

Meeting the Challenge of the Asian Citrus Psyllid in California Nurseries

A two-day workshop in Riverside, California

June 11-12, 2009

Organizing Committee:

- T. Delfino**-California Citrus Nursery Society
A. Eskalen-Dept. of Plant Pathology & Microbiology, University of California Riverside
R. Lee-USDA- ARS, National Clonal Germplasm Repository for Citrus and Dates
G. Vidalakis-Citrus Clonal Protection Program, Dept. of Plant Pathology & Microbiology, University of California Riverside



Florida-Foundation Block



Brazil-Citrus Nursery



M. Rogers



Invited Speakers:

- J. Ayres**-Fundecitrus, Brazil
J. Bethke-UC, CA
G. Baze-Golden Pacific Structures, CA
T. Delfino-CCNS, CA
F. Dixon-Wells Fargo, CA
D. Elder-American Ag Credit, CA
T. Gast-Southern Gardens Citrus, FL
P. Gomes-CHRP, USDA -APHIS, NC
E. Grafton-Cardwell-UCR, CA
D. Howard-AgraTech, CA
N. Jameson-Brite Leaf Nursery, FL
R. Keijzer-KUBO, The Netherlands
P. Llatser-AVASA, Spain
S. McCarthy-CDFA, CA
G. Vidalakis-UCR-CCPP, CA

Registration: <http://ccpp.ucr.edu> & <http://eskalenlab.ucr.edu>

Location:

Sunkist Center
Citrus State Historical Park
9400 Dufferin Avenue
(Corner of Van Buren Blvd)
Riverside, California

Sponsored by:



CALIFORNIA CITRUS NURSERY BOARD



Stuewe & Sons, Inc.
Tree Seedling Nursery Containers



Bayer CropScience

Information on line at: <http://eskalenlab.ucr.edu>

CITRUS HEALTH RESPONSE PROGRAM



CHRP: Its Role in Protecting Nursery Production

Patrick Gomes

National Coordinator

USDA APHIS PPQ

June 11, 2009



CITRUS HEALTH RESPONSE PROGRAM



What is CHRP?

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Animal and Plant Health Inspection Service

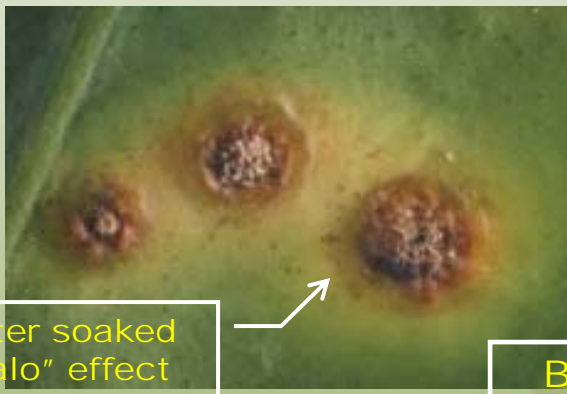
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Citrus Canker

Xanthomonas citri ssp. *citri*



Water soaked
"Halo" effect

Bacterial lesions on
leaves, fruit, twigs,
branches & trunk



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Asian Citrus Psyllid

Diaphorina citri

Insect vector of Citrus Greening



Adult



Nymph



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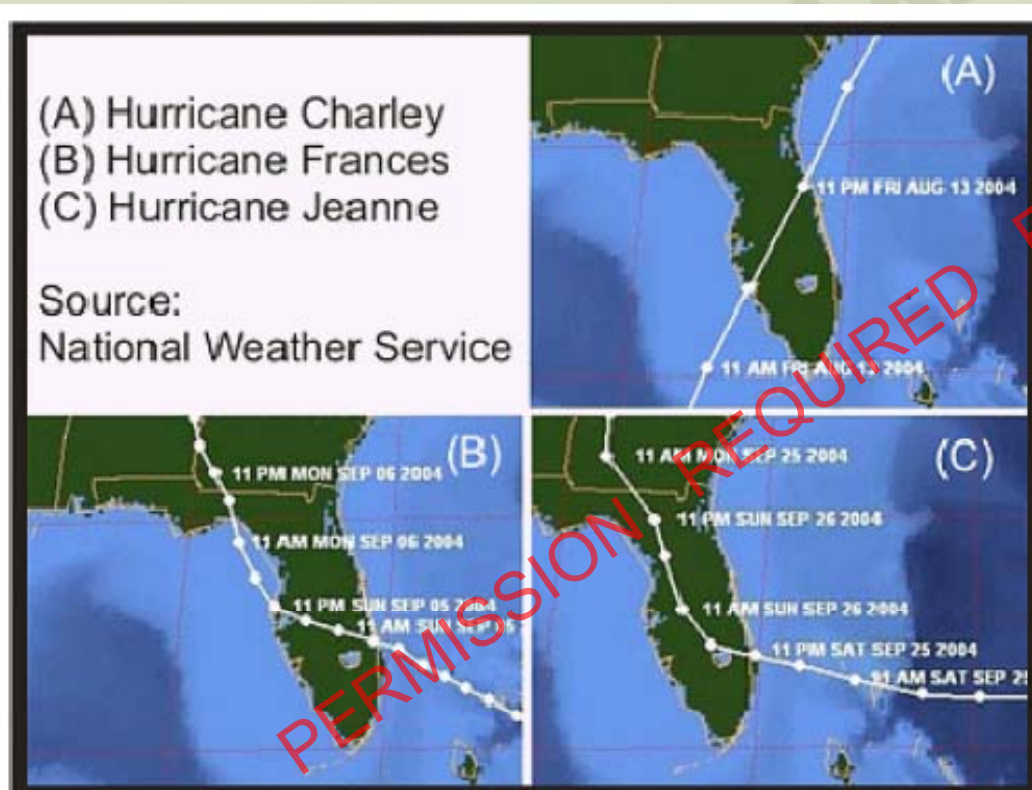


Fig. 2. Paths followed by the three hurricanes that had an impact on Florida citrus production areas during 2004.



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Blotchy mottle symptoms

Small lopsided fruit, columella staining, bitter taste



Citrus Greening
"Candidatus
Liberibacter asiaticus"

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Citrus Health Response Plan, Compliance Agreements & BMPs provide important guidance in achieving effective disease suppression

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CHRP BUSINESS PLAN

CITRUS HEALTH RESPONSE PROGRAM - GROWER / CARETAKER AGREEMENT ATTACHMENT - SCHEDULE 17



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Guiding Principles

- **Scientifically based**
- **Operationally & economically feasible**
- **Transparent**
- **Participative approach**



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CHRP Goals

- Preventing introduction & spread of citrus pests
- Early detection & response
- Promote best management practices = Recovery
- Maintain markets by ensuring requirements for shipment are met



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Objective

“Develop *minimum standards* for citrus nursery stock, citrus production, harvesting and post-production practices *to ensure continued economic sustainability* in the presence of citrus canker, citrus greening and other exotic citrus diseases.”



