

# 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



## 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**



**Bayer CropScience**

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

# Florida Citrus Nursery Stock Certification Program

California Citrus Nursery Society  
“Meeting the Challenge of Asian Citrus Psyllid in  
California Nurseries”

June 11<sup>th</sup> & 12<sup>th</sup> 2009

Presented by:

Nate Jameson, Brite Leaf Citrus Nursery, LLC

Why did Florida Change from  
Field Citrus Nursery production  
to Fully Enclosed Citrus Nursery  
Production?

# Citrus Canker

*Xanthomonas axonopodis* pv. *citri*

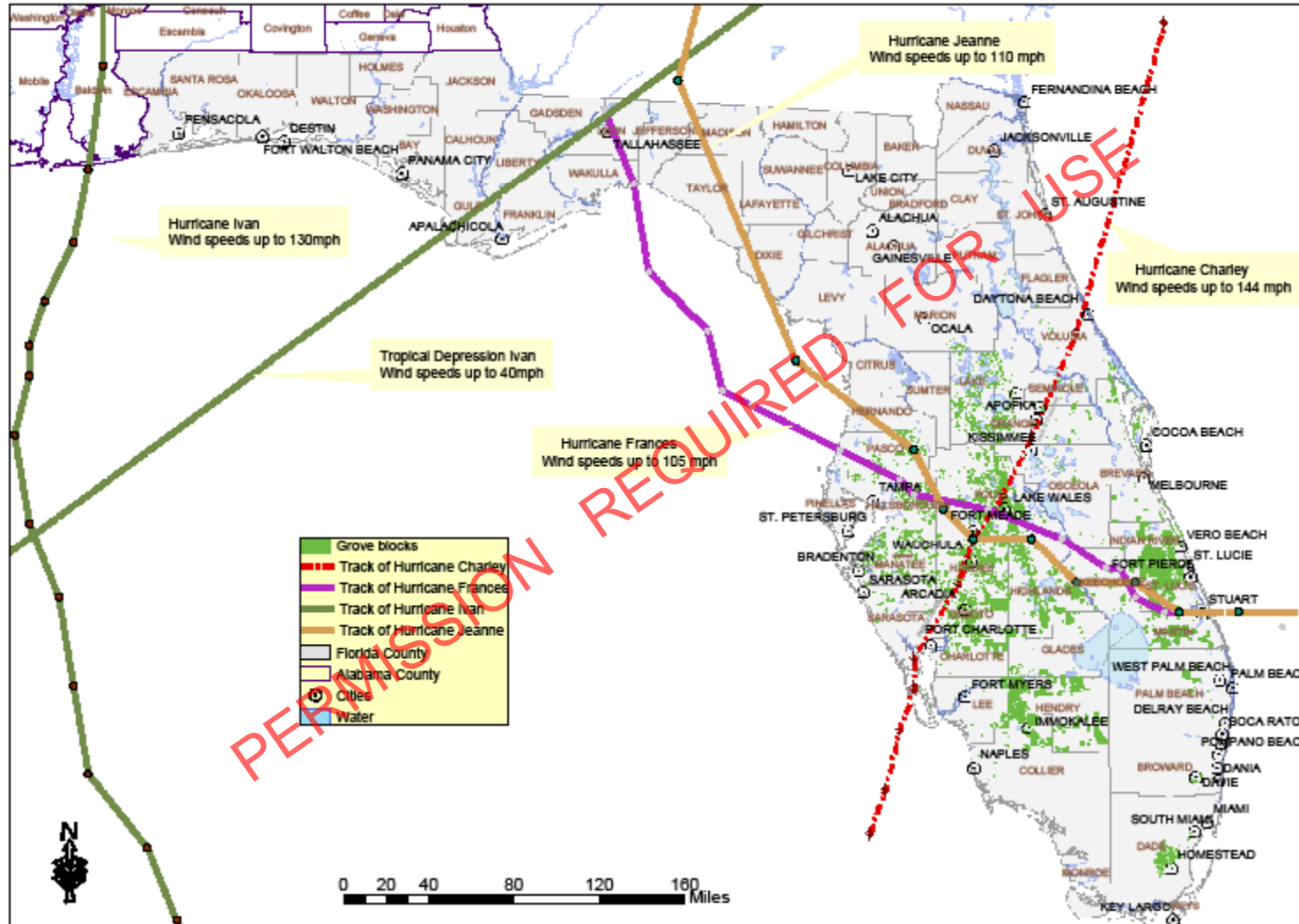
- Discovered in Florida  
1995 in Residential Area
- 1900 foot rule  
implemented 2000
- First field nursery infected  
in May 2005
- Thousands of  
homeowner trees infected



