

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



CLR DV
Symptoms on
Regrowth



Cotton Aphid Collections at Tallulah Louisiana, from 1941-1947

Rumex sp.

Sonchus asper

Bignonia radicans

Chaenomeles lagenaria

Cocculus carolinus

Erigeron philadelphicus

Geranium carolinianum

Hibiscus syriacus

Iva ciliata

Lamium amplexicaule

Myosurus minimus

Oenothera laciniata

Oenothera speciosa

Plantago virginica

Pyrrhopappus Carolinianus

Senecio glabellus

Solanum carolinense

Docks and sorrels

Spiny thistle

Trumpet creeper

Snow

Carolina snailseed

Philadelphia fleabane

Carolina geranium

Hibiscus

Asteraceae

Henbit

Mousetail

Cutleaf evening primrose

White evening primrose

Virginia Plantain

Carolina desert-chicory

Butterweed

Carolina horsenettle

Cotton Aphid Pest Status (Georgia)

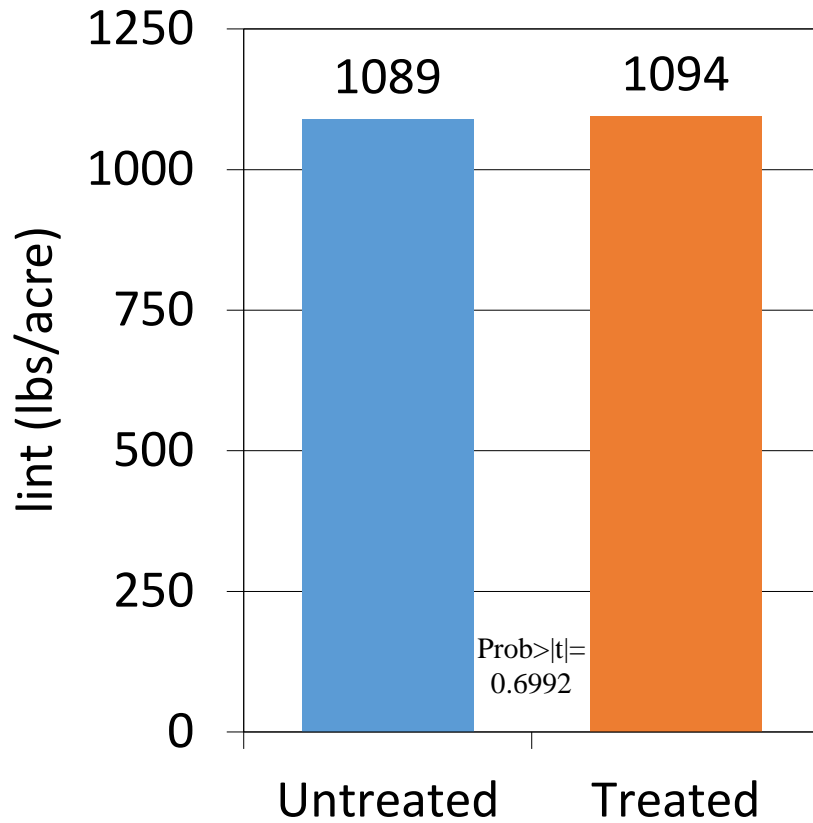
- Potentially infest cotton from emergence to leaves dropped.
 - 100 percent of Georgia cotton infested annually.
- Sucking mouthparts
 - Feeds on plant sap from phloem.
 - Stress inducing pest
- Severe infestations
 - Slow plant growth
 - Yellowing of terminals
 - Sooty mold develops on honeydew and 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)



Neozygites fresenii

Impact of Cotton Aphid on Yield

1998-2008 GA Cotton



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



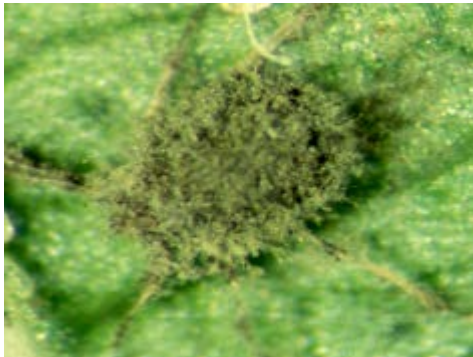
Cotton Aphid Management

Natural Controls

- Conserve beneficial insects.



- Naturally occurring fungus



Insecticides

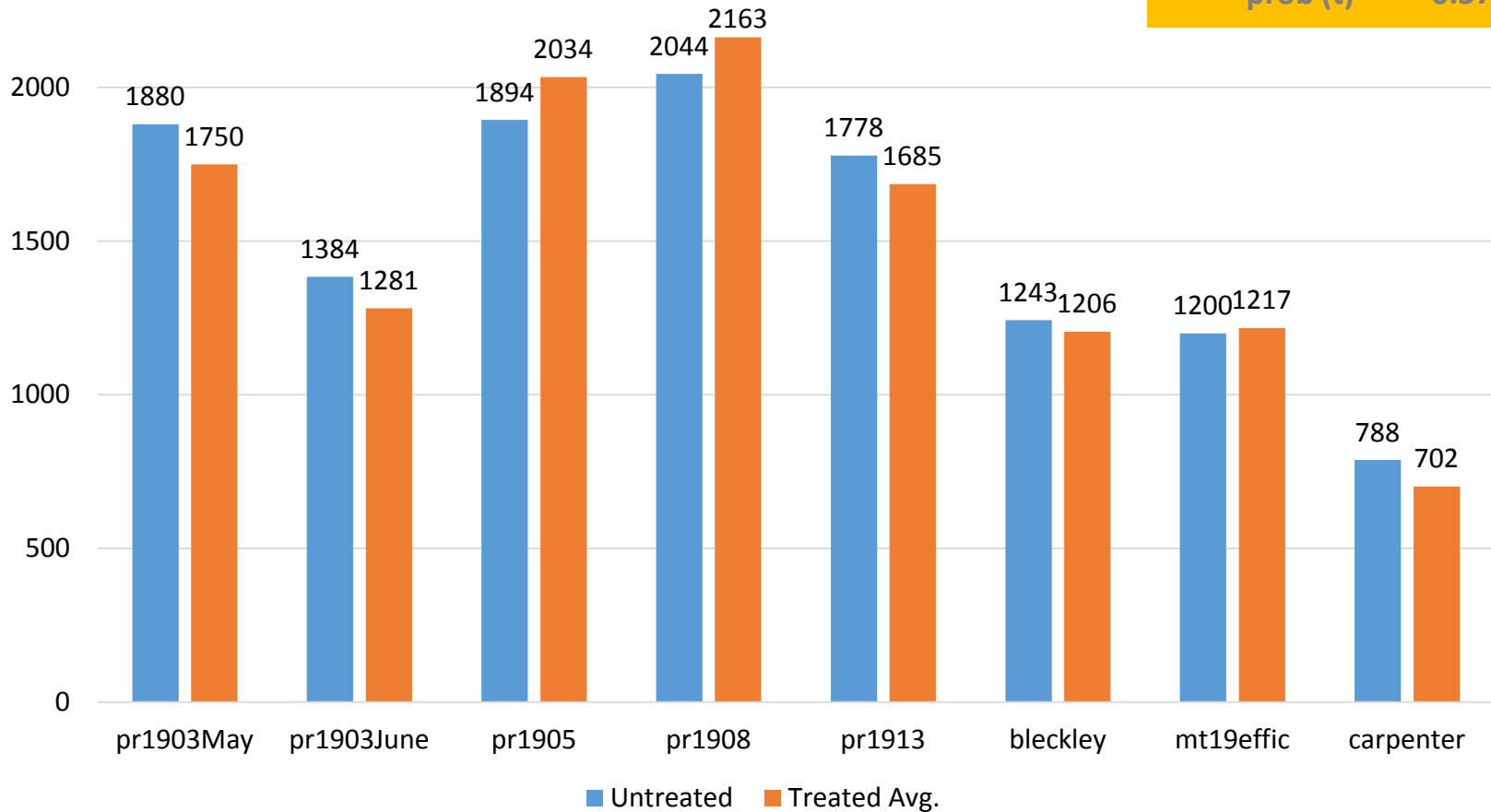
- Transform (sulfoxaflor)
- Assail (acetamiprid)
- Carbine (flonicamid)
- Centric (thiamethoxam)
- Admire Pro (imidacloprid)
- Bidrin (dicrotophos)



