



Fig. 1. Cost of removal of HLB trees with tree grinder is \$4.50 to \$5.50 per tree. Chipped material remains in the grove middles.

Cooperative Producers: integrating best management practices for HLB

By Jim Graham

A large number of Florida citrus growers with increasing disease incidence have adopted an alternative approach of enhanced foliar nutrition for management of huanglongbing (HLB; citrus greening). In contrast, Cooperative Producers rely mainly on the traditional program widely practiced in Brazil and elsewhere HLB causes severe crop loss.

Cooperative Producers, Inc. (CPI) and Ranch One groves are 3,600- and 3,140-acre grower-owned groves near Felda and Immokalee, respectively. They are part of the Florida's Natural Growers Cooperative, and the majority of their fruit is destined for the processing plant in Lake Wales. Tom Kirschner, the director of grove operations, and Mike Murphy, the chief executive officer of the cooperative, have been managing their groves like the large companies in Brazil and a few other citrus producers in Florida since just after the discovery of the disease in 2006. They learned HLB management practices of scouting and removing HLB symptomatic trees and stringent psyllid control mostly after seeing these programs first-hand in large-scale citrus farms in São Paulo state.

Like many company farms in São Paulo, Cooperative Producers groves are large contiguous areas under a single management policy, making them a good place to measure the success of an aggressive HLB management program in the Florida citrus industry.

Looking back after HLB was discovered in Florida in 2005, it is

now well accepted that the disease started in the southeastern corner of the citrus industry, and that disease pressure is very high across the southernmost area.

The structure of Cooperative Producers would appear to create management challenges, since the farm is divided into 20-acre parcels with many individual owners. However, while the owners participate in deciding harvesting schedules and where they would like the fruit marketed, Kirschner and Murphy (aka "management") are in complete charge of the day-to-day, grove-management decisions including pest and pathogen control programs for HLB. Nevertheless, they must keep operations as economical as possible for the owners and report to them semiannually that costs of the traditional program and profitability of the groves are being kept in balance.

Initially, management was not certain that grove operation costs of HLB were going to be profitable, but they were

convinced that an aggressive psyllid control program must be sustained to remain in business over the long term. As a consequence, the psyllid program has been refined, intensified and focused on the principles of area-wide management within their groves for reduction of the effect of infected psyllids from surrounding neighbors. As a participant in the Gulf Coast Citrus Health Management Area (CHMA) program, area-wide applications in late fall and

Table 1. Cooperative Producers psyllid spray program

Application timing	Type of spray application	Mode of Action	Example of active ingredients
Dormant	Ground	Broad-spectrum ¹	dimethoate
Post-Bloom 1	Aerial	Broad-spectrum	fenpropathrin
Post-Bloom 2	Ground	Broad-spectrum	malathion
Summer 1	Ground	Soft chemistry ²	spirotetramet
Summer 2	Aerial	Broad-spectrum	fenpropathrin
Summer 3	Ground	Soft chemistry	spinetoram
Summer 4	Aerial	Broad-spectrum	zeta-cypermethrin
Fall 1	Ground	Broad-spectrum	dimethoate
Fall 2	Aerial	Broad-spectrum	fenpropathrin

¹ Organophosphates and pyrethroids alternated throughout the season

² Mode of action with less effect on beneficial insects

early winter are made to kill the adult psyllids when the trees are not actively producing new flush. In past seasons, the psyllid management program included a full rate of Temik®. With the loss of Temik® for use in citrus, an additional ground spray has been added. Details for the spray program and examples of materials used are shown in Table 1 (page 10).

In the last few years, with the recognition that primary infection by psyllids was arising from the neighboring groves, aerial perimeter sprays with a broad-spectrum material have been applied during the intervals between the sprays listed in Table 1. To check that psyllid control is adequate, scouting for psyllids is conducted by flush observation and sweep nets. This is conducted as part of the citrus rust mite scouting program for fresh fruit wherein perimeters and hot spots are surveyed on a routine schedule.

The program for resets is very aggressive, and likewise the psyllid control program very intensive, utilizing soil applications of systemic neonicotinoids, imidacloprid and thiamethoxam every other month. To stay within label rates per acre, only the resets receive these applications. In addition to soil applied neonicotinoids, resets get the regular foliar program. CPI's tractors are equipped with sensors so that the new trees receive an appropriate quantity of insecticide. Thus far, protection against psyllid infection has remained strong as only 0.1 percent of the 100,000 plus resets planted in the last four years have been detected with HLB symptoms. Resets are very labor intensive because they also get dedicated weed control and time-release fertilizer applications. Management estimates a minimum of \$175/acre per year, including tree cost, is required to reset the groves.