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*Protection of Citrus germplasm,
budwood & commercial nurseries
is of prime importance in
sustainability of the Citrus industry*

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Nursery & Budwood Provisions

- Registration of citrus nurseries & budwood facilities
- Approval of nursery & budwood sites
- Geographic separation from concentrations of citrus trees
- Production of nursery stock in approved structures
- Security & sanitation measures to prevent pests
- Training & education
- Inspections to verify absence of pests
- Citrus nursery stock, budwood & seed certification



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Citrus Nursery Stock Certification

- **Location:** sites must be a minimum of one mile from commercial groves
- **Structure:** approved structure must have enclosed sides and tops and positive process double-door entries
- **Sanitation:** all plant material and soil must be removed from equipment before entering/exiting nursery
- **Decontamination:** everyone who enters nursery must decontaminate with approved products



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Major Pests Threats

- Citrus canker
- Citrus greening = Huanglongbing (HLB) – **3 strains**
- Asian & African citrus psyllids
- Citrus leprosis virus
- Citrus Variegated Chlorosis (CVC)



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Citrus Leprosis Virus (CiLV)



Mite vector
Brevipalpus spp.



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Fig. 4

Citrus Variegated Chlorosis (CVC)

Xylella fastidiosa



Glassy-winged sharpshooter

Homalodisca vitripennis

©1999 The Regents of The University of California

Insect vector of CVC



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Program Activities

- **Surveillance**
- **Diagnostics**
- **Regulatory**
- **Investigation & Enforcement**
- **Emergency response**
- **Research & Development**
- **Outreach/Education**



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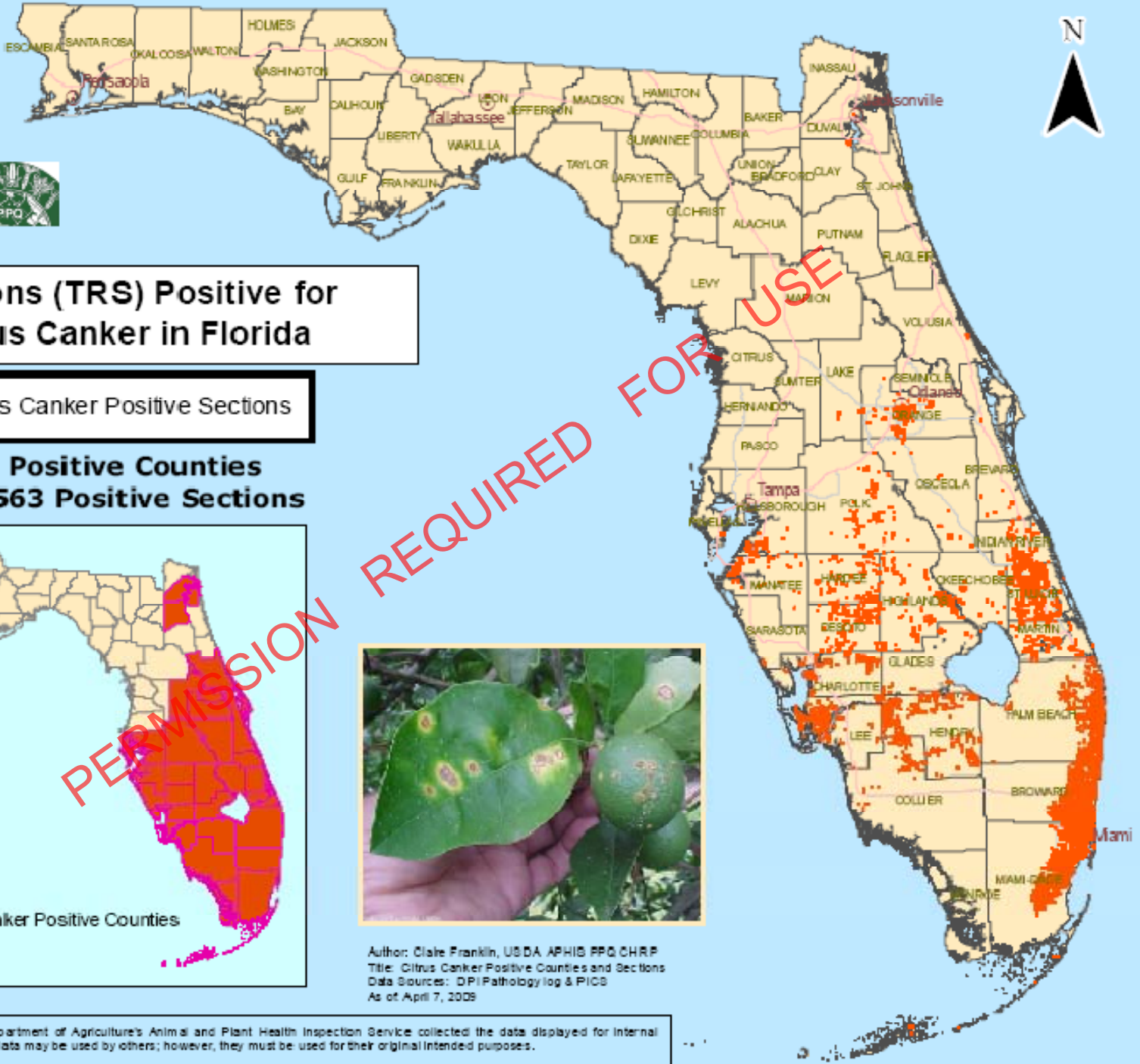
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Disease Surveillance

- Citrus Commodity Surveys
- High risk areas (Hot zones)
- Special surveys
- Training on pest recognition