Cotton Aphid Field Trials

Georgia 2019

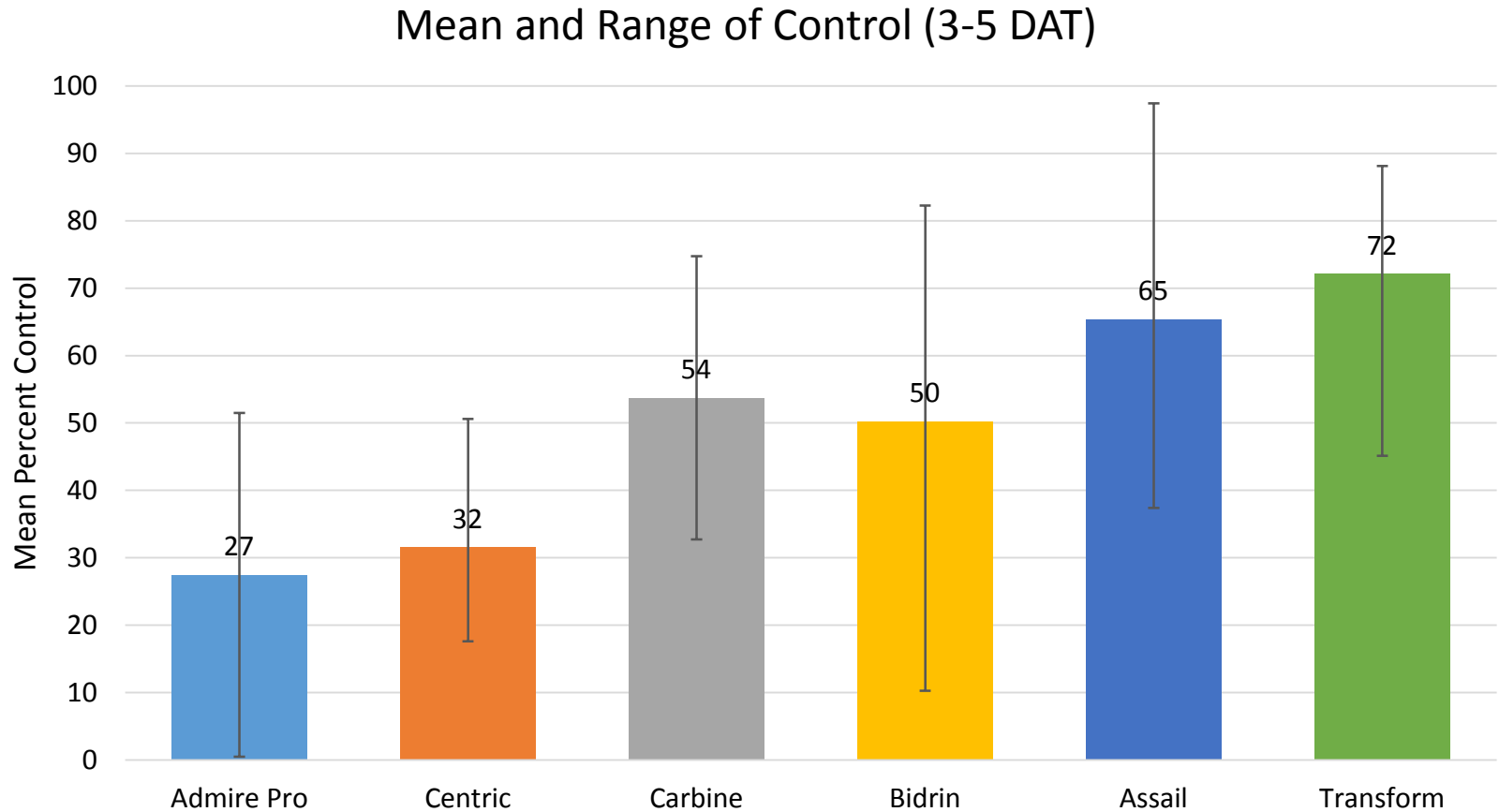
<u>Yield</u>	<u>(lbs lint/acre)</u>
Untreated	1,526
Treated Avg.	1,505
prob (t)	0.5737



Treated Avg. is mean of all insecticide treatments in a trial.

