## Huanglongbing disease vector

# Asian Citrus Psyllid

One potential hazard of indiscriminate propagation of fruiting plants

Asian citrus psyllid adult shown close-up

Asian citrus psyllid adults shown to scale

Asian citrus psyllid nymphs

Diseased and normal sweet oranges in Florida

Waxy tubules produced by ACP nymphs

Huanglongbing in Florida lime tree

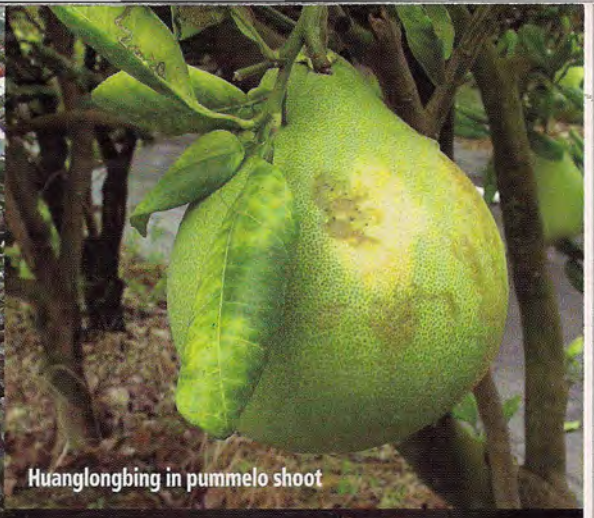
*Story by Andrew Glazier*

*Images courtesy of University of California Citrus Clonal Protection Program*

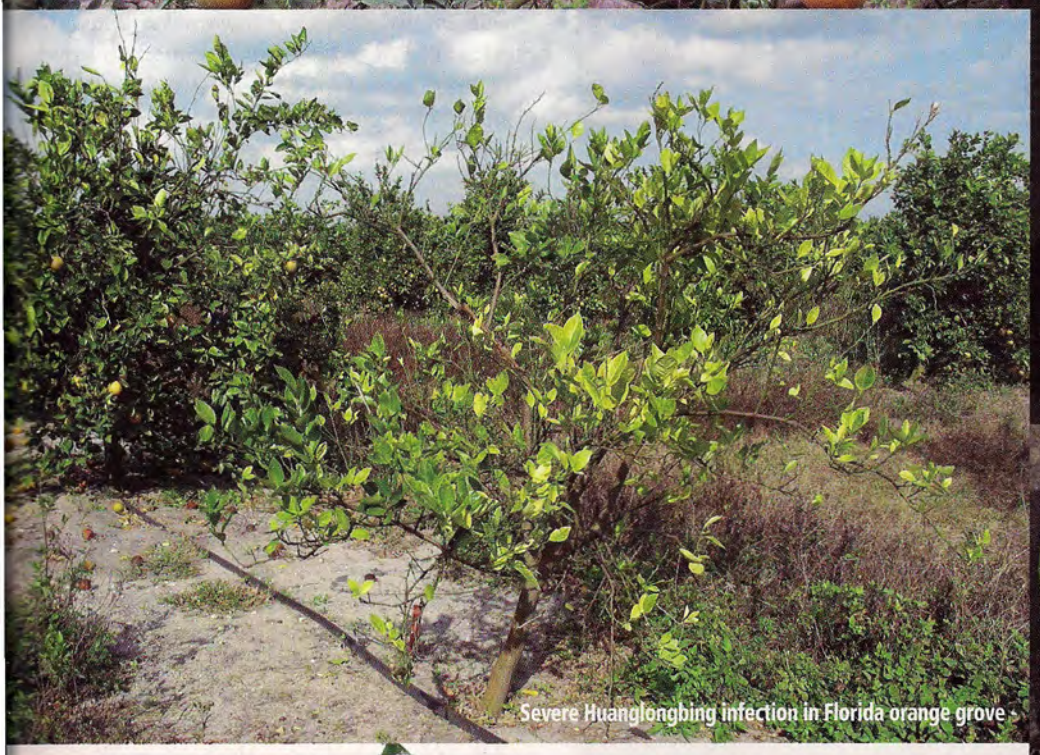
As an admittedly obsessive plant collector, I sometimes ask myself why I go to the lengths I do to find the next rare plant. Is it really some belief that the world will be better if I find the next hybrid whatever, or is it essentially rooted in my ego? I recently took inventory of my plant collection and saw that it had reached ridiculous proportions. Considering the recent birth of my daughter, I knew changes had to come. I could no longer justify my behavior.