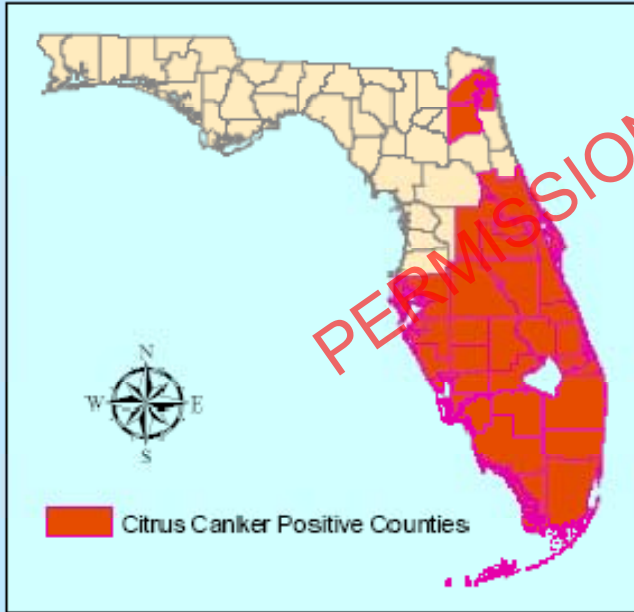




Sections (TRS) Positive for Citrus Canker in Florida

 Citrus Canker Positive Sections

**29 Positive Counties
2,563 Positive Sections**



 Citrus Canker Positive Counties



Author: Claire Franklin, USDA APHIS PPQ/CHRP
 Title: Citrus Canker Positive Counties and Sections
 Data Sources: DPI Pathology log & PICS
 As of April 7, 2009

DISCLAIMER: The U.S. Department of Agriculture's Animal and Plant Health Inspection Service collected the data displayed for internal agency purpose's only. This data may be used by others; however, they must be used for their original intended purposes.

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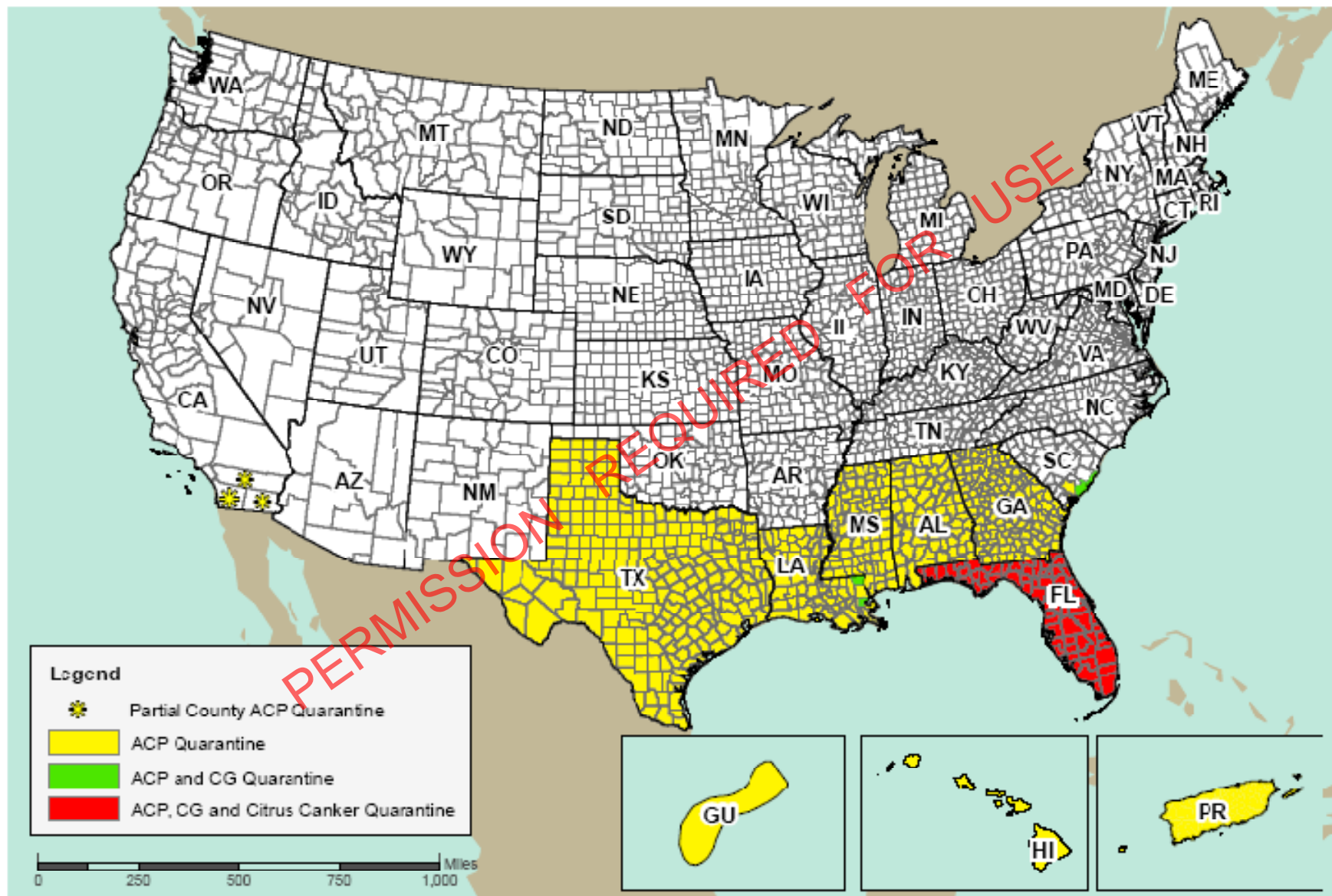


Citrus Greening

- 2005 – First detection in Florida
- 2008 - Infected trees found & removed in Orleans & Washington Parishes, Louisiana
- 2009 - Infected trees found on 3 properties in Charleston, SC
- Surveys underway in all States where citrus occurs




National Quarantine Citrus Greening (CG) and Asian Citrus Psyllid (ACP)

