Citrus Expo 2006

Ft. Myers, Florida
August 28, 2006

(Notes by Felicia Parks)

Status of Citrus Canker
Richard Gaskalla, director, DPI, FDACS
Thank you to the organizers for bringing the South American citrus growers & specialists to share information with us at this meeting.
Eradication of Canker was undesirable.

Citrus Health Response Plan was developed:
Registrations-tracking; Survey inspections; Fruit certification; Disease management strategies
CHRP Status: Nursery regulations and 2006-07 fresh fruit movement complete
BMP Grove mgmt. and survey for disease in progress.
Canker Exposure Map-Draw a line across SR60, the north is free of canker and the south has infections.
Canker finds 2006-No real pattern by the month in 2006
60% have been inspector finds; 40% have been industry finds.
CHRP Priorities: Fresh fruit inspections; Harvest inspections; Continue exotic pest & disease surveillance; Education of growers/packers; Sept. 7th Management Techniques: World-wide Meeting
Long Term: Action of abandoned groves & residential properties, Level playing field on mgmt strategies
Visit our website for more information and to help keep current:
www.doacs.state.FL.US/Pi/chrp

Citrus Canker Control Measures
Beatriz Stein, chief, fruit Section, EEAOC
Lemon in Tucaman, Argentina
She works at a 100 year old experiment station and also is a lemon grower.
They average 600 boxes/acres on a good soil/climate with good advice from research.
Introduction to Argentina Industry:
Argentina - In 2004-05 they were rated 1st as the biggest producers of lemons in the world. In 2006 they were rated 7th. They produce 29% of the lemon crop in the world. 144,400 ha, 3 million tons of citrus are produced here.
NE Argentina area produces Tangerines, Oranges and Navels. (32% of Argentina production)
NW area produces Grapefruit, Valencia and Lemons mostly to Europe (Spain)
Lemons-60-70% processed and 32% is fresh market. 30% of the Tucaman groves are under irrigation. Most of the soils are fertile, with hot humid summers. It rains during the summer. They have an expanded flowering season. Harvest is 3-4 times in the winter.
Challenges: Leafminer pressure is high and 80% of the flushes have damage
Citrus Canker: Has been present for 4 years with uneven distribution.
Damages: limits commerce, increases costs, reduces marketable fruit
IPM of Canker: avoid the entrance of the disease into the grove; use canker free new plantings; sanitation: Must have permits to get into the groves, Shoe and hand disinfection, Equipment disinfection in and out going.
Chemical control-2 trials in process- El Corte trial 2002-06: 2 different scion/rootstock and trees 5 years old. San Andre trial 2004-06: 3 year old trees, using high volume handheld spray

6 applications per season - Begins at petal fall and ends in Sept. Evaluation I, II, III April, June and August. Classification of fruits with and without canker. Graphs were displayed.

All treatments have 50% or more marketable fruit. Best treatment had 1% infected fruit, worst had 5% infected. Control had 50% infected. Best was Co Ox 0.3% and Mz 0.2% + oil 0.1% +Abamectin Young plants with high incidence low dosages of copper does not work well. Always Cu Hydroxide is more efficient. Use oil as adherent. Kocide 0.15% + oil 0.1% works best than higher doses of Kocide. Copper Oxychloride with Mancozeb@2 doses shows 3 years figures are all about the same. Copper Oxy combined with Quat Ammonia did not help much.

Conclusions: All cupric fingicides are effective (once per month, checking to see if less will work); Dry spring and summer best results; Higher doses more effective; Use low doses when disease and favorable conditions are low and plants are young

Leafminer damage control: Abamectin with oil by plane on bearing, ground rig on non bearing.

Fresh fruit steps: Inspection of grove, Pass—certification; Harvest inspection, Packing house registration, Packing house inspection especially if for European Union

Traceability: Each bin has stickers (2 colors) which help track the destinations; Orchard #; Date of harvest; Computer system database; Sanitary auth. Inspection sticker; Bar codes; In case of a problem it can be traced back; Block # and how many bins per block; Time of processing; Sodium hypochlorite disinfection PPM for __?___ time and location; Clear European Union labels on pkg. in Packing house; Reinforcement of inspections in packing house; Electronic eye and people inspecting at 2 location on line; Lab samples taken to make sure before it leaves Buenos Aires

Answer to Questions:

Windbreaks not use in Tucoman because they have heavy soils there. No resistance has been found to copper there yet. Copper 2000 was used. The oil was the usual citrus oil everybody uses in the summer. % formulation was used-0.2% means 200grams product per 100 L water

Citrus Canker in Argentina
Cecilio Taylor
Argentina citrus grower

CECNEA Chamber of Citrus Exporters from the NE Region of Argentina.

