Hoja Blanca Disease

Louisiana Agricultural Technology & Management Conference

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February 13, 2026

Hoja blanca disease symptoms

- Chlorotic or white stripes on leaves
- Plant stunting
- Partial or total sterility of panicles
- Root reduction
- Plant death

- Losses typically range from 25-50%, but have been observed up to 100%

PC: M. Cruz

Hoja blanca disease symptoms

- Symptom severity depends on the age of the plant
  - Mature plants usually asymptomatic
  - Younger plants have dramatic foliar symptoms and plant death

- Once infected, newly emerged leaves exhibit white stripes or complete chlorosis

Hoja blanca disease is caused by rice hoja blanca virus (RHBV)

PC: M. Cruz, S. Rustom; Wilson et al. 2023

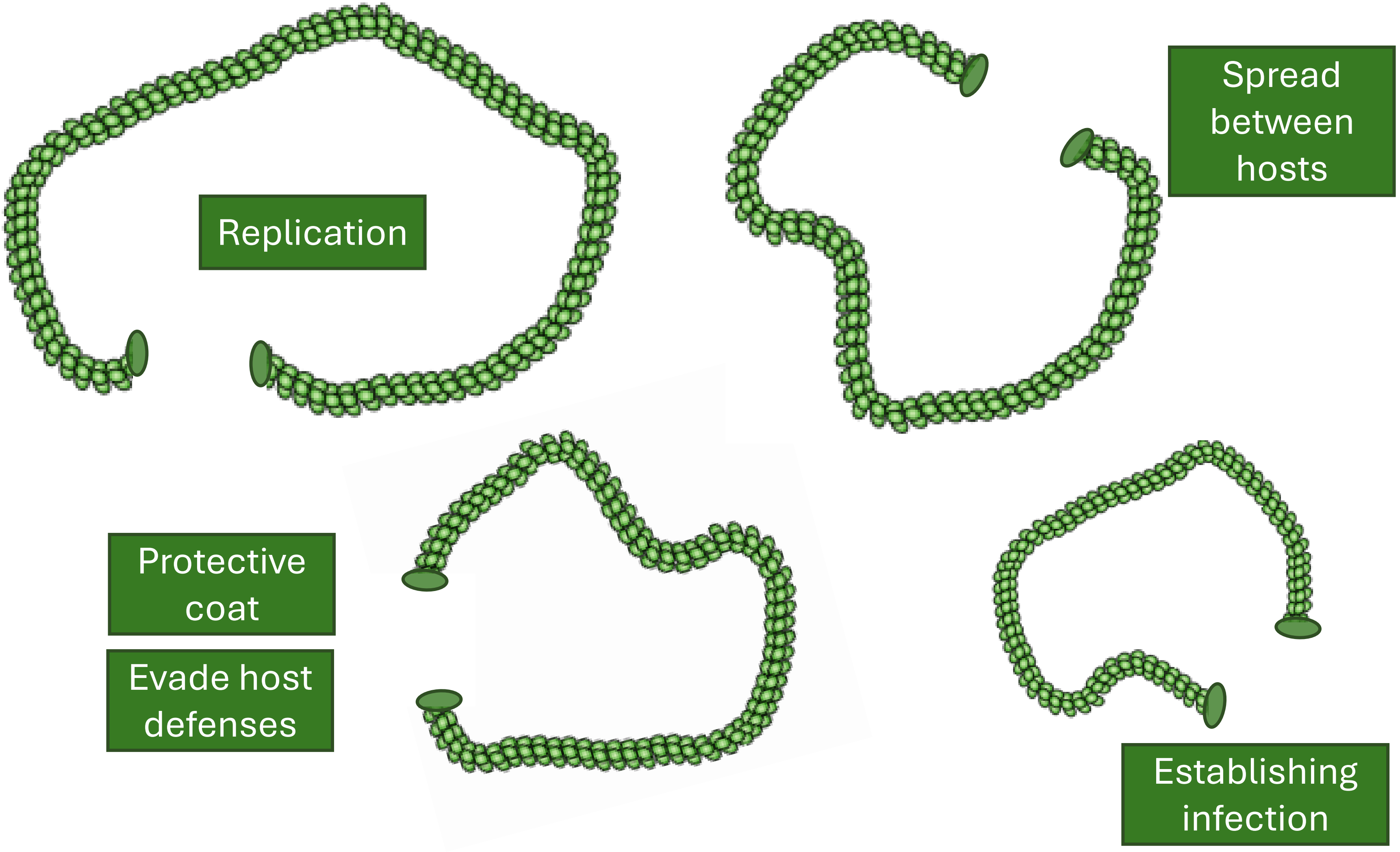
What is a virus?