*(turn to page 16)*

Badly damaged Florida murcott tree with normal and diseased fruit

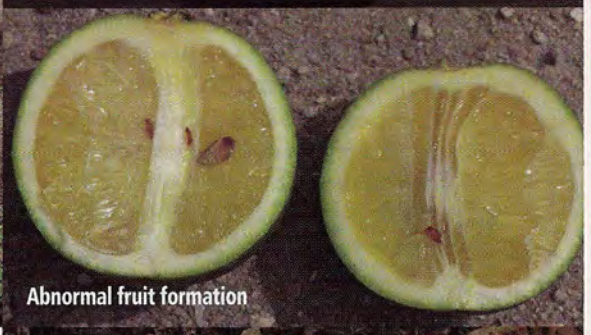


Huanglongbing in pummelo shoot



Severe Huanglongbing infection in Florida orange grove

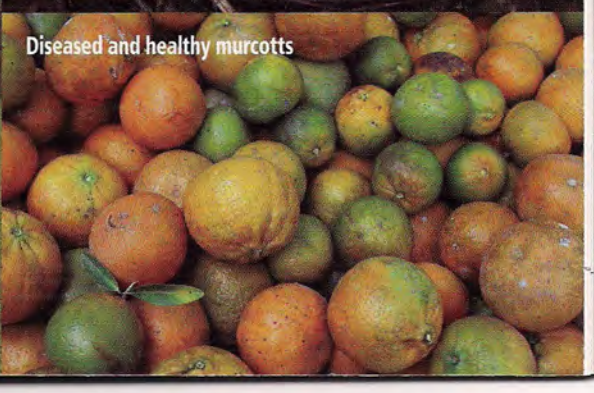
Lopsided grapefruit



Abnormal fruit formation

Remains of a badly damaged Florida lime grove

Lopsided pummelo



Diseased and healthy murcotts

Others in the Rutaceae family such as curry, *Murraya koenigii*, can harbor the Asian citrus psyllid.

**ASIAN CITRUS PSYLLID** *(from page 14)*

## Honesty Really is the Best Policy

Let me take you back a few years to where I really began to realize the desire for plants is the root of much suffering. Sometime in the early 90s I lived in San Francisco and I worked at a local nursery. Occasionally I would visit the Strybing Arboretum. There I would see plants I was unable to find anywhere else, and I would ask nurseries if they could order them for me. Of course they couldn't, and then the trouble began.

At the time I was obsessed with salvias. One in particular I wanted was *Salvia dorsiana*. It had beautiful pink flowers and an indescribable scent. One day I walked by the shrub, which was full of branches, and I decided to pinch a few to try to grow it myself. Stealing isn't something I normally did. As a young boy I once stole a chocolate bar, and I felt so bad that years later I went back and paid the man for the candy. I felt better about that, yet here I was once again taking something that wasn't mine. I hadn't noticed a man who had quietly approached from behind. "You can get cuttings of that if you volunteer time in the greenhouse," he said. At the time I didn't realize it was Don Mahoney, a well known figure in the San Francisco gardening scene and the head of the volunteer program at Strybing. I was at once mortified and petrified, yet he offered a solution which was far better than I could have accomplished with my own methods. I followed him to the greenhouse bench where he showed me the soil, perlite and containers for the cuttings. He brought me some plant material to be propagated and my transformation from plant thief to honest gardener had begun.

I wouldn't normally brag about something like this, much less discuss it openly, but sometimes confession is good for the soul—and sometimes for the plants themselves. At this point, you might be wondering what this has to do with anything that interests you. Please bear with me.

