

Tomato yellow leaf curl virus: Factors Influencing Vector Populations and Virus Epidemiology in South Georgia's Vegetable Production System

Rajagopalbabu Srinivasan, David Riley, Alton Sparks, Stan Diffie, and Scott Adkins



1785

The University of Georgia

®

Overview

- *Tomato yellow leaf curl virus*
- **Whitefly and TYLCV incidence in Georgia**
- **Whitefly sampling and TYLCV detection**
- **Cultivar evaluations**
- **Insecticides and TYLCV management**
- **New virus in Georgia?**
- **Implications**

Tomato yellow leaf curl virus

- DNA virus
- Genus *Begomovirus*;
Family *Geminiviridae*
- Primarily infects tomato
- Other hosts: pepper and petunia
- Detected in GA in 2001 (Tift, Colquitt, and Grady counties)



Tomato yellow leaf curl virus

- **Exclusively transmitted by whiteflies**
- **Common whitefly types (B and Q) are efficient TYLCV vectors**
- **TYLCV incidence is directly correlated to whitefly pressure**



http://www.bgi-usa.com/images/pests/whitefly_lg.jpg

Overview

- *Tomato yellow leaf curl virus*
- **Whitefly and TYLCV incidence in Georgia**
- Whitefly sampling and TYLCV detection
- Cultivar evaluations
- New insecticide chemistries
- New virus in Georgia?
- Implications

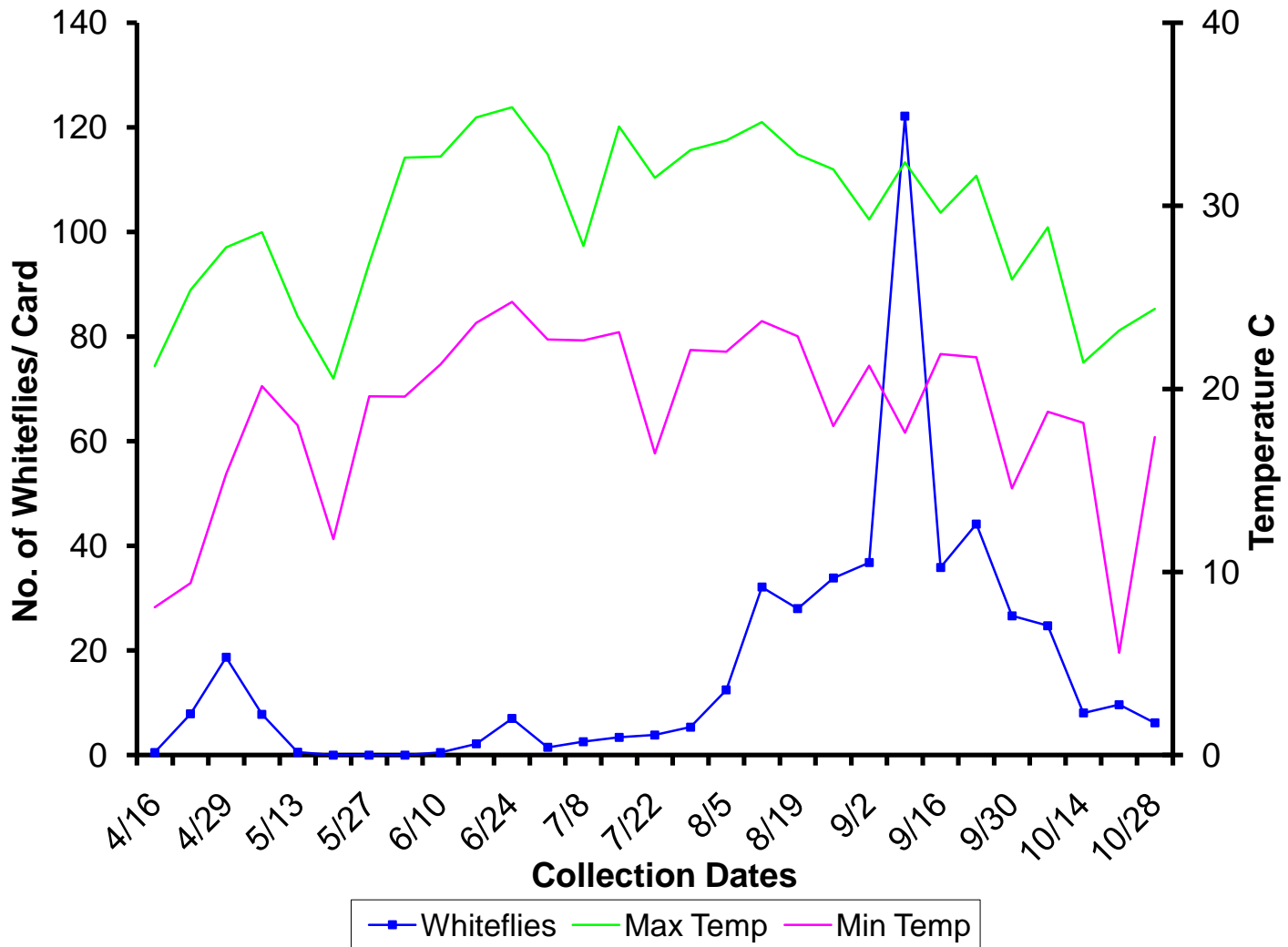
Whitefly Sampling

- **Weekly sampling (April-October)**
- **Sampling area encompassed major tomato producing counties**
- **Yellow sticky traps were placed at two mile intervals (60 miles)**