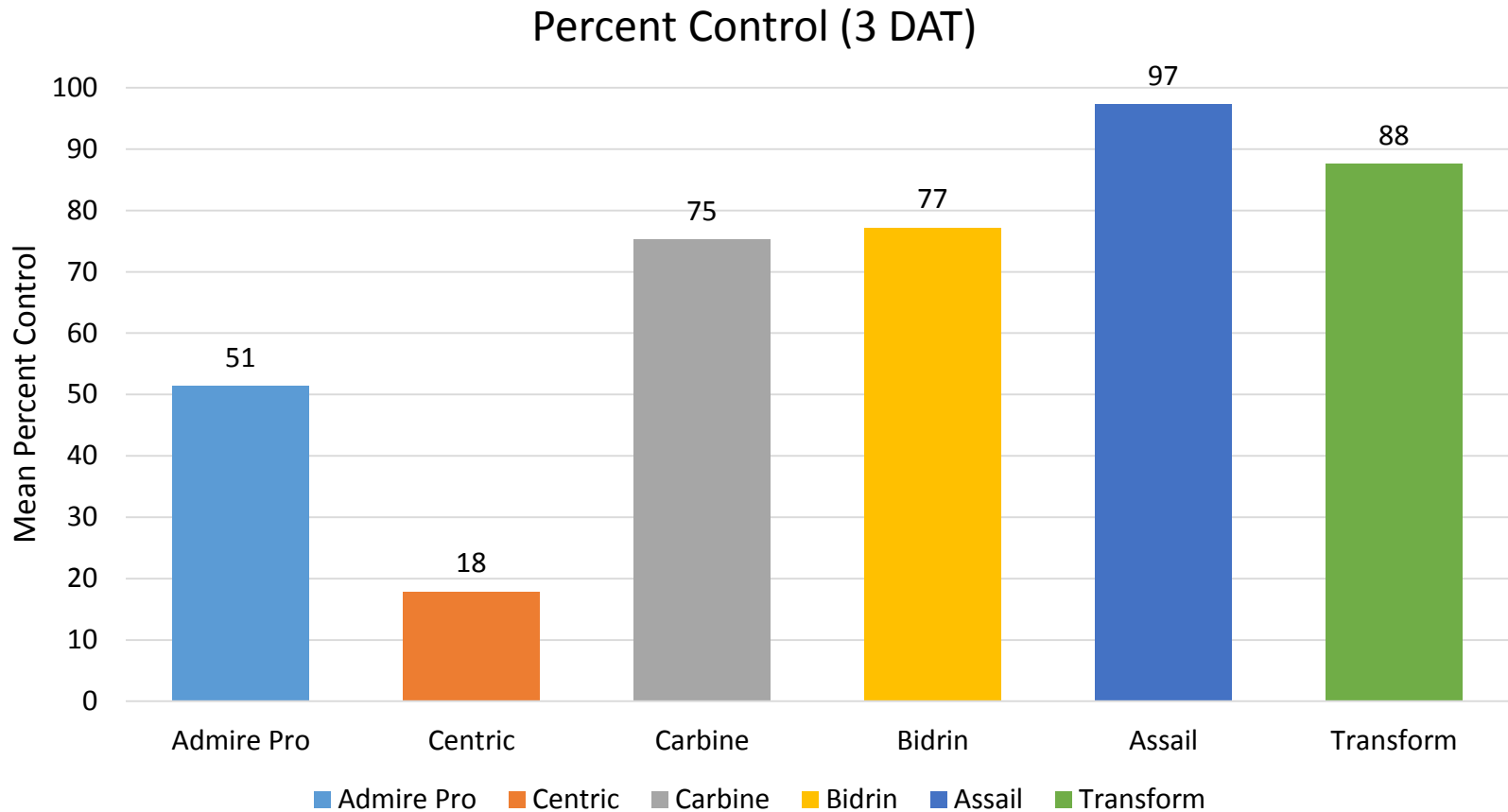
Cotton Aphid Insecticide Trial (n=4)

Georgia 2019



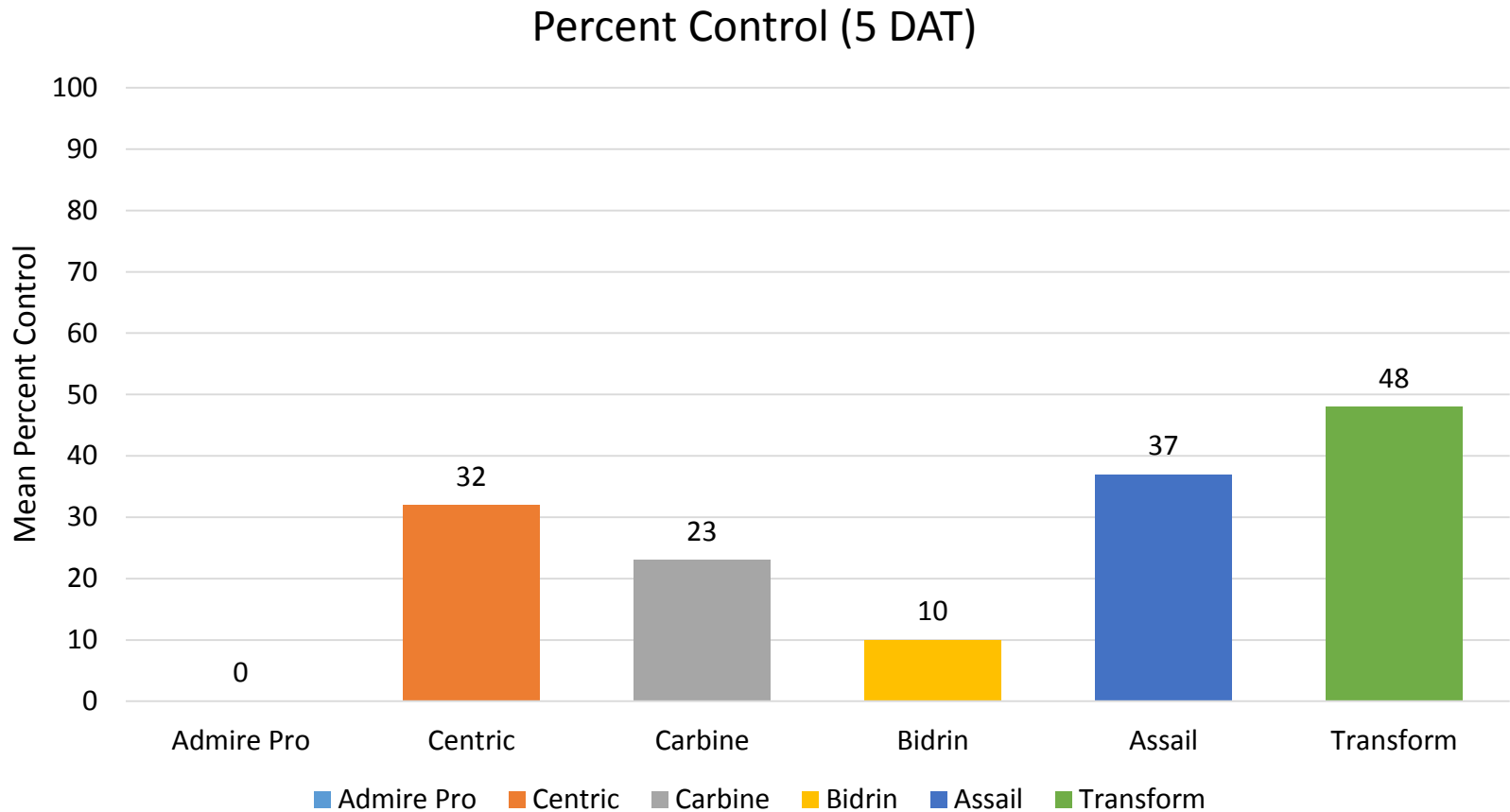
Cotton Aphid Insecticide Trial

Candler County



Cotton Aphid Insecticide Trial

Tift County (late planted)





Susceptibility of *Aphis gossypii* to Imidacloprid in Alabama

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2019 *Aphis gossypii* Collection Locations

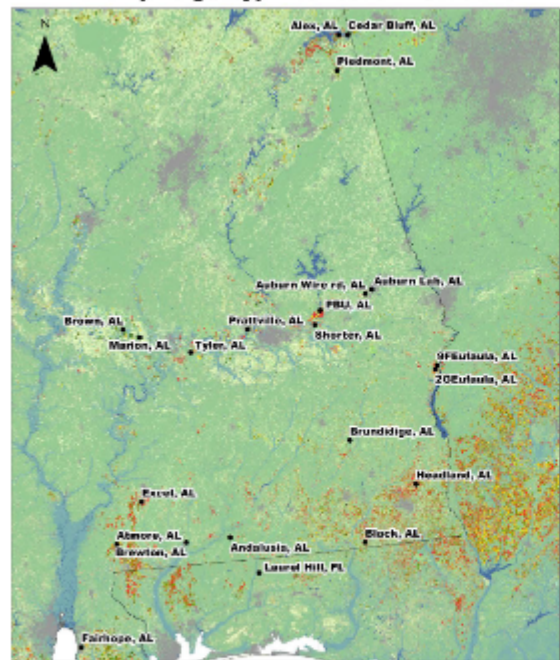


Figure 4. Spatial distribution of *A. gossypii* collection locations. Areas of cotton production are shown in red.