There are three to four surveys for HLB symptoms per year. Because the scouts have remained with the company from the beginning of the disease epidemic, they are now entrusted to identify whether a tree has HLB, based on symptoms, with final review by a grove supervisor. One of the biggest HLB management challenges is getting scouts into a block in a timely manner. Scouting is an inherently slow process, but there are other factors, like budget, harvesting timetables, tree pulling and resetting, which also factor into decisions for when a block is scouted. Another major challenge is removing infected trees on a timely schedule.

In general, once a symptomatic tree is identified, there is an allowance for

FDOC School Marketing Creates Statewide Junior Citrus Ambassadors

By Leigh Killeen

Deputy Executive Director, Domestic Marketing

We know that children today have many more beverage choices than we did, and orange juice may not be a staple in their home. FDOC wants to create a personal, emotional engagement with these children and encourage them to drink orange juice every day.

Last year, we launched "The Adventures of Captain Citrus" pilot program in Hardee, Highlands and Polk county elementary schools. Our orange super hero interacted with more than 111,000 students, teachers and parents to spread good news about Florida citrus and position Florida orange juice as a fun, delicious beverage.

The big news is that Captain Citrus is going statewide this year to create more junior citrus ambassadors throughout Florida!

We will deliver four sets of school curriculum for teachers to incorporate during peak citrus season, November through May. Information is presented through animated graphics and hands-on activities to teach students about the importance of the citrus industry to the state and the numerous health benefits of orange juice and fresh oranges. Along with classroom materials, each curriculum includes parent guides for students to take home and share.

Fifty schools will experience an interactive visit from a grower and Captain Citrus. Getting to ask questions to growers and have photos taken with "Captain C" really brings the program to life for these students. During these visits, FDOC will provide samples of orange and grapefruit juices and fresh citrus (oranges, grapefruit and tangerines) to 3,800 students and teachers to encourage trial and retrial, and reinforce the great taste of our products.

We'll encourage students at all schools to become personally engaged with Florida citrus through the second year of the Creative Juices Challenge contest. Students will express what they learned about citrus in an artistic, musical or video entry for a chance to win prizes. This year, we'll expand the contest with a teacher challenge to solicit unique curriculum ideas for future programs.

Our website, www.CaptainCitrus.com, makes all program materials readily accessible to teachers, students and parents, and allows us to extend information beyond state borders to other educators.

What does this mean to you, the grower? More than 300,000 students, teachers and parents will learn about the citrus industry and the benefits of Florida citrus through our school curriculum. Most importantly, second-grade students throughout Florida will become junior citrus ambassadors and share their excitement with families and friends.

I invite you to witness this transformation firsthand by joining us for an upcoming school visit. Please contact me at 863-537-3966 or lkilleen@citrus.state.fl.us for more information.

The mission of the Florida Department of Citrus is to grow the market for the Florida citrus industry to enhance the economic well-being of the Florida citrus grower, citrus industry and the state of Florida. For more information, visit www.FDOCgrower.com



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the near mature crop to be harvested, and then a round of tree removal commences. Operationally, transporting the clipped trees to the burn pile site was causing excessive delay in tree removal. This has been addressed with the use of a tree grinder that chips the clipped trees on the site for spread of the debris in the grove middle (Fig. 1, page 10). Nevertheless, tree removal remains one of the greatest expenses because of the time and energy required.

IS IT WORTHWHILE?

HLB management is expensive and time consuming, but do the results continue to prove worthwhile? The disease first appeared in the young blocks in Ranch One in summer 2006 and in the CPI grove about six months later. In Ranch One, the scouting and removal program started in early 2007, and about six months later, in CPI grove. In Ranch One, the disease incidence peaked at 2.89 percent in early 2009 and has remained below 2 percent for six subsequent inspection cycles (Fig. 2). In CPI grove where the control program started later, disease incidence for inspection cycles in late 2010 and 2011 appears to have peaked around 2.5 percent with the current uncompleted inspection cycle showing a drop similar to that in Ranch One (Fig. 3). Whether this downturn in HLB incidence per inspection is sustained in CPI grove remains to be demonstrated. At CPI grove, psyllid control in the neighboring groves is more problematic than around Ranch One. In any case, for the traditional control program to remain profitable, disease incidence per cycle must be maintained from 5 percent to 8 percent, depending on the starting age of the grove.

