Rhizoctonia solani
Extent of the problem and control measures.

Michigan Sugar Company
Lee Hubbell
Rhizoctonia solani

• Serious root disease

• Severe in some areas

• In almost every field

• First tested a tolerant variety in 1990

• First tested Quadris for Rhizoctonia control in 1999
Rhizoctonia Strains

- AG 2-2 – Root and Crown Rot
  - 2-2 IV – Main strain in the past
  - 2-2 IIIB – Becoming more common
    - 50% is now IIIB
  - 2-2 IIIIB
    - Corn is a host
    - Stronger strain – more aggressive
Crown Rot
Root Rot
Extent of the Problem
Agriculturist Survey

- Use Susceptible variety and no Quadris
- Use Susceptible variety and 1 Quadris App
- Use Susceptible variety and 2 Quadris Apps
- Use Tolerant variety and no Quadris
- Use Tolerant variety and 1 Quadris App
- Use Tolerant variety and 2 Quadris Apps
Survey Results

• Agriculturalists areas (15)
  • Only 3 areas had any acres with "no" Rhizoctonia
    - Susceptible variety & no Quadris
    - 78% in Ontario, Canada
  • 1 area, all Acres need Tolerant variety
    + 1 or 2 Quadris applications
  • 30% of the acres - 2 Quadris applications
Survey Results

% of Acres

<table>
<thead>
<tr>
<th>Quadris</th>
<th>Sus Var</th>
<th>Tol Var</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Quadris</td>
<td>4.8</td>
<td>49.7%</td>
</tr>
<tr>
<td>1 Quadris</td>
<td>29.4</td>
<td>50.3%</td>
</tr>
<tr>
<td>2 Quadris</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>No Quadris</td>
<td>13.4</td>
<td></td>
</tr>
<tr>
<td>1 Quadris</td>
<td>22.0</td>
<td></td>
</tr>
<tr>
<td>2 Quadris</td>
<td>14.9</td>
<td></td>
</tr>
</tbody>
</table>

49.7% 50.3%
Methods of Control

- Cultural controls
- Return crop residue
  - Soil health
  - Longer rotations
- Varieties with tolerance
- Fungicide applications
Previous Crop

Host

Strain AG 2-2 IV  Dry beans, Soys
Strain AG 2-2 III B  Also Corn
Corn was recommended in the past
AG 2-2 III B  50% now

Non-Host  Wheat (clover, alfalfa)
Improve Soil Health

Cover Crops

- Improved soil structure & drainage
- Increase organic matter
- Erosion control
- Oil seed radish
  - Cyst nematode suppression
- Clovers planted in wheat
  - Produce nitrogen in soil
Variety Tolerance
Variety Selection

• One variety does not have all traits
  – Varieties that produce the most RWST and RWSA are the most susceptible to Rhizoctonia
  – The most tolerant varieties do not meet our approval standards – Special Approval
2010 Trials

Inoculate .3 gm/foot
AG 2-2

Quadris Rate
• 22 inch rows
  – 14.25 fl oz/acre
<table>
<thead>
<tr>
<th>Rhizoctonia Control Products Compared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quadris FL</td>
</tr>
<tr>
<td>Proline SC</td>
</tr>
<tr>
<td>Topsin M</td>
</tr>
<tr>
<td>Headline EC</td>
</tr>
<tr>
<td>In-furrow</td>
</tr>
<tr>
<td>Foliar</td>
</tr>
</tbody>
</table>
Rhizoctonia Control
Products Compared

Untreated = 31.7 Dead

Dead Beets/100’

- 14.25oz
- 14.25oz
- 14.25oz
- 8oz
- 7.1oz
- 17.6oz
- 4oz
- 8oz

IF 3.5" IF 3.5" IF 7" IF 3.5" IF 3.5" 4-6 If IF 3.5" IF 3.5" 4-6 If
Moncut Quad Quad Quad Proline Topsin Quad Moncut Head Actino Topsin Topsin
In-furrow Quadris
Rates & Band Widths

- In-furrow, T-band
  - Band width- 2, 3.5 and 7 inch

- Foliar- 4-6 leaf
# In-furrow Quadris

**Rates & Band Widths**

<table>
<thead>
<tr>
<th>Dead Beets/100’</th>
<th>IF 3.5” - 7.1 oz</th>
<th>14.25 oz</th>
<th>14.25 oz</th>
<th>4.1 oz</th>
<th>14.25 oz</th>
<th>14.25 oz</th>
<th>7.1 oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF 3.5” - 9.5 oz</td>
<td>IF 3.5”</td>
<td>4-6 lf</td>
<td>IF 2”</td>
<td>IF 2”</td>
<td>IF 7”</td>
<td>IF 3.5”</td>
<td></td>
</tr>
</tbody>
</table>

