Sugarcane Aphid on Grain Sorghum: Distribution, Thresholds, and Hybrid Sensitivity

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http://ccag.tamu.edu/entomology/
http://ccag.tamu.edu/sorghum-insect-pests/
I. The Aphid, Plant Damage & Distribution
II. Insecticides and Thresholds for susceptible hybrids
   Multi-site field experiment
   Out to the field: Links to insecticides and sampling
III. Hybrid sensitivity: Links to thresholds
IV. Communications

Financial supporters (Funding and in-kind)

Texas Grain Sorghum Board

USDA Step-up Training, Undergrads (TAMU Kingsville, Del Mar College)
USDA NIFA Crop Protect & Pest Manage., Applied Res. & Dev.
USDA NIFA Southern IPM Center
United Sorghum Checkoff Program
TAMU COALS Fellowships, Grads
Monsanto/Syngenta, harvesting, equipment
I. The Aphid, Plant Damage, Distribution

Which is sugarcane aphid? Which is tolerable injury and which is economic damage?
The Aphid

Corn Leaf Aphid

Yellow Sugarcane Aphid

Sugarcane Aphid

Greenbug Aphid
Which is tolerable injury and which is economic damage?

250 Aphids/Leaf  50 Aphids/Leaf  500 Aphids/Leaf

Quick Aphid Checker

Estimate the number of sugarcane aphids (SCA) per leaf to help time foliar insecticides for SCA control on sorghum. Each photo represents an estimate from the table. For example, photo A shows about 12 aphids.

<table>
<thead>
<tr>
<th>Photo</th>
<th>Range</th>
<th>Estimate</th>
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<tbody>
<tr>
<td>A</td>
<td>1-25</td>
<td>12</td>
</tr>
<tr>
<td>B</td>
<td>26-50</td>
<td>38</td>
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<tr>
<td>C</td>
<td>51-100</td>
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<td>D</td>
<td>101-500</td>
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<tr>
<td>E</td>
<td>501-1000</td>
<td>750</td>
</tr>
<tr>
<td>F</td>
<td>&gt;1000</td>
<td>1500</td>
</tr>
</tbody>
</table>

Field Average = Total of All Estimates / Total # of Leaves Examined

Learn more about sugarcane aphids at http://ttxcan.blogspot.com

Photos courtesy of Travis Abrome, Mike Brewer, and Rod Porter. Funding provided by the Texas Grain Sorghum Producers Board and the USDA NIFA Southern IPM Center and Crop Protection and Pest Management Program.

Educational programs of the Texas A&M AgriLife Extension Service are open to all people without regard to race, color, sex, religion, national origin, age, disability, genetic information, or veteran status.
Things happen fast, but the plant doesn’t die immediately

Pre-flowering arrival/increase

Less grain/
No heads

Aphids/honeydew at harvest

Asexual reproduction, required green host primarily *Sorghum* sp.
Plant damage caused by general plant decline, head emergence problems
Honeydew and aphids reduce harvest effectiveness
Coastal Bend growers, IPM officials meet on sugarcane aphid problems

2013 Sugarcane Aphid Occurrence in Sorghum
Aug/Sept

2012: Spots detects in South Texas

Brewer, Way, Villanueva, Kerns, Armstrong

Counties with Sugarcane Aphid in Sorghum

Management: feasible & challenging

+ Limited in landscape: *Sorghum* spp.
+ Damage from general decline, no acute toxicity
+ Not a vector, or only a potyvirus
+ Grain value

- Asexual, rapid reproduction

- Monitoring challenge:
  Wind-aided movement
  Aphids are small / leaves are green
Proper ID

Divide sampling effort

- Focus weekly **Fast Detection** for first detection in many fields
- Focus 2X weekly **Quick Aphid Checker** (aphid estimates) in infested fields
- Following up to a 2 month window after detection is critical

http://ccag.tamu.edu/sorghum-insect-pests/
II. Insecticides and Thresholds for susceptible hybrids

Effective Insecticides & Registration Status
Sinton, Texas 2015, Cooperator: Charles Ring

Early bloom, 15 GPA
Hand-held CO2 sprayer

<table>
<thead>
<tr>
<th>Pretreatment</th>
<th>7-DAT</th>
<th>14-DAT</th>
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<tr>
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<td>b</td>
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<td>a</td>
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<td>a</td>
</tr>
<tr>
<td>a</td>
<td>b</td>
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</table>

No. Aphids/Leaf

More poster info:
J. Gordy et al.
Insecticide efficacy
S. Biles et al.
Adjuvants

Courtesy: Robert Bowling
AgriLife Extension
Threshold Experiment
Economic Injury Level for susceptible sorghum hybrids

2014
LGC: Corpus Christi, TX
NLA: Winnsboro, LA

2015
LGC: Lower Gulf Coast (Brewer) Planted: May 1 (2nd planting)
UGC: Upper Gulf Coast (Gordy) Planted: July 16 (3rd planting)
OK: Oklahoma (Royer) Planted June 4 (2nd planting)
NLA: North LA (Kerns) Planted: May 29 (2nd planting)
AR: Arkansas (Seiter) Planted June 9 (2nd planting)
GA: Georgia (Buntin) Planted June 15 (1st planting)