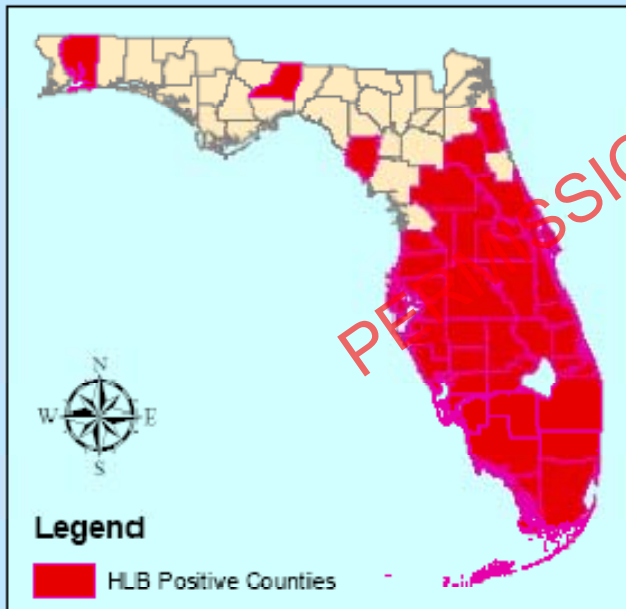




Sections (TRS) Positive for Citrus Greening (HLB) in Florida

 HLB Positive Sections

36 Positive Counties
2,055 Positive Sections

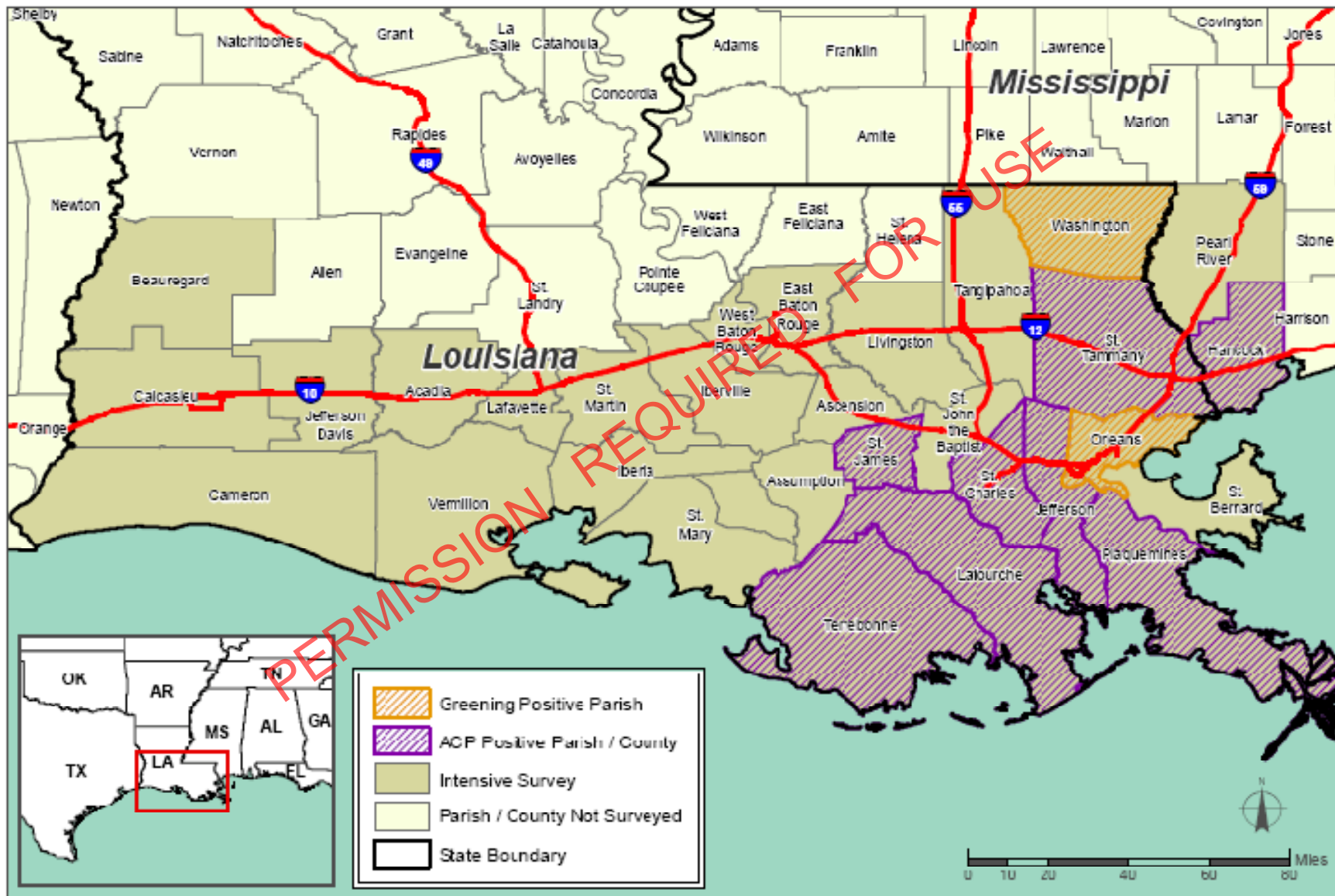


Author: Claire Franklin, USDA APHIS PPQ CRRP
 Title: HLB Positive Counties and Sections
 Data Sources: DPI Pathology log & Tim Riley
 As of March 31, 2009

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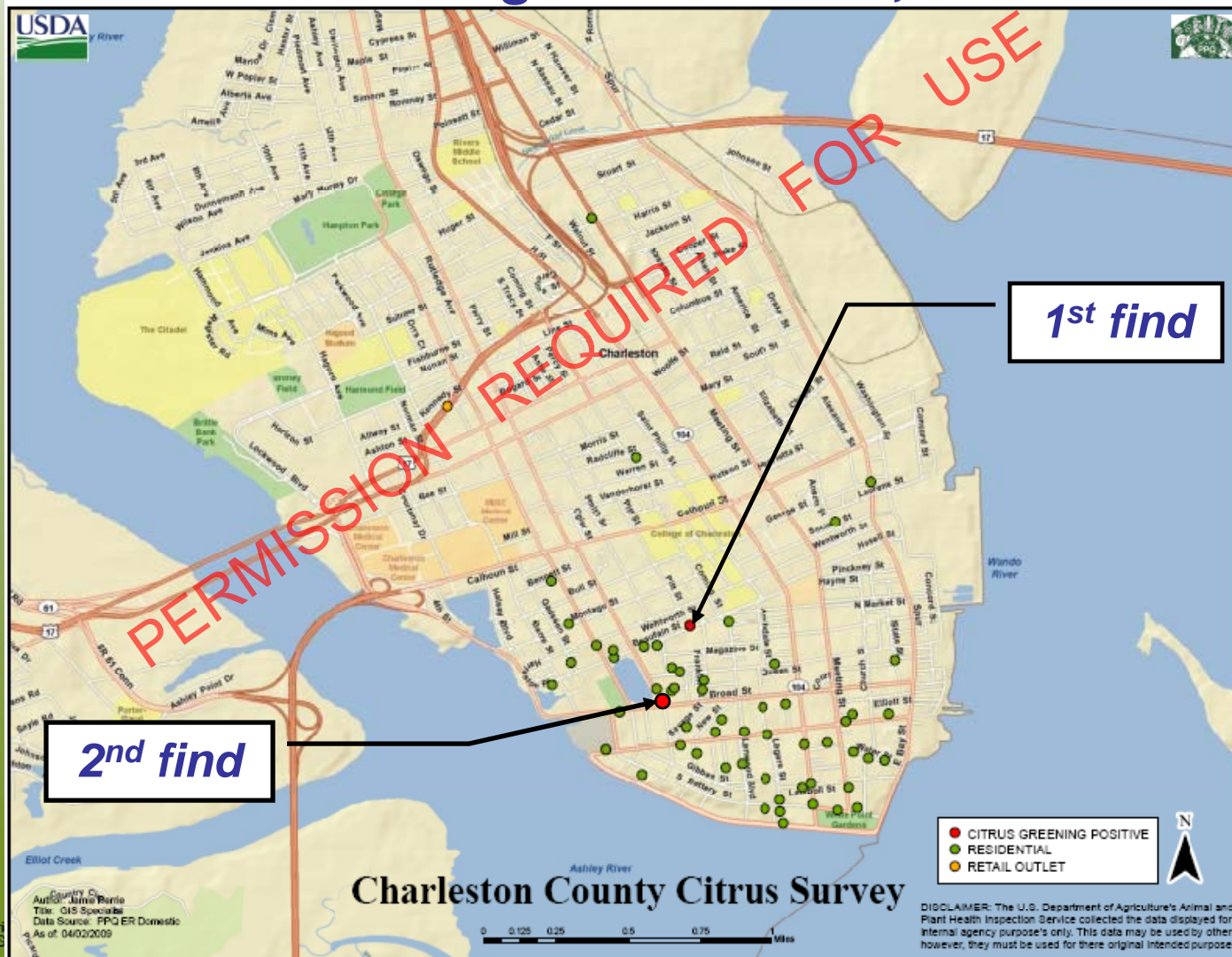
Citrus Greening / Asian Citrus Psyllid Delimitation Survey April 2009