# Canker Spreads

- Hurricane Charley  
August 13, 2004
- Hurricane Frances  
September 5, 2004
- Hurricane Jeanne  
September 26, 2004
- These storms moved Citrus Canker around Florida
- Possibly 20 – 30 miles

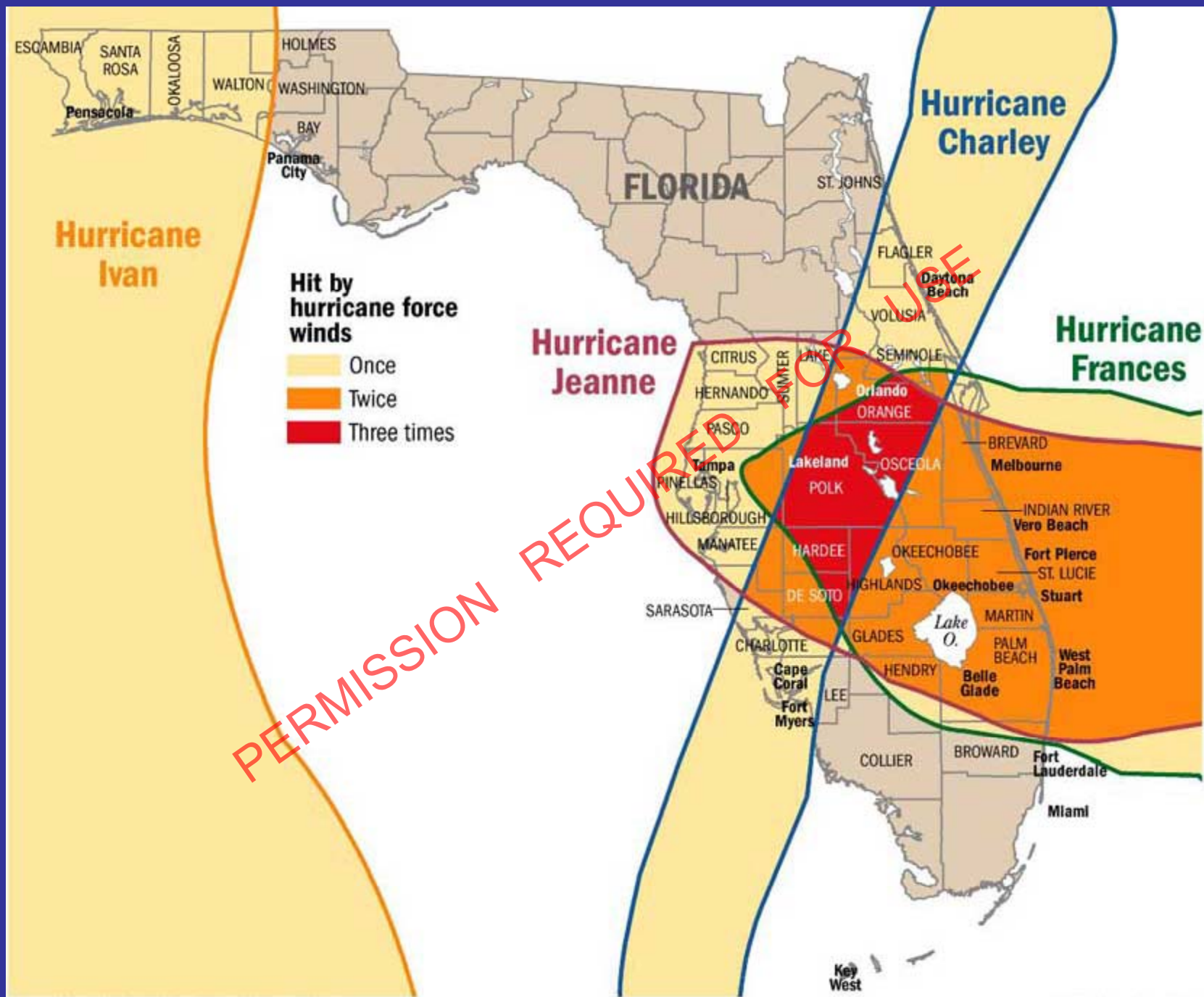
Path of Hurricane Charley, August 13th, 2004, Hurricane Frances, September 5th, 2004,  
Hurricane Ivan, September 15th, and Hurricane Jeanne, September 26th, 2004