Canker fight has occurred for the last 5-6 years. They have found control methods and also think positive 1985 windbreaks were found to be of benefit. Their location is bordered by 2 rivers with a large fresh water basin in between that they can pump water from during dry times.

History: 1915/18 1st planting of mandarine and orange

1937/40 New varieties from south Africa came grapefruit/navel/Valencia

1940/45 Tristeza-lost 85% of their citrus of sour orange stock. Most growers are on trifoliate rootstock now.

1940/50 Locust plague

Citrus Canker originated from Paraguay Why? There was no control there. Fruit was brought in over the river and juiced. The rinds were distributed throughout the area to cattle.

Climate: The temperatures in the summer at 70-80 degrees. Rains occur from June to August (25-30" rainfall per year). May thru Sept. is harvest time. Dry period is from Jan-Sept

Canker Symptoms: Mid 1980's we realized there was a problem. The govt. never helped. People thought it would disappear in a couple of years. Eradication of trees at the start of in infection 1977-1980. We knew it wasn't the solution. Violent situations developed and we stopped the eradication. We decided to try to manage it.

1st Reaction: Copper applied every 15-30 days. Trees were defoliated with herbicides (not recommended)

Results: Copper made the trees blue. Fruit was ruined. Phytotoxicity disorders were produced. Red scale and mite problems developed.

Wind Breaks and the end of the 1980's - Takes time. Results were seen in the 1990's. Know the wind direction. Create thick breaks on the side from where the wind comes.

Wind Break Types used: *Eucalyptus grandis*-good height, fast growing, must leave a big space away from citrus because it competes with the citrus roots for nutrients. *Cauarina cunninghamiana*-most popular. Pinus-slow growing, 25 meters of height. White Popular-new, no leaves in winter to stop wind flow, not affected by herbicide, 1 meter spaced. *Cupressus labertiana*-lower height

Combining different types: Start with fast growing Eucalyptus then interplanting Pinus. Cut Eucalyptus when Pinus is tall enough. Bamboo/Eucalyptus-(bamboo is an invader and not recommended)

Timing of the windbreaks: Plant the windbreaks 1st, then groves. Irrigation of windbreaks speeds growth

Other ways to help control Canker: Hand pruning; Leaf cleaning; Remove infected fruit; Scout/control and keep it clean especially when it starts to flush

Results of Wind Breaks: Reduced canker by 40%; Improved spraying on windy days; Minimizes damage to fruit by rubbing; Improves external fruit quality

Size of Plots with Wind Break Divisions

40 acres is the largest division allowed by law. 10 acres is a good size

Sprays: Spray each flush; Copper products; Doses-1,5kg metallic Copper/1000 liters water

Leafminer flushes 3,5-5cm (Vertimex 200cc+5l+oil/1000 liters 15 day old flushes)

Sanitation: Farm entrances use Quaternary Ammonia 2% or chlorine.

Be very particular with harvest crews or anyone coming from outside the grove.

Harvest inspections:

30 days prior to harvest and to neighboring lots if found. Groves also have own crew inspecting.

Citrus Nursery
Carlos
President of Citrus Nursery in Argentina

Sanitation is strict. They change the blocks they use every year. Use chicken manure for fertilization. Seeding machines used. Cover the seed with rakes. Wind breaks in 10 acre divisions. Root stock machine. Root stock is budded and cut by hand. Seed is certified by the government. Rows are tagged as they pass inspection. The bud is from the experimental station and free of canker. The seedlings are topped prior to pulling. Some growers prefer all leaves be pulled prior to pulling to prevent any possible infections from coming into the grove. He typically will not send 4-5% of the plants due to thin roots. Plants are bagged 30/bag, mudded and wrapped in pine needles, labeled and shipped. They are okay in this condition for 20 days in the bags.

Current Status of Greening in Florida
Wayne Dixon, Chief Bureau of Entomology, Nematology, and Plant Pathology, DPI, FDACS

Visit our website and download the map of greening in Florida. Dept. of Plant Industry. If you zoom in, you can get good results on computer. Lee county has 1 positive ID and 59 negative so far. Why are there so many negative samples? The symptoms in the tree may not have yet enough bacterium yet to indicate a positive.

In the Brazil visit, we saw that surveying of the groves is a key ingredient for control. Also screening of nursery/budwood stock is important.