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Citrus Greening – Charleston, SC

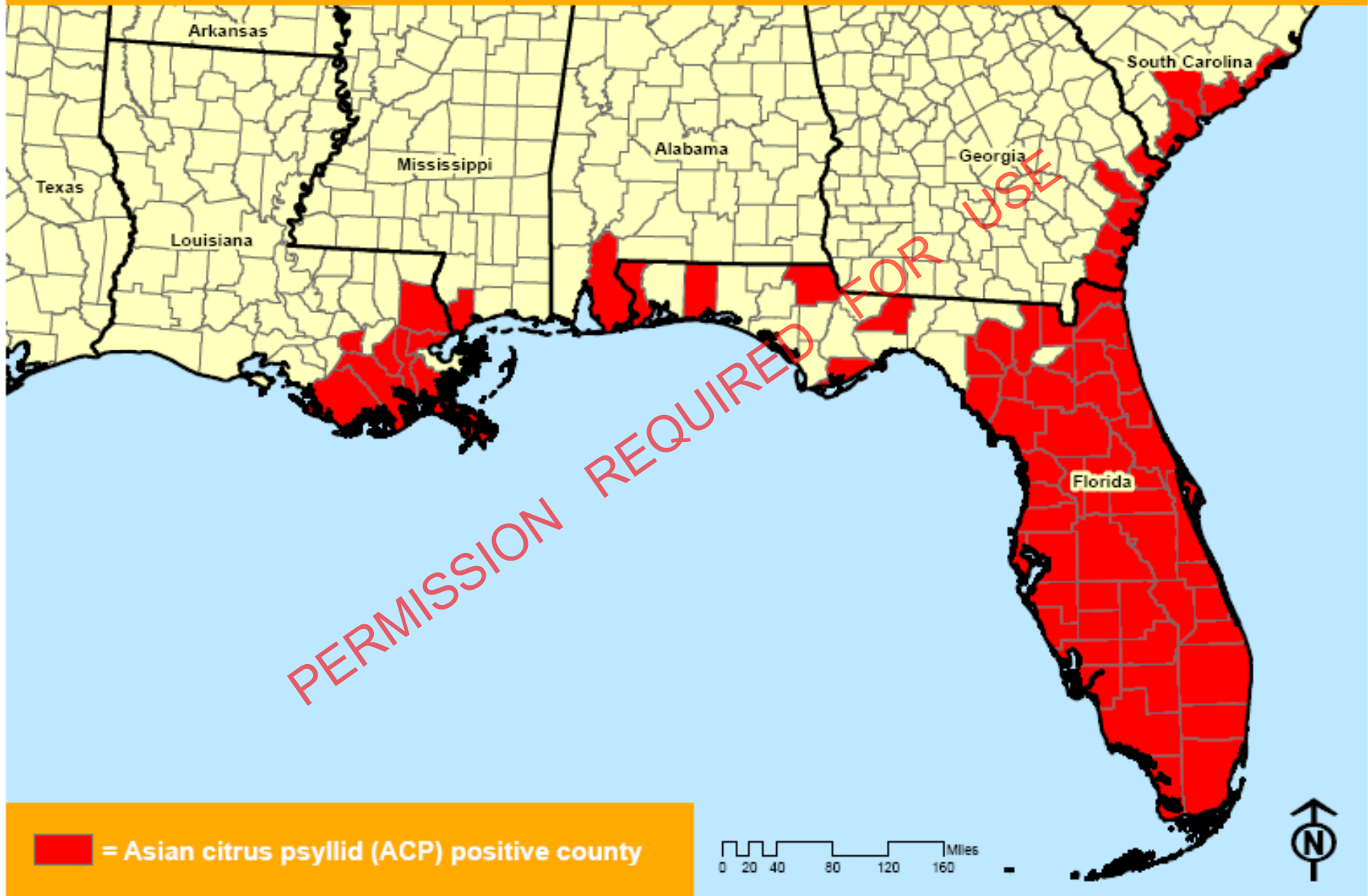


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Country: SC
Author: June Perle
Title: GIS Specialist
Data Source: FPO/ER Domestic
As of: 04/02/2009

Provider and employer.

