

Cotton leafroll dwarf virus in GA: Symptomatology, and Diagnosis.



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Thank You!

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- **Dr. Jared Whitaker**
- **Dr. Peng Chee**

- **Dr. Nelson Dias Suassuna**

EMBRAPA Brazil

- **Dr. Robert L. Nichols**

Cotton Incorporated

- **UGA Extension**

- **County Extension Agents**

- **UGA Plant Virology Team**

- **Dr. Afsha Tabassum** (Research Professional III/ Post-doc; Cotton)
- **Dr. RRD Nagacharan** (RP-III/Post-doc; Vegetable)
- **Nabin Sedhain** (Ph.D. Student; Cotton)
- **Anushi Deraniyagala** (MS Student; Peanut)
- **Patrice Tirana** (MPPPM Student)
- **Kaelyn Morgen** (Student Trainee, Fall 2019)
- **Calvin Chee** (Student Trainee, Summer 2019)

- **Funding**

- **UGA Startup fund**
- **Georgia Cotton Commission**
- **Cotton Incorporated**
- **Georgia Farm Bureau**



Cotton
Incorporated

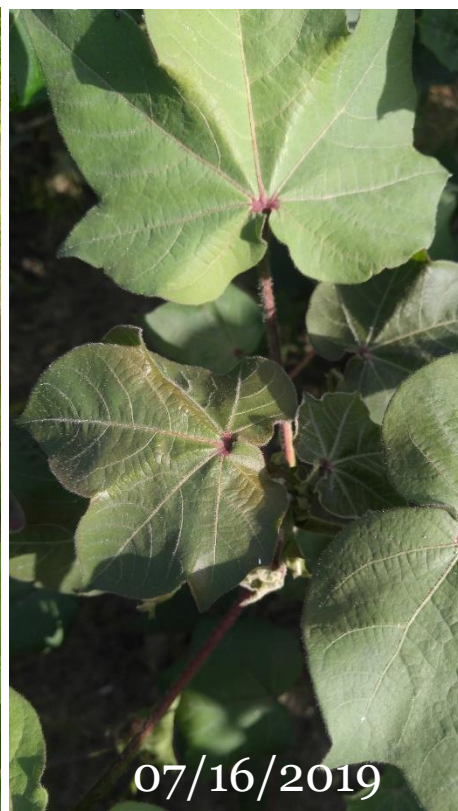


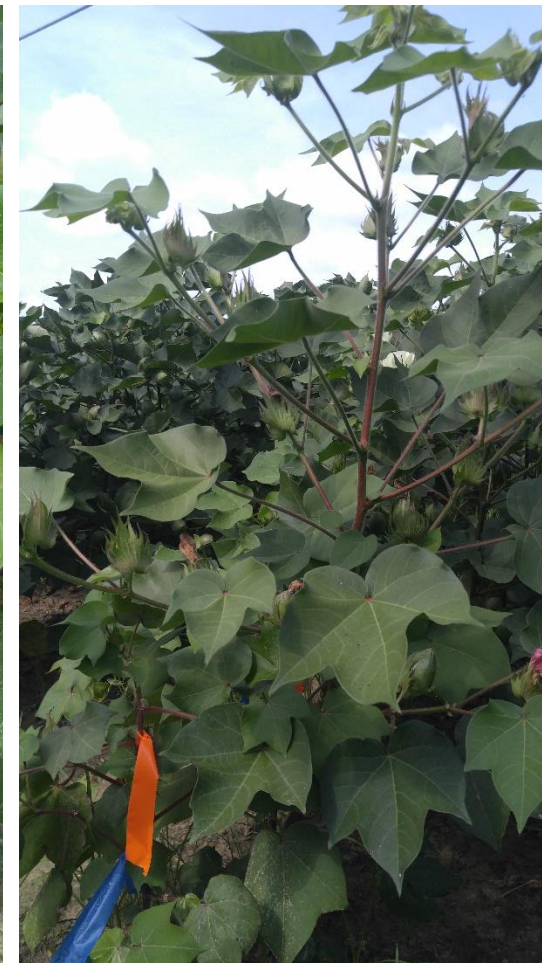
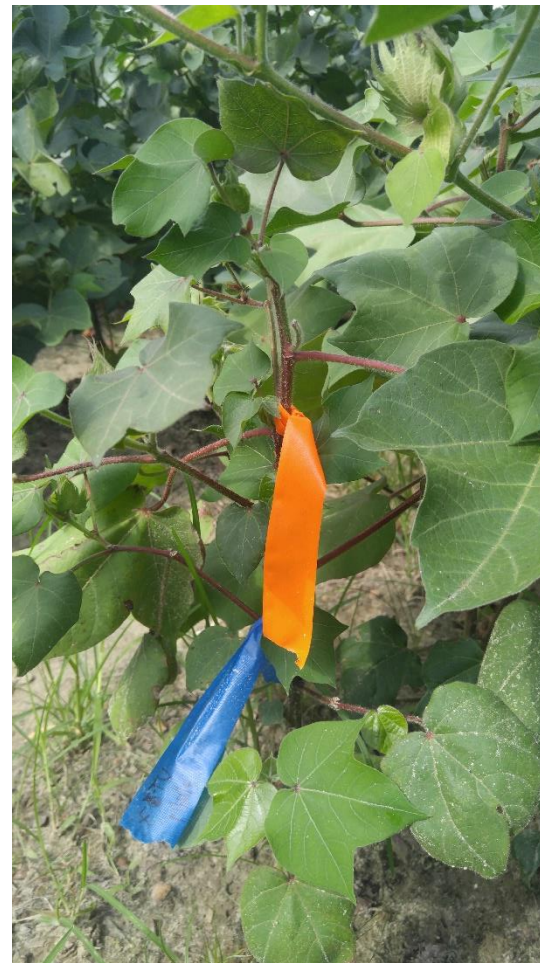
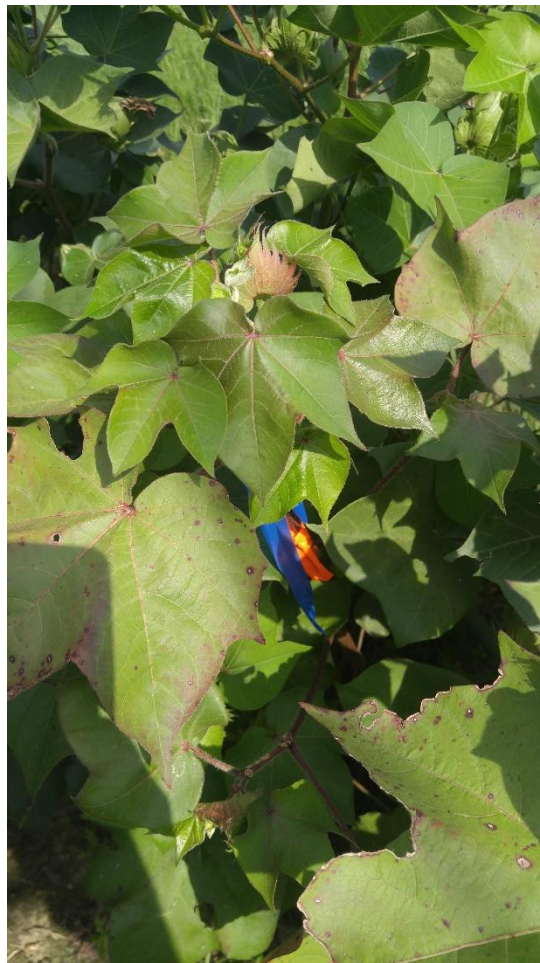
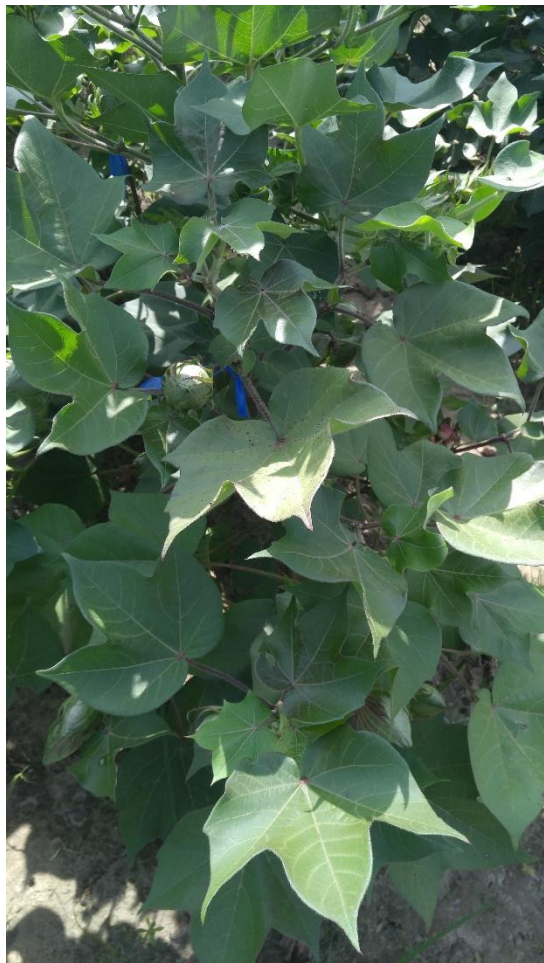
Outline