## But It's About More than Honesty

A few years ago I visited my mother in Florida, a trip I make from time to time. When I go, I visit local nurseries and gardens. On this particular trip I met a fellow rare fruit enthusiast who had a small citrus grove. When I met him, he said he was getting ready to rip out the citrus, every last tree. I was shocked until he explained it was all infected with a disease I had never heard of called "greening." He showed me a small, oddly shaped orange that wasn't orange at all, but a sickly yellowish green. He explained that the disease was fatal. There was no cure for it.

That day I learned that the disease was spread from the digestive tract of a small piercing insect called the Asian citrus psyllid that had arrived in Florida in 1998. It is now referred to as ACP. As the insect feeds it infects its host plant. Because the disease takes a few years to show, apparently healthy plants can be infected without exhibiting symptoms and further spread it before detection. Currently the only way to stop the disease is to destroy infected trees and use pesticide on the psyllid.

It is likely the disease arrived in Florida in illegal budwood that was grafted and planted in backyards. The disease began its spread when the psyllid arrived, picked it up during feeding and thus quietly transported it from place to place. It spread throughout the state in a few years. As it stands, plant pathologists believe that the disease is a bacterium; however, it has yet to be cultured in a lab. There is so much we have to learn, and the clock is ticking. Meanwhile any sort of better treatment may be a decade or so in the future.

## First a Scary Poster

When I moved to the Central Valley of California last year, I went to the county headquarters in Tulare to get information about local agricultural inspections so that I could enter the farmers market. As I stood in line I noticed a poster that reminded me of monster movies from the 50s, and as I read the text, I realized that this information was scarier than some fictional tale. It warned that citrus greening, also called *Huanglongbing,* or HLB, was in Brazil and moving northward. Huanglongbing means "yellow shoot disease" in Chinese. Microbiologists report that HLB is caused by a bacterial pathogen referred to as *Candidatus* Liberibacter asiaticusin.

As of this writing, the psyllid insect is being found in Southern California, but the disease itself has not been observed here yet. I took the information home and put it on the refrigerator because my home is in the middle of an orange grove. It is important to note here that the psyllid and HLB are not necessarily synonymous—that is, not until the two turn up in the same location. At that point it seems that the spread of HLB would be inevitable.

Recently I accompanied the Sequoia chapter on a tour of the Lindcove Station at Exeter, Calif., a plant research facility operated by the University of California. The day was to consist of a speech and slide show followed by a tour of groves of test trees that were full of fruit. We were anxious to begin, so when Eva Berghuis sternly commanded us to be quiet and warned that anyone caught taking scion wood would be banned for life from Lindcove and the chapter itself, the room quieted down.

Beth Grafton-Cardwell is a plant pathologist and entomologist who gave an informative speech and slide show for the rare fruit enthusiasts attending. People had heard some vague information about the Asian citrus psyllid and HLB, yet clearly many were taken aback at the frightening spectre of an incurable disease in South America moving toward the United States. As Beth finished her lecture, many somber questions were asked and the mood became quiet and thoughtful.

Soon enough, however, our group was outdoors picking fruit and enjoying the day. Clearly, some folks were more interested in picking fruit than anything else. This worried me a bit. I thought back to my friend in Florida who was forced to destroy the modest farm which for years had fed him with fresh fruit. I felt compelled to ask Beth for an interview on this topic, with an eye toward reaching as many fruit enthusiasts as possible and helping to ensure their realization of how serious this disease is.

After this outing, I mulled over my own indiscretions of the past and realized that we as plant lovers and collectors who shared plants have a duty to protect this industry as best we can. The HLB disease is in many areas of the world, such as Asia, India, Brazil, Cuba and Florida. Yet California citrus crops, which are among the very best in the world, are poised for an invasion whose potential disturbingly few people know about or understand.

Since the attacks on 9/11 Homeland Security agents at the border have understandably focused on terrorists and explosives, yet the potential economic damage that could quietly be brought on by this insect would devastate tens of thousands of farmers, workers, packers, truck drivers, nurserymen, shopkeepers—and the list goes on and on. In its own way, the psyllid could be as disastrous to our nation's food supply. So it's not overly dramatic to consider that we have a patriotic duty to be aware of the dangers of fruit and plant shipments. The California citrus industry is worth many billions of dollars. It must be guarded.