ACP POSITIVE COUNTIES

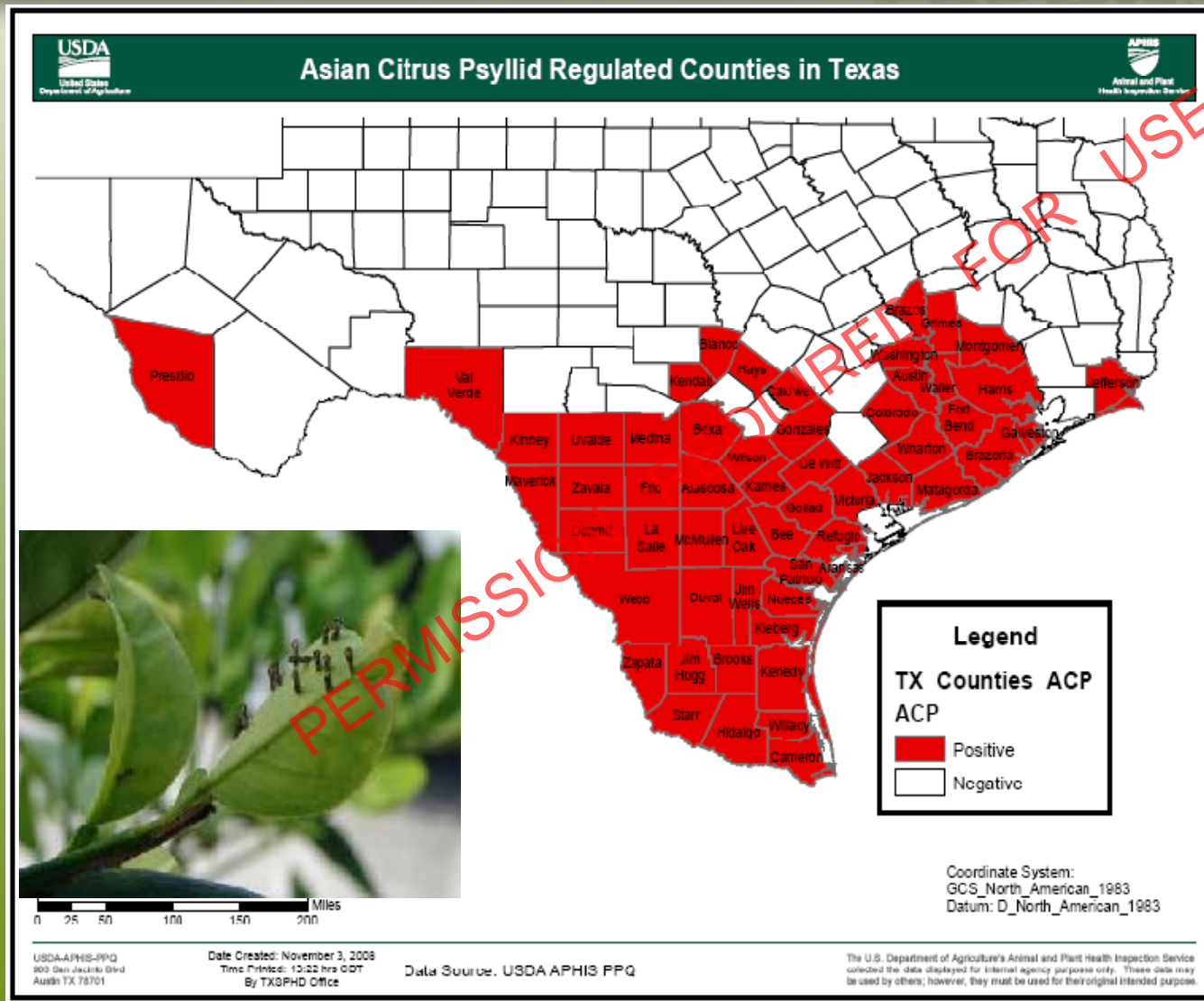


Map Created By CAPS
Wayne Dixon, Trevor Smith, David Saeger

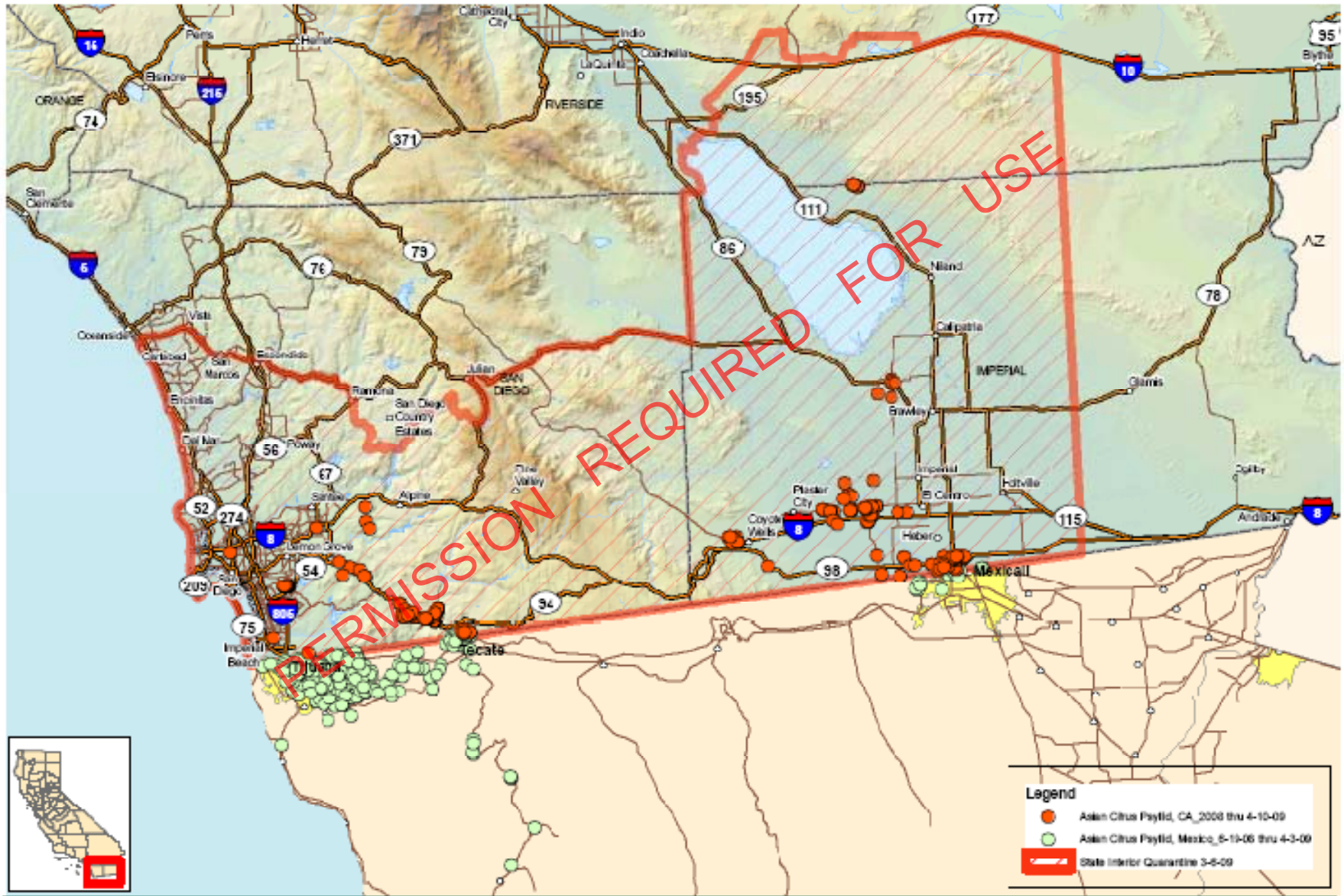


GCS: GCS North American 1983 HARN
September 17, 2008

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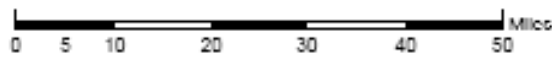
Asian Citrus Psyllid Cooperative Project California and Baja California



