

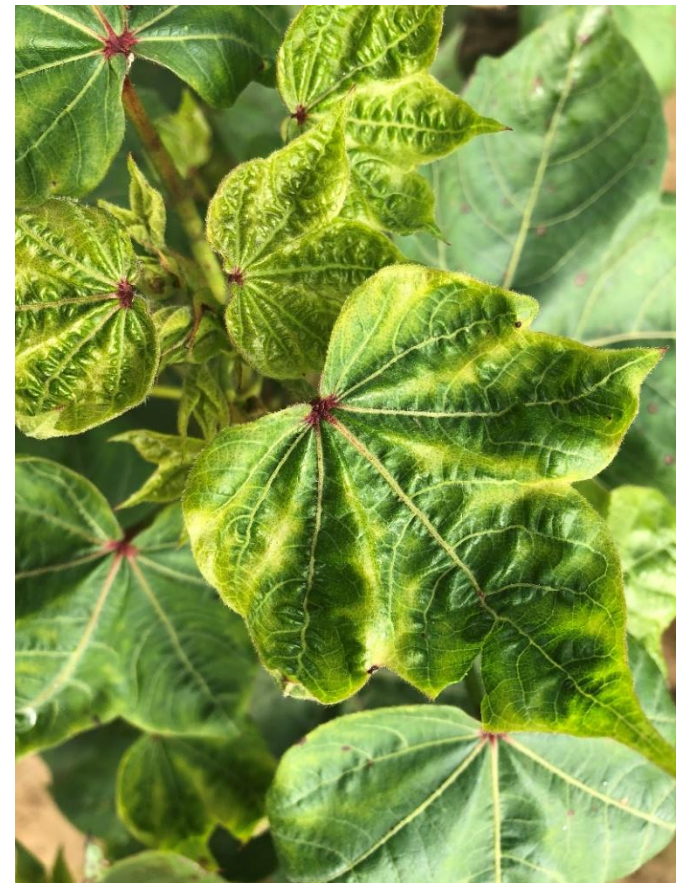
New Cotton Virus Detected in the SE US

J. Koebernick



Cotton Virus in Alabama

- 2016 - Crop advisors reported seeing symptoms
- 2017 - Virus tentatively identified as *Cotton leaf roll dwarf virus* which causes Cotton blue disease (CBD)
- 2018 - Limited distribution determined, all tested varieties susceptible
- 2019 – Whole genome sequences produced and compared for confirmation