## Then Even Scarier Details

Later on as I interviewed Beth, I cracked a few jokes and noticed she wasn't laughing. She is focused like a laser beam on this disease and rightly so. Many other major citrus-producing regions in the world are infected, and they are in trouble. The Central Valley of California appears so far to be free of this disease, but the arrival of a single smuggled shrub or tree from the Rutaceae family could ruin everything. This is because the psyllid is moving into California, and if it finds an infected tree it will rapidly transport the disease to any nearby place where citrus is grown.

HLB affects certain citrus more than others. Some will have the disease for years and barely show anything. A plant like that could infect many others before symptoms causing concern might be noticed. Scion wood shared from one collector to another could be infected. Beth opines that often collectors attempting to graft some prized budwood are quite likely to use a rootstock that won't work anyway, or won't work well.

Healthy, worry-free citrus trees are easily available because of the University of California's disease-free budwood program, the Citrus Clonal Protection Program, and can be purchased from designated nurseries. These trees are free of HLB and are grafted onto appropriate rootstocks—this is important because many varieties simply won't work with some rootstocks. Also, each distinct variety made available by CCPP represents many years of rigorous testing for productivity before it is ready to go. So to assume that one can simply cut wood from any tree that seems appealing and graft it to any rootstock may well be the wrong approach. Moreover, such offhanded practices in our current circumstances could utimately bring about far worse results than a poor graft or a failed one.

As collectors, we can own citrus collections that boast depth and breadth without becoming part of this problem; all one needs do is purchase our citrus from recommended nurseries. The disease-free plants these nurseries sell issues from CCPP, probably the most secure facility of its kind in the world. The CCPP was organized more than fifty years ago to secure a healthy future for citrus farmers and the industry. No citrus may legally enter the state through any other channel. To grow an introduced cultivar within the law, it must have gone through the CCPP, where it is tested for numerous diseases. If it is determined to harbor a pathogen it will then go through a treatment program that can include such things as application of heat (thermal therapy) and a quarantine greenhouse enclosed with a fine mesh screen to insure freedom from insects. Once a plant has been thoroughly checked—a process which can take as much as one to three years—it is subjected to rigorous final inspections and then gradually made available to the industry. In this way, California has the means of remaining competitive with clean, healthy, productive plants.

## Start a Clean Plant List Now

A "must have" list of new plants should include the following CCPP offerings:

**Tango** A nearly seedless mandarin, even when planted near other trees, it has beautiful fruit, and is an easy peeler with a great taste. It is in great demand so be prepared

Los Angeles County agriculture agents at LA International Airport inspect curry leaf from Hawaii

for a wait but it will be worth it. W. Murcott Afourer mandarin (VI 462).

**Nordmann kumquat** Similar to a Nagami kumquat except for its lack of seeds, the Nordmann cultivar is a major breakthrough, a kumquat that is completely edible. Without seeds the fruit is much more useable for preserves. *Fortunella margarita.*

**Australian finger lime** Slicing open one of these elongated fruits reveals "caviar-like" vesicles which can be used in jams and drinks. *Microcitrus australasica.*

**Variegated Pink Lemon** A sport from a Eureka lemon, this tree is an interesting ornamental. Its foliage is variegated and the rind of its fruit also exhibits striped variegation. The flesh inside is pink. *Citrus* × *limon.*

## Weigh Your Desires Carefully

I could have written this article with far more technical information than is presented here. But I felt I that my efforts might be of greater benefit if I took readers for a walk inside their own desires to collect desirable plant material and get them to focus on the root reasons for plant acquisition, which is risky for reasons already stated. If you are reading this, chances are you enjoy the rush of new and unusual plants as much as I once did. It is to you that this outreach by plant pathologists and industry workers is targeted. If we, the premier organization of amateur and professional fruit growers can shift our paradigm from concentrating on the hunt for the unusual to an emphasis on responsible management of desirable fruit-bearing plants, then we will have done a great deal to expand the legitimacy and effectiveness of our hobby, and will also have immeasurably helped the very plants we love.