Created by CAPS - Andrea Chavez, Wayne Dixon and Elicson Sosa  
19 October 2004 Alaska Coordinate System - NAD83 49588

Florida Cooperative Agricultural Pest Survey Program  
Division of Plant Industry  
Florida Department of Agriculture and Consumer Services  
Gainesville, FL

PERMISSION REQUIRED FOR USE



PERMISSION REQUIRED FOR USE

# Field Citrus Nursery May 2005





# Field Nursery Pre-Canker



# Field Nursery Post-Citrus Canker



Some of you might be asking yourself why is this guy talking about citrus canker?

1. Citrus Canker is a vectored disease that survives in the tree vs. on the tree
2. Eradication programs were developed and implemented for both commercial and dooryard citrus plantings
3. 40,000 acres of commercial citrus destroyed
4. 7 citrus nurseries destroyed
5. Thousands of dooryard trees destroyed
6. Lawsuits filed by home owners
7. Economic cost high, Billions of Dollars

# Citrus Psyllid

*Diaphorina citri*

- Discovered in Florida 1998
- Transmits HLB
  - Greening Disease
- 3-4 mm in size
  - Hard to Detect
- Difficult to control



# Citrus Greening [HLB]

Discovered September 2005

[confirmed by testing at USDA]



PERMISSION REQUIRED FOR USE



PERMISSION REQUIRED FOR USE

# Citrus Psyllid



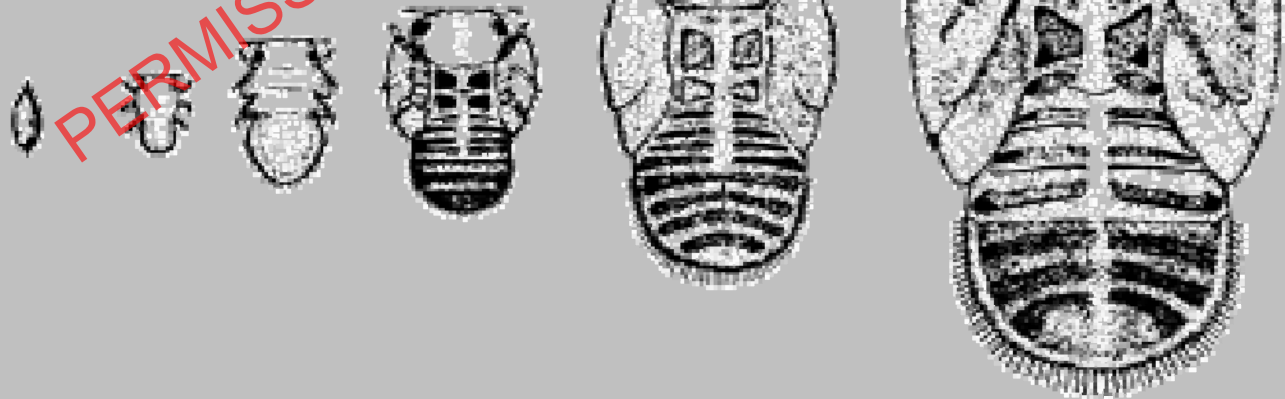
**Waxy Secretions of Nymphs**



**Eggs**



**Nymph**





# Citrus Greening Disease

## HLB

1. Leaves - Blotchy mottle; Yellow veins; Vein corking; Green islands; Zinc def.
2. Twigs - Die back
3. Fruit - *External*, Abnormal coloring; Lopsided; Small; Misshapen; -*Internal*, Aborted seeds; Curved central core; Yellow stain below calyx button
4. Flowers - Off-season bloom
5. Varieties affected – All
6. Lag time between infection & visual symptoms

## HLB vs. Citrus Canker

1. HLB is a vectored disease that survives in the tree
2. Eradication programs could be developed and implemented for both commercial and dooryard citrus plantings
3. What percentage of your industry should you remove?
4. Are you willing to destroy citrus nurseries if infected?
5. Are homeowners going to let you destroy their trees?
6. Will someone file a lawsuit?
7. Where's the money going to come from?

