Citrus Expo follow-up

Canker and greening – lessons from South America

By Bob Rouse and Fritz Roka

The 2006 Citrus Expo featured citrus managers from Brazil and Argentina who spoke about their management programs to control citrus canker and citrus greening diseases. The strategies they described have been successful and hopefully transferable to citrus production in Florida.

The Florida canker eradication program was abandoned in the spring of 2006 after the USDA predicted that canker would spread by 100,000 acres before the end of the year. Currently, most of the canker is south of Polk County's State Road 60. Since the eradication program ended, there have been about 100 new finds monthly.

Grower self-inspections have accounted for 40 percent of the new finds. DPI inspectors have identified the remaining 60 percent of new canker finds. The roles of DPI in future regulatory actions will include surveying abandoned groves, developing management strategies to maintain a level playing field, and establishing fresh fruit phytosanitary standards.

It has been 12 months since Huanglongbing (citrus greening disease) was confirmed in Florida. To date, greening has been found in 12 southern counties along the lower east coast and Southwest Florida. There have been 652 PCR confirmed positive trees, 557 residential and 95 in commercial groves. The Miami-Dade area remains a hot-bed of residential trees. Infected varieties in descending order are sweet orange, grapefruit, lemon, sour orange, lime, tangerine, kaffir lime and calamondin. Wayne Dixon of FDACS/DPI cautions that the full distribution of greening is not yet known, and he expects more new finds as inspections continue.

CANKER MANAGEMENT IN ARGENTINA

Beatriz Stein from the Tucuman area described the fresh fruit lemon industry in northwest Argentina. The region receives about 40 inches of annual rainfall and grows 51 percent of the world's lemons, making it the most important lemon producing area.

Argentina has had canker for decades, yet still manages to export 76 percent of its fresh fruit to the European market, mostly to the citrus producing country of Spain. Argentina has developed a three-part program of integrated management for citrus canker:

- 1) avoid entrance of disease to the citrus growing area;
- 2) start new plantings with disease-free plants; and
- 3) establish sanitation criteria that involves a spray station at the orchard entrance for vehicles and personnel.

Most growers have a chemical control program for leafminer on young trees that involves systemic insecticides (Imidacloprid) and abamectin plus oil for mature trees. Canker control is done with copper sprays monthly during the growing season. Both copper hydroxide and copper oxychloride are effective and copper hydroxide has been shown to be most efficient.

The best control is gained during the dry season. The addition of other products like oil, Mancozeb, or quaternary ammonia didn't help. The lemon growers in Tucuman are not using windbreaks. They have developed a state-of-the-art barcode tracking system from harvest to market for fresh fruit that identifies inspections, grove, block, packinghouse, date, disinfections, etc. for every box of fruit shipped.

Cecil Taylor described citrus production in the northeast region of Argentina where producers grow common oranges, mandarins and grapefruit.

Argentina was devastated by tristeza in the 1940s and in the 1960s began to see canker. Initial control efforts included eradication, tree defoliation and spraying enough copper that trees turned blue. These efforts proved fruitless, and growers demanded an end to any eradication policy.

During these early years, windbreaks were not part of any perceived solution. By the end of the 1980s, they began to realize, however, that the key to canker control lies in slowing down the wind, even though they did not experience strong winds. They started with low-growing plants like sugarcane, maze and sunflower. By the 1990s, they saw the need for taller plants and began to plant Eucalyptus grandis. A significant drawback was found in that Eucalyptus roots spread into citrus blocks, inhibiting growth and production of adjacent rows. Pine trees were also tried, but found to be too slow growing. Today, Casuarina cunninghamiana (Australian pine) is the most popular windbreak tree. Growers are now trying white poplar as well.

Taylor recommended planting windbreaks before planting the grove. With windbreaks, he asserted that the canker infection rate can be reduced by 40 percent. As additional horticultural benefits, windbreaks minimize lesions on plants and fruit from rubbing branches, reduce frost damage, and improve external fruit quality. Windbreaks also improve effectiveness of sprays on windy days.

Cultural practices for managing canker require spraying copper with each flush, which is four times per year in Argentina. Copper compounds include copper hydroxide, oxychloride, oxide and tribasic copper sulfide. All forms seem to be equally effective, and growers use the least expensive.