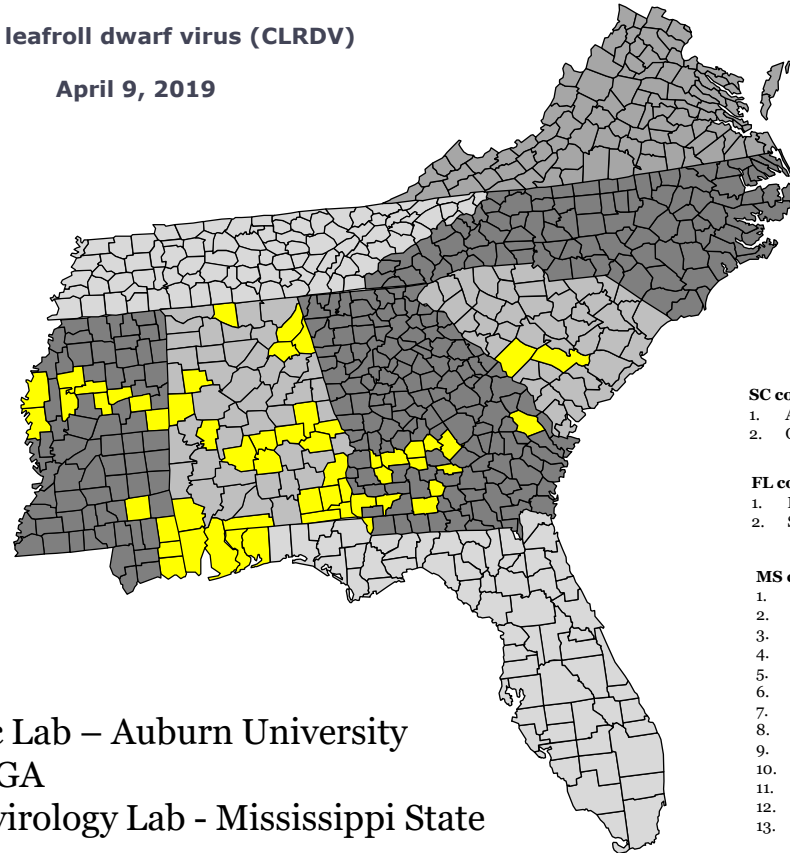




New Cotton Virus Distribution

Cotton leafroll dwarf virus (CLRDV)

April 9, 2019



SC counties

1. Aiken
2. Orangeburg

FL counties

1. Escambia
2. Santa Rosa

MS counties

1. Bolivar
2. George
3. Greene
4. Grenada
5. Jackson
6. Jones
7. Leflore
8. Montgomery
9. Noxubee
10. Oktibbeha
11. Tallahatchie
12. Washington
13. Webster

AL counties

1. Autauga
2. Baldwin
3. Barbour
4. Cherokee
5. Coffee
6. Dale
7. Dallas
8. DeKalb
9. Elmore
10. Escambia
11. Etowah
12. Fayette
13. Geneva
14. Hale
15. Henry
16. Houston
17. Lee
18. Limestone
19. Lowndes
20. Macon
21. Mobile
22. Pickens
23. Tallapoosa
24. Washington

GA counties

1. Baker
2. Benhill
3. Bulloch
4. Crisp
5. Colquitt
6. Dodge
7. Dooly
8. Early
9. Pulaski
10. Seminole
11. Sumter
12. Terrell
13. Tift
14. Webster

Detected by:
 Plant Diagnostic Lab – Auburn University
 Sudeep Bag – UGA
 Plant and Mycovirology Lab - Mississippi State University

Cotton Blue Disease (CBD) in Brazil

- Virus with greatest threat to yield, 80% loss
- Transmitted by the cotton aphid
- Solution: All varieties grown were resistant to CBD
- However, the virus mutated in 2006 and broke resistance
 - Two strains- Typical and Atypical
- Currently, 90% of varieties are susceptible to Atypical form of virus.

Cotton Aphid

Aphis gossypii



- Transmitted in a persistent manner
- CBD can be transmitted by viruliferous aphids in as little as **40 seconds**
- Can be transmitted for up to 12 days
- Broad host range >300 plant species

Managing Aphids is not an option

Symptoms

A decorative graphic consisting of a solid orange horizontal bar that spans the width of the slide. Below this bar, on the right side, there are several horizontal lines of varying lengths and colors, including orange and white, creating a layered, stepped effect.

