr>
<td>Syngenta NK S44-D</td>
<td>59.5</td>
<td>49.6</td>
<td>+9.9</td>
</tr>
<tr>
<td>Delta Grow 4670</td>
<td>70.6</td>
<td>69.0</td>
<td>+1.6</td>
</tr>
<tr>
<td>Armor DK 4744</td>
<td>68.9</td>
<td>61.3</td>
<td>+7.6</td>
</tr>
<tr>
<td>Dyna-Gro 39RY57</td>
<td>66.1</td>
<td>63.6</td>
<td>+2.5</td>
</tr>
<tr>
<td>Terral REV 56R63</td>
<td>65.6</td>
<td>64.5</td>
<td>+1.1</td>
</tr>
<tr>
<td>Delta Grow 5565</td>
<td>64.3</td>
<td>57.4</td>
<td>+6.9</td>
</tr>
<tr>
<td>Delta Grow 5625</td>
<td>64.3</td>
<td>45.9</td>
<td>+18.4</td>
</tr>
<tr>
<td>Armor 55R22</td>
<td>61.1</td>
<td>58.7</td>
<td>+2.4</td>
</tr>
</tbody>
</table>

Sprayed at 4 RBSB per 25 sweeps
Keys to successful control of redbanded stink bug:
1. Understanding the biology
Typically over threshold of 4 per 25 sweeps from R5 to R7
More females at R2, R5, and R7 = more eggs

More eggs = more stink bugs
Controlling the second generation on soybean:
In MG IV, 69% of eggs oviposited R5 to R6
In MG V, 86% of eggs oviposited R5 to R6

Table 2. Redbanded stink bug oviposition preference during reproductive growth stages a,b

<table>
<thead>
<tr>
<th>Growth Stage</th>
<th>Mean % Egg Clusters ± SE</th>
<th>MG IV</th>
<th>MG V</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2</td>
<td>10.0 ± 9.0 bc</td>
<td>1.9 ± 1.2 b</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>1.0 ± 0.6 c</td>
<td>2.8 ± 1.3 b</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>6.0 ± 3.7 bc</td>
<td>5.6 ± 3.1 ab</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>45.0 ± 12.0 a</td>
<td>44.0 ± 14.4 a</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>23.7 ± 9.3 ab</td>
<td>41.7 ± 16.9 ab</td>
<td></td>
</tr>
<tr>
<td>R7</td>
<td>14.3 ± 9.0 b</td>
<td>4.0 ± 2.0 ab</td>
<td></td>
</tr>
</tbody>
</table>
Where are redbanded stink bug eggs found?

70% or more found in lower two-thirds of canopy

30% of eggs found in the top 30 cm in MG IV

19% of eggs found in the top 30 cm in MG V
Where are redbanded stink bugs feeding?

60% found in lower two-thirds of canopy

40% of damaged seed found in the top 30 cm
Why should I be concerned about where they are feeding and ovipositing?

A typical sweep net is 38 cm in diameter and swept in the upper canopy.

Due to oviposition and feeding preferences for the lower canopy, sweep nets are underestimating redbanded stink bug adult and nymphal populations.
Why should I be concerned about where they are feeding and ovipositing?

Regardless of spray rate or ground speed, spray deposition is “highly variable” with most pesticide deposited in the upper canopy (Barbosa et al. 2009)

With a high frequency of egg clusters and feeding damage found in the lower two-thirds of the plant canopy, redbanded stink bugs are exposed to less insecticide residues.
Keys to successful control of redbanded stink bug: 2. Rotate insecticide chemistries

- Redbanded stink bugs are difficult to control
  - Tolerant to all insecticides
  - Multiple insecticide applications needed
  - Resistant populations exist
# 2011 Stink Bug Foliar Efficacy Trials

## 2011 redbanded stink bug foliar efficacy trials

<table>
<thead>
<tr>
<th>Treatment/formulation</th>
<th>Rate amt formulation product/acre</th>
<th>Mean RBSB/25 sweeps 2 DAT</th>
<th>7 DAT</th>
<th>14 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated check</td>
<td>—</td>
<td>7.7 a</td>
<td>9.0 ab</td>
<td>20.2 a</td>
</tr>
<tr>
<td>Endigo 2.06 ZC</td>
<td>4.5 fl oz</td>
<td>3.5 b</td>
<td>6.2 ab</td>
<td>22.7 a</td>
</tr>
<tr>
<td>Karate 2.08 CS</td>
<td>1.9 fl oz</td>
<td>3.0 b</td>
<td>6.7 ab</td>
<td>19.0 a</td>
</tr>
<tr>
<td>Besiege 1.25 ZC</td>
<td>12.5 fl oz</td>
<td>3.8 b</td>
<td>9.7 a</td>
<td>11.7 a</td>
</tr>
<tr>
<td>Leverage 360</td>
<td>2.8 fl oz</td>
<td>3.2 b</td>
<td>7.2 ab</td>
<td>16.5 a</td>
</tr>
<tr>
<td>Brigadier 2EC</td>
<td>6.1 fl oz</td>
<td>0.3 c</td>
<td>3.3 b</td>
<td>19.7 a</td>
</tr>
<tr>
<td>Cobalt Advanced 2.63 EC</td>
<td>22 fl oz</td>
<td>3.7 b</td>
<td>7.3 ab</td>
<td>21.0 a</td>
</tr>
</tbody>
</table>

Means followed by the same letter within columns are not significantly different (REGWQ; $P > 0.05$).
2016 Stink Bug Foliar Efficacy Trial

RBSB Control 7 DAT

Insecticide

- UTC
- Belay 4.0 oz/A
- Brigade 6.4 oz/A
- Orthene 0.5 lb/A
- Orthene 1.0 lb/A
- Karate 1.92 oz/A
- Venom 4.0 oz/A
- Orthene (0.5) + Endigo ZC (4.5)

# of RBSB per 25 sweeps
No field failures reported this year.

No increase in acephate resistance last year.
• Small founder population with limited genetic diversity.