*Untreated = 46.9 Dead*
In-furrow Quadris
Rates & Band Widths

Recoverable Sugar per Acre

<table>
<thead>
<tr>
<th>IF 3.5&quot; - 7.1 oz</th>
<th>14.25 oz</th>
<th>14.25 oz</th>
<th>4.1 oz</th>
<th>14.25 oz</th>
<th>14.25 oz</th>
<th>7.1 oz</th>
<th>4-6 If - 9.5 oz</th>
<th>IF 3.5&quot;</th>
<th>4-6 If</th>
<th>IF 2&quot;</th>
<th>IF 2&quot;</th>
<th>IF 7&quot;</th>
<th>IF 3.5&quot;</th>
<th>Check</th>
</tr>
</thead>
</table>
Quadris
Application Timings

• In-furrow- 3.5 inch T-band
  • 14.25 and 7.1 fl oz/acre

• Foliar-
  – Cotyledon, 2, 4, 6, and 6-8 leaf size
    • 14.25 fl oz/acre
Quadris
Application Timings

Dead Beets/100'

Untreated = 30.9 Dead

Application Temperature (°F)

IF +
73°

IF-
73°

IF
14.25 oz

IF
7.1 oz

6-8 If - 10.7 oz

6-8 if
14.25 oz

4 If
14.25 oz

2 If
14.25 oz

6 If
14.25 oz

Cotyl
14.25 oz
Quadris
Application Timings

Recoverable Sugar per Acre

<table>
<thead>
<tr>
<th>Application</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.25 oz</td>
<td>73°</td>
</tr>
<tr>
<td>7.1 oz</td>
<td>65°</td>
</tr>
<tr>
<td>6-8 if - 10.7 oz</td>
<td>60°</td>
</tr>
<tr>
<td>IF</td>
<td>70°</td>
</tr>
<tr>
<td>IF</td>
<td>55°</td>
</tr>
<tr>
<td>IF - 7.1 oz</td>
<td></td>
</tr>
<tr>
<td>6-8 if</td>
<td></td>
</tr>
<tr>
<td>IF</td>
<td></td>
</tr>
<tr>
<td>IF</td>
<td></td>
</tr>
<tr>
<td>4 If</td>
<td></td>
</tr>
<tr>
<td>2 If</td>
<td></td>
</tr>
<tr>
<td>6 If</td>
<td></td>
</tr>
<tr>
<td>Cotyl</td>
<td></td>
</tr>
<tr>
<td>Check</td>
<td></td>
</tr>
</tbody>
</table>
Fungicide Recommendations

• Quadris
  – Post emergence Foliar application
    • 4-8 leaf – best time varies with soil temperature
  – In-furrow T-band
    • At least as good as a foliar application and is not affected by temperature later
Recommendations for 2 Applications

Quadris – 2 applications

- Moderate Rhizoc – Susceptible Variety
- High Rhizoc – Tolerant Variety

• In-furrow + Foliar 6-8 leaf
  or
• Two Foliar
  2-4 and 6-8 leaf
Foliar Recommendations

• Do not cut rates
• 7 inch band
• Do not broadcast
• 4-8 leaf size
• Do not mix with oils (MSO, ECs)
## Foliar Application

### 7 inch band

Quadris Rates (fl oz/A) at Row Spacings

<table>
<thead>
<tr>
<th></th>
<th>30&quot;</th>
<th>28&quot;</th>
<th>24&quot;</th>
<th>22&quot;</th>
<th>20&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rows</td>
<td>10.5</td>
<td>11.2</td>
<td>13.1</td>
<td>14.3</td>
<td>15.8</td>
</tr>
</tbody>
</table>
In-Furrow
Recommendations

- T-band only, between seed drop and row closing
- Often see a 5% stand reduction
- Do not mix with fertilizer
- Do not dribble in-furrow
In-Furrow Recommendations

- Not less than 20 psi
- 5–10 gallons/acre
- Tip not less than “015” for volume
- 50 mesh screen
- Tip angle depends on height
  - 25° to 80°
In-Furrow
Summary

• Narrow T-band
  – 3.5 inches

• Lower proportionate rate
  – Down to ½ rate
In-Furrow, T-band, Rates of Quadris, fl oz/ acre

<table>
<thead>
<tr>
<th>Band Width</th>
<th>30 Inch</th>
<th>28 inch</th>
<th>24 inch</th>
<th>22 inch</th>
<th>20 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 inch</td>
<td>10.5</td>
<td>11.2</td>
<td>13.1</td>
<td>14.3</td>
<td>15.8</td>
</tr>
<tr>
<td>6 inch</td>
<td>9.0</td>
<td>9.6</td>
<td>11.3</td>
<td>12.3</td>
<td>13.5</td>
</tr>
<tr>
<td>5 inch</td>
<td>7.5</td>
<td>8.0</td>
<td>9.4</td>
<td>10.2</td>
<td>11.3</td>
</tr>
<tr>
<td>4 inch</td>
<td>6.0</td>
<td>6.4</td>
<td>7.5</td>
<td>8.1</td>
<td>9.0</td>
</tr>
<tr>
<td>3 1/2 inch or less</td>
<td>5.3</td>
<td>5.6</td>
<td>6.6</td>
<td>7.2</td>
<td>7.9</td>
</tr>
</tbody>
</table>
Questions?