Phenology and Insecticide Choices to Manage the SCA in 2016 in the Rio Grande Valley

Raul T. Villanueva
raul.villanueva@uky.edu

Sugarcane Aphid Informative Meeting - Weslaco, April 12, 2016
Phenology: study of life cycle events influenced by annual changes in seasons, climate, and habitat (i.e. latitude, altitude)

- Planting time
- Cultivar
- Environment
- Management
- Control
### Fall 2014

**Tolerant cv.**

- **Economic threshold:** 1-50 aphid
- **SCA/leaf:**
  - 8-Sep
  - 15-Sep
  - 22-Sep
  - 29-Sep
  - 6-Oct

- **Treatment:**
  - 1 Transform
  - 2 Sivanto
  - 3 Control

**Susceptible cv.**

- **Economic threshold:**
  - Over 200 aphid-leaf

**Graphs:**

- **0-50 aphid**
- **50-200 aphid**
- **>200 aphid**

**Legend:**

- W-TX2783
- Treatment: 1 Transform
- Treatment: 2 Sivanto
- Treatment: 3 Control

**Note:**

- Economic threshold for SCA/leaf.
<table>
<thead>
<tr>
<th>Company/Brand</th>
<th>Hybrid*</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pioneer</td>
<td>83P17</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Pioneer</td>
<td>83P56</td>
<td>Med-Full</td>
</tr>
<tr>
<td>DEKALB</td>
<td>37-07</td>
<td>Med-Early</td>
</tr>
<tr>
<td>DEKALB</td>
<td>Pulsar</td>
<td>Med-Early</td>
</tr>
<tr>
<td>Sorghum Partners</td>
<td>SP 7715</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Sorghum Partners</td>
<td>SP 78M30</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Sorghum Partners</td>
<td>SP 73B12</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Richardson</td>
<td>RS260E</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Richardson</td>
<td>Sprint W FG</td>
<td>Med-Early</td>
</tr>
<tr>
<td>Richardson</td>
<td>Jowar I</td>
<td>Full</td>
</tr>
<tr>
<td>Richardson</td>
<td>Swift</td>
<td>V. Early</td>
</tr>
<tr>
<td>Alta</td>
<td>AG1201</td>
<td>Early</td>
</tr>
<tr>
<td>Alta</td>
<td>AG1301</td>
<td>Med-Early</td>
</tr>
<tr>
<td>Alta</td>
<td>AG1203</td>
<td>Med-Early</td>
</tr>
<tr>
<td>Mycogen</td>
<td>627</td>
<td>Med-Early</td>
</tr>
<tr>
<td>Mycogen</td>
<td>1G688</td>
<td>Medium</td>
</tr>
<tr>
<td>B-H Genetics</td>
<td>BH 4100</td>
<td>Medium</td>
</tr>
<tr>
<td>B-H Genetics</td>
<td>BH 3400</td>
<td>V Early</td>
</tr>
<tr>
<td>Warner Seed</td>
<td>W-844-E</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Warner Seed</td>
<td>W-7051</td>
<td>Med-Full</td>
</tr>
<tr>
<td>Golden Acres</td>
<td>3960B</td>
<td>Med</td>
</tr>
</tbody>
</table>
Historic records on the presence of SCA in the U.S.

**Sugarcane aphid (Melanaphis sacchari)**

Distribution in the U.S and Mexico 2015

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A.</td>
<td>6</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Mexico</td>
<td>2</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

---

**SCA in TX sorghum 2013**

- **1999 - LA SUGARCANE**
- **1977 - FL SUGARCANE**
- **2013 - TX SORGHUM**

---

Beaumont Jun-2013

RGV Oct-2013
Sexual forms: Sugarcane Aphid

Sexual forms found on Mexico on areas near the sea level or higher elevation (1500 m)

*Peña-Martinez et al.* 2016
Partial Component Analysis of SCA hosts by geographic Interaction in MS, LA, OK, AR and TX

Identification of SCA: *Melanaphis sacchari*

Based on Taxonomic and molecular analysis of US populations

GS: grain sorghum, JG: Johnson grass, SC: sugarcane,
Sugarcane aphid (*Melanaphis sacchari*)
Almost 99% of commercial sorghum growers used Transform® 1, 2 or 3 times during the spring season.

