“WHEN” vs. “WHAT”
Optimizing protection against Asian Soybean Rust

The University of Georgia, The University of Illinois
The University of Florida, Phytogen Cotton Seed
2006 National Soybean Rust Symposium
St. Louis, Missouri
Asian Soybean Rust in Georgia 2006

- Rust over-wintered on kudzu in southern counties.

- Early epidemic expected; did not materialize.

- First rust on soybean detected on 3 July, near Florida line.

- Most important spread occurred from late August into September.
  - Commercial beans on their way to maturity.
Grower Response to Asian Soybean Rust

- Less “anxiety” about control.
  - Dry weather
  - Confidence in sentinel plots
  - Experience with fungicides from 2005

- Less fungicide applied for SBR in 2006 than in 2005. (45% vs. 65%)

- First warning “Spray” on 17 July.

- No. 1 question: “When do I spray?”
- No. 2 question: “What do I spray?”
Mixed Messages for Spray Timing…..

1. Using chlorothalonil?
   • Make first application at V5-V6; follow at R3 with strong curative fungicide.

2. Other fungicides:
   • Make first spray at R1; make second spray 2-3 weeks later if needed.

3. Or:
   • Make first application after disease detected in “region” but NOT before late vegetative growth stages.

4. Or: Wait for disease in local area, hit hard with strong curative fungicide at that time.

5. Protection complete once crop reaches R6 stage??
Deciding When to Spray.....

1. Using chlorothalonil?
   • Make first application at V5-V6; follow at R3 with strong curative fungicide.

2. Other fungicides:
   • Make first spray at R1; make second spray 2-3 weeks later if needed.

3. Or:
   • Make first application after disease detected in “region” but NOT before late vegetative growth stages.

4. Or: Wait for disease in local area, hit hard with strong curative fungicide at that time.

5. Protection complete once crop reaches R6 stage??

Terrell County, GA commercial fields
Photos: W. Duffie
Growth Stages of the Soybean Plant

SAFE?? The Critical Zone? SAFE?
Soybeans are susceptible before R1......

Attapulgus September 2006
Study Objectives

• Is optimum timing for initial fungicide application LOCKED to specific growth stage?

• What benefit comes from the second applications?

• How important is late-season protection?

• Is protection needed at R6 and beyond?
Disease Assessment

- Incidence of rust per 10 random leaflets/plot.

- Severity on each leaf:
  - 0 = no rust
  - 1 = less than 2.5%
  - 2 = 2.5-5%
  - 3 = 5-10%
  - 4 = 10-15%
  - 5 = 15-25%
  - 6 = 25-35%
  - 7 = 35-67.5%
  - 8 = greater than 67.5%

- Estimated % defoliation.

- Yield.
Gibb’s Farm Study, Tift County
R. Kemerait and L. Sconyers
(No rust found on 13 September)

Application dates: 6 July (V6) and 11 August (R3)

Applications premature/unnecessary?? NO EFFECT ON YIELD!

<table>
<thead>
<tr>
<th>SBR leaf severity</th>
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<tbody>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>0</td>
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</table>

Sample date 26 Sep
- Echo (32 fl oz) @ V6 + R3: 0.08
- Echo 720 (20 fl oz) @ V6 + R3: 0.06
- Echo (10 fl oz) @ V6 + R3: 0.08
- Untreated: 0.04

Sample date 2 Oct
- Echo (32 fl oz) @ V6 + R3: 0.2
- Echo 720 (20 fl oz) @ V6 + R3: 0.5
- Echo (10 fl oz) @ V6 + R3: 0.6
- Untreated: 0.8

Application dates: 6 July (V6) and 11 August (R3)

Applications premature/unnecessary?? NO EFFECT ON YIELD!
RDC Pivot Study, Tifton
R. Kemerait and L. Sconyers
(No rust found on 12 September)

Application dates: 10 July (V9), 1 Aug (R2-R3), 11 Aug (R3-R4) and 17 August (R4-R5)

Three fungicide regimes effective. Importance of chlorothalonil with later application of Muscle/Folicur?

Sample date 10-2
- Echo (20 fl oz) @ V9 + Muscle (4 fl oz) @ R3
- Echo (20 fl oz) @ V9 + Folicur (4 fl oz) @ R3
- Headline (6 fl oz) + 0.25% NIS @ R3 and R5
- Untreated

Sample date 10-9
- Echo (20 fl oz) @ V9 + Muscle (4 fl oz) @ R3
- Echo (20 fl oz) @ V9 + Folicur (4 fl oz) @ R3
- Headline (6 fl oz) + 0.25% NIS @ R3 and R5
- Untreated

Sample date 10-18
- Echo (20 fl oz) @ V9 + Muscle (4 fl oz) @ R3
- Echo (20 fl oz) @ V9 + Folicur (4 fl oz) @ R3
- Headline (6 fl oz) + 0.25% NIS @ R3 and R5
- Untreated
RDC Pivot Study, Tifton

R. Kemerait and L. Sconyers

(No rust found on 12 September)

Application dates: 10 July (V9), 1 Aug (R2-3), 11 Aug (R3-R4) and 17 August (R4-R5)

Yield advantage with later application timing?

