Germplasm Screening for Tolerance to Bermudagrass Stem Maggot (BSM)

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Bermudagrass stem maggot (BSM) *Atherigona reversura*
Recent History of the BSM
Mitigation Strategies

- **Physical**
  - Clip Early

- **Cultural**
  - Early detection

- **Biological**
  - Resistant cultivars

- **Chemical**
  - Spray for control

- **Integrated Pest Management**
Objectives

- Select the most tolerant and highest producing forage bermudagrass lines for further evaluation
- Evaluate promising bermudagrass breeding lines for yield, quality under sprayed and non-sprayed conditions.
Screening of Bermudagrass Core Collection Nursery

The core collection was planted and evaluated at Citra, FL and Tifton, GA. (University of Florida)
### Ratings over locations

<table>
<thead>
<tr>
<th>Entry</th>
<th>BSM rating (FL)</th>
<th>BSM rating (Tifton)</th>
<th>Yield Tifton Mg/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal</td>
<td>5.5</td>
<td>3.9</td>
<td>4.5</td>
</tr>
<tr>
<td>Jiggs</td>
<td>5.3</td>
<td>4.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Tifton 85</td>
<td>3.7</td>
<td>3.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Mean</td>
<td>3.4</td>
<td>3.2</td>
<td>4.1</td>
</tr>
<tr>
<td>Range</td>
<td>0.6 – 7.2</td>
<td>1.2 - 5</td>
<td>0.5 – 11.4</td>
</tr>
<tr>
<td>N</td>
<td>N = 9</td>
<td>N = 4</td>
<td>N = 4</td>
</tr>
</tbody>
</table>

Entries for further testing were selected with BSM ratings of 2.5 or lower and Yields of 5.0 Mg/ha or greater
Methods

- Established side-by-side plots of 16 plant introduction lines plus 4 checks RCBD and 4 reps.
- The two side by side plots of the same genotype were split into two treatments where one is sprayed with pyrethroid insecticide to control BSM and the other not sprayed to determine full yield loss due to BSM.
- Once established, sprays began in June prior to normal onset of BSM.
- The plots were clipped every 5 weeks during each summer with a Carter harvester (flail mower) harvesting 3’ centers of each plot and obtain weights.
- Samples saved for quality estimates
Results

Alicia

Tolerant line
October 25, 2018 – Last clipping

Susceptible line

Tolerant line
Pattern of yield losses over years

Percent yield loss for Alicia from BSM

- June
- July
- Aug
- Sept
- Oct

Alicia

2017  2018
## September Clipping Yield losses

<table>
<thead>
<tr>
<th>Entry</th>
<th>2016 % Red.</th>
<th>2017 % Red.</th>
<th>2018 % Red.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI 294467</td>
<td>6.6 a</td>
<td>17.0 a-c</td>
<td>14.2 a</td>
<td>12.5</td>
</tr>
<tr>
<td>PI 290901</td>
<td>7.7 ab</td>
<td>19.1 a-d</td>
<td>5.6 a</td>
<td>10.8</td>
</tr>
<tr>
<td>PI 290812</td>
<td>9.5 ab</td>
<td>18.8 a-d</td>
<td>26.6 a-e</td>
<td>18.3</td>
</tr>
<tr>
<td>Breeding Line</td>
<td>10.3 ab</td>
<td>15.1 ab</td>
<td>9.6 a</td>
<td>11.7</td>
</tr>
<tr>
<td>PI 290664</td>
<td>11.1 ab</td>
<td>12.3 a</td>
<td>19.5 abc</td>
<td>14.3</td>
</tr>
<tr>
<td>PI 290872</td>
<td>19.2 ab</td>
<td>16.2 a-c</td>
<td>8.0 a</td>
<td>14.5</td>
</tr>
<tr>
<td>Tifton 85</td>
<td>18.5 ab</td>
<td>51.1 fg</td>
<td>24.4 a-d</td>
<td>31.3</td>
</tr>
<tr>
<td>Jiggs</td>
<td>47.4 c</td>
<td>57.4 gh</td>
<td>31.1 b-f</td>
<td>45.3</td>
</tr>
<tr>
<td>Alicia</td>
<td>40.3 c</td>
<td>70.1 h</td>
<td>59.4 f</td>
<td>56.6</td>
</tr>
</tbody>
</table>
Average Total Yield When Unsprayed

Total Yield of Unsprayed Plots

- PI 294467
- PI 290901
- PI 290812
- Breeding Line
- PI 290664
- PI 290872
- PI 295114
- Tifton 85
- Jiggs
- Alicia

2017 vs 2018
Conclusions

- Tolerance to BSM has been found among available bermudagrass accessions within the Bermudagrass Core Collection.
- Tolerance has held up over two years and is significantly better than current cultivars – including Tifton 85.
- These lines will continue to be evaluated, increased and used for breeding.