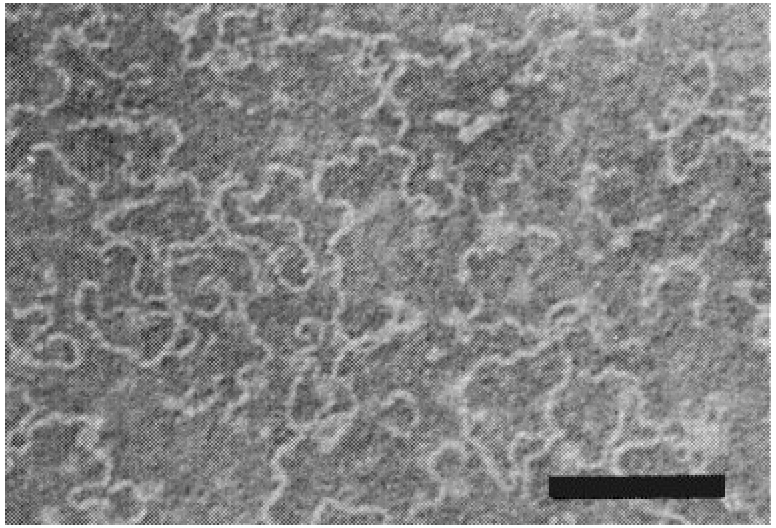
Can spread and survive outside of a host, but need a host cell to reproduce

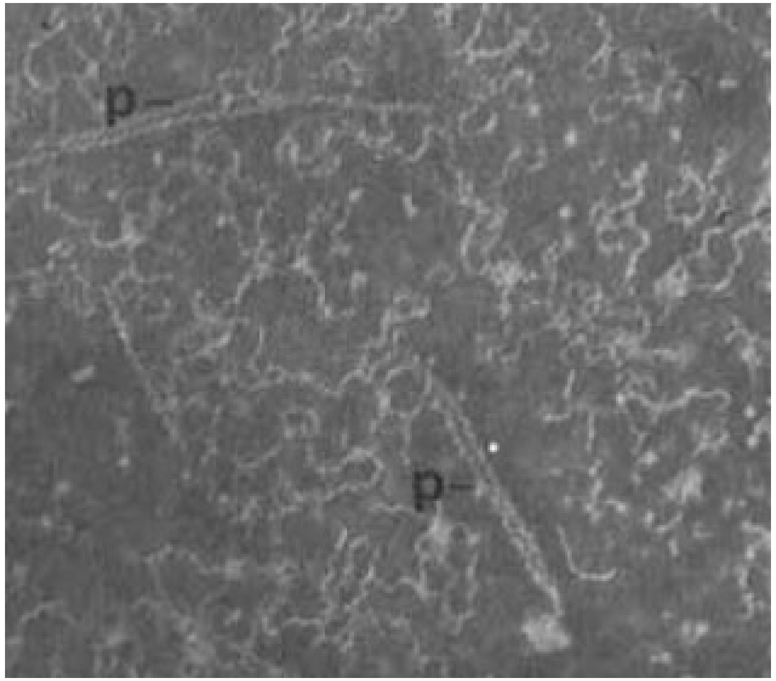
They're small.

"an ultramicroscopic (20 to 300 nm in diameter), metabolically inert, infectious agent that replicates only within the cells of living hosts, mainly bacteria, plants, and animals: composed of an RNA or DNA core, a protein coat, and, in more complex types, a surrounding envelope."

Basic requirements for a virus to be a virus: protein coat and a genome





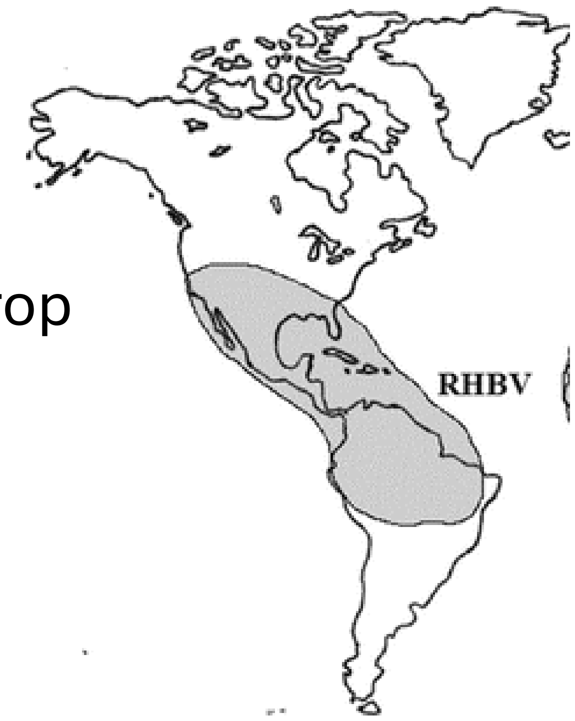


- **The RHBV genome is tetrapartite and composed of RNA**
- **All four components are needed for infection**

