Aphid Management and Implications for CLRDV

2019 Row Crop Short Course, Mississippi State University

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December 2, 2019
Aphid Biology and Ecology

- Variable in size and color, range from light yellow to dark green or almost black.
- Highly polyphagous, many host plants.
  - Cultivated and weedy species
- Parthenogenic reproduction, females do not mate and give birth to living young.
- High reproductive capacity.
  - 1 female can give birth to 80 offspring.
  - Newborn aphid will begin giving birth to young in 4-5 days.
  - Prone to develop insecticide resistance.
- Winged (alate) and wingless (apterous).
  - The formation of winged types is usually in response to crowding or poor host quality.

Cotton aphids may infest cotton from emergence to leaves dropped.
Cotton Aphids on Cotyledon Cotton

June 21, 2019 (4 DAP)
Cotton Aphids on Seedling Cotton

June 18, 2018

June 19, 2019
Cotton Aphids on Squaring/Flowering Cotton
Neozygites fresenii Fungal Epizootic
Late June/early July in GA
Cotton Aphid Late Season

- Aphids may rebound to detectable levels after crash due to fungus.
- As populations build generally crash again due to the fungus.
- Commonly observed aphids at low, but detectable levels late season during 2019.

August 20, 2019
Cotton Aphid on Basal Regrowth
Cotton Aphid on Basal Regrowth

CLRDV Symptoms on Regrowth
Cotton Aphid Collections at Tallulah Louisiana, from 1941-1947

<table>
<thead>
<tr>
<th>Plants</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rumex sp.</td>
<td>Docks and sorrels</td>
</tr>
<tr>
<td>Sonchus asper</td>
<td>Spiny thistle</td>
</tr>
<tr>
<td>Bignonia radicans</td>
<td>Trumpet creeper</td>
</tr>
<tr>
<td>Chaenomeles lagenaria</td>
<td>Snow</td>
</tr>
<tr>
<td>Cocculus carolinus</td>
<td>Carolina snailseed</td>
</tr>
<tr>
<td>Erigeron philadelphicus</td>
<td>Philadelphia fleabane</td>
</tr>
<tr>
<td>Geranium carolinianum</td>
<td>Carolina geranium</td>
</tr>
<tr>
<td>Hibiscus syriacus</td>
<td>Hibiscus</td>
</tr>
<tr>
<td>Iva ciliata</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>Lamium amplexicaule</td>
<td>Henbit</td>
</tr>
<tr>
<td>Myosurus minimus</td>
<td>Mousetail</td>
</tr>
<tr>
<td>Oenothera laciniata</td>
<td>Cutleaf evening primrose</td>
</tr>
<tr>
<td>Oenothera speciosa</td>
<td>White evening primrose</td>
</tr>
<tr>
<td>Plantago virginica</td>
<td>Virginia Plantain</td>
</tr>
<tr>
<td>Pyrrhopappus Carolinianus</td>
<td>Carolina desert-chicory</td>
</tr>
<tr>
<td>Senecio glabellus</td>
<td>Butterweed</td>
</tr>
<tr>
<td>Solanum carolinense</td>
<td>Carolina horsenettle</td>
</tr>
</tbody>
</table>

Young and Garrison. 1949. J. Econ. Entomol. (42)6: 993-994
Potentially infest cotton from emergence to leaves dropped.
  - 100 percent of Georgia cotton infested annually.

Sucking mouthparts
  - Feeds on plant sap from phloem.
  - Stress inducing pest

Severe infestations
  - Slow plant growth
  - Yellowing of terminals
  - Sooty mold develops on honeydew and interferes with photosynthesis

Research in Georgia has not demonstrated a consistent yield response to control.
  - Effective insecticides in terms of lowering plant stress from aphids.
  - *Neozygites fresenii* fungal epizootic crashes populations (late June – mid-July)
Impact of Cotton Aphid on Yield
1998-2008 GA Cotton

- 27 trials
- Untreated vs. treated.
  - Recommended aphicide.
  - 1-4 sprays (mean=1.85).