Table 2. Leaf-dip bioassays with Imidacloprid (Admire Pro) against *A. gossypii*, 72 h after treatment

Population	Ln Slope ¹	LC ₅₀ (C.I.) ²	RR ³
Auburn lab, AL	1.23	1.89 ppm (1.15-2.94)	26.25
Tallassee, AL	1.36	17.065 ppm (9.078-29.00075)	237.014
Prattville, AL	1.12	0.805 ppm (0.35-1.55)	11.18
Laurel Hill, FL	1.5	4.74 ppm (1.46-8.79)	65.83
Atmore, AL	0.92	1.51 ppm (0.56-3.14)	20.97
Fairhope, AL	1.76	2.92 ppm (1.65-4.406)	40.56
Wire rd, Auburn, AL	0.98	0.307 ppm (0.14-0.57)	4.26
Brewton, AL	2.044	7.21 ppm (4.601-10.2004)	100.14
9F Eufaula, AL	1.23	1.9 ppm (0.74-3.52)	26.39
2G Eufaula, AL	1.58	8.043 ppm (4.092-12.76)	111.708
Excel, AL	1.13	19.87 ppm (10.61-33.32)	275.97
Shorter, AL	1.56	6.6 ppm (3.044-10.73)	91.67
Headland, AL	1.22	7.45 ppm (1.48-16.27)	103.47
Marion Junction, AL	1.49	6.67 ppm (3.06-11.078)	92.64
Tyler, AL	1.8005	9.88 ppm (5.39-15.47)	137.22
Brown, AL	1.55	4.34 ppm (2.66-6.46)	60.28
Brundidge, AL	1.55	8.55 ppm (4.69-13.48)	118.75
Black, AL	0.99	19.99 ppm (8.97-37.35)	277.64
Andalusia, AL	0.88	7.305 ppm (2.93-14.89)	101.46
Piedmont, AL	1.97	4.32 ppm (2.46-6.39)	60
Cedar Bluff, AL	1.17	9.77 ppm (4.067-18.35)	135.69
Alex, AL	1.22	10.79 ppm (3.73-20.89)	149.86
Susceptible	1.026	0.072 ppm (0.042-0.11)	-

¹The slope of the dose-response regression line.

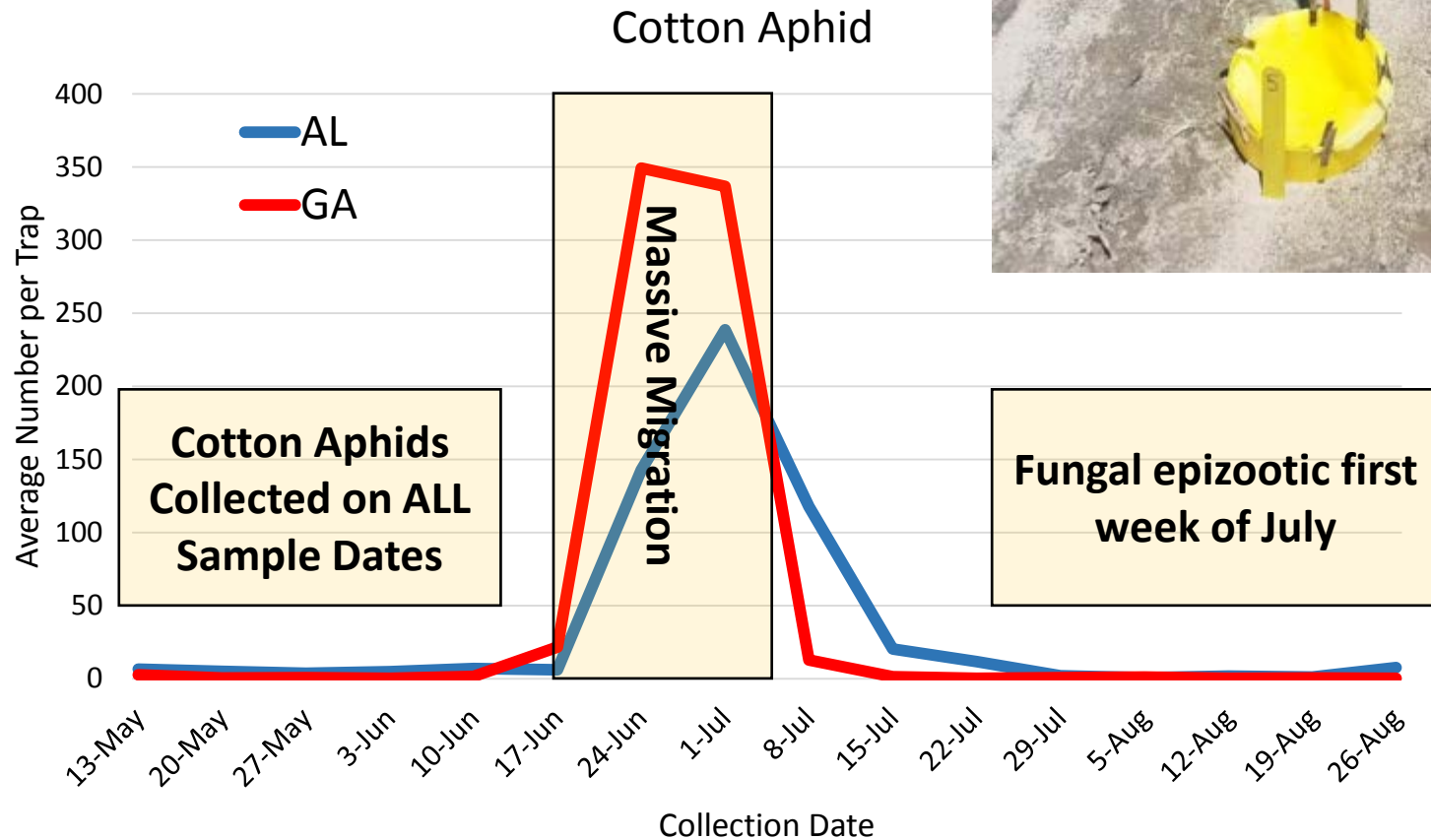
²The concentration that kills 50% of the population with confidence intervals.