# The Big Question



- What should nurserymen do?
- Options?

PERMISSION REQUIRED FOR USE

# Agencies, Scientists & Growers

- USDA, FDACS, IFAS and Growers began discussions concerning action plans for suppressing diseases Fall 2005
- Citrus Health Response Plan (CHRP)



# Management vs. Eradication

- Evaluate each segment of Florida Citrus Industry in terms of Disease Mgt.
- Develop Action Plans for each segment to prevent disease spread

Three Basic Segments:

1. Nursery Production
2. Fruit Production
3. Fresh Fruit Packing and Juice Processing

# Citrus Health Response Plan

- The CHRP is a Federal Document that defines the standards necessary to allow Florida to ship citrus Nationally and Internationally
- The Florida Citrus Nursery Regulations are one component of the CHRP requirements

# Florida Citrus Nursery Stock Certification Program

- Florida required to adopt a rule governing citrus nursery plant protection as part of the USDA Citrus Health Response Plan
- Florida developed the Citrus Nursery Stock Certification Program
- State Rule 5B-62
- Web address:

<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5B-62>

# Florida Rule 5B-62

- Became state law December 26, 2006
- There are 27 sections
- Review 7 most important

PERMISSION REQUIRED FOR USE



# Purpose

The purpose of this rule chapter is to minimize the spread of serious graft-transmissible diseases and certain other pathogens as well as nematodes of citrus by requiring all nurserymen propagating citrus to participate in a mandatory citrus nursery stock certification program. The requirements for program participation are established in this chapter. It is intended that there shall be no propagation of citrus nursery stock except as provided in this chapter, and it shall be unlawful to plant citrus nursery stock in Florida unless that citrus nursery stock has been propagated pursuant to this chapter.

# Requirements for Citrus Nursery Structure

1. All citrus nursery stock propagated after January 1, 2007 must originate from a greenhouse structure and site approved by the Department. All citrus nursery stock moved or sold after December 31, 2007 must originate from a greenhouse structure and site approved by the Department.
2. Effective January 1, 2007 newly propagated commercial and dooryard citrus nursery stock and all budwood source trees must be maintained in an approved structure at an approved site as follows:
  - (a) An approved structure must have enclosed sides and tops built to exclude insects with positive pressure double-door entries. Sides and roofs shall at a minimum exclude melon aphids.
  - (b) If cooling pads and fans are used, they must be enclosed with insect screen that will allow for adequate air displacement.
  - (c) If the integrity of the structure is compromised or breached, the citrus nursery stock shall be subject to immediate quarantine action and will not be eligible for certification until treated as prescribed by the Department and released from quarantine. Pest monitoring tools such as yellow sticky traps or other detection devices for plant-feeding insects should be used by the nursery and may be used by the Department to evaluate the integrity of the structure.
  - (d) Dooryard citrus nursery stock maintained in containers larger than seven inches in diameter may be kept in an enclosed screen house designed to deter citrus psyllids.
  - (e) Citrus nursery stock may be moved from one approved structure into another approved structure on the same approved site provided the plants are in the process of being actively relocated and are covered.

# Requirements for Citrus Nursery Site Approval

- (1) Citrus nursery sites must be a minimum of one mile away from commercial citrus groves and 100 feet away from plants not certified by the Department as being free of nematodes listed in Rule 5B-62.003, F.A.C., and free of any exterior, field or container grown plants from all genera, species, and varieties of the Rutaceous subfamilies Aurantioideae, Rutoideae, and Toddalioideae, unless specifically excluded by the rules of the Department. Citrus nurseries located on sites prior to April 1, 2006 will not be required to comply with the one mile setback from commercial citrus groves while continuously operating at the April 1, 2006 location. Seed source trees may be kept within 100 feet of a citrus nursery site or on the nursery site until January 1, 2012 provided they are not infested with citrus canker or citrus greening and are treated to control Asian citrus psyllid.
- (2) Sites found to be infested with nematodes listed in Rule 5B-62.003, F.A.C., will not be approved for field grown or in-ground production of citrus nursery stock. Citrus nursery stock may be produced on the site if grown on benches at least 18 inches above ground.
- (3) The nursery site should be well drained with no runoff from surrounding areas.
- (4) The site should have adequate parking outside the facility.
- (5) The site should incorporate an area for deliveries and shipments.
- (6) The site should have an adequate water supply without using surface water for irrigation.
- (7) The site should incorporate natural or artificial windbreaks that would reduce wind blown rain.
- (8) The nursery site must be fenced and all entrances must be secured.
- (9) Site access shall have permitted entry only through an area that incorporates decontamination areas for personnel and equipment.