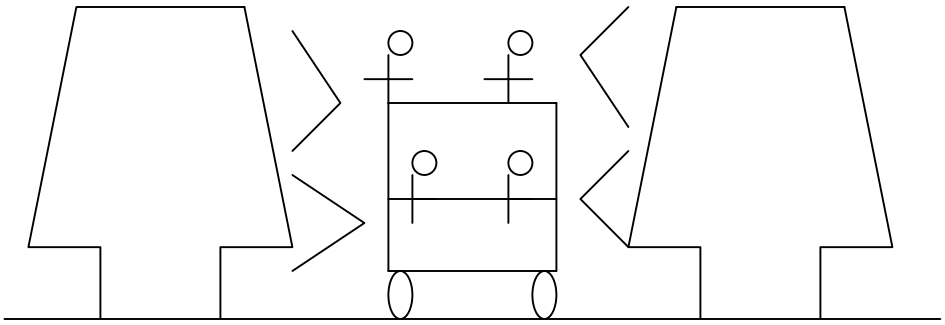
Greening Production Management
Fernando Tesi, Brazil Citrus Manager
Cambuhy Farms

In Brazilian oranges greening moves rapidly. Cambuhy Farm is a 35,000 acre farm with 18,000 acres in citrus. Plant age ranges from 1-20 years. High solids makes for low cost per acre on this farm. Plant density is low. They must irrigate. They have plaques. Citrus greening is a new problem. They must inspect the trees for greening 4 times per year. This makes costs higher. Vectors must be controlled.

Handling greening: Farms that do not control their greening are out of business. We use 2 inspectors per lane of trees. Inspecting 500 trees per day per person. We mark the plants with a pen to help with

diagnosis. We eradicate or prune trees with symptoms. For adult trees- 1 inspector per 190 acres 4 times per year. For young trees-1 inspector per 280 acres 8 times per year.

See picture below. This method of scouting for greening is 94.73% effective. This is the best method. 4 persons required to ride a vehicle. The vehicle is usually a tractor.



For PCR testing we collect the leaf at the base of the branch showing the symptoms.
Phase 1-yellow dragon; Phase 2-PCR; Phase 3- Cross Inspection; Phase 4-Bonus for Inspection
Train & Motivate inspectors! Spring & Summer Transmission of Greening Fall & Winter Detection of Greening.

Growing Demand for Citrus in a Cost/Price Squeeze.
Bob Norberg, Director, Economic and Market Research, GDOC

Opportunities: Cost to make orange juice is up. Consumers react by purchasing less. Juice is expandable consumer good. Make a difference by 1) advertise, 2) promotional tactics

Costs to Produce: 2003-04 was $2.55. Now is 2.82. Profit margins are down 80% from a year ago. Retail prices are going up example Walmart is up 9.5% this past year.

Consumption versus Demand: Consumption is gallons sold. Demand is sold at specific price. Demand is coming back from a year ago. 7% of total consumed liquid is orange juice. Water is the only one gaining shares now.

Perception of Orange Juice: Surveys- 70% of consumers drink OJ weekly (feel they can drink more but waiting for sale or a specific brand in the store); 23% of consumers drink OJ daily

Fixed Consumption verses Expandable: Expandable is the target. Advertising gets people to want the product. Merchandising gets the people to buy it. Retailers are the consumer's critical link. Merchandizing reinforces, enables consumers, category market, generic. Why? Profit

Promotional Tactics: Feature adds, Displays, Feature with display, Temporary price reductions, Baseline, Promotional opportunities

FDOC supplies compelling market information
Motivate retailers; Use high quality promotional tactics; Add pharmacy initiative; Reinforce grocers auth. In health (Secondary cooler locations; Dairy case shelf allocation; Brochures)

Summary: High production costs driving change - FDOC is working with retailers to expand consumption
Questions? What age group? 35-65 years of age

Ag Labor Relations in Transition
Walter Kates, Director of Labor Relations Division, FFVA