Mean numbers of SCA/leaf in the Rio Grande Valley on 13 and 15 commercial sorghum fields in 2014 and 2015, respectively.

SCA PHENOLOGY: 2014 vs. 2015
Environmental Conditions

Between Jan and May there were 1 rain event every 10, 5, and 3 days in 2013, 2014 and 2015, respectively.

Between Jan and May the cumulated precipitation in 2015 was 2.5 to 2.8 times greater than in 2013 and 2014, respectively.

Ratio of SCA remaining at end of hour

Amount of rain during the hour
Threshold has been changed based on further studies leaded by Dr. Brewer (Corpus Christi, TX) and Dr. Kerns (Winnsboro, LA)

- **2014**: 50 to 125 aphids/leaf up to boot stage of development
- **2015**: 30 to 135 aphids/leaf up to boot stage of development

![Impact of sugarcane aphids on susceptible sorghum yield](image)

- Cumulative Aphid Days:
  - 0
  - 2000
  - 4000
  - 6000
  - 8000
  - 10000
  - 12000
  - 14000
  - 16000
  - 18000

- Yield (bu/acre):
  - 0
  - 20
  - 40
  - 60
  - 80
  - 100

- Regression equation:
  \[ Y = 73.44 - 0.0043X \]

- \( R^2 = 0.74 \)
- \( P < 0.001 \)

- 1000 aphids per leaf over a 7 day period results in a 42% reduction in yield
Seed treatment

Greenhouse study

Seed treatments protect sorghum for at least 4 to 6 wks after emergence

Fall 2014: Young volunteer sorghum damaged by SCA

Alex Navarro
Insecticides recommended for the management of the SCA in sorghum - 2016

- Transform® (sulfoxaflor)
- Sivanto® (flupyradifurone)

<table>
<thead>
<tr>
<th>Insecticide / Mode of action</th>
<th>Use</th>
<th>Reapplication interval</th>
<th>Rate</th>
<th>PHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transform® WG</td>
<td>Max 2 sprays or 3 oz/A</td>
<td>14 days</td>
<td>0.75 - 1.5 oz/A</td>
<td>14 d</td>
</tr>
<tr>
<td>MoA: 4C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sivanto® 200 SL</td>
<td>Max/season 28 oz/A</td>
<td>7 days</td>
<td>4.0 - 10.0 oz/A</td>
<td></td>
</tr>
<tr>
<td>MoA: 4D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

High volume of water is important for good coverage
- Ground ≥10 GPA
  15-20 GPA is better
- Air ≥ 5 GPA
  10 GPA is suggested

High volume of water is important for good coverage
- Ground ≥10 GPA
  15-20 GPA is better
- Air ≥ 5 GPA
  10 GPA is suggested
Is Transform® working?

Sorghum Planted on:
31 May       15 August

Transform®
• Spray 9/25
• Pics 9/29
Control options for SCA, and other sorghum pests - 2016

**Leaf cutters**
- Caterpillars
- Whorl worms

**SCA establishment**

**Seed treatment**
- Transform/Sivanto/
- Transform/Sivanto/
- Transform/Sivanto/
- Transform/Sivanto

**Vegetative growth**
- Germination
- 3 leaves
- 5 leaves
- Headed initiation
- Flag leaf
- Boot

**SCA population outbreaks**
- Flowering
- Soft dough
- Hard dough
- Maturation

**Whorl feeders**
- Prevathon

**Midge**
- Chlorpyrifos 1pt

**Headworms**
- Lannate/Belt/Prevathon
SCA sampling

- 40 plants per field when plants are small
- 20 plants per field in large plants (older than 5 leaf-stage)

Check entire plant, lower side of leaf

2 leaves per plant: 1 leaf below flag leaf and the green lowest leaf in plant
Late planting and insecticides against SCA