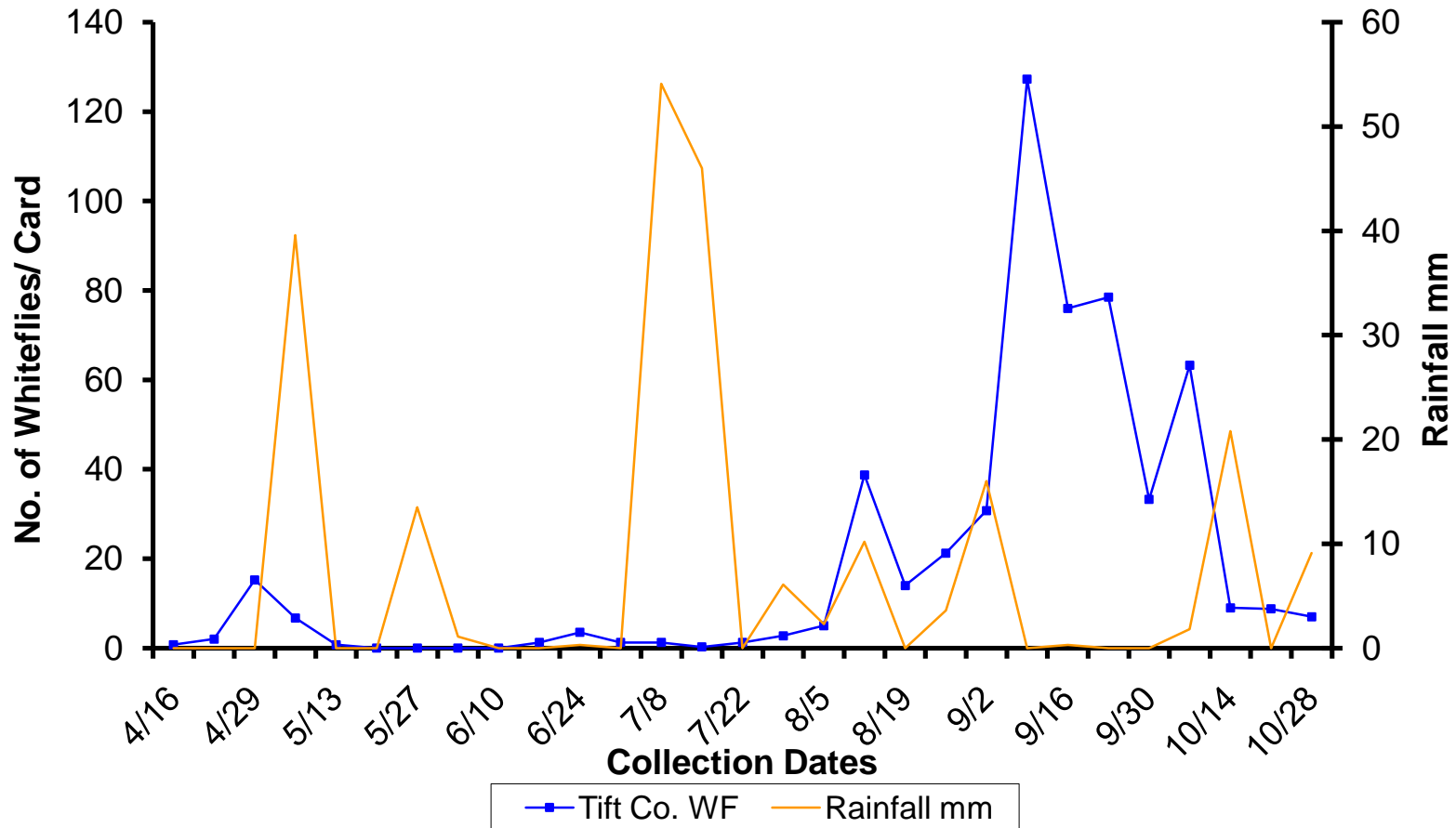


www.noticeoftrusteessale.com/states/1z.ga_cou

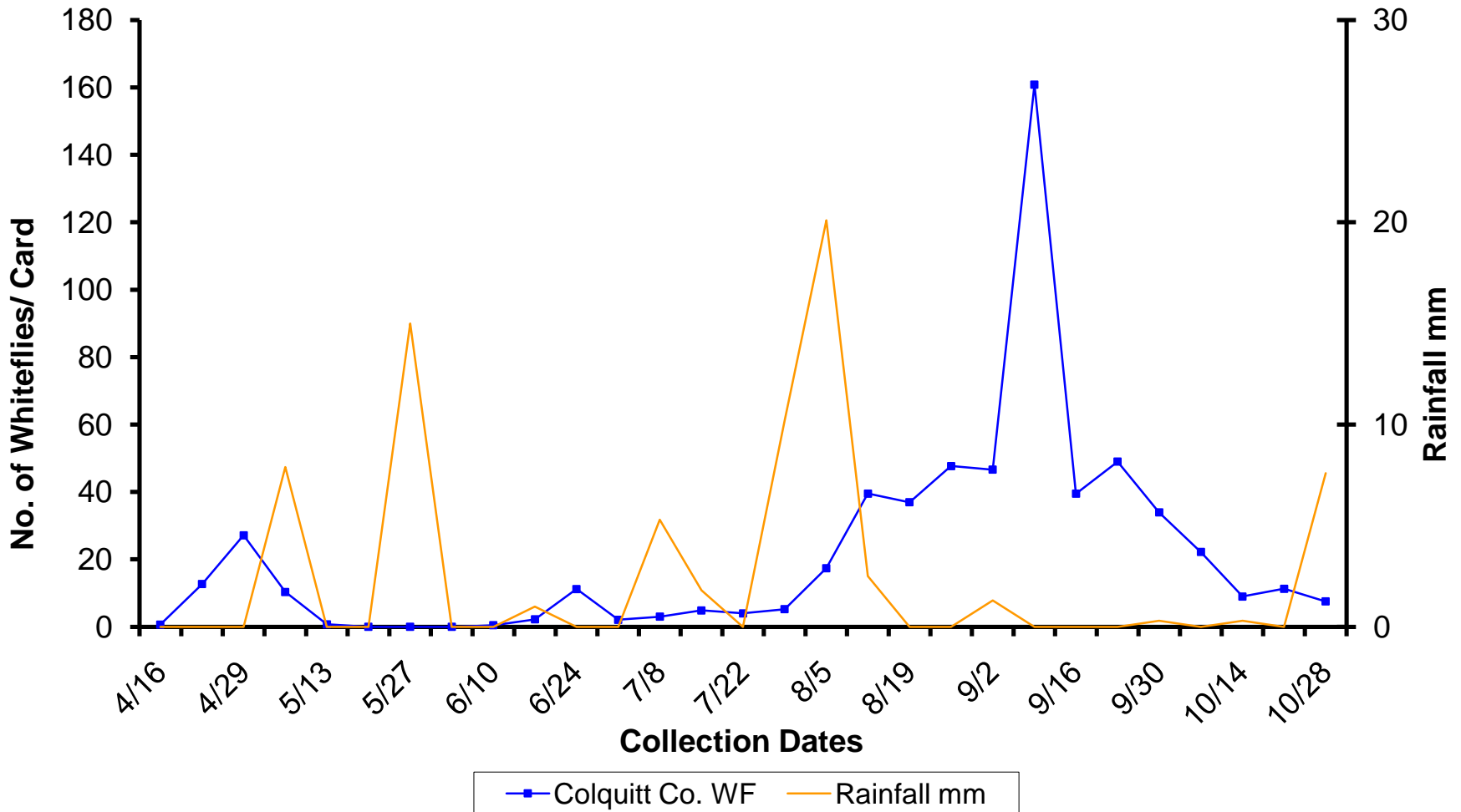
Whitefly Incidence-2009



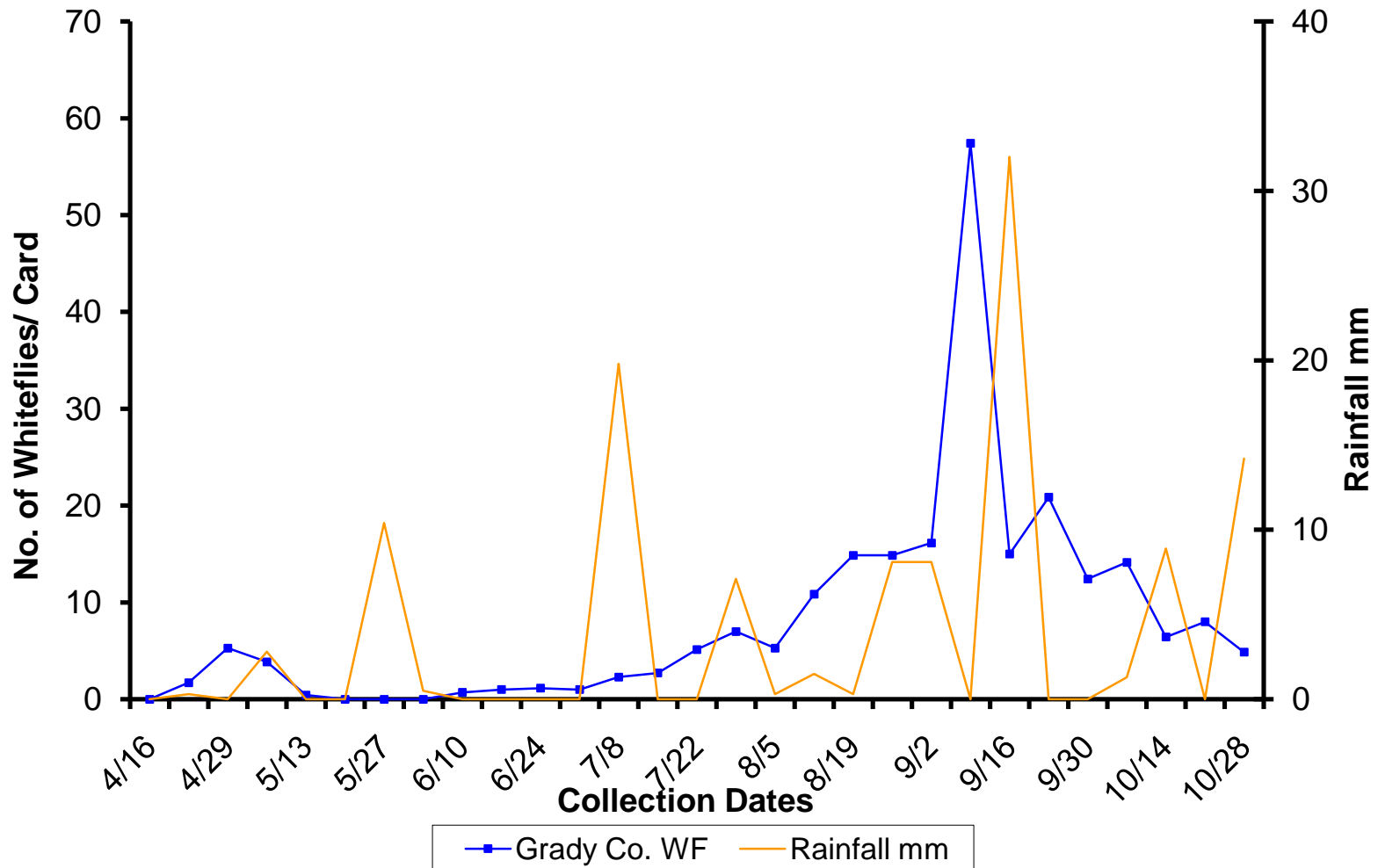
Whitefly Incidence-Tift 2009