The bar chart shows the lint yield (lbs/acre) for untreated and treated cotton. The untreated yield is 1089 lbs/acre with a probability of being significantly different from treated yield of 0.6992. The treated yield is 1094 lbs/acre.
Cotton Aphid Management

Natural Controls
• Conserve beneficial insects.
• Naturally occurring fungus

Insecticides
• Transform (sulfoxaflor)
• Assail (acetamiprid)
• Carbine (flonicamid)
• Centric (thiamethoxam)
• Admire Pro (imidaclopid)
• Bidrin (dicrotophos)
Cotton Aphid Field Trials
Georgia 2019

**Yield (lbs lint/acre)**
- **Untreated** 1,526
- **Treated Avg.** 1,505

**prob (t)** 0.5737

Treated Avg. is mean of all insecticide treatments in a trial.
Cotton Aphid Insecticide Trial (n=4)
Georgia 2019

Mean and Range of Control (3-5 DAT)

- Admire Pro: 27 (± range)
- Centric: 32 (± range)
- Carbine: 54 (± range)
- Bidrin: 50 (± range)
- Assail: 65 (± range)
- Transform: 72 (± range)
Cotton Aphid Insecticide Trial
Candler County

Percent Control (3 DAT)

- Admire Pro: 51%
- Centric: 18%
- Carbine: 75%
- Bidrin: 77%
- Assail: 97%
- Transform: 88%

pr1941: treated June 25, 2019
Cotton Aphid Insecticide Trial
Tift County (late planted)

Percent Control (5 DAT)

Mean Percent Control

0 10 20 30 40 50 60 70 80 90 100

Admire Pro 32 23 10 37
Centric
Carbine
Bidrin
Assail
Transform

pr1943: treated July 2, 2019
Resistance Ratios ranged from 4.26 ppm – 277.64 ppm
95 percent of populations > 10-fold RR
50 percent of populations > 100-fold RR
2019 Cotton Aphid Trapping
Brewton AL and Tifton GA

Average Number per Trap

Collection Date

Cotton Aphids Collected on ALL Sample Dates

Fungal epizootic first week of July

Massive Migration
Cotton Aphid Reinfestation

July 1, 2019
Treated June 21 and June 27 (4 DAT2)
Influence of Aphid Management on Incidence for CLRDV
Aphid Pheno GA 2019

- Field plots were 6 rows wide and 30 feet in length arranged in a randomized complete block with at least four replications.
- Treatments included an untreated control and 7 aggressively protected treatments initiated on different dates (weeks).
- Aphids were counted prior to treatment initiation.
- Aggressive control achieved by applying acetamiprid weekly (i.e. attempted to eliminate aphids for remainder of season).
Cotton Aphid Pheno
pr1908

Aphids per one upper, middle, and lower leaves

Aphids crashing due to fungus.

Planted May 14, 2019
Cotton Aphid Pheno

We were unable to eliminate aphids.

Planted May 14, 2019
Aphid Pheno GA 2019

Planted May 14, 2019

Weekly applications initiated on: Assail 30 WG 2.5 ozs per acre
Methods (AL and GA 2019)
Epidemiology and Management of CLRDV

**Control:** No management of *A. gossypii*

**Treatment 1:** Prevent colonization of crop by aphids. Beginning at the 1-true-leaf stage, make weekly applications of acetamiprid.

**Treatment 2:** Spray at first detection to prevent population buildup in the crop. Primary CLRDV spread should occur, but secondary spread should not.

**Treatment 3:** Current grower practices: make a calendar-based application the first week of July.

**Two planting dates:** May and June to evaluate time of infection and plant growth stage interaction.
100% of plants were infested with aphids for 2 weeks - Brewton, AL
Epidemiology and Management of CLRDV

Assail 30 SG Applications:
1. May 10
2. May 17
3. May 24
4. May 31
5. June 7
6. June 14
7. June 21
8. June 27
9. July 3

Percent Infested Terminals (Assail 30 SG 2.5 ozs/acre)
Epidemiology and Management of CLRDV Georgia and Alabama (n=4)

Means with the same letter are not significantly different; LSD p=0.05
Aphid Management and Implications on CLRDV
Influence of Aphid Management on Incidence for CLRDV

Brewton AL

- Untreated Current First Detection Weekly
- Percent Confirmed Positive CLRDV
- 80 89 n.s. 84

Tifton GA (partial data)

- Untreated Current First Detection Weekly
- Percent Confirmed Positive CLRDV
- 100 100 100 93
Influence of Aphid Management on Incidence for CLRDV

• Aphid management did not influence incidence of CLRDV in these trials.
  • Weekly sprays vs. Untreated

• Aphid management did not increase yield compared with untreated.

• Aggressive aphid management flared spider mites in Alabama and Georgia.