For information on citrus pathogens go to www.CaliforniaCitrusThreat.org. If you want CCPP plants that are guaranteed to be disease free, they can be found at the following nurseries:

**Four Winds Growers** Four Winds Growers offers an amazing selection, which can be seen on the variety list at their website, http://fourwindsgrowers.com. Order online for speediest service. If a rare plant is not on that list, but is available from the Citrus Clonal Protection Program (http://ccpp.ucr.edu), Four Winds Growers will custom graft: email specialorders@fourwindsgrowers.com.

**Orchard Supply Hardware** Four Winds Growers citrus plants are available at Orchard Supply Hardware nearly statewide in California. Go to www.osh.com. They are retail and will help with the smallest of orders as well as the large ones. This is probably the easiest way for many collectors to find what they want.

**Brokaw Nursery** Saticoy, Calif. Go to www.brokawnursery.com. Wholesale only.


Geraldo Perez grafts Tango mandarin scions onto appropriate rootstocks at Lindcove

**Willits and Newcomb, Inc.** Bakersfield, Calif. Go to www.wncitrus.com. Wholesale only. Occasionally retails at Costco stores.

## Ask Yourself: Why Am I Grafting?

Finally, Beth Grafton-Cardwell discourages private users from grafting budwood unapproved by CCPP and encourages obtaining approved cultivars grafted on appropriate rootstock. Still, it is only fair to point out two things: CCPP does offer budwood to private as well as commercial growers, with certain conditions and restrictions that absolutely must be met. Find out more at http://ccpp.ucr.edu. The other thing is that CRFG does have members possessing tremendous expertise in successful grafting methods and at selecting appropriate rootstock. Those people are more than capable of successfully manipulating plant material. And the best of them realize that responsibility in handling plant material, especially that from the Rutaceae family, is more essential today than ever before. In fact it is now crucial. The excerpts from news stories that follow underline the seriousness of our circumstances.

**June 12, 2008** The Animal and Plant Health Inspection Service Plant, Plant Protection and Quarantine (PPQ) Molecular Diagnostics Laboratory and the PPQ Center for Plant Health Science and Technology National Plant Germplasm and Biotechnology Laboratory in Beltsville, Md., confirmed the identification of HLB in a leaf sample from a residential property in Algiers, Orleans Parish, La. The samples in which HLB was confirmed were from a lime tree on which Asian citrus psyllid had previously been found. This is the first confirmation of HLB in Louisiana. See the entire report at http://ccpp.ucr.edu/news/HLB%20&%20ACP-Lousiana.html.

**June 23, 2008** The USDA confirmed the ACP in the city of Tijuana, Mexico. The initial ACP specimens were collected among sweet orange plants on a residential property approximately two miles from Mexico's border with California. As of the date of the report, ACP had been detected on sweet orange or lemon plants on six residential properties in the area. See the entire report at http://ccpp.ucr.edu/news/ACP-Tijuana.html.

**August 29, 2008** The California Department of Food and Agriculture and the USDA announced a presumptive positive detection of a single Asian citrus psyllid in San Diego. According to federal regula-

Citrus under scrutiny at Needles, Calif., agricultural inspection station

tions, before the identification was final, it had to first be verified by a USDA entomological laboratory in Washington D.C. On the date of the report, the specimen was being sent there. See the entire report at http://ccpp.ucr.edu/news/ACP-CA.html.

Be warned: considering the current circumstances it is extremely unwise to gamble against the very real possibility of becoming instrumental in the destruction of California's citrus industry. Such destruction is already occurring in Florida.

***Andrew Glazier*** *is a landscaper, writer and commercial artist from Exeter, Calif. His work has appeared in* Time *and* Sunset *magazines and the* San Francisco Chronicle. *He is an avid collector of rare and unusual plants, especially cactus. One can find him lurking at garden shops or online looking for the rare and unusual. He has volunteered to help with propagation for the San Francisco Botanical Gardens at Strybing Arboretum, the origin of much of his epiphyllum collection. He likes plants from the Lily family, the namesake of his daughter Lily, his prettiest flower of all. For more information go to WildWestGardens.com.*