Whitefly Incidence-Colquitt 2009



Whitefly Incidence-Grady 2009



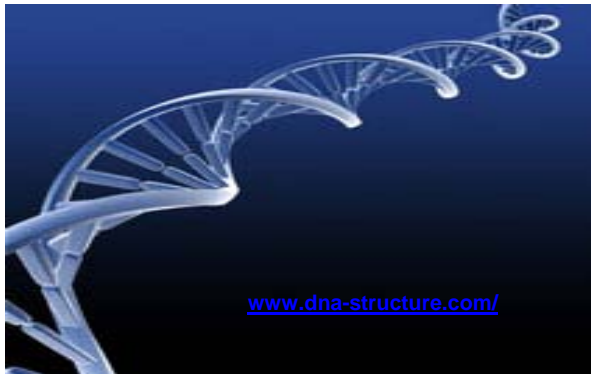
TYLCV Detection in Whiteflies



Trapping with yellow sticky cards



Whitefly collection from yellow sticky traps

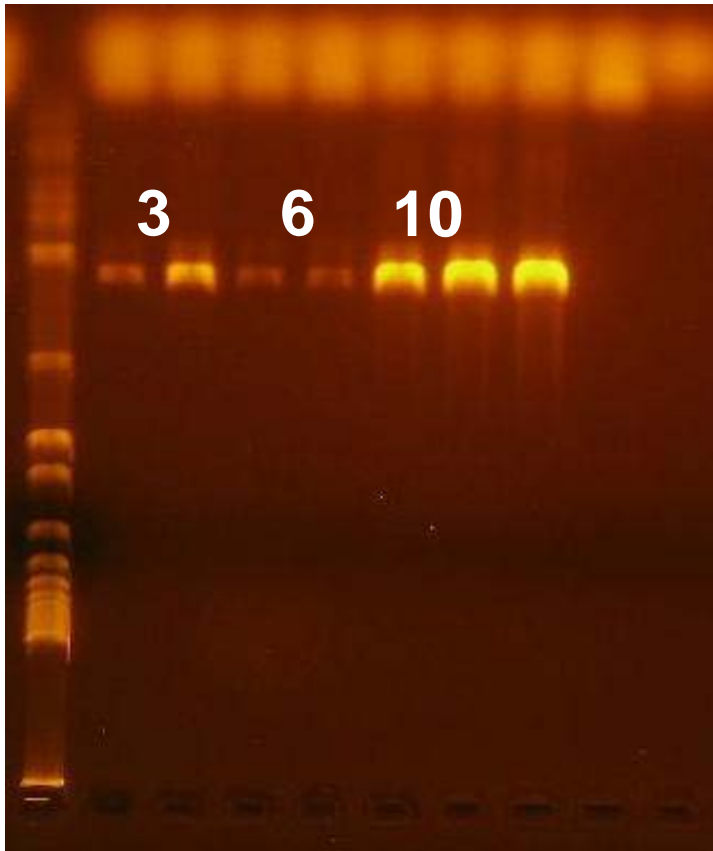


