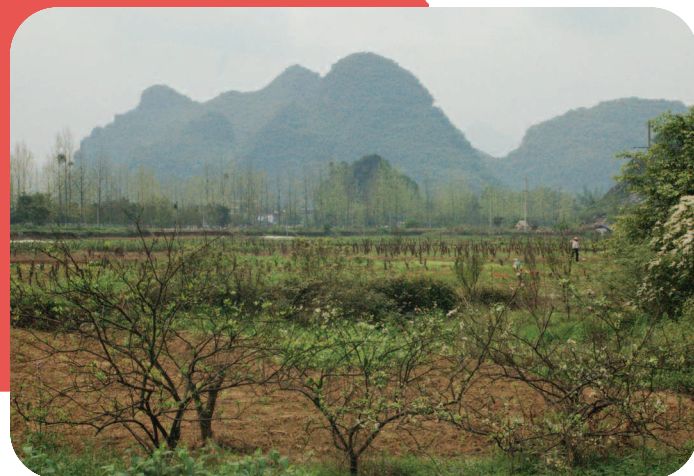


# Incidence and management of HLB in Southern China



*Photo 1, left: a healthy survivor standing alone in an abandoned, diseased 10-year-old grove in Guangdong. Photo 2, above: a devastated grove in Guangxi, replaced by corn and soybean, about 30 miles from productive healthy groves.*

By Chunxian Chen, Fred G. Gmitter Jr., Jiwu Zeng, Ganjun Yi, Yun Zhong and Xiuxin

**“It’s** (greening) been in China a thousand years, and they’re still producing citrus,” Todd Holtsberry said in the April 8, 2008 Greening Summit at Avon Park (*Citrus Industry*, May 2008). China is the second largest citrus producing country in the world, but in truth, Huanglongbing (HLB) is not an ancient disease, though it has spread widely in the major citrus production regions in Southern China beginning in the early 20th century.

Why are production levels in China increasing even as HLB devastation continues to spread? How are industries in severely affected regions surviving? With the help of Xiuxin Deng and Ganjun Yi, we visited citrus groves in the most severely affected regions of Guangdong, Guangxi and

Jiangxi provinces. The first-hand information, from the visits and conversations with colleagues and farmers, provides insight and some answers to these questions.

## **INCIDENCE OF HLB**

Visits to groves in Guangdong and Guangxi clearly revealed the severity of HLB. Citrus production in these provinces, although still a substantial proportion of the Chinese total, has dramatically changed because of HLB and other economic factors. Acreage and yield of citrus in Guangdong in 1998 was half of the peak in 1991. Since then, citrus production vacillated year by year. Highly susceptible varieties are disappearing, being replaced by a few predominant localized varieties.

In Guangdong, season-long high

temperature and humidity, a broad range of common host plants, and scattered small farms make it impossible to prevent HLB through vector control alone. Dying or dead trees could be found in almost all groves in Guangdong, even those that were well maintained. Increasing numbers of small abandoned groves increase the difficulty of vector control (Photo 1). HLB-infected groves in Guangxi are no better, even though the climate provides lower humidity and cooler winters than Guangdong. In Guangxi there were more groves with sweet orange, completely destroyed and forced to other crops (Photo 2); one reason for the demise of these farms was early ignorance of the severity of HLB, and the failure to act in controlling it.



*Photo 3: Production in Jiangxi where HLB infection is now only one tree in 10,000. (Co-author Deng, lower left.)*

### MANAGEMENT OF HLB

HLB is incurable, but is it manageable? The answer is “Yes!” based on several perfectly healthy groves we visited, even though many others just 30 miles away or less were devastated (Photo 2). In Jiangxi, we visited production areas where the frequency of HLB was reduced to one tree in 10,000 (Photo 3), from a rampant and widespread epidemic, because of strict adherence to certain management strategies including:

**1) VECTOR CONTROL.** Constant psyllid control through insecticide sprays from tree planting is a key to minimizing disease incidence and maintaining profitable production, even though psyllid vectors cannot be eradicated. Coordinated, mandatory area-wide spray programs in Jiangxi have yielded maximum benefits. Vector populations are monitored closely to assess effectiveness of different control measures and to adjust the following sprays accordingly. Because psyllids prefer young shoots, prompt and thorough sprays just prior to new spring and during summer and fall shoot growth are most effective. Another key to effective psyllid control is management practices to promote synchronized new shoot growth, though this is more difficult in younger trees.