- Symptomatology
 - Early infection symptoms
 - Impact
 - Late Infection symptoms
 - Impact
- Diagnosis
 - Current (2019)
 - Future (2020)

Symptomatology 2019

- **Planting Date: May 14, 2019**
 - **Early Symptoms**
 - **Red leaves and petiole**
 - **Downward Drooping**
 - **Dwarf**





08/13/2019





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09/26/2019

I M P A C T



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Aphid Feeding



Planting Date: May 14, 2019



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Tifton: UGA Farm (Carpenter Rd)

Planting Date: June 6, 2019



07/29/2019



07/29/2019



09/19/2019

**No bolls, dwarf,
red leaves not
observed!**



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Early Infection / Symptoms (July 26, 2019)

Planting Date: June 17, 2019



UGA-Tifton

Plants crashed within 7-10 days of symptom observations

Planting Date: June 17, 2019



07/30/2019 Tifton



UGA-Tifton Plants revived!



Remains Dwarf!



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08/20/2019 Stage 5 and 6





08/20/2019 Plant recovery, new symptoms and more aphids observed



Dooly County, GA

07/25/2019



Approximately 15 % Plants showing the symptoms: red leaves, Drooping, wilting, square/leaves dropping, plant crashing !!



Dooly county

07/25/2019



Only one plant showing leaves
deformation, puckering symptoms





UGA-Gibbs Farm Tifton



Sentinel plot 08/22/2019

09/30/2019

Dr. Chee Trial
08/22/2019



Bleckley County (08/12/2019); Field 1
Red leaves, Turgid, leaf crinkling sound



Bleckley County (09/9/2019); Field 2

**NO red leaves, leaves deformation, NO bolls (5-51%),
Early shading of squares,
Insect feeding injury on mid-ribs,
In some case main branch shows symptoms and had no
bolls, while vegetative branch are asymptomatic with
bolls and vice-versa!**



**Deformed leaves,
NO Fruits
CLR DV: Detected**



**09/18/2019;
Bleckley County**



Tall/Rouge plant
32-36 internodes
Fruits till the upper node
(in vegetative branch)
CLR DV: Detected

Tall/Rouge plant
32-36 internodes
Fruits till the upper node
(in vegetative branch)
CLR DV: Detected

Tall/Rouge plant
32-36 internodes
Fruits till the upper node
(in main branch)
CLR DV: Not-Detected

Planting Date: May 1, 2019

09/10/2019; Tift County



Tall/Rouge plant
32-36 internodes
Deformed leaves
NO Fruits
CLRDV: Detected



Tall/Rouge plant
32-36 internodes
Deformed leaves
NO Fruits
CLRDV: Detected



09/10/2019; Tift County



09/25/2019; Tift County



Bushy Top, Deformed leaves
NO Fruits (~5% incidence)
CLR DV: Detected



09/18/2019; Ben Hill County

Photo: Phillip Brandon
Ben Hill County



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Bushy Top, Deformed leaves
NO Fruits
CLR DV: Detected



