

# Florida growers visit Brazil

## *Part II: Canker management and take-home lessons for greening and canker*

**By Jim Graham, Holly Chamberlain  
and Bill Barber**

**P**art II of the trip report to Brazil discusses the group's observations of "living with canker" in Parana. Canker has been endemic in Parana since the 1950s. Parana has a much smaller industry (approximately 30,000 acres) than in São Paulo state and Florida. Mid- and late-season oranges are grown primarily for processing.

From the beginning of new citrus plantings in 1990, Rui Leite implemented an integrated program for control of canker. A major component of his program is prohibition by the Parana Ministry of Agriculture of planting highly susceptible cultivars including grapefruit, Mexican lime, lemons and early oranges (e.g. Hamlins and Navels). Alternatively, growers are encouraged to use canker-resistant varieties including IAPAR-73 (early), Valencia and Natal (mid) and Folha Murcha (late) — all selected from Leite's canker field screening program and grown in canker-free nurseries. Leite's recommendations also include use of windbreaks and from two to six copper sprays depending on susceptibility of the cultivar, disease pressure, and tree age.

The key to canker control on processed oranges is to suppress early season infection of the bacterium that leads to fruit drop before harvest. Since the early season is usually rainy, canker sprays generally begin by protecting the spring flush and are again applied at 2/3 petal fall and 30 days postbloom (about 21-day intervals). To avoid excessive new flush thereafter, fertilization is controlled, especially on young trees.

On March 29, the group visited Corol Cooperative in Rolandia. Corol was founded in 1963 as principally a coffee cooperative, but in 1975, a severe frost killed a high percentage of the plantations. Today Corol has 7,000 associates with highly diversified farms producing citrus, sugarcane, grapes, wheat, soybeans and other field crops. Corol Cooperative has approximately 9800 acres of citrus of which 20 percent is grown for fresh market and 80 percent for processing. For fresh market fruit, the Parana Ministry of Agriculture conducts inspections for freedom from canker, then issues a certificate

for shipment to other states like São Paulo where canker is under control with Fundecitrus's eradication program.

In Rolandia, groves have been kept canker-free because they are isolated by forested hills and wide areas of non-citrus crops such as coffee and soybeans. Workers and vehicles are decontaminated prior to entry into groves; windbreaks and copper sprays are utilized to reduce the introduction and establishment of canker. The most resistant varieties, IAPAR-73, Valencia and Folha Murcha are widely planted in Corol associates' groves.

Near Rolandia, Fazenda Victoria was established in 1990. The farm is still canker free in large part due to entry restrictions on workers, harvesters and outside equipment, strict sanitation, and an extensive windbreak system as well as native forest perimeter. The windbreak species here is principally *Grevillea robusta* (silk oak) planted at the perimeter and within rows in some of the blocks (Fig. 1). *Grevillea* is the species of choice in Parana because: 1) it has a restricted root system that competes minimally with citrus, 2) the tree canopy branches tend to persist from top to bottom, and 3) *Grevillea* is also relatively pest and pathogen free and rarely declines. If branches are lost at the bottom of the canopy, elephantgrass (*Pennisetum purpureum*) is grown as an understory to provide windbreak near the ground level. After 25 years on this site, the canopies are weak and upper limbs have begun to break out in high winds. *Grevillea* is also freeze sensitive, so it would be appropriate only for coastal areas in Florida.

In Corol Cooperative, the group visited a second location with a very tall perimeter windbreak of *Eucalyptus grandis*. In 1998, when the trees were 2 years-old, canker became established in this block of IAPAR-73. The block is relatively isolated from other groves and the canker-infected branches were removed by pruning them back to the trunk during the fall-winter dry season. The flush that emerged after pruning was sprayed with dilute copper every two weeks to prevent recurrence of the disease on the new foliage. This block was inspected every 30 to 60 days to quickly detect new outbreaks of infection. A few new canker infections occurred in the same block and were removed and treated by the same procedure. With continued surveillance, sanitation and restricted entry, this grove has been maintained canker-free until the present.