Whitefly DNA extraction

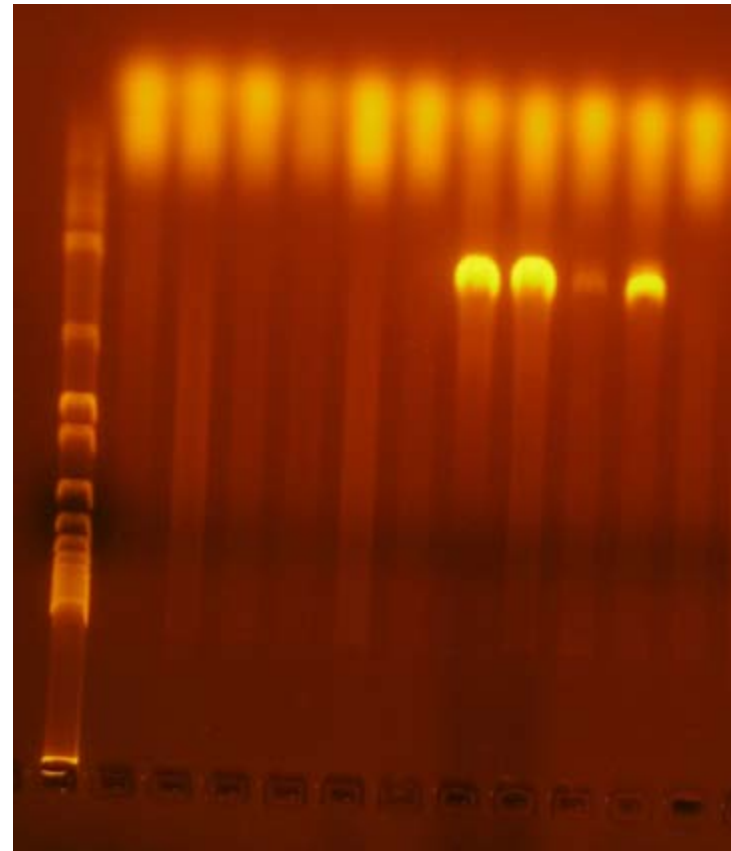


PCR

TYLCV Detection

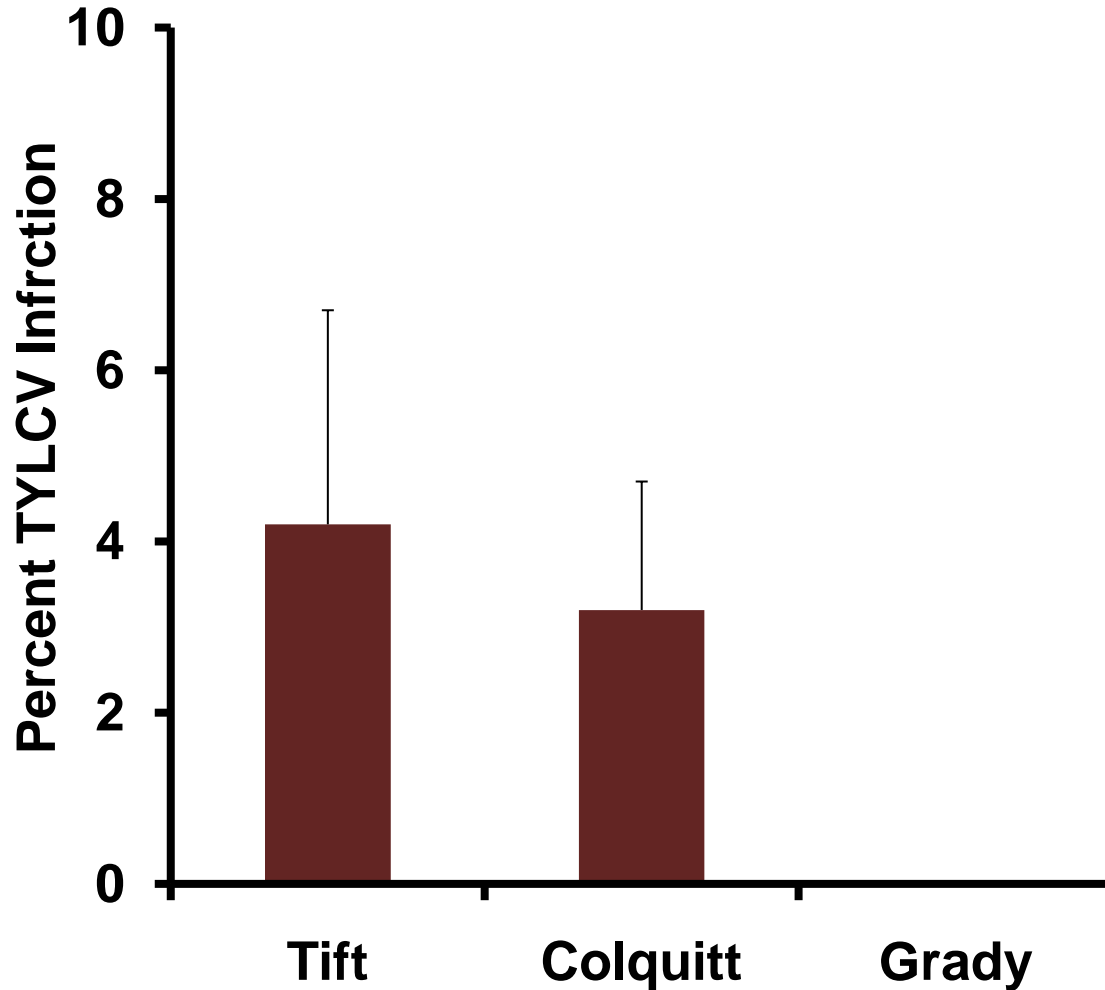


TYLCV detection in whiteflies



TYLCV detection in tomato plants

TYLCV Incidence



Overview