**Deformed leaves, No pollen,
Longer stamen
No or deformed fruits
CLR DV: Detected**





Deformed leaves
NO Fruits on whole or on the upper top after 15-18 internodes
CLRDV: Detected



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Bleckley County

Dooly County

CLRDV Diagnostic- 2019

- Reverse transcription-polymerase chain reaction (RT-PCR)
 - Plant samples
 - Petiole
 - Leaves
 - RNA Purification
 - CTAB process (Conventional/Cheaper)
 - Spectrum RNA purification kit (Sigma/Expensive)
 - cDNA synthesis
 - Superscript III (Invitrogen)
 - Platinum hi-fidelity Taq (Invitrogen)
 - Primers used in 2019

Primers	Sequence	Target	Reference
SB11F	AGGTTTTCTGGTAGCAGTACCAATATCAACGTTA	ORF3-4 (777bp)	Tabassum et al., 2019
SB11R	TATCTTGCATTGTGGATTTCCCTCATAA		
SB3F	GCTGCACGCGCAGTGGAAGTG	ORF 5 (1065bp)	Ana J. Diste'fano et al., 2010
SB3R	TGCCTATCCTTTTCGGAGTCGTTCC		
AL674F	CCGTAGCGGTCATCGTCTTT	Po (733bp)	Avelar et al., 2019
AL1407R	TAACCCTGACACAGTGGGGA		

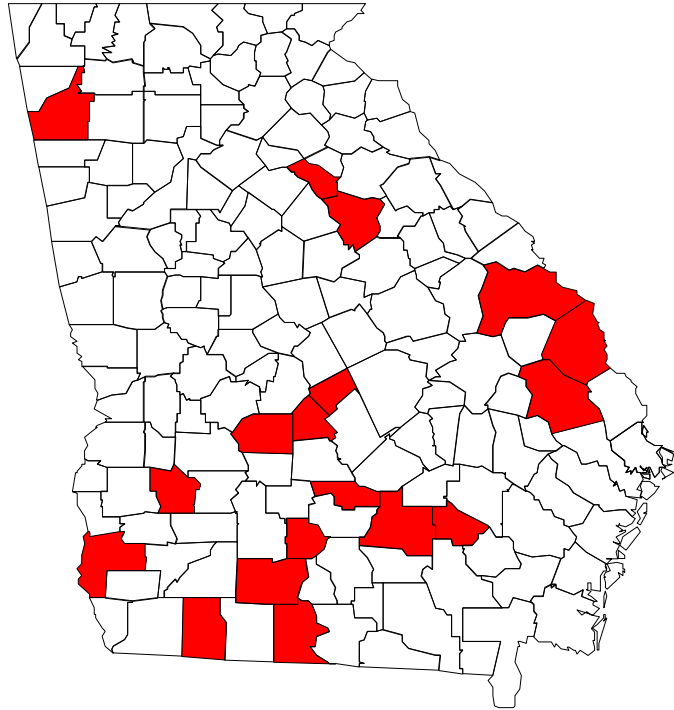


2019 CLRDV Confirmed Counties in GA

Updated September 19, 2019

Symptomatic Plant tissues

1. Benhill
2. Bullock
3. Bleckley
4. Brooks
5. Bruke
6. Coffee
7. Colquitt
8. Dooly
9. Early
10. Floyd
11. Greedy
12. Greene
13. Pulaski
14. Oconee
15. Screven
16. Terrell
17. Tift
18. Wayne



CLRDV Diagnostic 2020

- Efficient process for RNA purification
- Serological detection
 - Enzyme-Linked Immunosorbent Assay (ELISA)
 - Dot-Immuno Binding Assay (DIBA)
- Nucleic-Acid detection
 - Improved/precise detection primers
 - RT-qPCR





Thank you



Dooly County; 09/18/2019