New Cotton Virus Detected in the SE US

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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

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
Symptomatology – Red petioles & leaves
Symptomatology – Downward curling

09/06/2018

07/17/2018

October 2018
Symptomatology – Upward curling
Symptomatology – Leaf Crinkling
Symptomatology – Dwarfed plants

8/21/2018
Symptomatology – Shortened Internodes, abnormal top growth

October 2018
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