USDA, APHIS, PPQ
Western Region GIS Specialist
650 Capitol Mall, Suite 6-400
Sacramento, CA 95814

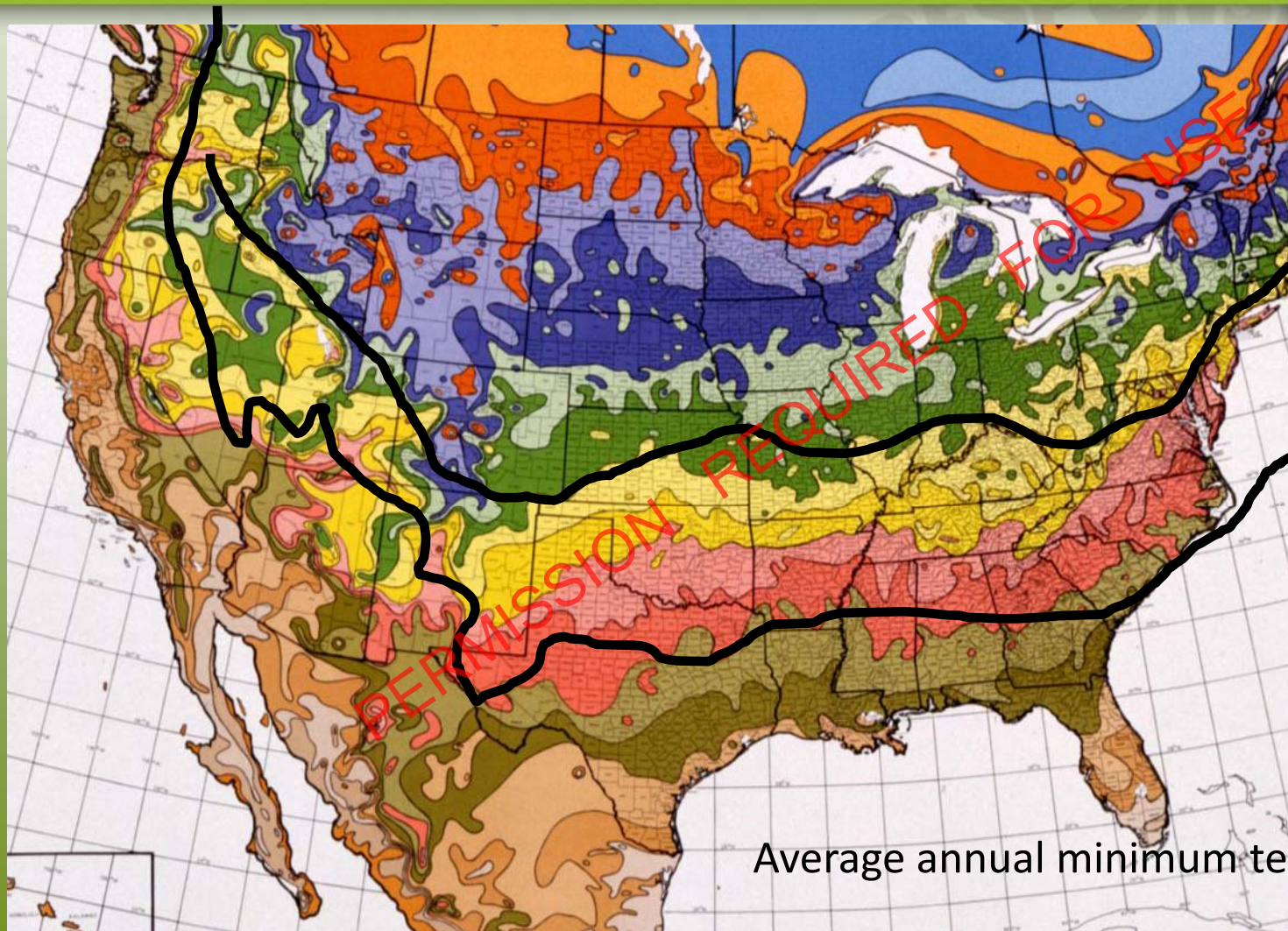
Coordinate System:
Teab Albani, NAD83
Date Created: April 15, 2009

Data Source:
CA Dept of Food & Ag
USDA, APHIS, IS
TeleAtlas Dynamap



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Average Annual Minimum Temperature

Temperature (F)	Zone
Below -50	1
-45 to -50	2a
-40 to -45	2b
-35 to -40	3a
-30 to -35	3b
-25 to -30	4a
-20 to -25	4b
-15 to -20	5a
-10 to -15	5b
-5 to -10	6a
0 to -5	6b
5 to 0	7a
10 to 5	7b
15 to 10	8a
20 to 15	8b
25 to 20	9a
30 to 25	9b
35 to 30	10a
40 to 35	10b
40 +	11

Average annual minimum temperature.



