



## Redwood Barn Nursery

1607 Fifth Street Davis, California

### Citrus Disease Update:

#### Some good news about citrus

There is finally some good news about the infamous disease that has been afflicting citrus trees.

#### What it is: the characters.

HLB = Huanglongbing disease, also called citrus greening disease. It is caused by a bacterium that causes slow death of the trees, greening of the fruit which makes it unmarketable, and increases the bitterness of citrus fruit to a very noticeable degree.

ACP = Asian citrus psyllid, the vector. Psyllids (sill-id; the p is silent) are small aphid relatives that suck the juices of the plant and carry the bacteria from tree to tree.

Tamarixia radiata = Asian citrus psyllid parasitoid, a tiny predatory wasp that attacks ACP.

#### History and impact

HLB has been found in citrus trees in all the major citrus growing regions of the world. The impact has differed due to how orchards are distributed geographically, and how the local governments responded.

Brazil, the world's leading producer of orange juice, has been heavily impacted by HLB but farmers there adopted an aggressive practice of destroying infected trees and replanting, allowing them to stay ahead of the problem to a much greater degree than Florida growers did. Brazilian orange growers have also steadily moved their operations further out into new areas.

Florida's orange juice industry has been nearly destroyed by this disease. Florida growers focused on plant nutrition strategies, which ultimately were not successful.

- In 1998, ACP (the psyllids) were found in Florida, and by 2003 they had been found in California.
- In 2005, HLB was found in the Valencia orange groves in Florida. The vector and the disease are now present in all the commercial citrus regions of that state.

The impact has been stark.

- In 2000, Florida citrus acreage totaled 832,275 citrus acres.
- 2024 Florida citrus acreage was 248,028 acres, which was down 17% from the year before.
- 2024-25 citrus production was down 28% from the previous year.
- Citrus fruit production in Florida is down 90% since HLB arrived.

Some growers have resorted to growing their citrus trees in screened houses. One grower now has 1500 acres of citrus under protective screening, producing about 1.2 million boxes of fruit in 2024 with revenue of \$30 million. But that's a major infrastructure cost.

Note that Florida's citrus industry is based on Valencia oranges grown for juice. Most citrus fruit contains some bitterness from the naringin content. Valencia has no naringin, which is why it's



## Redwood Barn Nursery

1607 Fifth Street Davis, California

used for juice. Unfortunately, bitterness is one of the symptoms of HLB, so fruit from infected Valencia trees quickly becomes unusable.

“HLB is the most devastating disease affecting Florida citrus, and it threatens the survival of the citrus industry. Once a tree becomes infected, there is no cure. The risk of a citrus tree becoming infected with HLB is high and ultimately unavoidable. Disease spread is endemic in Florida; therefore, the tree will become infected. Growing a citrus tree during the HLB era is an investment of time, money, and resources with no guarantee of success.” – University of Florida

In 2024, California surpassed Florida as the nation’s leading citrus fruit producing state. California citrus growers mostly grow navel oranges and mandarins.

### **How it spreads**

The disease is spread by the psyllid, injected into the tree from the proboscis of the insect. The psyllid can fly, but the main means of movement is on infested trees or fruit, and it can live on other species than just citrus.

Identifying the host range and preventing the movement of host plants became the first line of defense.

The State of California quickly implemented quarantine zones for movement of fruit and trees. Nurseries in some parts of the state cannot buy or sell trees from other parts of the state unless the trees have been certified and inspected. Growers are required to treat the trees before releasing them to retailers, mark them with a blue tag, and provide records to the state ag department. The trees must have the blue tag present in retail nurseries and are subject to inspection by the county ag commissioner. Required treatments are mostly systemic insecticides. There are basically no organically grown citrus trees available.

The quarantine zones have been adjusted as new finds of the psyllid have occurred.

### **Where it is now in California**

HLB disease is only present south of the Tehachapis: Santa Barbara, Ventura, Los Angeles, Riverside, Orange, and San Diego counties. Infected trees have mostly been found in backyard gardens in urban areas. Trees that are confirmed to be infected are immediately destroyed, as has been done to about 6,000 trees to date.