Leafminer control is essential and uses a product called Vertimex plus oil. Growers apply disinfective sprays to all vehicles, equipment, and personnel going in and out of their farms. Disinfection products are quaternary ammonia (1 percent for personnel and 2 percent for equipment) and chlorine at 200 ppm concentration. Less sanitation is used on many farms because they have their own equipment and personnel, particularly for harvesting. Taylor concluded by saying that in Argentina, they were able to manage and control citrus canker, and we will be able to do it in Florida, too.

CANKER MANAGEMENT IN BRAZIL

In Brazil, Leandro Teixeira asserts, it is easy to control canker if a grower knows when to spray. Teixeira manages citrus in the Parana state of Brazil, which is south of São Paulo state. Parana had no citrus before the 1990s, and all orchards have been planted with technology for citrus canker control.

The Parana state's strategy is to start with varieties that have been shown to be more tolerant to canker. Growers consider Hamlin to be too susceptible to canker. Instead, they plant an early maturing variety called Iapar-73, along with Pera, Valencia, and Folha Murcha (willow leaf). Growers are permitted to plant only these four varieties.

Cultural and grove care strategies include utilizing only clean nursery trees grown under screen, restricting unauthorized access through gated orchards, insisting on

decontamination, and establishing temporary windbreaks (new planting) and permanent windbreaks. Grevillea robusta (silk oak) is the most-used windbreak plant, although pine, eucalyptus, and natural wooded areas are also used. Windbreaks are spaced every 200 meters.

Chemical control includes copper hydroxide and oxychloride. Sprays are applied before flowers open, 2/3 petal fall, small fruit after fruit set, olive-size fruit, and Ping-Pong-ball-size fruit. Each of these sprays is about 25 days apart. In addition to control on fruit, growers need to spray each new flush, especially on young trees, which may require sprays every five days. So far, there appears to be no evidence of copper resistance by the canker bacteria.

Leafminer control is critical to prevent lesions for bacteria entry. Fertilizer management and application timing is important to synchronize with flushes. Canker is more difficult to control in wet years when rain can wash chemicals off the leaf and large orchards are more difficult to manage.

In conclusion, Teixeira stated it is possible to manage canker in Parana state, but not without windbreaks, and copper sprays alone are not sufficient.

GREENING MANAGEMENT IN BRAZIL

Fernando Tersi is the citrus manager of Cambuhy Farms, with 18,000 acres of citrus in the heart of citrus greening in San Paulo state, Brazil. He has developed a grove management program for greening that is viewed as being successful. The program is based on inspections, correct handling of infected trees (i.e., eradication), and vector control.

In addition to greening, Tersi has to deal with leprosis and ortezia mites, blight on Rangpur rootstocks, and CVC. He feels that greening is worse than all the other diseases and fears that his neighboring growers are exacerbating the problem by doing nothing or waiting to harvest the crop from trees with greening.

Tersi started his inspection program in May 2004 and does four inspections per year. Inspectors started by walking, but now travel on platforms built on tractors. The higher visibility has improved the inspectors' chances of finding disease symptoms. Two inspectors stand on platforms one above the other on each side of the tractor — one at eye level and the other at the upper canopy shoulder looking down at the tree.

There is an incentive program for inspectors who accurately find greening. During the first year (2004), every suspect tree was confirmed by PCR. Now, trained inspectors achieve an accuracy level greater than 95 percent.

Greening trees and fruit are tagged by inspectors. A separate crew cuts down the tagged tree on the same day. Trees are cut up with a chain saw, and stumps are painted with herbicide. Blocks with more than 20 percent of trees infected with greening are eradicated. Pruning infected limbs is not done because experience has shown that all tree regrowth tested positive within three months. The biggest problem with regrowth is that the young flush attracts psyllids.

Systemic and non-systemic insecticides applied by ground and by airplane accomplish vector control of the psyllid. Young trees are treated by Imidacloprid drench the first three years. Mature trees are sprayed at the three flushes per year, and blocks with more than 3 percent greening trees get monthly sprays.

The additional effort to control greening is expensive but necessary, and worth it to stay in production. Although Cambuhy Farms has removed 13,897 trees in two years, that is only 0.6 percent of the trees there and 99.4 percent healthy trees remain.

Citrus canker and greening are significant challenges to the Florida citrus industry. Production managers from Argentina and Brazil have been battling these and other major disease problems for many years. Their message at the 2006 Citrus Expo offered a light of hope that with concerted and careful effort, citrus production in Florida can remain viable.

NOTE: The PowerPoint slide presentations from the 2006 Citrus Expo are available on the Southwest Florida Research & Education Center web site at http://swfrec.ifas.ufl.edu.