The present and future management and profitability of Cooperative Producers groves does not solely rest on the traditional program, but also relies heavily on best horticultural practices for irrigation and nutrition programs. The foliar nutritional program in Cooperative Producers groves had already been stepped up after the hurricanes in 2004 and 2005 depleted the grove trees. With the requirement to survey for HLB, it was deemed useful to minimize generic nutrient deficiency patterns on foliage to facilitate detection of disease symptoms. The stepped-up foliar program has also remained in place to keep trees in the most stress-tolerant condition possible to withstand the debilitating effects of not only HLB, but also the onslaught of drought, freezes and other diseases, including citrus black spot, caused by

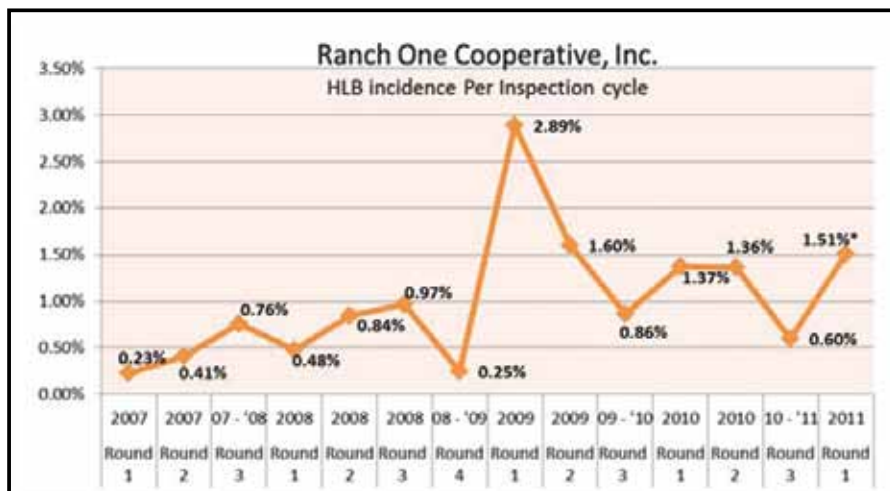


Figure 2. Incidence of HLB trees per inspection cycle in Ranch One grove from mid-2007 to present (*June 2011 survey result is incomplete).

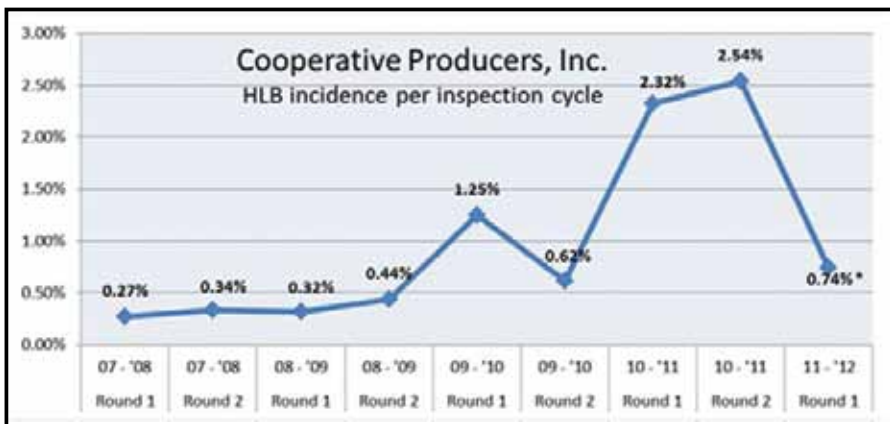


Figure 3. Incidence of HLB trees per inspection cycle in CPI grove from late-2007 to present (*June 2011 survey result is incomplete).

Guignardia citricarpa, and detected in the vicinity of Ranch One.

Management feels that tree health has been better sustained with the nutritional program, which includes aerial sprays of phosphite, ground sprays of potassium nitrate, di-potassium phosphate, and additional manganese sulfate and zinc oxide in sprays. Management has compared its foliar nutritional program with other enhanced nutritional programs in matched citrus blocks to test their effects on production and disease incidence. After three years, no additional benefit has been measured with these programs with respect to yield, HLB incidence or early crop loss of diseased trees, which varies from 13-28 percent. Hence, management confirmed that Cooperative Producers nutritional program is well-balanced and cost-effective for sustaining productivity of trees in the face of weather, pest and disease challenges.

Management is also striving to find new and better production systems to add to the regimen. Currently, management is working with IFAS researchers on an “open hydroponics-

like” production system planted at a density of 326 trees/acre. It is testing multiple rootstocks with drip and microjet fertigation and dry fertilizer treatments.

Management feels that its aggressive psyllid control and tree removal program has reduced the number of newly symptomatic trees in the groves.

It is under no illusions that it has beaten HLB, but it is managing HLB sustainably. Management is most confident about the value of the psyllid control program and is a strong believer that Cooperative Producers’ grove success depends upon the effectiveness of area-wide management since their neighbors no longer remove diseased trees. In contrast, the weakest part of the HLB management program is the timely removal of symptomatic trees. Yet, despite the shortcomings of the tree removal program, management has maintained acceptable levels of newly diseased trees and increased fruit returns to its cooperative members.

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