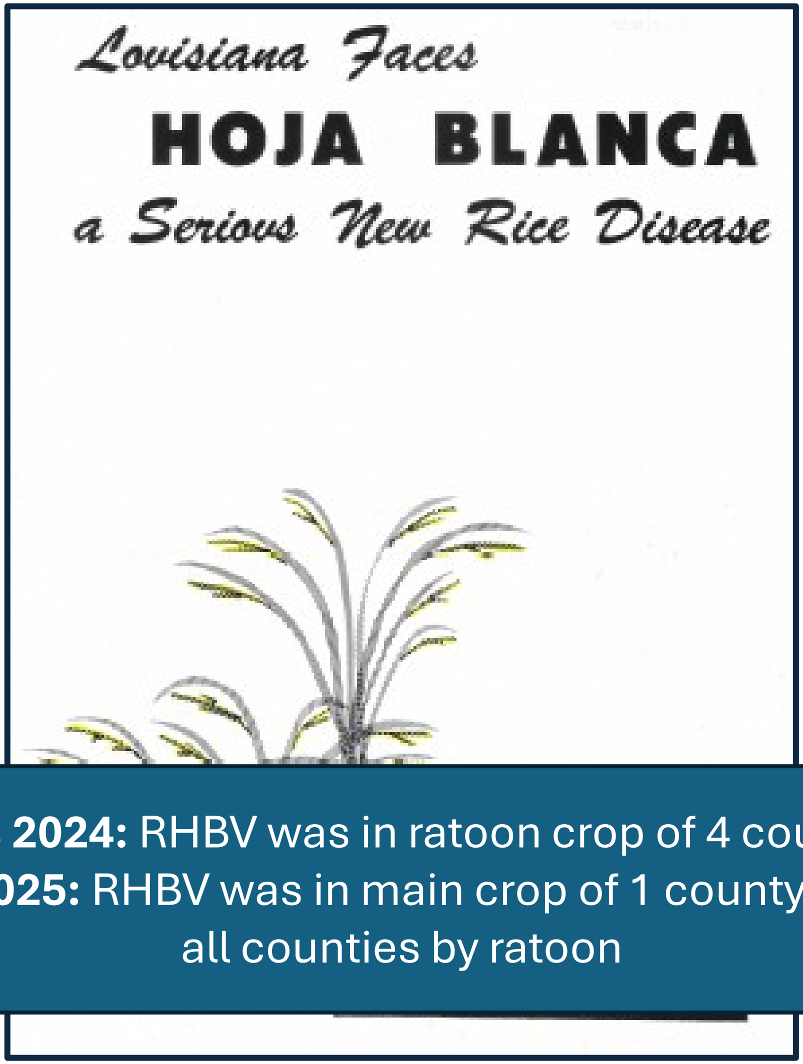
Morales and Niessen 1983

RHBV is a longstanding threat to rice production

- 1935: First observed in Cauca Valley, Colombia
- 1952: Small outbreaks in Panama
- 1956: Cuba had crop losses of 25%
- 1956: In Venezuela, entire industry infected within 90 days and crop losses of 50% were reported
- 1957-1967: Largely prevalent in Central and South America, and Caribbean
- 1980-1985: epidemic level in Latin American countries
- 1996-1999: Colombia had an additional outbreak



Historical context within the U.S.



Texas 2024: RHBV was in ratoon crop of 4 counties
Texas 2025: RHBV was in main crop of 1 county, almost all counties by ratoon

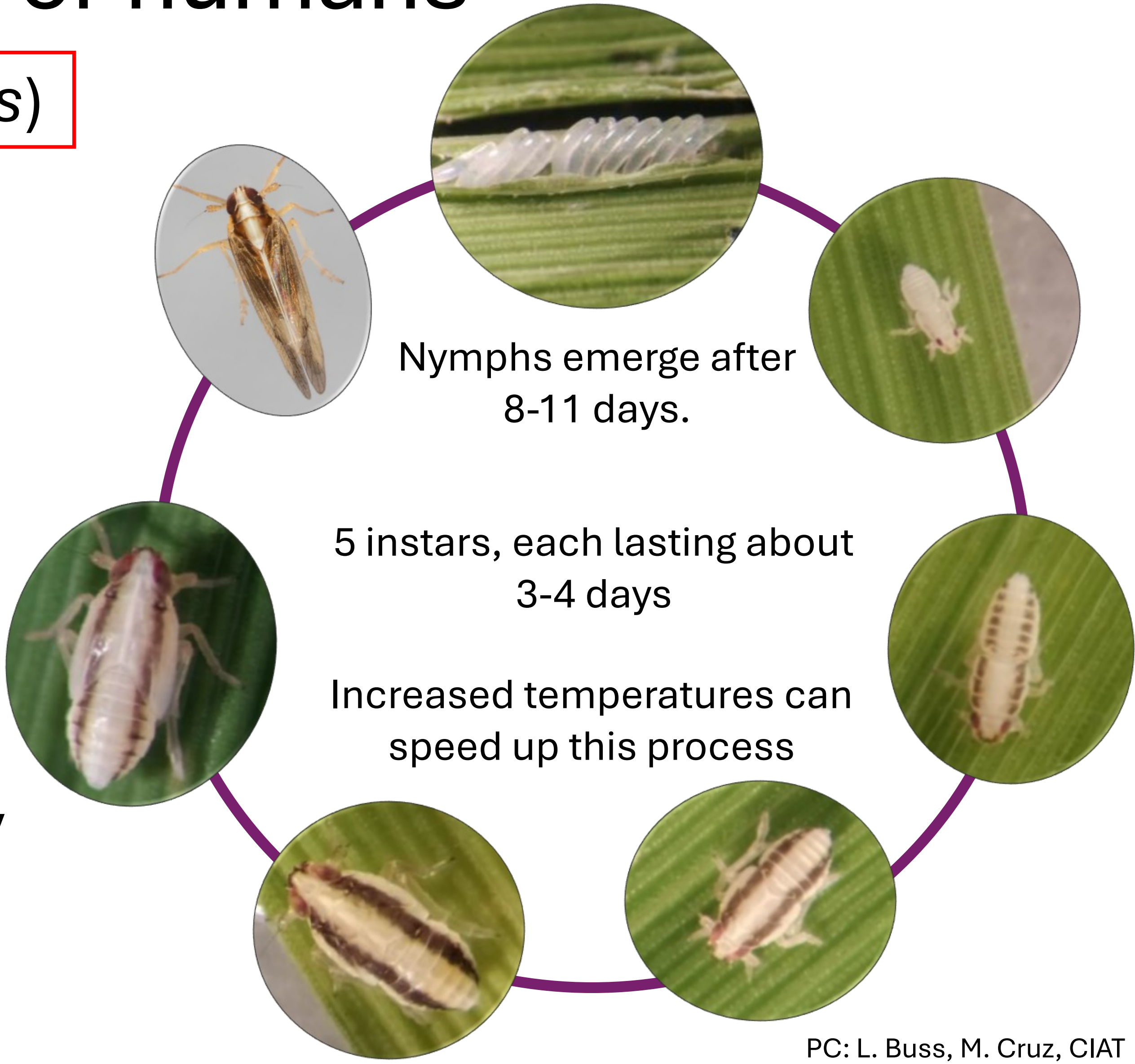
- 1957: RHBV found in Florida
- 1958: RHBV in Mississippi
- 1959: RHBV in Louisiana