Early Planting
Escaped damage
LGC, UGC, OK, NLA, RA

Late Planting
Aphids arrived pre-boot

More poster info:
J. Gordy et al.
Thresholds
Sorghum ‘S’ Hybrids: Threshold Experiment

Plot size: 40 ft by 4 rows, data taken on inner two rows

Action triggers for foliar insecticide

(0 GA only), 50, (100 to 125), 250 & 500 aphids/leaf & UTC

Transform (sulfoxaflor) 1.0 oz per acre, 10-15 GPA

First aphids arrived at 5-6 leaf, pre-boot

Sorghum Hybrids:

2014
LGC: RTX430, 1 spray max
NLA: RTX430, 2 sprays max

2015
LGC: Dekalb DKS 53-67, 1 spray max
UGC: Dekalb DKS 53-67, 4 sprays max
OK: DK53-67, 1 spray max
NLA: TX430, irrigated, 2 sprays max
AR: P83P99, irrigated, 3 sprays max
GA: SS800A, 3 sprays max

Measurements: weekly

Aphid density (aphid/leaf)

20 leaves per plot,
10 top-half, 10 bottom-half
used quick aphid checker
(5-10 min per plot)

Yield
2014, 2015 Results in Pictures, Susceptible (TX430, DKS 53-67)

50/100 (S)
Few aphids 7-14 DAT, no injury, no yield loss, natural enemies reduced

LGC: 1 spray
UGC: 4 sprays
NLA: 2 sprays
GA/AR: 3 sprays

250 (S)
Few aphids 7-14 DAT, sooty mold detected, no yield loss, abundant natural enemies

UTC & 500 (S)
High aphids 7-14 DAT, damage visible, yield loss, natural enemy zoo

LGC/UGC: 0 spray
NLA: 0 spray
GA/AR: 0 or 1 spray
2015 Yield (Susceptible hybrid)—Max Aphid Load Regression

2015 Yield Loss estimates in lbs/acre (and % yield reduction) for every 100 aphids/leaf
Values in a feasible IPM management zone, here ET = 0.7*EIL
2015 ET variation 30 — 135 aphids per leaf
2014 ET variation 50 — 125 aphids per leaf

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<td></td>
<td></td>
<td>GA</td>
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From Pedigo’s method $EIL = C/(V*I*D*K)$, $C$ = control cost, $V = $ value of grain
K set at 0.95 as the proportion of the insect population controlled (taken from efficacy studies)
$I*D$ is loss estimate estimated from the slope of yield—aphid/leaf regression
Use of these thresholds

✓ ID, sampling, and estimating aphid load critical

✓ Insecticide use within same or few days
✓ Excellent insecticides available

http://ccag.tamu.edu/sorghum-insect-pests/
Picking a specific threshold for you:

2015 ET variation  30— 135 aphids per leaf
2014 ET variation 50 — 125 aphids per leaf

One responsible approach: choose an ET in the lower part of the range and adjust as you get more information

Location, insecticide cost, grain value

Sampling once (↓ ET) or twice (↑ ET) weekly

Is hybrid very susceptible (↓ ET) or less susceptible (↑ ET) ?

Is it hot and dry (↓ ET) or rains and natural enemies (↑ ET) ?
### III. Hybrid sensitivity

**Hybrid Resistance (2016 expected commercially available)**

<table>
<thead>
<tr>
<th>Hybrid Source</th>
<th>Hybrid</th>
<th>Maturity</th>
<th>Approach</th>
<th>Source</th>
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<td>Med-Full</td>
<td>A, B</td>
<td>S, P</td>
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<td>A, B</td>
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<tr>
<td>Richardson</td>
<td>Jower I</td>
<td>Full</td>
<td>B</td>
<td>S, P</td>
</tr>
</tbody>
</table>

**Approaches**

- A. Seedling greenhouse
- B. Full season field
- C. Characterize resistance
- D. Identify genetics

**Source**

- S. Seed company
- I. Independent private
- P. Public sector (Univ.)

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**Nov, 2015, courtesy B. Bean, United Sorghum; D. Kerns, LSU**
IV. Communications

In-season: Turn-Row, Crop Tours Grower/trade meetings TPPA, Ag. Tech., Seed Trade

Ongoing: Maps, TDA, Webinars

Robert Bowling, Robert.Bowling@ag.tamu.edu
Stephen Biles, biles-sp@tamu.edu
John Gordy, John.Gordy@ag.tamu.edu
Allen Knutson, a-knutson@tamu.edu

http://ccag.tamu.edu/sorghum-insect-pests
You can do it: ID, detect, sample, and compare to threshold

Use of these thresholds

Values are in a feasible IPM management zone

2015 ET variation 30—135 aphids per leaf
2014 ET variation 50--125 aphids per leaf

ID, sampling, and estimating aphid load
Insecticide use within 2 days: Possible in large production
Excellent insecticides available
And the future looks promising for Integrated management

Natural Enemies + Sorghum Resistance + Good Rains =

Less damaged sorghum/ less susceptible to aphid (↑ET)?

250 Aphids/Leaf

Lady bugs, Hover flies, Parasitoids

70 Aphids/Leaf