Insecticide options for 2015

### Table: SCA July 30th Sprayed (SNK)

<table>
<thead>
<tr>
<th></th>
<th>29-Jul</th>
<th>3-Aug</th>
<th>10-Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>640 a</td>
<td>158.50 a</td>
<td>28.33 a</td>
</tr>
<tr>
<td>Transform</td>
<td>564.33 ab</td>
<td>4.83 b</td>
<td>18.5 ab</td>
</tr>
<tr>
<td>Sivanto 7 oz</td>
<td>497.17 ab</td>
<td>0 b</td>
<td>0 b</td>
</tr>
<tr>
<td>Nichino 4.8 oz</td>
<td>410.80 b</td>
<td>10.07 b</td>
<td>0 b</td>
</tr>
<tr>
<td>Nichino 6.4 oz</td>
<td>389.17 b</td>
<td>6.37 b</td>
<td>0.667 b</td>
</tr>
<tr>
<td>Sivanto 4 oz</td>
<td>200.7 c</td>
<td>0.60 b</td>
<td>0 b</td>
</tr>
</tbody>
</table>
Insecticide options for 2015

Evaluating insecticides fall 2015
Rio Grande Valley  
Fall 2015 Test  
Untreated seeds

Planted on: 08/31/15  
Sprayed on: 09/30/15

Day 0 = Sept 30  
Day 5 = Oct 5  
Day 8 = Oct 8  
Day 13 = Oct 13  
Day 19 = Oct 19

SCA crash on control was due to complete deterioration of plants due to sugarcane aphid damage.
Natural enemies

Numerical response of natural enemies to still cannot keep up with large population explosions of SCA

Image 6/6/14. Numbers of ladybugs on some plants are extremely high. Note high amounts of aphid honeydew, cast skins (?) and beginning sooty mold development.
Evaluation of entomopathogenic fungi for SCA control

In bioassays, *B. bassiana*, *M. brunneum* and *I. fumosorosea* caused >80% mortality.

Ten *M. sacchari*, and tallies at 24, 48, 72 h.
Harvest and desiccants

- **Honeydew and sooty mold** may affect **Glyphosate**
- **Sodium chlorate** can be a better option when SCA have deposited honeydew or presence of sooty mold
- **If SCA are abundant and move into heads** **Transform®** (14-d PHI) may be included with the desiccant spray
Summary

• There are tools to manage the SCA: Seed treatments, resistant/tolerant cultivars, early planting

• Transform® (sulfoxaflor) worked effectively to control SCA, it was recently approved for its use in 2016.

• Sivanto ® (flupyradifurone) is very effective against the SCA,

• Threshold approx. 30 to 120 SCA/leaf (Brewer &Kerns)

• Natural enemies were abundant but no sufficient

• Yield losses can be great: from 50 to 100%
Thank you!

Acknowledgments

Grower cooperators

Daniel Sekula
Gabriela Esparza-Diaz
Raul Medina
Robert Bowling
David Kerns
Raul Medina
Karla Cruz-Aldaco
Miguel Arias
Jorge Arellano
Alex Navarro
Brad Cowan
Enrique Perez
Web Wallace
Beto Garza
Sergio Davila
Lauren Fann
Joe Martinez
Alma Olguin
Elizabeth Arzola
George Loya
Kendall Duke
John Norman
Samuel Zapata
L. Rodriguez de Bosque
Sergio Sanchez
Victor Maya

Colleagues

• Bill Rooney - Texas A&M Univ., College Station
• Mike Brewer - AgriLife Research, Corpus Christi
• Scott Armstrong - USDA-ARS, Stillwater, OK
• Mo Way - AgriLife Research, Beaumont
• David Kerns - Louisiana State University
• JP Michaud – Kansas State University
Raul T. Villanueva
1205 Hopkinsville Street
Phone: (270) 365-7541
raul.villanueva@uky.edu
**Helicoverpa armigera** (Old World Bollworm)

- Annual losses in Brazil: $2 billion, yields were reduced by 35%
- **OWB** developed rapid resistance to insecticides and Bt-cultivars
- USDA-APHIS confirmed the first U.S. detection on June 17, 2015 in Florida