When is it not a transition? Where we are now and predicting the future:1952 Immigration and nationality act INA; H2 program on other coast; Both allowed foreign seasonal workers to enter US; Mid 1960's Congress eliminated the INA and kept H2; We saw a transition in citrus where many immigrants started to dominate workers in the industry. There were no problems. 1980's congress passed IRCA-no illegals allowed; Congress preserved the H2 program and have a more generous amnesty program in Ag. SAL's workers allow for Ag employees. We were good! Congress had I9 form and all was well. SAL's workers left Ag and we had a shortage in Ag. Fraudulant documentation started happening and employees couldn't question by law documents for fear of discrimination. 9/11 came and drove legislation to change issue by shutting down borders. Dec. 05 Congress passed a reform bill and increased border enforcement/build a fence. Penalize employers who use them became a federal felony. SS enumerization allows for fast verification of documents. We cannot live with this.Ags Jobs Bill is preferred. (Reforms bill and almost was passed 5 years ago); Added it to a senate bill and was overwhelmingly passed; Helps us; Those immigrants who qualify must stay in Ag. for 3-5 years. What do we do with the illegals here now? Amnesty becomes an issue. Senator Martinez-people who have been here for years illegally have roots. We need to give them a chance. Those who recently are here must go home. House bill-with us 100%. Senate side-has everything for everybody; 2006 demonstrations wiped out the middle ground. Now nobody has met and talked for a while. Trying to get sides together now. House still has some trepidation about what to do with illegals. Seeing a shrinking labor supply now; H2H $8.58/ hour minimum wage now. 45 day process now to get workers their papers so they can work.

WPS Hot-Button Issues
Mike Aerts, Assistant Director of Environnmental and Pest Management Division, FFVA

New Penalties: $250 not less than per violation,

$250 times the number of workers sent into grove still under restriction. Not negotiable.

WPS Enforcement: ¾ million dollars for 10 new employees doubles the number of inspectors in FL this year. Farms inspected last year 1,789; 46% were in noncompliance; On the hotline, 114 complaints were logged last year. 56% of those checked were in noncompliance. Pay attention! Where are the violations occurring? Central posting and training; At the booth in the trade show pick up copies of WPS inspection forms-use this to check yourself and prepare.

The EPA is considering enhancing certification for general user.

Applicators certification of 15 persons will stop-all must be certified; Trainers must test users 18 years of age for application; Testing for occ.; Users; Children protection under OSHA; CCA-exempted out of this; Want all of these in place by this time next year.

FL Ag Safety Worker Act FAWSA - MSDS copy provided (in your possession)

Seller provides-written or printed; If worker asks, must have it within 2 days to that person.

Must provide report of all complaints to FL House & Senate. Pay close attention. Stay in compliance!
Questions: Hiring temps for canker inspection. If workers are contracted are they exempt? No

Immokalee SWREC has on powerpoint the lectures from the Citrus Expo for the last few days.
At Barto Stewart Ag. Center on Oct. 3 at 1:00PM there will be a forum on Defoliation Tool for Citrus Canker Control.

Nursery tree production and availability: a nursery managers view.
Nate Jameson, past-president, FCNA

Roland L. Dilley and Son Inc. Citrus Nursery
Pictures shown pre and post canker. The nursery was destroyed due to the control actions.

History of Canker: Found in Dade County; Law suits; Hurricanes; Eradication program ends; May 2005 first canker found in citrus nursery; 8 nurseries were destroyed-5 million trees had to be destroyed (significant loss); 62% of tree inventory was destroyed; Included budwood (7,951 trees) and seed trees. As a result, budwood is not easily found. Budwood must now be certified. Tree movement has been reduced to almost zero. Value of tree liners and seedlings destroyed ranges from $24,000,000 to $27,000,000. Not included were the cost of the loss of budwood in these figures.

Budwood: Regulated by the DPI; Originates from starter certification program (pathogen free); Annual testing of scion for pathogens

Budwood Foundation: 50% of winter Haven/Dendee Budwood was lost; Due to this the Bureau of Citrus Budwood has limited availability of budwood; Limit of 200 eyes/customer/variety

Greening: Citrus greening in the winter of 2005 was confirmed in South FL

In the efforts to prevent the further spread

All outdoor budwood sources are suspect for greening

Concern by nurserymen, growers, DPI, IFAS, USDA and other citrus producing states.

FL Citrus Plant Committee was formed as a result:

What will the nursery industry do? 2 opposing groups; Nurseries can stop selling; Determined that what was outside must go inside

Rule 5B-62: Keep psyllids out; Existing plants sell until Jan 2008. There is a significant demand for trees.

Costs $7-12/square foot to build cover structures. 9 million trees needed invest required

As a grower: build a relationship with a nurseryman; order trees in advance; Order 75% of what you think you will need; Expect cost to go up, Inspect your nursery trees, Expect more risk.

Question: Compensation for nursery tree losses? USDA Funding is allocated, don't think that is has been received yet.