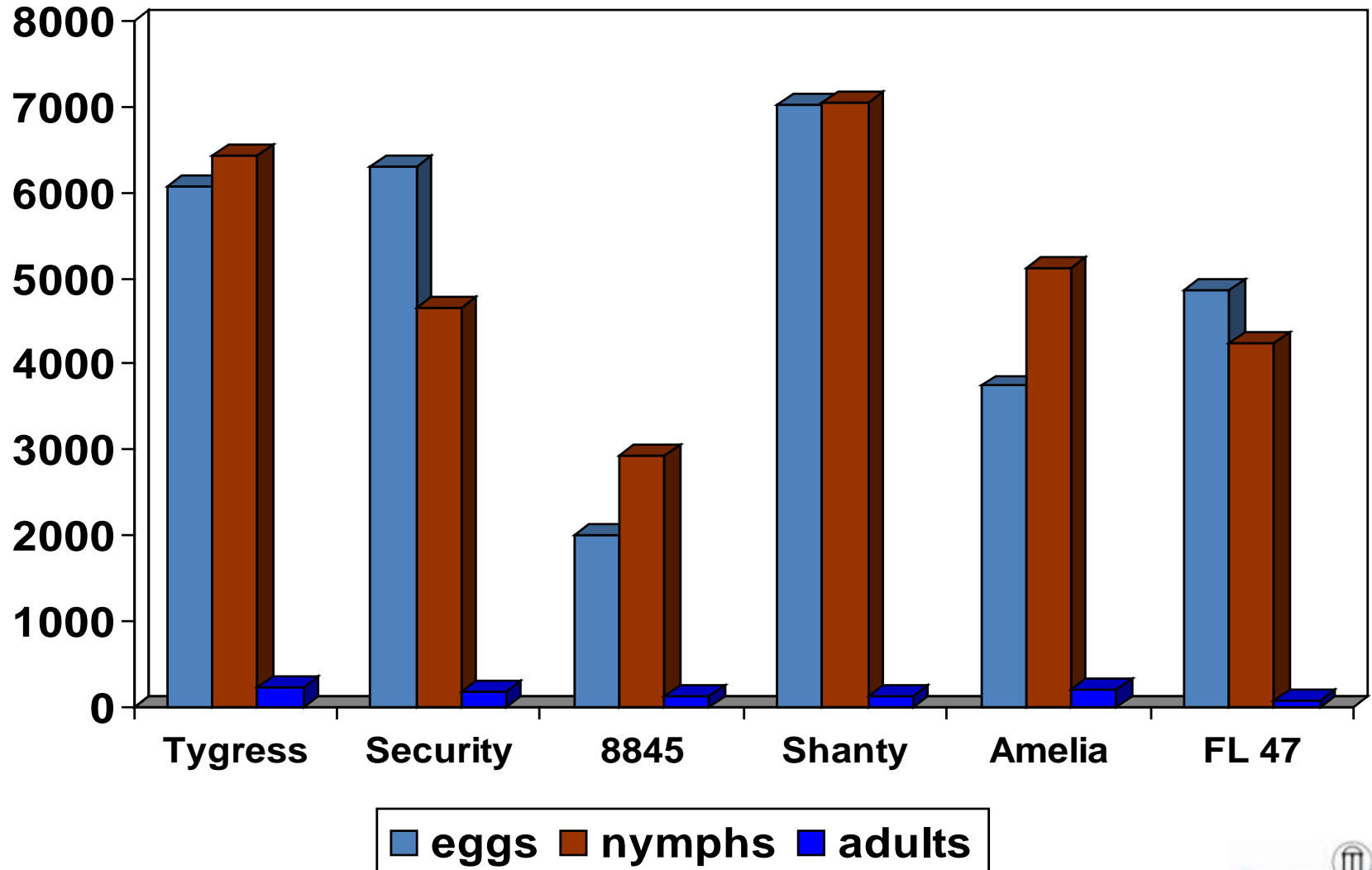
- *Tomato yellow leaf curl virus*
- Whitefly and TYLCV incidence in Georgia
- Whitefly sampling and TYLCV detection
- **Cultivar evaluations**
- Insecticides and TYLCV management
- New virus in Georgia?
- Implications