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Source: U.S. National Arboretum, USDA-ARS

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Diagnos

- Support services
- Accreditation
- Methods development
- Policies
- Research



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Plant pathogens

- **Some key disease threats cannot be cultured**
- **Symptoms non-specific**
- **Uneven distribution of pathogen within host**
- **Diagnostics lack sensitivity and specificity**
- **Latency of symptom expression**
- **Easy uptake and transmission by vectors**



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Recent Regulations

- **Interim Rule – Interstate movement of Citrus fruit from quarantine areas**
- **Interim Rule – Citrus Nursery Stock from quarantine areas**
- **Final rule for Interstate movement of citrus fruit from Florida**
- **Federal Orders – Citrus Greening & Asian Citrus Psyllid**



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Rule-making Process

- **Pest risk assessment**
- **Risk management analysis**
- **Environmental assessment**
- **Economic analysis**
- **Public comment**



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Response Capability

- Incident Command System
- New Pest Response Guidelines
- Action Plans
- Task Force/Action Committees
- Training on Pest Recognition & Diagnostics



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- ***New Response Guidelines***
 - Citrus Greening – updated April 2008
 - Citrus Variegated Chlorosis – Draft under review
 - Citrus Leprosis – Draft under review
- ***ARS/NPRDS – APS Recovery Plan***
 - Citrus Greening – Plan developed
 - Citrus Variegated Chlorosis – Plan in preparation



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Enforcement

- **Smuggling, Interdiction & Trade Enforcement (SITC)**
- **Investigative & Enforcement Services (IES)**
- **State road stations**
- **End point & terminal inspections**



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Pathways & Sources

- Movement of propagative material
- Movement of fresh cut foliage
- Incidental movement of plant debris
- E-commerce sale of plants
- Hobbyists/gardeners
- Domestic & foreign sources





KAFFIR LIME

Citrus hystrix



Photo by Hilda Gomez-USDA



Photo by Hilda Gomez-USDA



Photo by Hilda Gomez-USDA



Photo by Hilda Gomez-USDA

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CURRY LEAF

Bergera koenigii



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A major contributing cause to pest introduction is a lack of awareness by the general public and affected industry of the threat



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Outreach/Education

- **Public awareness & involvement**
- **Grower/Caretaker education**
- **Educating others – Master gardeners, extension agents, scouts**



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National Campaign

- **Stop spread caused by movement of infected plants from areas under quarantine.**
- **Interrupt purchase of plants over the Internet using banner ads**
- **Create a “micro-site” that contains simple message – Don’t risk citrus; Don’t move citrus**
- **Create greater public awareness of the problem**



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Citrus Greening Disease, Don't Move Citrus Plants, Trees - USDA - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address http://www.saveourcitrus.org/

Asian citrus psyllids have also been found in Mexico, southern California and other citrus-producing states.

LEARN MORE >

+ HIGH-RISK ACTIVITIES

Moving (shipping or transporting) citrus plants outside quarantined areas

Grafting citrus plants

Buying citrus plants of an unknown origin

LEARN MORE >

A message from the USDA | www.usda.gov

+ QUARANTINE INFORMATION

> ALABAMA

> CALIFORNIA

> FLORIDA
Entire state is under quarantine for citrus greening disease and Asian citrus psyllids.
It is illegal to move live citrus plants, plant parts, budwood, or cuttings from Florida. (Note: Citrus fruit cannot be moved from Florida unless USDA has issued a limited permit.)

> GEORGIA

> GUAM

> HAWAII

> LOUISIANA

> MEXICO

> MISSISSIPPI

> PUERTO RICO

> SOUTH CAROLINA

> TEXAS

+ TRACK SAVEOURCITRUS.ORG

FACEBOOK

FLICKR

TWITTER

Start | Conne... | \ncra... | \ncra... | Welco... | 2008 ... | USDA... | Citrus... | 9:50 AM

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Quarantine information by State

Using social media tools

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Regulation changes underway

- 7CFR301.75 – Citrus Canker Regulations
- Interim Rule – Citrus Greening & Asian Citrus Psyllid
- Proposed Rule – Citrus Nursery Stock



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New Nursery Requirements



- Insect resistant enclosures
- Host free buffers
- Nursery environ surveys
- Controlled access
- Monthly inspections
- Reporting requirements & audit controls



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Other Considerations

- Bio-security in all phases of production, packaging & shipping
- Decontamination
- Pest surveillance measures
- Testing procedures
- Treatment requirements
- Labeling/Tagging
- Corrective measures



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Key Technical References

- 2006-7 Citrus Health Response Plan
- 2007 Technical Working Group Findings on Production & Movement of Citrus Nursery Stock
- 2008 Florida Citrus Nursery Stock Certification Procedures Manual
- 2008 FDACS Systems Approach Proposal
- State rules & regulations



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R&D Component

- **Methods Development**
- **Basic Research**
 - **Identify research needs/priorities & monitor progress**
 - **International coordination**



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Center for Plant Health Science & Technology

- Identifying critical needs & priorities
- Developing & validating diagnostics
- Evaluating ways to control ACP
- Convening Technical Working Groups
- Conducting pilot projects



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Technical Working Groups

- Citrus greening/Asian citrus psyllid – January 2006
- Detection of CG positive psyllids – March 2007
- Production of disease-free Citrus nursery stock – September 2007
- Response to early detection of Citrus greening and/or Asian citrus psyllid – August 2008
- Systems approach to disease-free production of Citrus nursery stock – October 2008
- Area-wide Control of Asian citrus psyllid – February 2009



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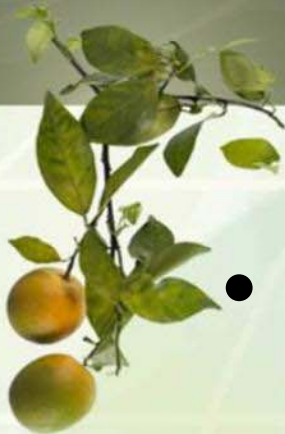


Research

- Major investments in basic & applied research by Florida and California producers
 - National Academies of Science enlisted to review proposals & develop a strategic plan
- ARS & CSREES increasing their efforts
 - ARS SWAT Assessment – April 2008



INTERNATIONAL RESEARCH CONFERENCE ON HUANGLONGBING



“Reaching Beyond the Boundaries”

- Over 400 participants from 26 countries
- Research underway in key areas
- Priorities & needs discussed
- Proceedings will be published by APS



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International Cooperation

- Many pathogens can only be studied at their origin
- Technical exchange vital in developing detection & control strategies
- Addressing the pest at source can mitigate risk of spread & introduction
- Helps gain acceptance of practices & establishment of international standards



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Collaboration with Mexico

- Technical exchange
- Diagnostic training & support
- *Operation Psyllid Watch* detected ACP in Tijuana, Tecate & Mexicali
- Coordinating survey & suppression activities with Mexican Government



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Key USDA Websites

<http://www.aphis.usda.gov>

<http://www.saveourcitrus.org>

<http://www.ars.usda.gov/citrusgreening/>

Other Important Websites

<http://www.doacs.state.fl.us/pi/chrp/index.html>

<http://www.cdfa.ca.gov/phpps/acp/index.html>

<http://www.californiacitrusthreat.org/>



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Contact Information

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**Thank you for
your attention!**

Questions?

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