Managing Canker
Jim Graham UF/IFAS CREC

Where are we at in FL with canker? In general fruit are clean especially where growers are taking steps for control. There were infections early in the season after Wilma. Fruit set just after became infected. Processed fruit-early infected fruit becomes a problem as fruit matures. Canker finds after Wilma-75% of infected acres is within 5 miles of a canker find. Immediate concerns see June Citrus Industry Magazine. History of research efforts based upon South America. UF/IFAS & USDA/ARS conduct research in Brazil and Argentina since late 1970's. Recent trip listed in citrus industry magazine. Serious decontamination between blocks in South America. Defoliation-copper nitrate & reglone experimentation. Do the leaves on the ground further transmit disease? No, not where dessicants were used. Leafminer control-more of a problem now on east coast due to dryness. This drives inoculum production. The citrus spray guide contains products for control.

Windbreaks and Copper:

Essential for fresh fruit production; Most effective measure for canker management.

Kocide and Streptomycin reduced rates and increased frequency of sprays less risky during sensitive periods of fruit development. Combos of windbreaks and copper were most effective.

New trials add leafminer control to see if there is additional help.

Varietal resistance-making hybrids

Kumquat; Citrus ichangensis-cold hardy, non edible; Inject leaves with canker and watch for the symptoms. Works with acid fruit and not with sweet fruit. Mapping canker resistant genes and determining their functions. Quantitatively linked trait analysis for resistance-mapping. Microarray analysis-enables study of complex interplay of all gene simultaneously. Chemicals that produce induced systemic resistance ISR gene responses and how they control disease.

Variety improvement for Grape Fruit:

A pummelo fruit hybrid resistant to canker is a valuable breeding parent.

Managing Psyllid
Phil Stansly UF/IFAS SWREC

Lady beetle- no cost; Metallic blue lady beetle- no cost; Blood red ladybeetle- no cost; Multicolored asian ladybeetle- no cost; Lacewing- no cost; Hirsutella citrifomis- no cost
Tamiarixia radiate- no cost (watch for emergence holes)

They are every where why aren't they doing more paratism. Studies in Puerto Rico show a lot more paratism there than here. Why? Trial –exposed psyllids are dying, caged ones live, and concluded that lady beetles are doing most of the control.

When is biological control not enough?

In nurseries and young trees or where ever greening is found.

Scout for greening:

Inspect twice per year and Rogue

Brazil scouting:

4 passes per year; All trees; Rogue immediately

Focus control on young trees - Susceptible (Lose value fast); Likely to get it (Frequent flushes, Likely sources); Good control practices

Program

Admire or Temik in winter/spring; Allows beneficials to build up; Most flush; Longest residual; Oil is an option; Summer-rapid leaching, alternate products; Fall-admire again if psyllids are hot

Foliar

Good coverage as soon as new flush opens; Short residual (2-4 weeks=1 flush); Broad spectrum products-bad on beneficials & mites; Target over wintering populations; Oil-8 days control (short)

Mature trees

Less susceptible; Uncertain control options; What about Temik? Some effect, apply early
Target over wintering populations; Full rate; Placement of material important

Needed Technology - Biological controls; More mass releases; New insecticides & delivery systems, ex: trunk injection

Detection - Remote sensing; Signature yellow dragon

Questions: Will Admire hurt beneficials? Yes but only those that feed on the plant. How are we to coordinate an effect to tell the difference between greening and nutritional deficiency? Who will check the samples? You can be pretty sure based upon the look of the tree.

Managing Greening
Bill Dawson, UF/ IFAS CREC

Greening is caused by bacteria. Trees can be infected and not show symptoms and transmit by vectors (psyllids). The bacterium is related to a common bacterium found in insects. The tree may act as a host to keep the psyllids coming in and keep the bacterium going.

Costly for control; Control insect; Rogue infected trees; Manage flush; Design trees to be adaptable to the disease; Interaction of tree and pathogen; Create plant tolerance; Resistance

Tools needed:

Better detection procedures. Understanding movement and distribution of bacterium in tree, culturing the bacterium, bacterium genome sequence, understanding bacterium gene expression
What genes are expressed in the psyllid? In the plant? In areas with no symptoms? Etc.

Biological Control of Greening? Mild strains compete with greening. Are there mild strains? Use tolerant plants to reduce incidence. Engineer resistant plants. Treatment to increase natural resistance. Engineer multiple defense mechanisms. How is bacteria distributed in the plant? Don't know yet. Probably in levels of plant below our level of detection. Phloem limited disease and very low concentration. South America tried injecting antibiotics and it worked but not a well understood process.