³Resistance ratios of the LC50 of field-collected population: the susceptible population

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



Cotton Aphid Reinfestation



July 1, 2019

Treated June 21 and June 27 (4 DAT2)

Influence of Aphid Management on Incidence for CLRDV

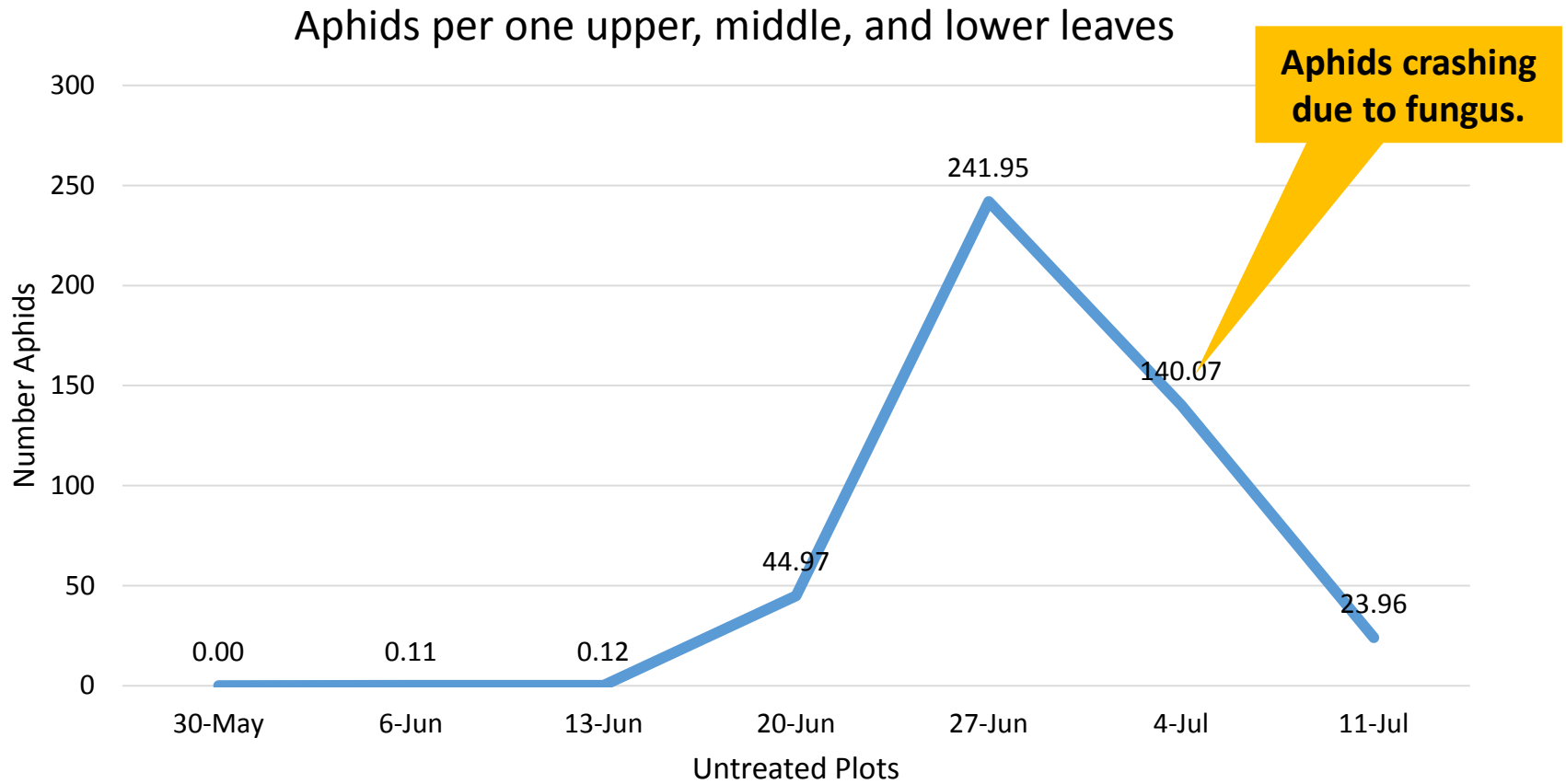
Aphid Pheno GA 2019



- 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

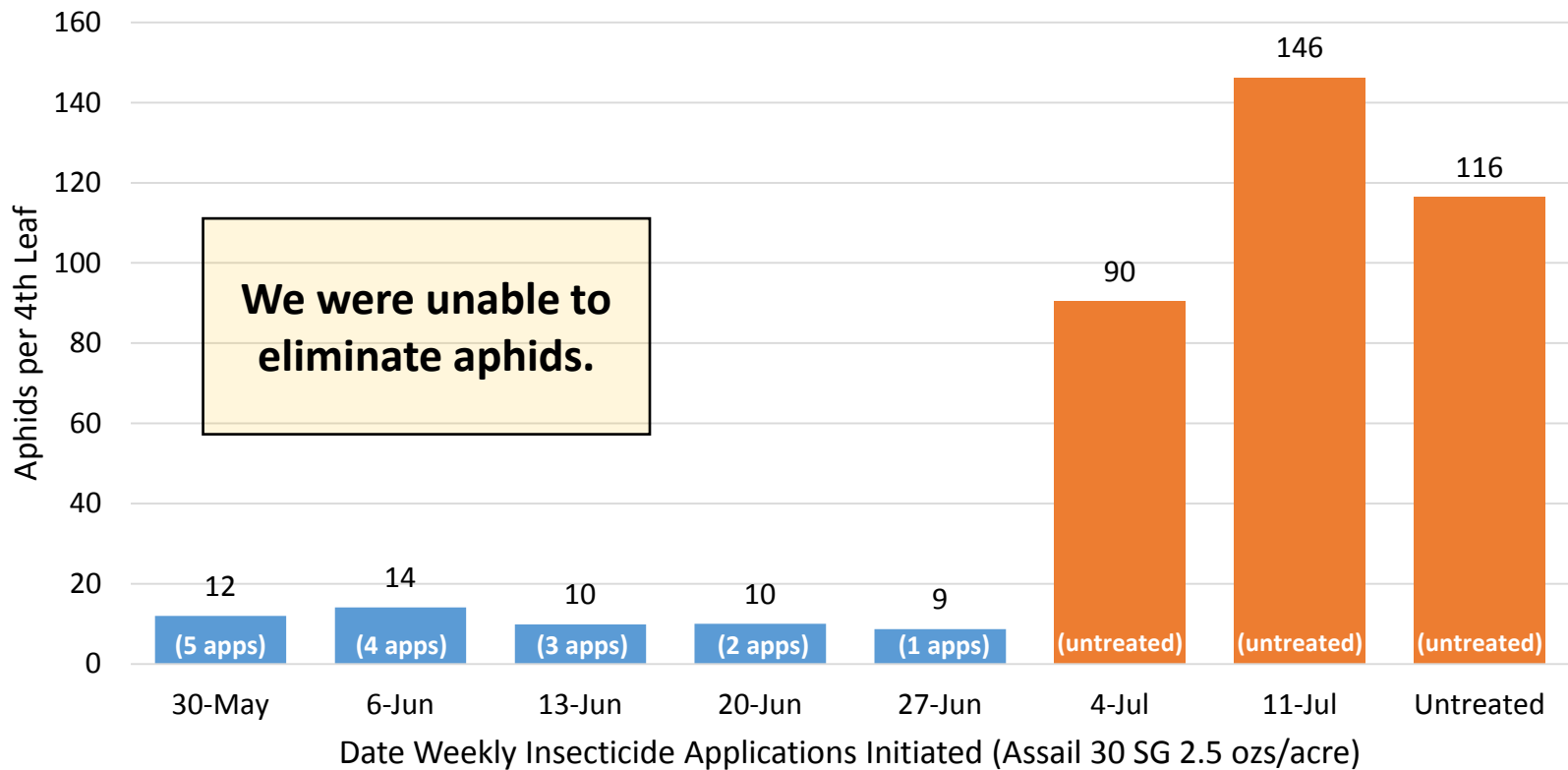


Planted May 14,2019

Cotton Aphid Pheno