**Fig. 1.** Windbreaks of *Grevillea robusta* planted within the row, left, and at the perimeter (right photo) with an understory of elephantgrass to maintain the windbreak action near the ground level on older trees that have lost their lower limbs.







*The Florida group visited Cocomar Cooperative in Paranavai. Cocomar citrus production staff is identified by their medium blue shirts.*

On March 30, the group visited the staff in citrus production and processing programs at Cocomar Cooperative in Paranavai, Parana. The first plantings in this region were established in 1990, with average grove age of 5 to 6 years and the varieties most often planted are Pera, Valencia and Folha Murcha. Cocomar Cooperative produces about 2.5 million boxes of oranges from 22,000 acres and is adding about 2,500 acres of new plantings each year. More than 95 percent of the crop is processed and the plant has a capacity of 5 million boxes. Cocomar also processes soy products, peach, passionfruit, coffee and cotton.

Cocomar's program is similar to that of Corol for inte-



**Above:** Early season infection of 4-year-old Valencia oranges in Parana, PR that had inadequate protection with windbreaks and copper sprays. **Below:** The fruit drop due to canker in this block was estimated at 30 percent.



grated management of canker – use of tolerant varieties, use of Grevillea windbreaks in new blocks and control of canker on young trees with copper sprays and of leafminer with soil applied insecticides, thiamethoxam (Actara, Syngenta Crop Protection) and imidacloprid (Confidor, Bayer Crop Science).

To educate growers about the value of integrated management, Cocomar has set up a demonstration site that features blocks with resistant and susceptible varieties side by side on vigorous

and less-vigorous rootstocks surrounded by temporary windbreaks of elephantgrass and permanent windbreaks of Grevillea. This is one of two sites where trials of standard and experimental chemicals are conducted in collaboration with UF/CREC. At this site, Valencia and Folha Murcha were shown to be field resistant and trees became more resistant with age as the canopy flushes become less frequent and more concentrated. Canker also decreases dramatically as the perimeter windbreaks increase in height and the tree canopies close within the row to provide both external and internal windbreaking.

The group saw the value of integrated management best in 4-year-old Valencia blocks with adequate wind protection, leafminer and copper sprays that experienced minimal disease loss despite 36 inches of rainfall in the summer. In contrast, a nearby Valencia block with inadequate wind protection from the southwest (the prevailing direction of cold fronts in the spring) and no copper sprays suffered 30 percent fruit drop this past season. In a nearby farm, the group saw no canker on fruit in a 6-year-old block of Folha Murcha that received two copper sprays and had mature windbreaks of Grevillea, whereas two seasons ago, canker was epidemic under a different owner who neglected the copper spray program.

#### TAKE HOME LESSONS

- In São Paulo, there is ZERO tolerance for citrus greening. Federal law requires destruction of infected trees by the grower, and if not removed by the grower within 15 days, Fundecitrus removes the tree and invoices the grower for the control action.

- In the face of adversity, the São Paulo citrus industry adapts quickly to greening and canker threats because they are kept well informed by Fundecitrus and their industry-wide disease surveys. Suppression programs endeavor to stay one-step ahead of the epidemic. This is reflected in the frequency and intensity of grower survey for early detection and the quick removal of affected trees to slow disease spread. To sustain the removal of trees by suppression programs, the São Paulo nursery industry is committed to producing healthy nursery trees.

- São Paulo companies, with the assistance of Fundecitrus, thoroughly train scouts for grove inspections of greening symptoms, have checks on quality of survey, build platform decks for survey as needed and aggressively scout for and control the psyllid. Use of these tactics has achieved large reductions in greening disease incidence in several locations. Companies do not relax survey or psyllid spray programs even after they gain a high level of control because transmission and the disease expression vary with the season.

- Fundecitrus is optimistic about the future of greening control in São Paulo for several reasons: 1) low disease incidence in most areas; 2) pre-existence of screenhouse

nurseries producing disease-free trees; 3) past experience with control of another serious insect-vectored disease, CVC; 4) effective cooperation among Fundecitrus, government and growers; and 5) a strong national and international research network.