- Disease was present in 11 parishes
- Plants were destroyed and no real yield loss seen (because infected mature plants)
- At the time, already one of the largest viral threats of the western hemisphere
- Alarms sounded immediately

Vector: insects or animals that transmits a disease to other animals or humans

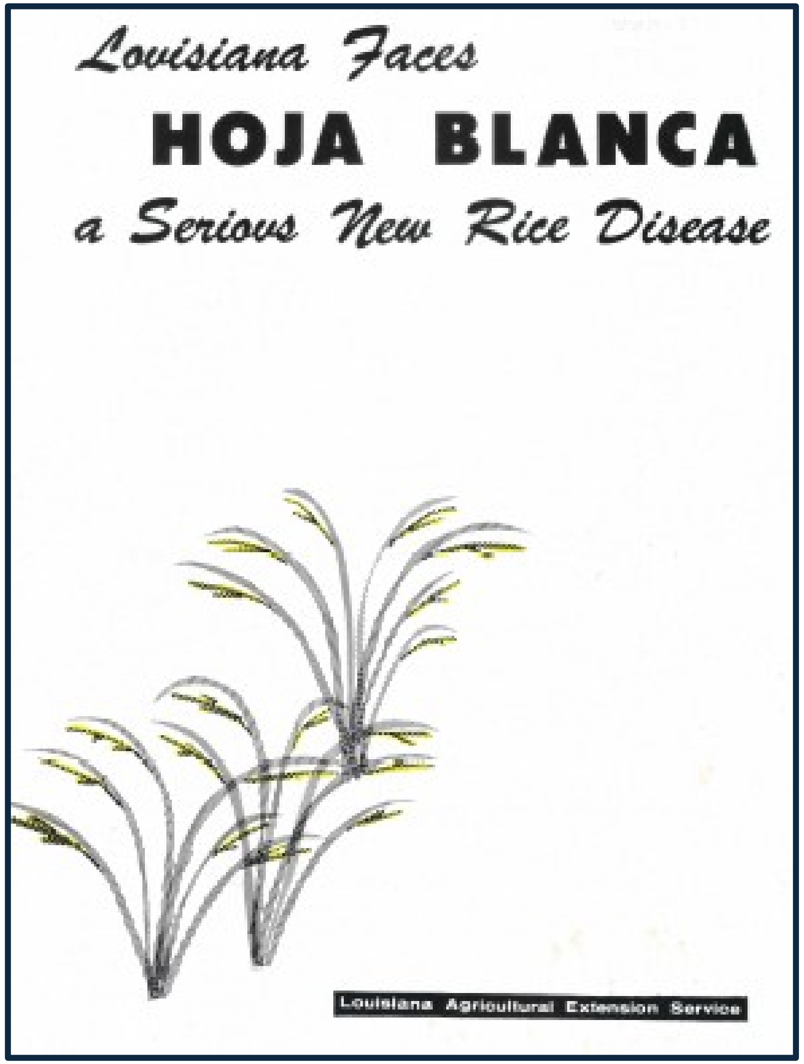
Rice delphacid (*Tagosodes orizicolus*)

- Males live typically 14-24 days
- Females live typically 24-36 days
- Females typically deposit 160 eggs in rice