# Requirements for Citrus Propagation

- (1) Propagative material including budwood, air-layers, cuttings and all topworking material shall be from source trees produced or grown in accordance with Rule 5B-62.012, F.A.C., and for which a Certificate of Source Tree Registration (DACS-08072) has been issued as specified in Rule 5B-62.017, F.A.C.
- (2) Budwood shall be taken under the direct supervision of a witness authorized by the Department. Budwood from each source tree shall be wrapped separately. Each bundle shall be labeled showing variety, the tree identification number, and the number of buds counted or estimated.
- (3) All propagative material data including topworking shall be recorded on a Source Tree Bud Cutting Report (DACS-08172) and submitted to the Bureau of Citrus Budwood Registration at the time of collection. Persons authorized to fill out a Source Tree Bud Cutting Report (DACS-08172), shall sign a Certification To Witness Registered Budwood form, DACS-08111.
- (4) Propagations from each source tree shall be maintained in nursery rows or on greenhouse benches so that each group can be traced back to an individual source tree. Nurserymen shall use permanent tags to label each separate group of propagations with the source tree registration number.
- (5) All citrus nursery stock and propagative plant parts shall remain within the approved structure at all times or be moved under protective cover.

# Scion Trees

Scion trees shall be propagated from foundation trees, be registered on a Certificate of Source Tree Registration (DACS-08072) as specified in Rule 5B-62.012, F.A.C., and must meet the following requirements:

- (1) Scion tree planting is witnessed by the Department on Growers Record of Registered Scion Tree Movement Form DACS-08071.
- (2) Registered scion trees shall be vigorous, productive, and horticulturally true-to-type and shall have borne fruit.
- (3) Scion trees on which annual registration fees are not paid shall be removed from the protected greenhouse within 30 days of the second notification of the Statement of Charges for Annual Source Tree Registration (DACS-08064).
- (4) Scion trees found infected with a pathogen shall be removed from the protected greenhouse within 10 days of notification of test results.
- (5) Scion trees shall meet all the requirements in Rule 5B-62.012, F.A.C., for source trees.
- (6) Effective January 1, 2007 all scion trees must be located in an approved structure as described in Rule 5B-62.010, F.A.C.

# Increase Trees

Increase trees shall be registered on a Certificate of Source Tree Registration (DACS-08072) as specified in Rule 5B-62.012, F.A.C., provided they have been propagated as follows:

- (1) Budwood must have been obtained under the direct supervision of the Department from foundation, or scion trees.
- (2) There must be a minimum vacant space of 24 inches between each clone of increase trees planted in the ground and 12 inches between each clone of plants grown on greenhouse benches (or a well-defined physical barrier between clones) with each clone individually identified.
- (3) Trees propagated as increase trees under this rule chapter serve as registered sources of budwood with no testing required for a period of up to 36 months from budding.
- (4) Nursery stock propagated from increase trees shall not serve as further sources of registered budwood.
- (5) Increase trees from foundation trees used for increase budwood shall qualify for scion grove planting in accordance with Rule 5B-62.015, F.A.C.
- (6) Increase trees shall meet all the requirements in Rule 5B-62.012, F.A.C., for source trees.

# Sanitation

All equipment entering or leaving the nursery must be clean of all plant material, soil and decontaminated in accordance with Department procedures using approved decontamination products.

(a) Budding knives, clippers and other cutting implements shall be sterilized between different groups of propagations using a solution of household bleach 20% by volume.

Sterilization solution shall be made up fresh each day.

(b) All equipment, if possible, should be kept on site.

(2) Nursery employees who work with citrus produced outside of the approved structure shall not return to work within the approved structure until the following day.