Cultivar Evaluations

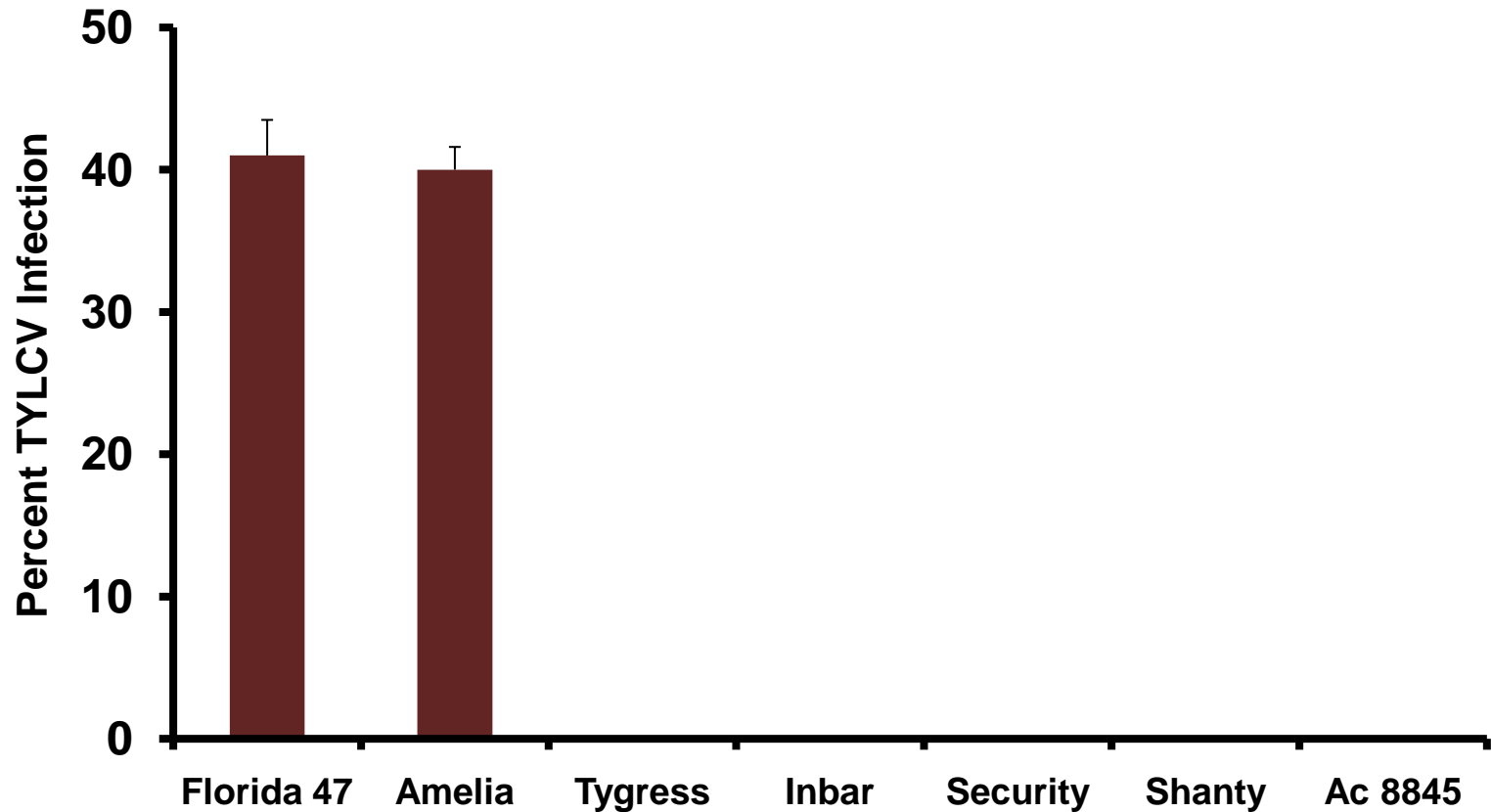
- **Susceptible cultivars (Florida 47, and Amelia)**
- **Resistant cultivars (Tygress, Security, Shanty, Inbar, and 8845)**
- **25plants/row, RCBD, 4 replications**