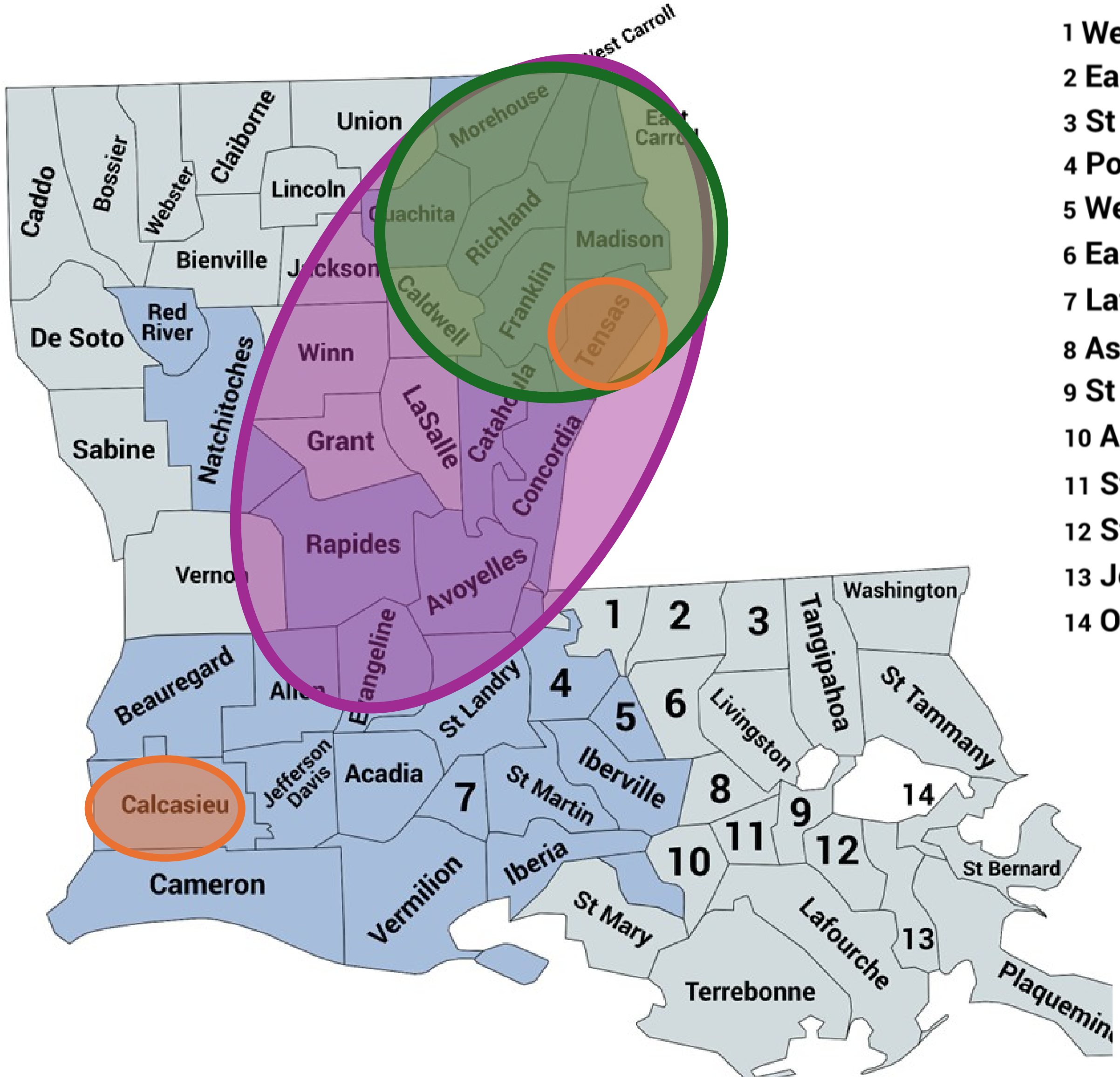
PC: L. Buss, M. Cruz, CIAT

Historical context within the U.S.



- 1957-1959: Delphacid and RHBV found in Florida
- 1958-1959: Delphacid and RHBV in Mississippi
- 1959: Delphacid and RHBV in Louisiana
- Vector was present in 14 parishes of Louisiana
  - RHBV found in 11 of 14
- The presence of the vector does not mean presence of the virus

The rice delphacid in Louisiana



1 West Feliciana
2 East Feliciana
3 St Helena
4 Pointe Coupee
5 West Baton Rouge
6 East Baton Rouge
7 Lafayette
8 Ascension
9 St John the Baptist
10 Assumption
11 St James
12 St Charles
13 Jefferson
14 Orleans

- July 2025: Delphacid was found in Tensas and Calcasieu parishes

- August 2025: Heavy infestations in NE LA

- September 2025: Prevalent in NE LA and Central LA

Very low numbers in SW LA

The rice delphacid is a pest of rice

- Feed on both the phloem and the mesophyll via stylet
- Tend to feed lower on the plant
- Feeding damage as a result is called "hopper burn"

- Texas 2025: Found in main crop (June)
  - Estimated that 40-50% of ratoon crop was not harvested