(3)(a) Prior to entering the nursery everyone must decontaminate with an approved personal decontamination product and wear a clean garment that should be provided by the nursery. If gloves are worn, they must be disposable gloves or decontaminated each day and kept on site.

(b) All persons entering an approved structure or soil storage area shall walk through a sanitizing foot bath containing a decontaminant that is approved by the Department such as copper sulfate.

(4) All plants, plant parts (except seed), soil, peat, sawdust, mulch, manure or other plant-growing or potting media entering the approved site for the production of commercial citrus nursery stock must be accompanied by a nematode (BN) certificate.

(5)(a) All pots, cans, or other containers used to produce commercial citrus nursery stock free of nematodes of citrus must be stored in such a manner to prevent contact with the ground or contamination by flooding, rain-soil-splatter or ground water runoff.

(b) Growing containers shall be cleaned and decontaminated between crops of commercial citrus nursery stock.

(6) All benches approved for nematode certification for commercial citrus nursery stock must be at least 18 inches above the ground. Measurement shall be from the bottom of the bench to the ground surface. Benches shall be cleaned and decontaminated between crops.

(7) All nematode-certified growing or potting media used for commercial citrus nursery stock must be stored at least 18 inches above the ground or on concrete or asphalt that is above ground level and not subject to flooding or ground water runoff.

# Sanitation cont.

- (8) Non-certified nursery stock cannot be grown in or introduced into the same greenhouse or structure with citrus nursery stock.
- (9) Any plant certified free of nematodes that is dropped or set on the ground no longer meets nematode (BN) certification and shall not be returned to the bench.
- (10) Nursery records shall be made available to division inspectors for:
  - (a) All chemical applications;
  - (b) Nursery budding and tree movement records.
- (11) It shall be the responsibility of the nurseryman to:
  - (a) Prevent encroachment of Rutaceous subfamilies Aurantioideae, Rutoideae, and Toddalioideae, plants and the use of non-certified material, which would endanger the nursery site of becoming infested with injurious nematodes of citrus.
  - (b) Follow established sanitation procedures to prevent nematode, Diaprepes, psyllid, aphid or other common plant pest infestation of the nursery site.
- (12) Nursery areas and perimeter shall remain weed free.
- (13) Approved citrus nursery sites not planted within 12 months shall be reevaluated prior to use.
- (14) Any citrus nursery stock or budwood source tree found infected or exposed to plant pest infestation shall be subject to immediate quarantine action and will not be eligible for certification until treated as prescribed by the Department and released from quarantine.



# Foundation Trees

Foundation trees belong to the Florida Department of Agriculture and Consumer Services and are kept in secure greenhouse facilities for budwood cutting and distribution to citrus nurseries. It shall be unlawful for any person to plant any genera, species, and varieties of the Rutaceous subfamilies Aurantioideae, Rutoideae, and Toddalioidae, within one mile of a foundation tree and unlawful to plant a commercial citrus grove within 10 miles of a foundation tree.

- (1) Foundation trees originate from tested parent trees.
- (2) Foundation trees shall be the source for all scion trees.
- (3) Foundation trees shall meet all the requirements in Rule 5B-62.012, F.A.C., for source trees.

# Psyllid Status

- Florida 1998
- Texas 2001
- Mexico 2004 ?
- California 2008
- What about other threats ?
  - Citrus Variegated Chlorosis
  - Sudden Death
  - Black Spot
  - Leprosis

# What Happens when HLB is discovered?

- Finger Pointing-It's always somebody else's fault
- Growers and nurserymen become adversaries
- Nurserymen and regulators become adversaries
- All exposed budwood becomes suspect for infection

Budwood shortage

Price increases

- Growers stop taking exposed trees
- Greenhouse construction slow
- What about seed trees?

# Suggestions

- Be pro-active and develop a nursery rule
  - All Citrus Nurseries must participate
  - Commercial , Dooryard and Back Yard
  - Develop tracking system to ensure budwood used is Pathogen Free
  - Establish penalties for illegal propagations
  - All nurseries must be on level playing field
- Visit Infected Citrus Production Areas
  - Brazil, South Africa, Florida
- Talk with Growers Fighting Diseases
- Learn to ID visual symptoms
- Visit Nurseries Growing in Screenhouses

# Final Thought !

We all do what we want as long as we can afford it. Question is, what will we do when we can no longer afford it?

Thank You