Whitefly Incidence



TYLCV Incidence



Overview

- *Tomato yellow leaf curl virus*
- Whitefly and TYLCV incidence in Georgia
- Whitefly sampling and TYLCV detection
- Cultivar evaluations
- **Insecticides and TYLCV management**
- New virus in Georgia?
- Implications

Insecticides and TYLCV Management

- **Insecticides were evaluated under greenhouse and field conditions**

Greenhouse conditions

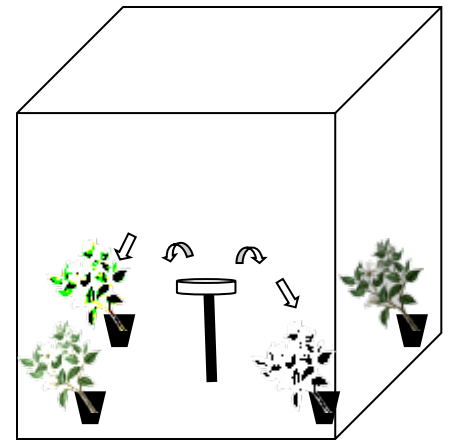
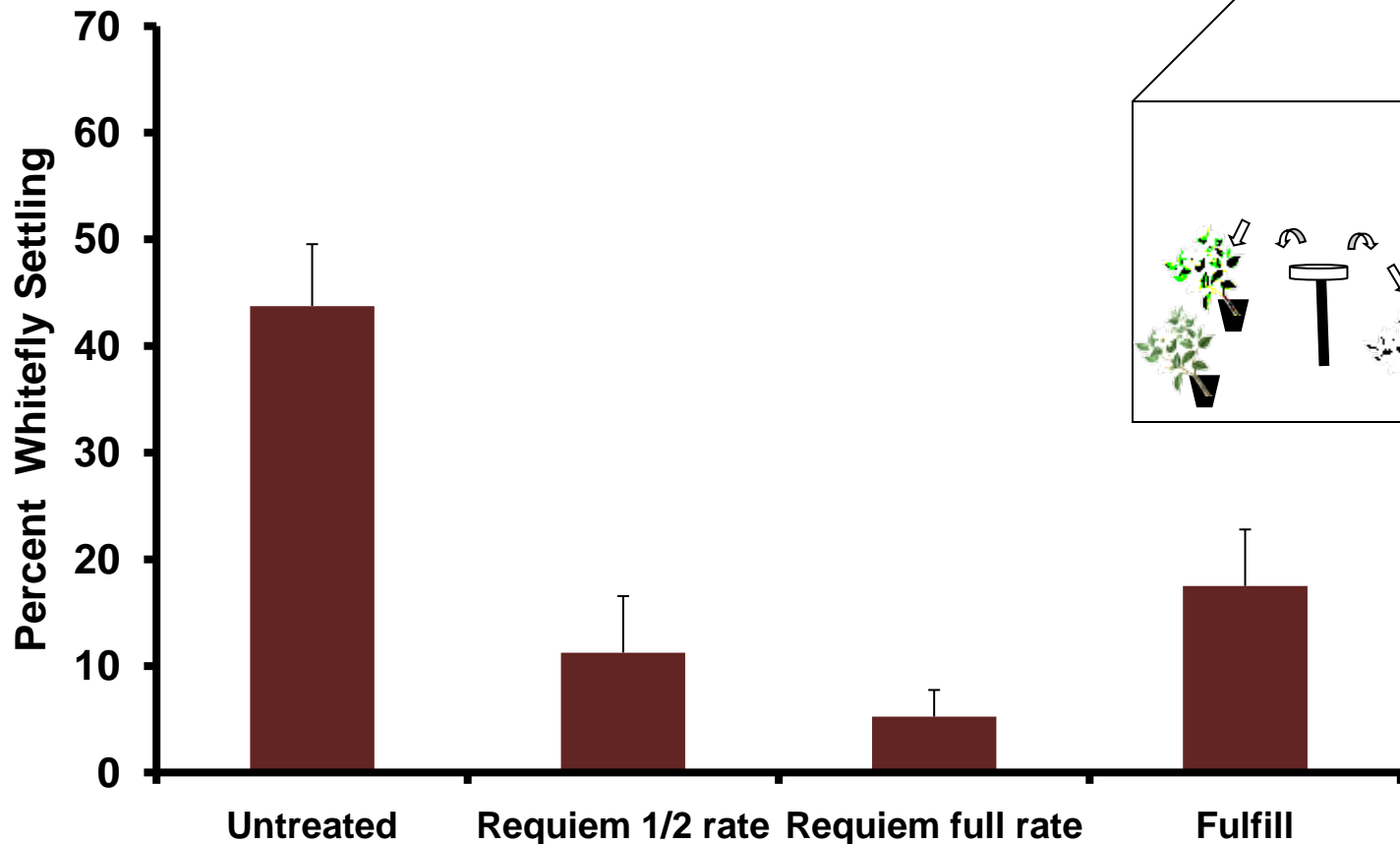
- **Whitefly preference**
- **TYLCV transmission**