Symptomatology – Red petioles & leaves



Symptomatology – Downward curling



09/06/2018



07/17/2018



October 2018



Symptomatology – Upward curling



8/16/2018



Symptomatology – Leaf Crinkling



Symptomatology – Dwarfed plants



8/21/2018

Symptomatology – Shortened Internodes, abnormal top growth



Symptomatology & Yield Loss – Boll drop



Pic: Mark Freeman

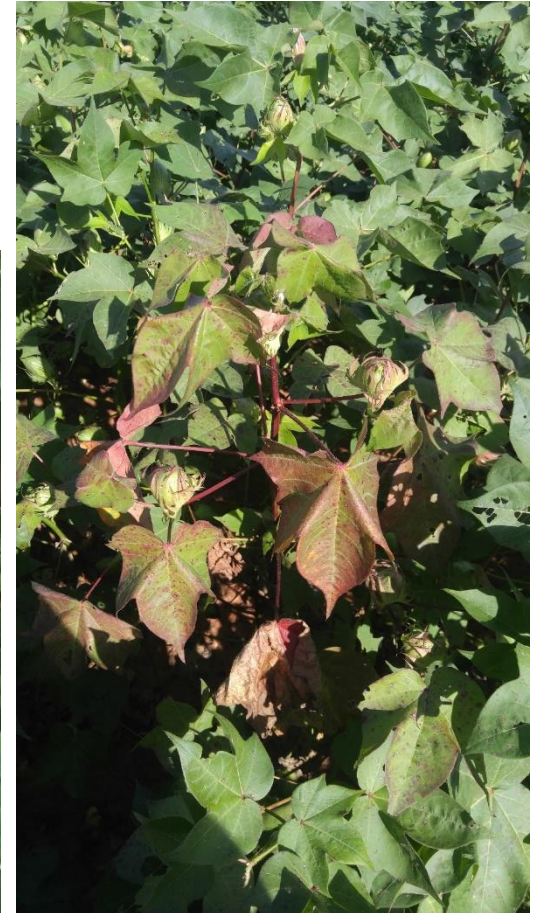


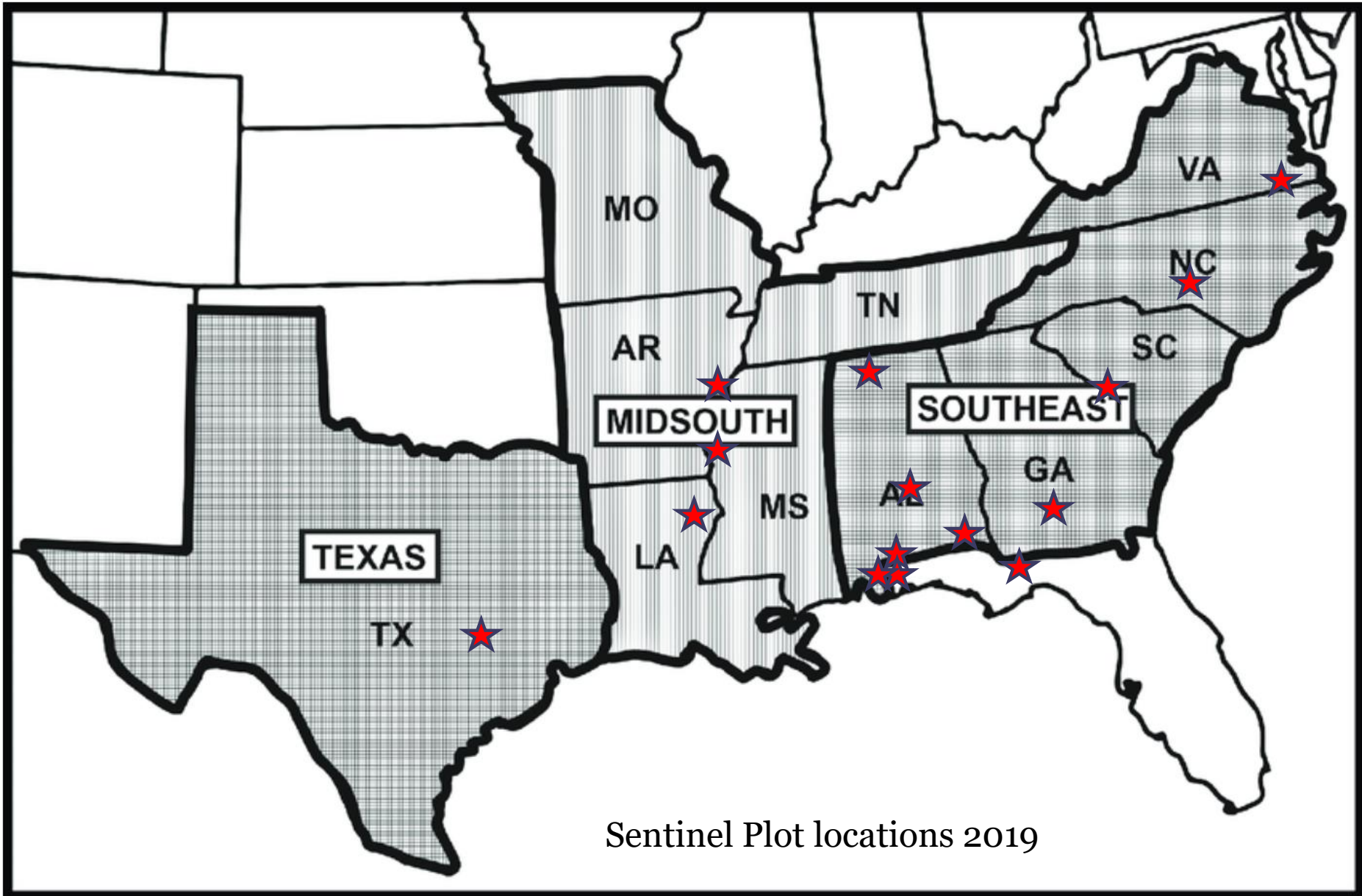
September 2018



Sentinel Plots

- Symptom x Variety x Environment
- Yield loss estimates
- Planting date
- Disease survey