PC: E. Kraus, M. Way

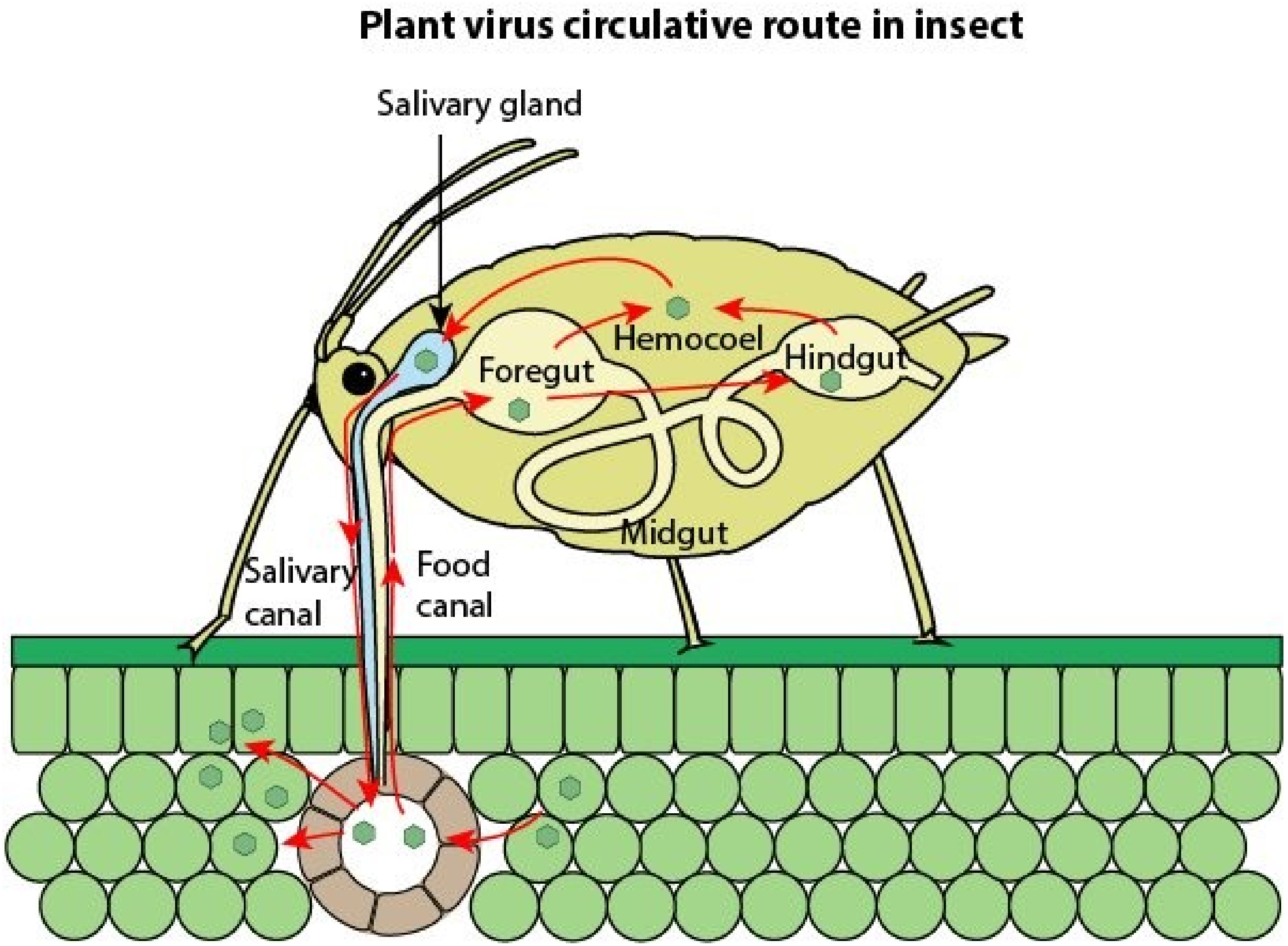
Hopper burn is a serious threat to growers.