• Canker is another story; Parana and São Paulo have very different strategies for disease management. São Paulo has been practicing eradication for many years and follows the state law that requires destruction of canker-infected and exposed trees. Parana has a more flexible approach and has successfully managed the disease. São Paulo grove blocks are large, whereas in Parana, farms are smaller, more diversified and growers belong to cooperatives that provide technical support. In Parana, growers use more resistant mid- and late-season oranges in areas with endemic canker in conjunction with integrated management. In isolated areas, they con-

tinue to practice decontamination and exclusion to maintain groves canker-free. In endemic areas, windbreaks are established and copper and leafminer control is practiced on young trees at their most susceptible stage. In both Parana and São Paulo, it is illegal to plant highly susceptible varieties such as grapefruit.

• Growers are involved at the grassroots in the formulation and implementation of regulations. They do not leave the fate of their grove management in the hands of the government. Rather Fundecitrus and cooperatives function to harmonize the State Ministries of Agriculture role with citrus industry objectives. They provide education, training and research as ongoing support to keep pace with the onslaught of new diseases and pests.

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## A Florida grower's perspective on canker and greening in Brazil

**By Bill Barber**

**S**ince we have both canker and greening in Florida, I was very interested in going to see and hear about disease management and control in Brazil. When we left Florida, I had a fear of canker, and a respect for greening, but did not understand what a devastating disease greening is. After returning, I now believe that we can control citrus canker to an economically viable level, but I am very concerned about greening management and control in Florida.

Although weather patterns are different in Brazil than here in Florida, I have seen the results of an integrated program for canker management. All of the management techniques mentioned in these two articles are working for the Brazilians, and I believe that they will work for us, also.

Citrus canker was being controlled to a manageable level with the use of windbreaks, resistant varieties, spray programs, and proper sanitation procedures including clean nursery stock. The programs were so successful that when asked about their major problems, canker was very low or not even on the production manager's list.

Scouting for disease incidence was shown to be paramount in knowing when to spray, and how effective the sprays are. Timing of sprays is critical if the disease is to be controlled. Sprays that are too late are a waste of time and materials.

Where canker was endemic, I have

seen firsthand the difference in a good, timely spray program versus a poor program.

Although it will be harder to implement in Florida, I have also seen the importance of windbreaks in controlling the disease incidence. One obstacle that we have in Florida is the plantings of highly susceptible varieties that we have interspersed in our groves (Hamlin, grapefruit, etc.). Disease management will be much harder for us since we have not considered varietal susceptibility to canker. As former citrus acreage is planted back, consideration should be given to varieties that show some resistance to the disease. More work is needed in Florida to have new varieties available that will grow in the presence of the canker bacteria.

Management of greening was probably more important than canker in São Paulo state. I have observed that without aggressive scouting and tree removal, a grove can possibly become unproductive in one year's time. It also will serve as a source of disease for neighboring groves. The programs mentioned for psyllid control are critical to mitigate the possibility of introducing disease into new areas. Also, the timely detection and removal of greening infected trees is one of the most important control measures that we can do.

We can't afford as many inspectors in our groves as there are in Brazil. A critical need in Florida is to develop a detection method to find

the diseased trees very early so that the source of inoculum can be removed before it spreads throughout the grove or area.

I believe that there needs to be research into long-term sustainable programs for psyllid control, since some of the broad-spectrum sprays needed to control the insect today will also be very harmful to beneficials that control scales and other pests. Thanks to biological control, we can't recall how long it's been since we saw a population of snow scale causing tree decline or of black scale reducing growth of young trees. If we use broad spectrum pesticides for psyllid control for years to come, we will reduce populations of wasps, fungi and other organisms that are working for us in suppression of other pests.

There are several other diseases or disorders that are present in other parts of the world, but not here in Florida. As we continue to develop new programs to deal with canker and greening, keep in mind that we should be very strict on movement into our groves. Security and sanitation is critical in keeping new diseases out of our agricultural areas.

Also, since we have groves in close proximity of each other, if one neighbor is doing a good job in controlling these diseases, but next to him, the owner is not, the programs are not going to be successful in either grove. If ever there was a time that those in the Florida citrus industry need to unite and cooperate with each other, it is now.