Sentinel Plot locations 2019

Current Projects in Al and Ga

Entomology

- *Aphid management studies*- Insecticide efficacy and Different regimes to reduce incidence
- *Monitoring aphid studies*- Which week is aphid transferring the virus and what species are present
- *Cage Studies*- interaction between cotton growth stage and time of infection and disease severity and yield loss.
- *Overwintering hosts*

Diagnostics/Virology

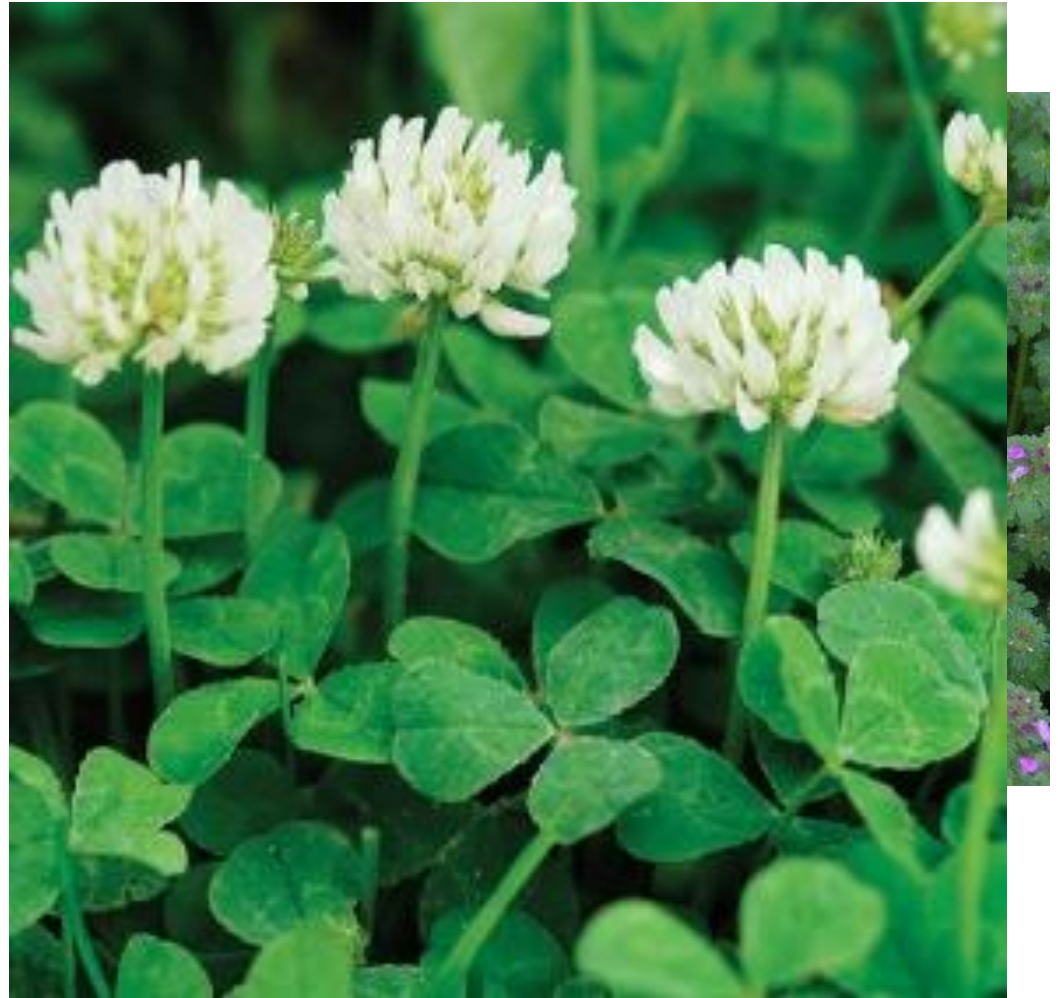
- *Confirmation* of disease presence in all CLRDV related experiments
- *Survey* throughout the southeast
- Improved *diagnostics*