PC: E. Mejía, A. Cuevas, ANAR, T. Musgrove

Colombia, January 2025

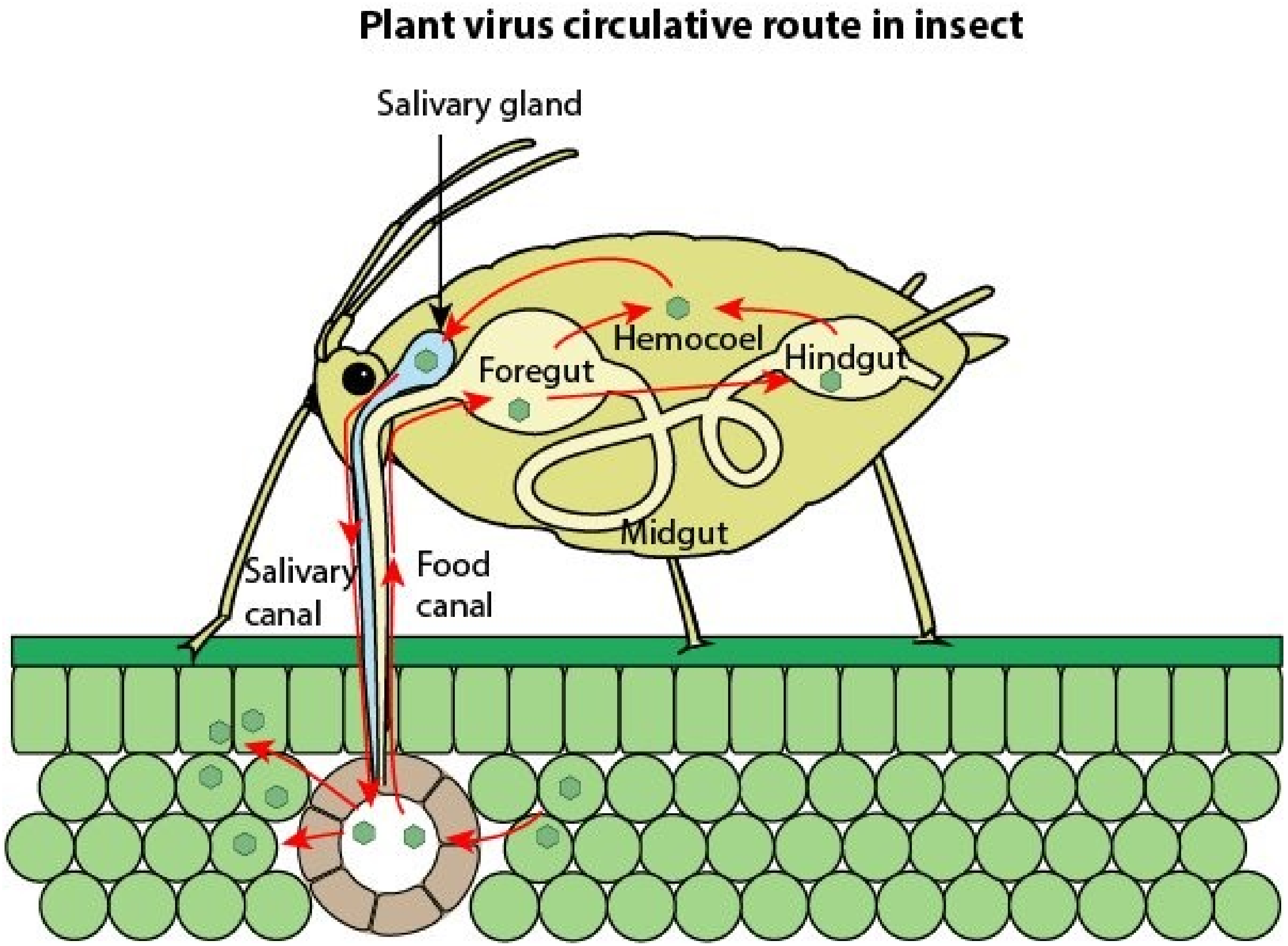
Louisiana, September 2025

Transmission of RHBV is circulative and propagative



- Males and females transmit.
- Nymphs can transmit.

Transmission of RHBV is circulative and propagative



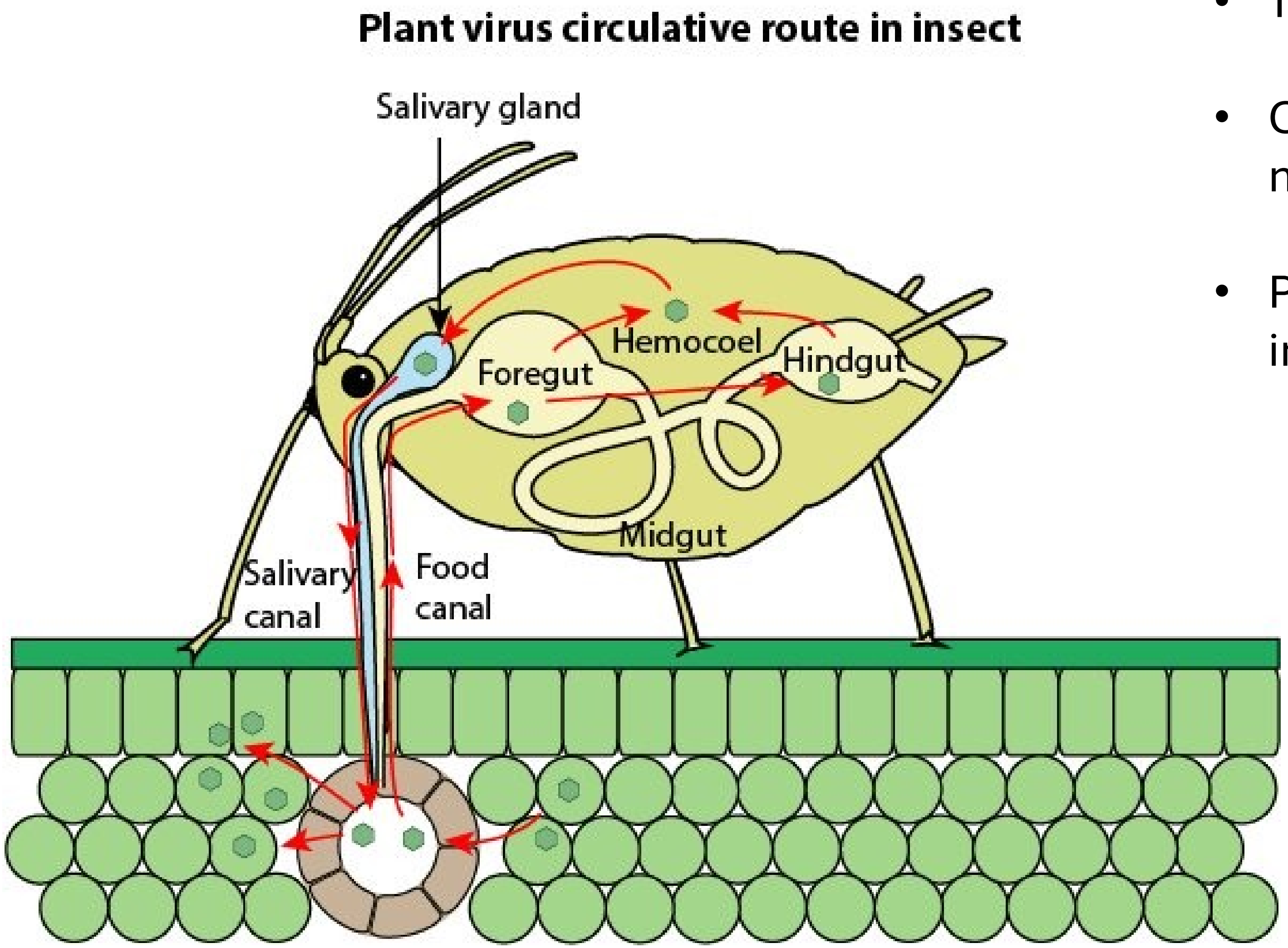
- That means RHBV actually *<u>infects</u>* the insect