- Echo (20 fl oz) @ V9 + Muscle (4 fl oz) @ R3
- Echo (20 fl oz) @ V9 + Folicur (4 fl oz) @ R3
- Headline (6 fl oz) + 0.25% NIS @ R3 and R5
- Untreated
Attapulgus Timing Study I

Rust first identified on 1 September
R. Kemerait and L. Sconyers

Application dates: 28 July (R1), 14 Aug (R3), and 28 August (R5)

Importance of timing: R3 (yellow) best in this study.
Attapulgus Timing Study I
Rust first identified on 1 September
R. Kemerait and L. Sconyers

Application dates: 28 July (R1), 14 Aug (R3), and 28 August (R5)

Rough Yield (bu/A)
Lessons for Growers from 2006

In THIS Attapulgus trial:

1. Timing of fungicide application very important.

2. Best timing for disease control R3 and R1; R5 not better than untreated….

3. Timing more critical for Folicur than for Domark or for Headline SBR.

4. Effective window for Domark and Headline SBR similar?

5. Fungicide could improve yield by 17 bu/A.
• Rust first observed on 1 September.

• Single fungicide application:
  – 27 July (R1) OR
  – 18 August (R3) OR
  – 7 September (R5)

• Fungicide choice less critical. **SPRAY!**
• Rust first observed on 1 September.

• Fungicide application:
  – 27 July (R1)
  – 18 August (R3)
  – 7 September (R5)

• Fungicide timing: AVOID TOO LATE
Attapulgus Timing Study II
Area Under the Disease Progress Curve
T. Mueller and G. Hartman

The bar chart illustrates the Area Under the Disease Progress Curve (AUDPC) for various treatments and application timing. The treatments include Headline (9.2 oz) @ R3, Headline@R1, Folicur@R3, Folicur@R1, Headline@R3, Folicur@R3, Headline@R5, Folicur@R3, Headline@R5, Quilt@R1, Quilt@R3, and None.

Application timing categories are:
- R3 application
- R1 & R3 application
- R3 & R5 application

The chart shows the effectiveness of each treatment and timing combination in reducing AUDPC, with the highest effectiveness indicated by the tallest bars.
Attapulgus Timing Study II
Yield (bu/A)
T. Mueller and G. Hartman

The diagram shows the yield levels for different treatments in three application scenarios:

- **R3 application**: ABC, ABCD, AD, AD, ABC, A, AD, AB
- **R1 & R3 application**: None
- **R3 & R5 application**: None

The treatments are color-coded as follows:

- **Headline (9.2 oz) @ R3**
- **Folicur (4 oz) @ R3**
- **Quilt (14 oz) @ R3**
- **Headline@R1, Folicur@R3**
- **Folicur@R1, Headline@R3**
- **Quilt@R1 and R3**
- **Quilt@R1 and R3**
- **Quilt@R3 and R5**
- **None**
Lessons for Growers from 2006

Results from THIS trial at Attapulgus:

1. Dual application, triazole and strobilurin, improved disease control over single strobilurin.

2. Dual triazole and strobilurin did not improve on well-timed triazole alone.

3. Dual applications of Quilt did not improve disease control over single Quilt application.

4. In this study, yield not significantly improved with dual applications.
Quincy Timing Study
T. Mueller, G. Hartman, J. Marois, and D. Wright

- Rust first observed:

- Fungicide application:
  - 26 July (R1)
  - 16 August (R3)
  - 5 September (R5)

- Single fungicide application:
  - Headline SBR, Folicur best
  - Quilt less effective
Quincy Timing Study
T. Mueller, G. Hartman, J. Marois and D. Wright

- Rust first observed:
- Fungicide application:
  - 26 July (R1)
  - 16 August (R3)
  - 5 September (R5)
- Single fungicide application:
  - R1 too early here?
  - R3 & R5 equally effective.
Quincy Timing Study
Area Under the Disease Progress Curve
T. Mueller, G. Hartman, J. Marois, and D. Wright

Headline (9.2 oz) @ R3
Folicur (4 oz) @ R3
Quilt (14 oz) @ R3
None

R3 application
R1 & R3 application
R3 & R5 application

A

Legend:
- Headline (9.2 oz) @ R3
- Folicur (4 oz) @ R3
- Quilt (14 oz) @ R3
- None
Quincy Timing Study
Yield (bu/A)

T. Mueller and G. Hartman
Lessons for Growers from 2006

Results from THIS trial at Quincy:

1. Dual triazole & strobilurin applications improved control over single strobilurin application.

2. Dual triazole and strobilurin applications improved disease control over well-timed triazole alone.

3. Dual applications of Quilt improved disease control over single Quilt application. Quilt less effective than other fungicides tested.