#### **2) TIMELY ERADICATION.**

Quick removal of abandoned orchards and symptomatic trees, after vector control, is implemented to eliminate HLB pathogen and vector reservoirs and avoid driving psyllids to neighboring healthy trees or groves. This is widely practiced in areas with healthy

young orchards and good production; in areas where this was not done, the devastation is overwhelming.

**3) PATHOGEN-FREE PROPAGATION.** Nursery trees, all in containers, are propagated in screen houses using buds from pathogen-free source trees maintained in locked greenhouses. The trees in healthy-looking groves come from these sources, and being HLB-free minimizes disease incidence. By contrast, in Guangdong we observed an unaware farmer still propagating much cheaper nursery trees directly in outdoor beds, some even with HLB symptoms, despite his awareness of their very limited longevity.

**4) TREE HEALTH MANAGEMENT.** Any management practice that

enhances tree health is thought to increase the defense capacity and reduce the infection incidence, or at least prolong production once transmission had occurred.

### MAINTAINING PROFITABILITY

Though farmers are struggling with HLB, like any other business, profit allows the industry to survive. Many farmers indicated that they earn more from citrus than most other crops they might produce, despite the ravages of HLB. How can they be profitable, with so many infected trees in their groves? Their simple answer is to maintain the greatest number of healthy trees producing marketable fruit for the longest time. That is accomplished mostly through vector suppression. However, there are other specific practices widely adopted in Southern China's severely affected regions.

**1) USE OF LOCALIZED VARIETIES.** Since HLB has spread, ‘Shatangju,’ a local mandarin variety with well-known quality, has become predominant for many farmers, now accounting for 60 percent of the production in Guangdong. Shatangju is seedless, easy to peel, very sweet, highly productive, and most importantly, it ripens around Chinese New Year, meeting the unrivaled seasonal demand. ‘Nianju,’ another local mandarin, also has seen a substantial increase in some counties. Its harvest can be extended to March-April under orchard cover protection. High financial returns allow production to continue, even with significant tree losses.

**2) USE OF AGGRESSIVE CULTURAL METHODS.** Girdling is in-



*Photo 4: Girdling to enhance early and heavy fruiting.*

tensively used in many groves (Photo 4) to enhance flower initiation, reduce fruit drop and promote early production.

### **3) USE OF DWARFING AND HIGH-DENSITY PLANTINGS.**

Most groves are planted very densely with small trees, particularly in small farms where no mechanical equipment is used. Two direct benefits are: higher early production and continual profitable production even with accrued tree loss as high as 50 percent.

### **4) USE OF COVER STRUC-**

**TURES.** This practice is used in some groves, for instance, to maintain 'Nianju' fruits on trees through March-April. Fruit quality is substantially improved, other fresh citrus cannot be found in the market, and the profit can be two to three times higher than the normal harvest season. The cover can reduce HLB transmission, although the vector is less active in winter.

### **CONCLUDING REMARKS**

These field trips might not have re-

vealed all issues or survival strategies, but they did provide useful perspective and new information as we face HLB in Florida. Certainly much of the increased production from China is coming from regions where there is no HLB or psyllids. Still, farmers in the severely infected but surviving regions in Southern China have made significant management adjustments and developed various alternative approaches to maintain sufficiently profitable production. The differences between Florida and China are substantial; we cannot simply adopt localized approaches from China. But there are management practices we can adopt, such as pathogen-free nursery trees, maintenance of tree health, and coordinated area-wide vector control. Hopefully Florida growers and researchers together can find alternative approaches most suited to our conditions, to manage HLB and thus remain profitable.

Additionally, we were looking for and found "survivors" in severely in-

fected or abandoned groves (Photo 1). Other citrus relatives, hosting psyllids but surviving the disease, were also observed. These trees are being investigated in collaboration with scientists at the Guangdong Academy of Agricultural Sciences, Institute of Fruit Tree Research (GAAS-IFTR). We plan to broaden this collaboration to utilize our complementary expertise and facilities, to work together so the best strategies for management and profitability can be developed for the future.

*Chunxian Chen (cxchen@ufl.edu) and Fred G. Gmitter Jr. (fgmutter@ufl.edu) are with UF-CREC, Lake Alfred; Jiwu Zeng (jiwuzeng@163.com), Ganjun Yi (yiganzun@vip.163.com) and Yun Zhong (zhongyun99cn@163.com) are with Guangdong Academy of Agricultural Sciences, Institute of Fruit Tree Research, Guangzhou, Guangdong, China; Xiuxin Deng (xxdeng@mail.hzau.edu.cn) is with Huazhong Agricultural University, Department of Horticulture, Wuhan, Hubei, China.*