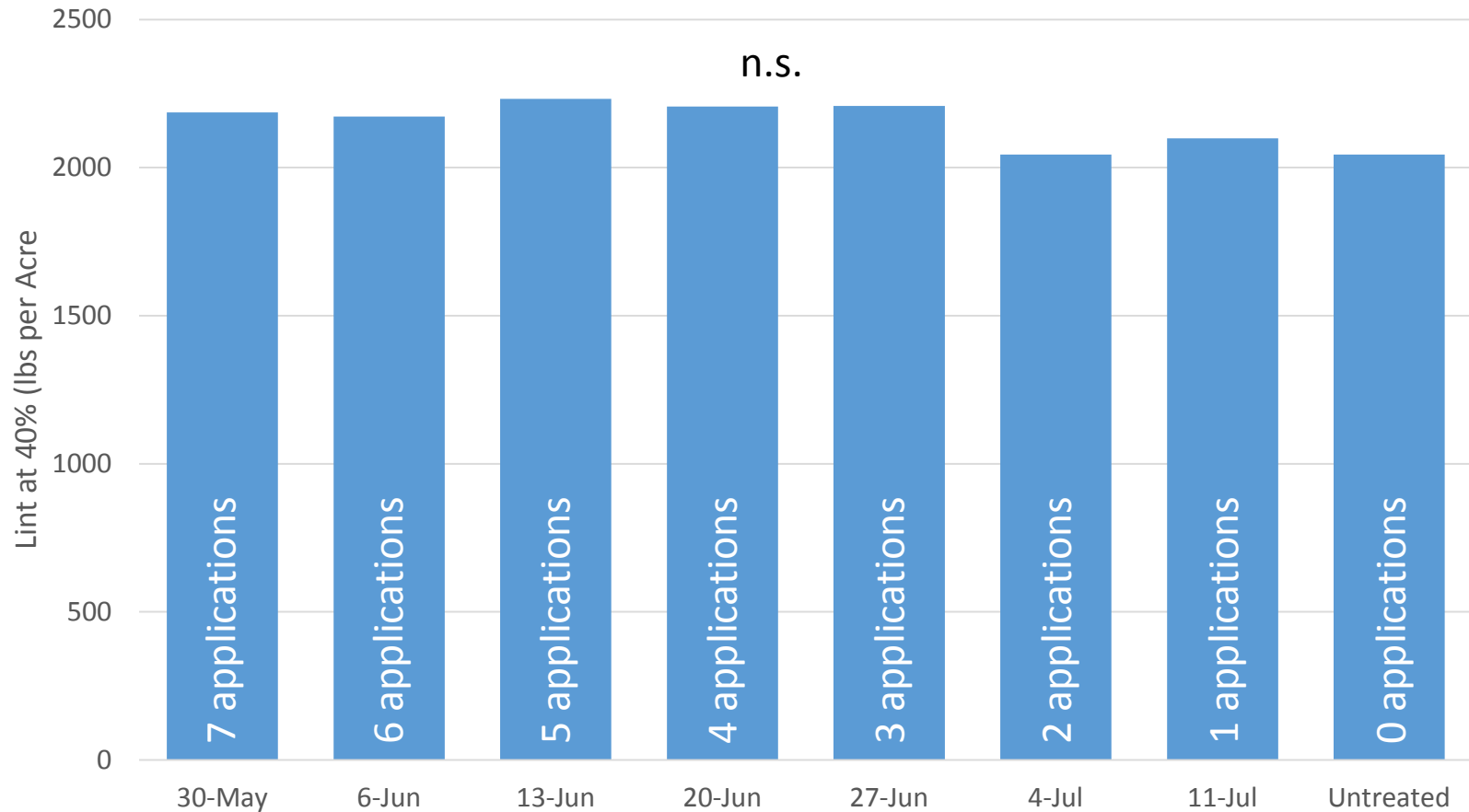
pr1908

Aphid Counts 4th Leaf (July 2, 2019)



Planted May 14,2019

Aphid Pheno GA 2019



Weekly applications initiated on:
Assail 30 WG 2.5 ozs per acre

Planted May 14, 2019

Methods (AL and GA 2019)

Epidemiology and Management of CLRDV

Control: No management of *A. gossypii*

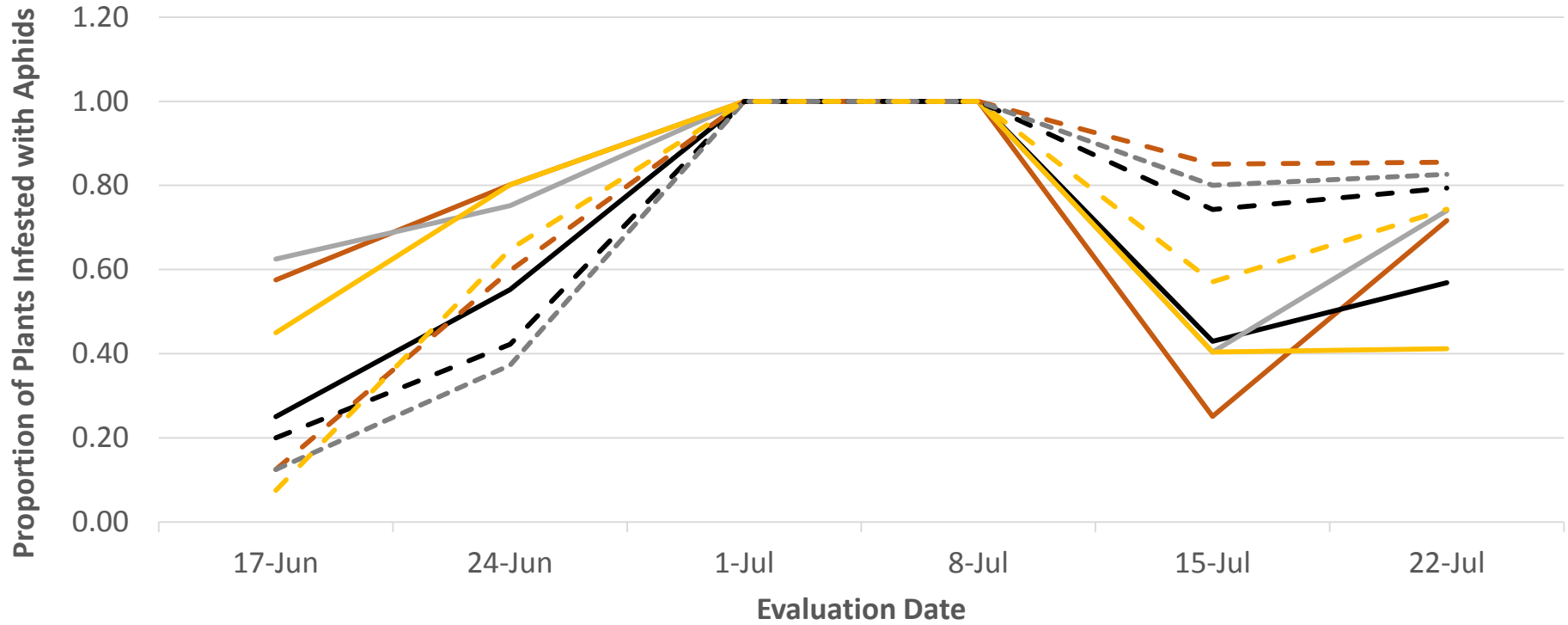
Treatment 1: Prevent colonization of crop by aphids. Beginning at the 1-true-leaf stage, make weekly applications of acetamiprid.