4. Dual applications of Headline SBR partially improved disease control over single Headline SBR application.

5. In this study, yield not typically improved with dual applications.
Summary for Grower Recommendations

1. Timing is very important for control of ASR.
   a. R3 worked well each time
   b. R1 and R5 variable
   c. Vegetative stages likely too early

2. Fungicide choice important as well
   a. Differences between fungicides not always evident
   b. Reduced disease control not always linked to yield differences
   c. Well-timed, single application of best fungicides may be as effective as two applications of other fungicides.

3. Dual applications at times offers improved yields over single applications.
   a. In 2006, seems that R3 & R5 timing was better than R1 & R3.
   b. Dual applications with chlorothalonil early still needs more study.

4. Importance of an R6 fungicide application not known.

5. ADVICE: Anticipate fungicide application between R1 and R3, depending on sentinel plot warnings, with strong fungicide. Much of “battle” likely won at that point.
The Southeastern USA Team

- **Illinois:**
  - Tristan Mueller and Glen Hartman

- **Florida:**
  - Jim Marois and David Wright

- **Georgia:**
  - Layla Sconyers, Dan Phillips, Phil Jost, Roger Boerma, Jason Brock, John Sherwood, Rick Jackson, Michael Foster, Bob Kemerait
  - Billy Mills and Crew at Attapulgus Research Farm
Questions?
Basic Experimental Design

- Randomized complete block. 4-6 replications.
- Row and seed spacing: 3 feet and 6 seed/foot of row.
- Unsprayed borders between treated plots.
- Spray initiation: appropriate growth stage
- Spray volume and pressure: 15-17.5 gal/A and 40 p.s.i.
- 8002 flat fan tips
- Mounted boom sprayer.
Quincy Timing Study
Area Under the Disease Progress Curve
T. Mueller and G. Hartman

The graph shows the area under the disease progress curve for different treatments and application times.

- **R3 application**
  - Headline (9.2 oz) @ R3: 33.1
  - Folicur (4 oz) @ R3: 31
  - Quilt (14 oz) @ R3: 51.8

- **R1 & R3 application**
  - Headline SBR @ R3: 20.2
  - Headline@R1, Folicur@R3: 21.1
  - Folicur@R1, Headline@R3: 20.2
  - Quilt@R1 and R3: 33.5

- **R3 & R5 application**
  - Headline SBR @ R3 and R5: 15.8
  - Folicur@R3, Headline@R3: 15.1
  - Quilt@R3 and R5: 15.9

- **No treatment**
  - A: 66.2

Legend:
- Headline (9.2 oz) @ R3
- Folicur (4 oz) @ R3
- Quilt (14 oz) @ R3
- Headline SBR @ R3
- Headline@R1, Folicur@R3
- Folicur@R1, Headline@R3
- Quilt@R1 and R3
- Headline SBR @ R3 and R5
- Quilt@R3 and R5
- Headline@R3, Folicur@R5
- Headline SBR @ R3 and R5
- None
Attapulgus Timing Study
T. Mueller and G. Hartman

Area Under Dis Prog Crv

<table>
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<th>R1</th>
<th>R3</th>
<th>R5</th>
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<td>28</td>
<td>18.4</td>
<td>16.6</td>
</tr>
<tr>
<td>Folicur (4 oz/A)</td>
<td>21.9</td>
<td>8.8</td>
<td>17.5</td>
</tr>
<tr>
<td>Quilt (14 oz/A)</td>
<td>28.9</td>
<td>25.4</td>
<td>26.2</td>
</tr>
<tr>
<td>Untreated</td>
<td>51.6</td>
<td>51.6</td>
<td>51.6</td>
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</tbody>
</table>
Attapulgus Timing Study
T. Mueller and G. Hartman

![Bar chart showing Rough Yield (bu/A) for different treatments at R1, R3, and R5 stages.](chart.png)

- Headline (9.2 oz/A)
- Folicur (4 oz/A)
- Quilt (14 oz/A)
- Untreated