• Harsh winters and/or extreme insecticide pressure are reducing genetic diversity.

• RBSB has limited dispersal rates and mate with individuals in their vicinity, most likely their relatives.

• All this is contributing to increased insecticide resistance.

• Resistance will be localized but will be permanent.
Keys to successful control of redbanded stink bug:
3. Continue to scout until harvest

Harvest Aids in Soybean

Applied to:
- Desiccate weeds
- Desiccate leaves and speed plant drying
## Insecticide Termination Trials

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate/Acre (lb ai)</th>
<th>Sprays (No.)</th>
<th>Yield (bu/A)</th>
<th>Moisture (%)</th>
<th>100 seed wt. (g)</th>
<th>Abnormal seed (#/100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-treated</td>
<td>-----</td>
<td>0</td>
<td>29.2 b</td>
<td>18.5 a</td>
<td>10.7 b</td>
<td>19.3 a</td>
</tr>
<tr>
<td>Orthene (R5)</td>
<td>0.8</td>
<td>4</td>
<td>35.0 b</td>
<td>17.6 ab</td>
<td>11.3 b</td>
<td>6.3 a</td>
</tr>
<tr>
<td>Orthene (R6)</td>
<td>0.8</td>
<td>5</td>
<td>39.8 a</td>
<td>16.3 b</td>
<td>11.6 b</td>
<td>7.4 a</td>
</tr>
<tr>
<td>Orthene (R7)</td>
<td>0.8</td>
<td>6</td>
<td>40.5 a</td>
<td>16.0 b</td>
<td>12.1 a</td>
<td>3.8 a</td>
</tr>
<tr>
<td>(P&gt;F)</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
<td>0.04</td>
<td>0.09</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Insecticide applications started at R4.
Soybeans are still susceptible to stink bug damage after harvest aids are applied (yield loss as much as 10 bu/acre).

Stink bugs should be controlled prior to or at harvest aid application if at action thresholds:

- Reduces chance of stink bugs moving to adjacent fields
- Reduces overwintering populations
Keys to successful control of redbanded stink bug:

4. Reduce overwintering hosts
Cover crops
Crimson clover (*Trifolium incarnatum* L.)
Cardinal red clover (*Trifolium pratense* L.)
Austrian winter pea (*Pisum sativum* L.)
Berseem clover (*Trifolium alexandrinum* L.)
Hairy vetch (*Vicia villosa* Roth)
White clover (*Trifolium repens* L.).

RBD with four replications per location
3 locations each year for 3 years – (2013 to 2015)
Individual plot size was 7.62 m x 3.04 m with a 3.04 m alley
Redbanded stink bug 59%
Southern green stink bug 14%
Spined soldier bug 13%
Mean (± SE) of RBSB (adults and nymphs) collected from different host plants at New Iberia, Louisiana. Value bars with different letters within adult or nymph are significantly different ($P<0.05$, Tukey’s HSD)
Conclusions

- Cover crops can increase pest populations
- Crimson clover and white clover cover crops are a bridging host for RBSB when soybean is not present
- Based on mean nymphal production over 3 years, a single acre of crimson clover in a 12 week period can produce 570,000 RBSB
- In comparison, a single acre of soybeans produces 35,000 RBSB, 16 times less.

K. Kamminga 2009
Keys to successful control of redbanded stink bug:
5. Hope for cold weather
# Lethal Temperatures (LT) for Redbanded Stink Bug

Table 1. Lethal exposure time (hrs.) required for 50% and 90% mortality of RBSB population from Ben Hur, Louisiana to subzero temperatures.

<table>
<thead>
<tr>
<th>Temp (°C)</th>
<th>N</th>
<th>LT$_{50}$ (hrs.)</th>
<th>95% FL</th>
<th>LT$_{90}$ (hrs.)</th>
<th>95% FL</th>
<th>Slope ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>810</td>
<td>53.41</td>
<td>51.18 - 55.64</td>
<td>75</td>
<td>72.32 – 79.17</td>
<td>0.058 ± 0.0035</td>
</tr>
<tr>
<td>-2</td>
<td>720</td>
<td>37.41</td>
<td>35.45 - 39.4</td>
<td>55.24</td>
<td>52.43 – 58.67</td>
<td>0.068 ± 0.0043</td>
</tr>
<tr>
<td>-5</td>
<td>630</td>
<td>6.48</td>
<td>6.0 - 6.9</td>
<td>9.64</td>
<td>9.02 - 10.46</td>
<td>0.363 ± 0.031</td>
</tr>
</tbody>
</table>

Non-overlapping 95% fiducial limits shows the significant differences in lethal exposure time for given temperature.
ACKNOWLEDGEMENTS:
These projects were funded in part by the Louisiana Soybean and Grain Research and Promotion Board and the United Soybean Board.