- Virus infects the organs and glands resulting in respiratory and organ failure

- Reduced lifespan and reproductive capability
  - Females lay 1/3 as many eggs
  - Males also less fertile
  - Fewer nymphs reach adulthood

- In field conditions, 5-15% of insects are infected due to reduced fitness

Transmission of RHBV is circulative and propagative



- Transmission is also transovarial
- Ovaries become infected and up to 100% nymphs are infected and infectious
- Progeny can transmit sooner than those that ingest after emergence

Historically, RHBV epidemics are driven by vector populations.

- Epidemics tend to be cyclical
- Delphacids like it warm and humid (75-83˚F)
  - Sustained temperatures over 100˚F likely to kill off insects
  - Low humidity greatly reduces the viability of eggs

Dr. Tyler Musgrove
January 5, 2026

Management options

- RHBV is not mechanically transmitted
  - Still a good practice to disinfect machines and tools between uses and farms
- Vector control:
  - This is extremely costly when epidemic levels are reached and has negative effects on other bio-control organisms
  - Chemical control is not likely a viable long-term solution where crawfish are also grown
- The best method of control is to develop and implement varieties resistant to the delphacid and RHBV
  - Work with CIAT suggests no commercial lines show strong resistance, but some promise in lines that can be used in crosses
  - There are South American lines showing promising resistance to the vector, these can be a source of resistance in the U.S. breeding program

Future considerations for RHBV and delphacid management

- Assess vector behavior and survivability in Texas and Louisiana
  - Crawfish production = consistently available feeding and reproductive host of the delphacid
- Continue to assess available germplasm collections for resistance to RHBV and the vector
- Investigate the role of beneficials to combat the delphacid

HOW HOJA BLANCA IS BEING FOUGHT BY RESEARCH

In 1956, when hoja blanca gave clear warning of its destructiveness, ARS joined with Latin American agencies on an emergency program focused on three objectives:

1. To understand the nature of the disease and how it can be transmitted--for clues to control.
2. To determine the biology, ecology, and control of the vector.
3. To provide growers with rice varieties that combine resistance and desirable qualities--the best hope for protection.

Much of the United States' work thus far has been done in Cuba, Venezuela, and Colombia, where research on the disease has been active and the reaction of breeding lines could be studied under field conditions. Early in 1960, the two entomologists and the plant pathologist assigned to the ARS Hoja Blanca Laboratory in Cuba transferred to the Louisiana Agricultural Experiment Station in Baton Rouge to study the disease and its vector in our Gulf Coast climate.

Louisiana rice growers have the opportunity to be proactive to hoja blanca disease

- Ordinarily, plant pathologists and growers are reactive to threats
  - We know what the problem is!
- The best thing you can do is monitor your fields for symptomatic plants and the presence of the vector
  - If something looks weird, call us!
- For any pathogen, it is important to **check, not guess**.
  - We want to ensure the cause of the symptoms is RHBV using sensitive and accurate molecular techniques.

What we know:

- Both are devasting to rice production
- Texas is in crisis with both the delphacid and RHBV
- For Louisiana, it's a matter of **when**, not if, RHBV is present
- There is no silver bullet of management for this system

An ongoing statewide survey:

- Identify delphacid hotspots
  - Know when delphacids were first present in the growing season and their population growth over time
  - Identify delphacids infected with RHBV

- Identify hoja blanca disease hotspots
  - Visual assessments will track symptom onset over the course of the season in main and ratoon crops
  - Confirm via molecular testing

Our goal is to systematically assess for the vector and RHBV **before** epidemic levels are reached, and extension agents are called

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Acknowledgements

- Virology Lab
- Rice Pathology Lab-Dr. Felipe Dalla Lana
- Dr. Tyler Musgrove
- Rice Research Board

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Questions?

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