Virus Survival in Field



Identified Weed Hosts

- Henbit
- White Clover



Current Projects in Al and Ga

Breeding

- Large scale *field screening trial* (~1500 lines)
- *Laboratory Transmission studies*- protocol for timing of acquisition and transmission, leaf disk assay to screen for resistance to virus, grafting

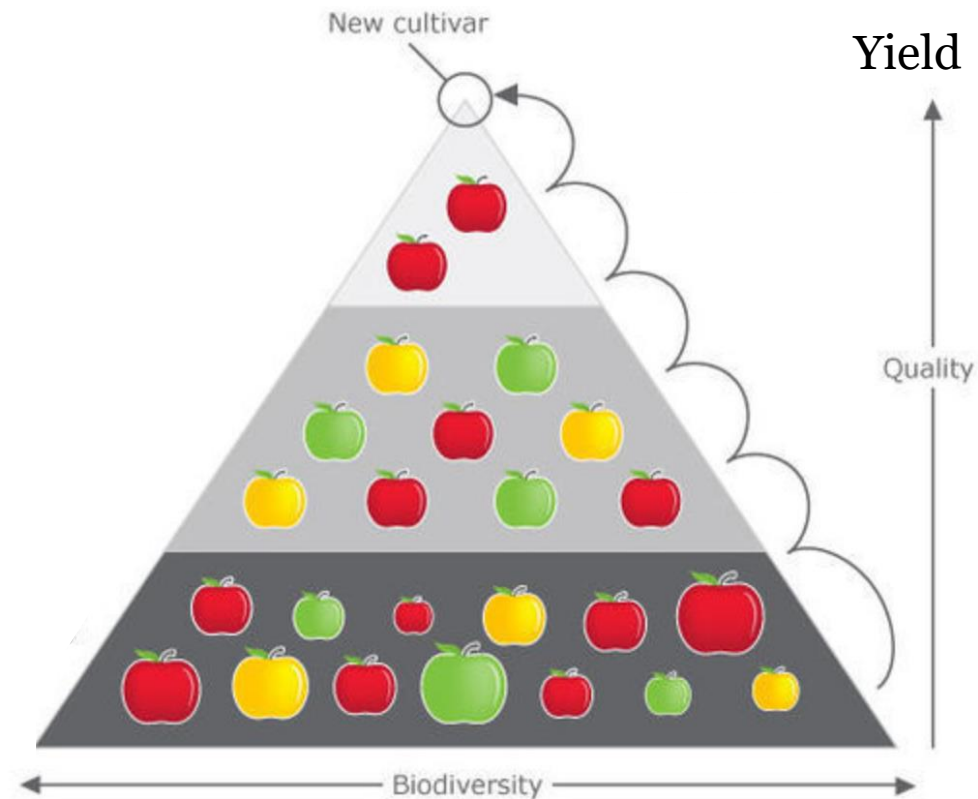


Genetic Diversity

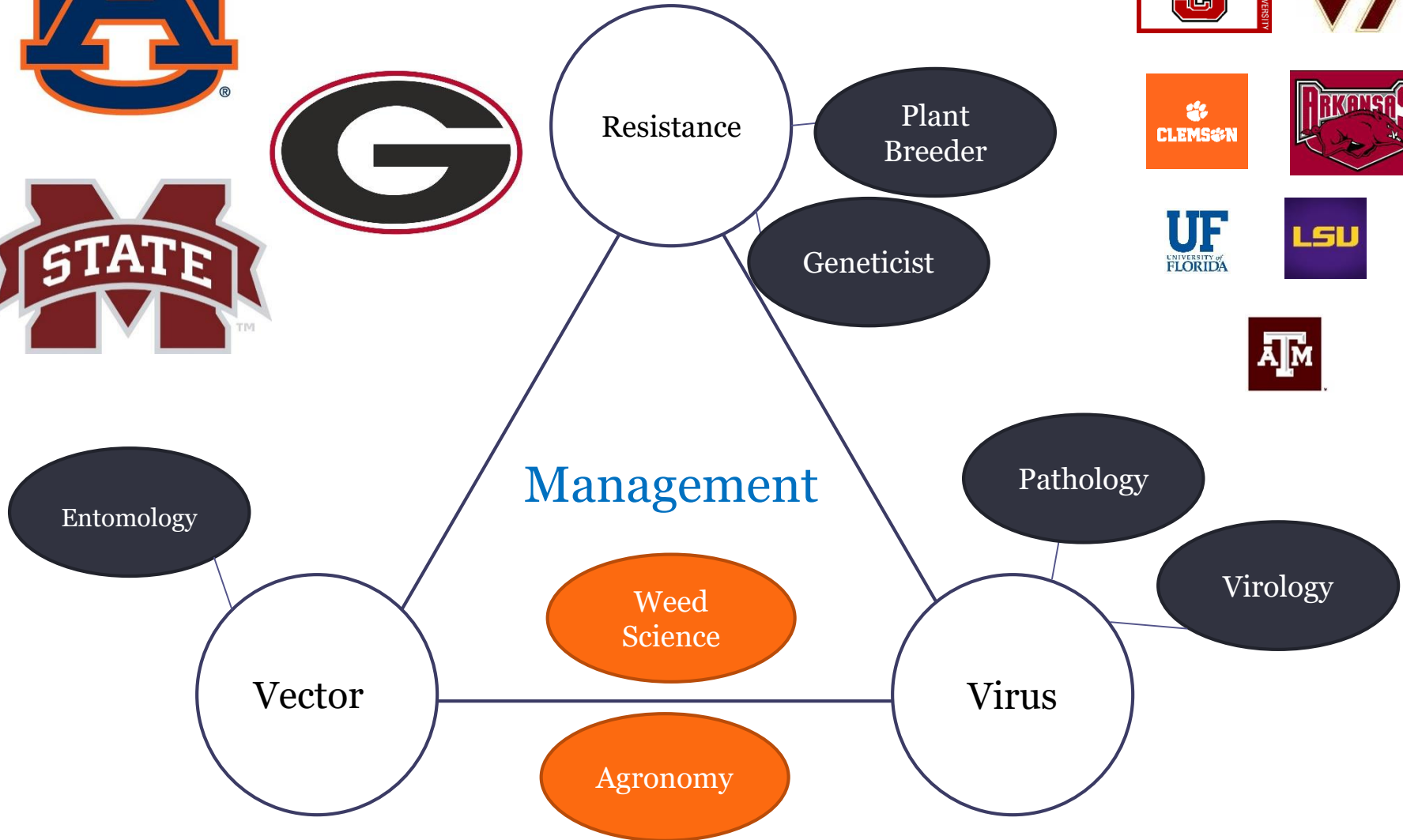
Cultivar Breeding Material: High Quality
Timeline: 3-5 Years

Elite Populations: Medium Quality
Timeline: ~10 Years

Germplasm Collection: Low Quality
High degree of genetic diversity
Timeline: 10-20 Years



Interdisciplinary- Multistate Approach



Critical Questions

- What is the distribution of the virus in cotton?
 - Potential to be spread across entire cotton belt
- Do other row or cover crops serve as hosts?
 - Vector feeds on 300 plant species
 - Legumes are reported as host in India
- Can we identify resistance?
 - Resistant varieties will be the backbone of management strategies
- Resistance to insecticides or herbicides?
 - Aphids notorious for developing resistance
 - Mid-South
 - Weed resistance is already a problem for US farmers

Acknowledgements

- Alabama Experiment Station
- USDA NIFA Hatch
- Alabama Cooperative Extension System
- Cotton Incorporated
- Alabama Cotton Commission
- Foundation of Food and Agriculture Research-
Rapid Outcomes from Agriculture Research
- Collaborators at UGA, Miss State and other
universities

Questions?