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.

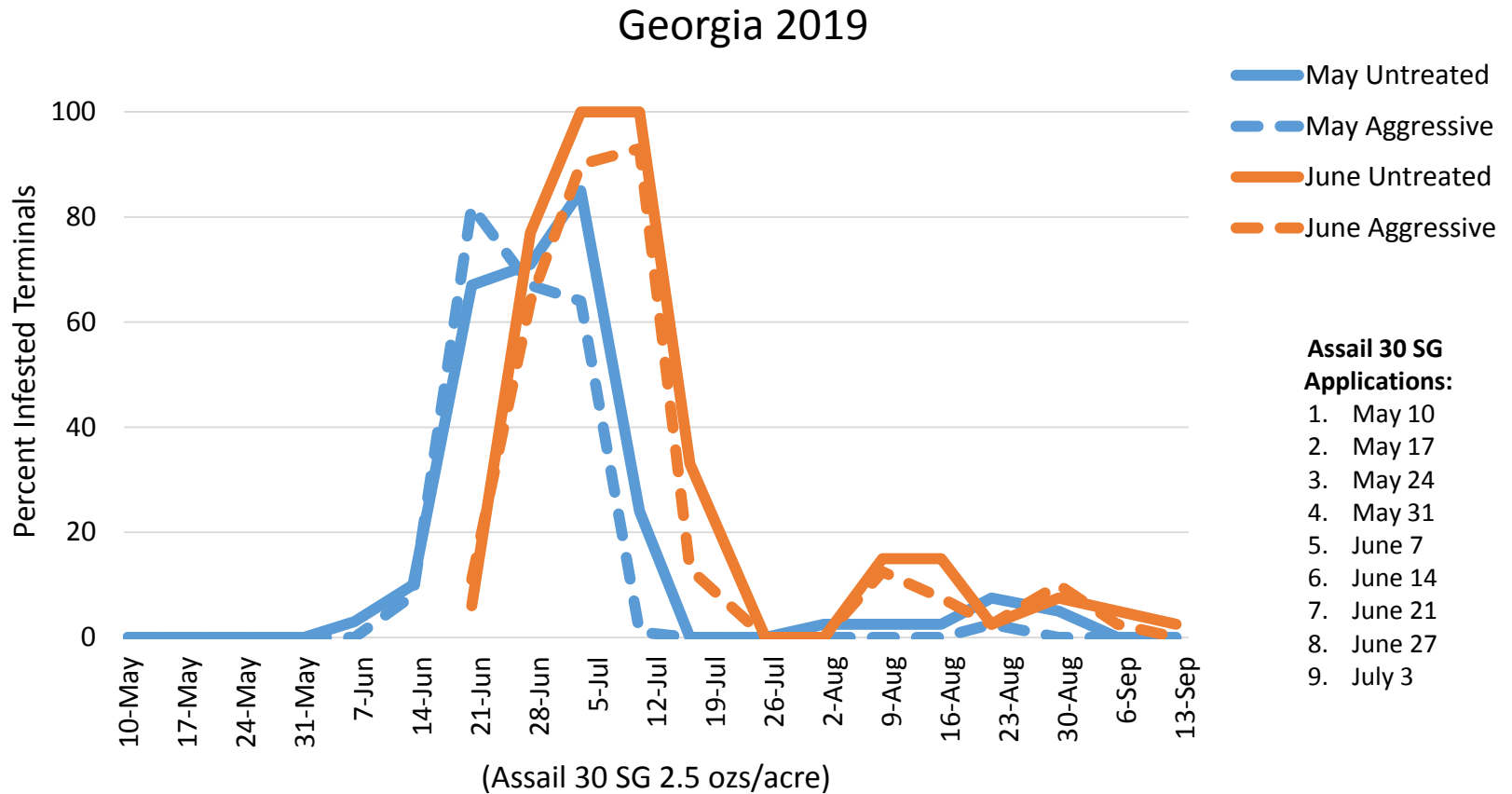
100% of plants were infested with aphids for 2 weeks - Brewton, AL