Field conditions

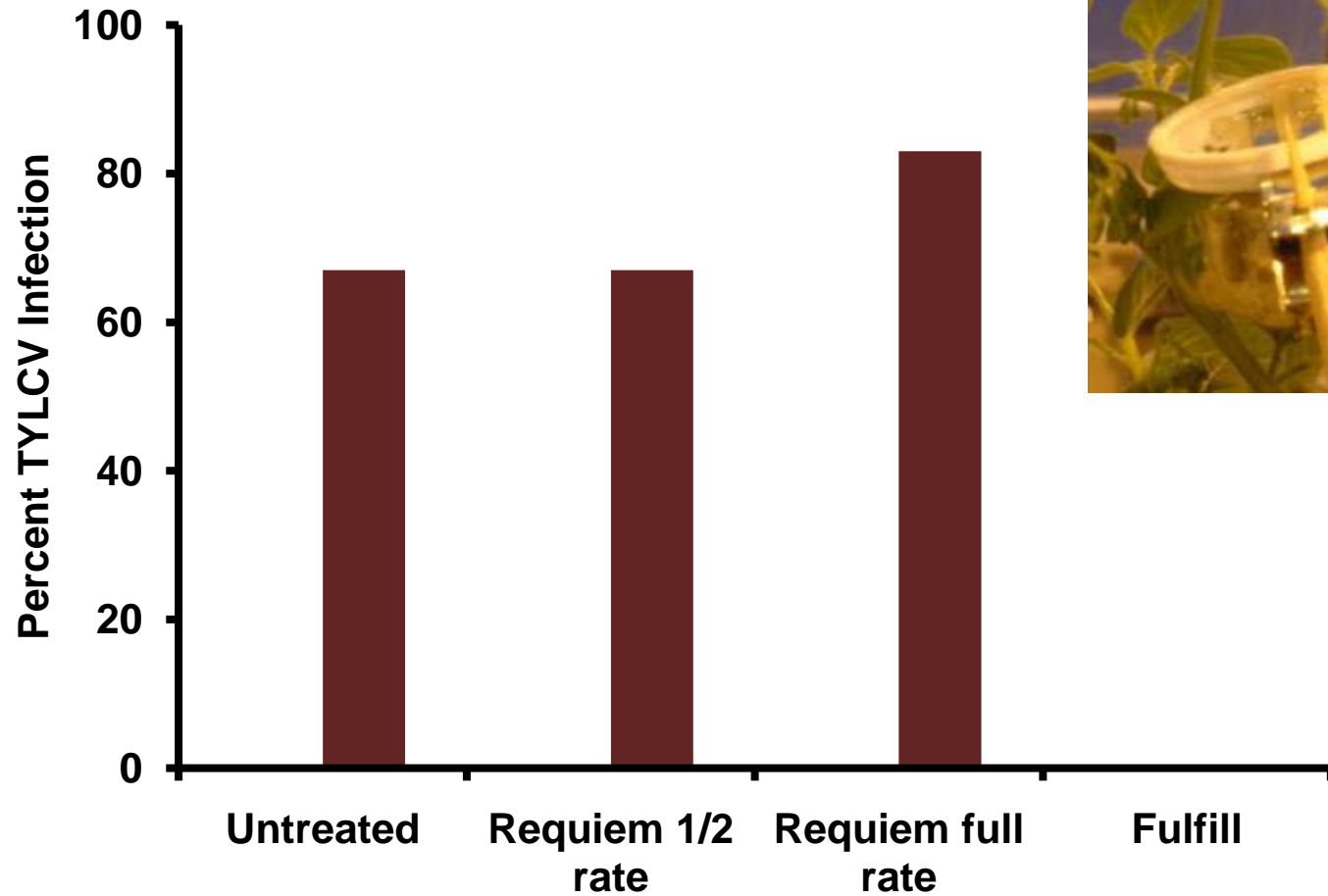
- **Whitefly suppression and TYLCV incidence**

Greenhouse evaluations

Whitefly preference



TYLCV transmission



Field trials

- **Standard treatments: Venom and Provado**
- **Requiem and Fulfill in rotation with Venom, knack, and Oberon**
- **In general all the treatments suppressed whitefly populations**
- **None of the insecticide treatments suppressed TYLCV incidence**
- **>90% infection**

Overview

- *Tomato yellow leaf curl virus*
- Whitefly and TYLCV incidence in Georgia
- Whitefly sampling and TYLCV detection
- Cultivar evaluations
- Insecticides and TYLCV management
- **New virus in Georgia?**
- Implications

New virus in Georgia?

- **Inconsistency in testing**
- **Presence of a new virus/new TYLCV strain**
- **Further testing at USDA-ARS, Fort Pierce, FL**
- ***Tomato chlorosis virus (ToCV)***



Tomato chlorosis virus

- **Whitefly transmitted virus**
- **RNA virus**
- **Genus *Crinivirus*, Family *Closteroviridae***
- **Reddening or purpling of lower leaves**
- **Often mistaken for minor nutrient deficiency**



Tomato chlorosis virus



Mixed Infections (TYLCV-ToCV)



- Often found in conjunction with TYLCV
- Often overshadowed by TYLCV or TSWV

Implications

- **Whitefly transmitted viruses are emerging as a major threat**
- **Population dynamics studies help to understand whitefly and TYLCV incidence patterns**
- **Resistant cultivars are very vital to TYLCV management**
- **Insecticides are capable of suppressing whitefly populations but not TYLCV**

Implications

- **ToCV incidence in Georgia has been recorded for the first time**
- **ToCV severity and spread are unknown**
- **Information on resistant sources are unknown**
- **Insecticide efficiency in ToCV management needs to be evaluated**

Acknowledgements

- Georgia Fruit and Vegetable Growers Association
- Mr. Simmy McKeown, research technician
- Ms. Sheran Thompson, research technician
- Ms. Rebecca Estes, Student worker
- Ms. Tiffany Wiggins, Student worker
- Mr. Jonathan Ruberson, Student Worker