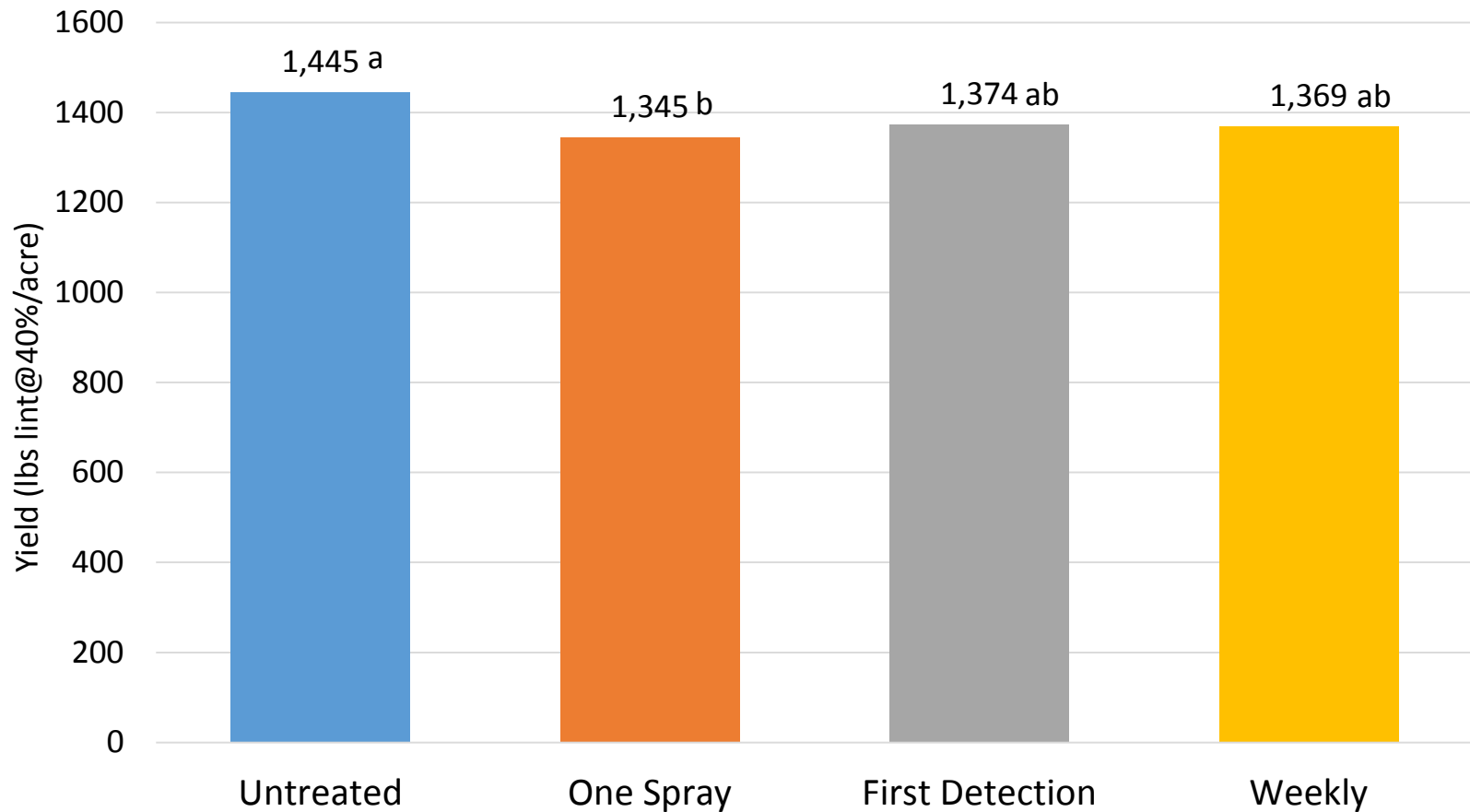
First Plant Date: — No Management — Weekly Applications — First Colonization — CurrentGrower
 Second Plant Date: - - No Management - - Weekly Applications - - First Colonization - - CurrentGrower

Epidemiology and Management of CLRDV

pr1903



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

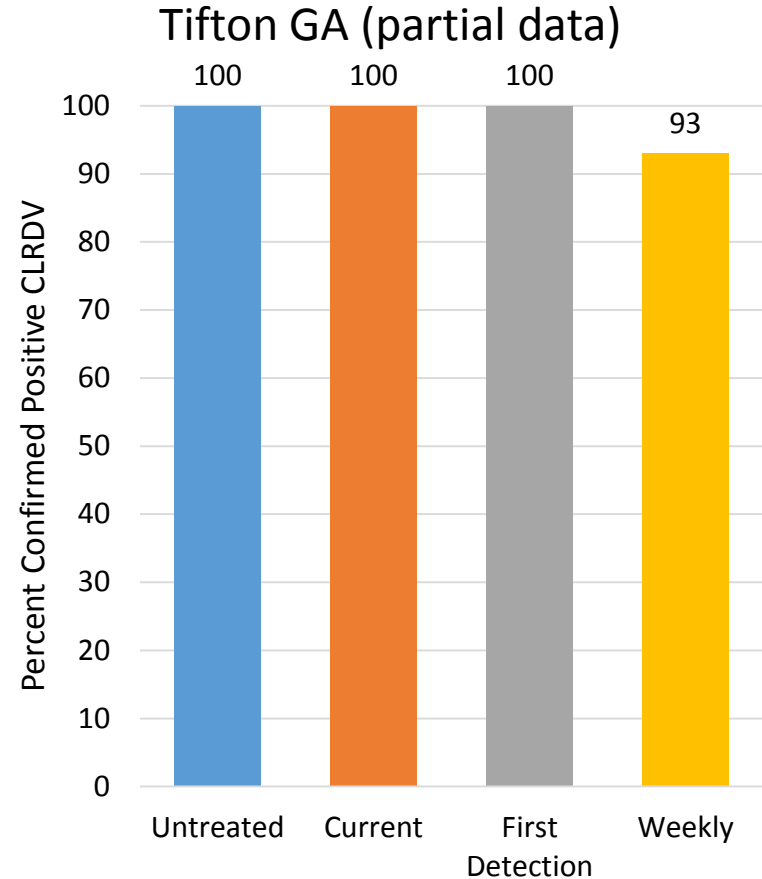
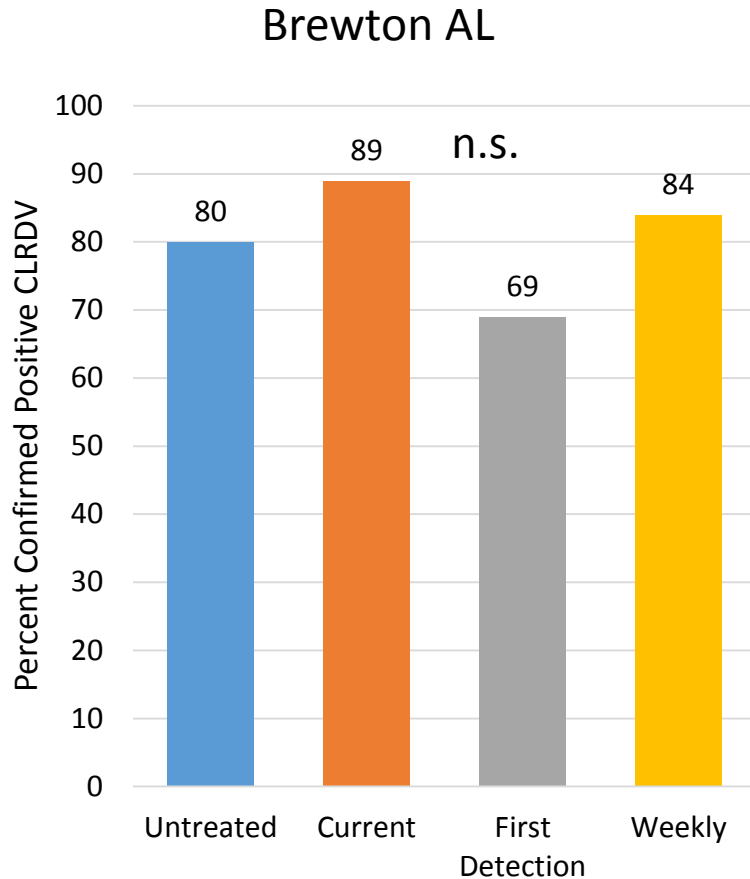


September 12, 2019



September 30, 2019

Influence of Aphid Management on Incidence for CLRDV



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.





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EXTENSION