The Asian citrus psyllid has spread up into Northern California, but not the disease. Psyllids have been found in the Bay Area (mostly around San Jose), along the I-5 corridor, and near Fresno and Bakersfield in San Joaquin County. This latter is the major threat to California’s citrus industry as Fresno, Kern, and Tulare are the leading citrus producing counties in the state. In fact, those three counties are the highest-value farm crop counties in the country.

### **What the state has been doing.**

Preventing the spread of the disease: establishing and adjusting quarantines, destroying infected trees, spraying to kill the vectors, and regulatory management of the trees sold in the nursery industry.



## Redwood Barn Nursery

1607 Fifth Street Davis, California

Department of agriculture officials monitor for spread of the psyllids by posting pheromone traps in citrus trees on private property, in nurseries, and in orchards.

Research efforts began immediately and focused on:

- Cultural practices: heavy feeding, treatment with micronutrients.
- New varieties: some citrus proved more tolerant or even resistant to HLB, so new hybrids are being developed and tested. Trifoliolate orange, a common citrus rootstock, turns out to be HLB tolerant and may become an important breeding parent for new citrus varieties. But it has bitter fruit, so back-crossing is necessary. This type of conventional breeding is time-consuming.
- Genetic modification. For example, insertion of a gene from spinach blocked the symptoms of the disease. Development and testing of new varieties is faster using genetic modification than by conventional breeding.
- Identifying possible natural control remedies, a practice known as biological control.

Fun note: trained dogs have been used to sniff for infected trees, with very high accuracy! According to researchers with the USDA Horticultural Research in Fort Pierce, FL, “the canines were able to detect infected fruit trees with 99 percent accuracy in controlled tests (where the infection status of each tree tested is known) – exceeding the accuracy rate of any other available detection technology. Additionally, the detector dogs could travel through groves of trees in mere minutes. Previous HLB detection techniques involved humans picking a small number of leaf samples from suspect trees and spending days to weeks performing laboratory testing. The time saved in detecting the disease earlier gives citrus growers the chance to immediately remove infected trees, minimizing spread of the disease, and therefore controlling what could have been a severe outbreak and crop loss.”

### What’s working?

Meanwhile, research in California also focused on controlling spread of the disease by controlling spread of the psyllid via biological control. The *Tamarixia* wasp was found in Pakistan, was readily mass reared in laboratories, and proved to establish well in California. The wasps were first released in 2011, and by 2022 23 million had been released in the state.

The results have been dramatic: surveys have shown that population decline of the psyllid exceeds 70% and some surveyed areas have “been ACP-free for more than two years.”

The disease can’t spread on its own, so suppressing the psyllid is a major accomplishment.

“California’s commercial citrus groves remain free of HLB disease 14 years after Asian citrus psyllids were first detected there.”

--Citrus Industry, AgNet Media, 2022

“Eleven years after the initial HLB detection in California, it is highly unlikely California citrus will be destroyed by ACP/HLB.”

-- Mike Hoddle, biological control specialist at the UCR Department of Entomology, May 2024.



## Redwood Barn Nursery

1607 Fifth Street Davis, California

### What can you do?

Don't take citrus fruit, budwood, or citrus trees outside of your quarantine area. Purchase trees only at nurseries within your quarantine zone.

How serious is this? Placer County was put into a quarantine in 2016 because one individual brought ACP-infested trees up from Southern California. CDFA officials found the psyllids had spread to a neighboring tree. Those trees were all destroyed. Placer County is still under quarantine.

"That's a really sad story because somebody brought three potted citrus trees from Orange County. They had quarantine tags on them," said Josh Huntsinger, Placer County's Ag Commissioner. According to news reports at the time, the \$75 plants that were purchased and moved caused a \$100,000 disaster.

### Can home gardeners identify the disease?

Not easily. The symptoms mimic many other citrus problems. Images of HLB symptoms may pop up on your phone as you scan apps to try to evaluate yellowing leaves or spots on your citrus, but it's very, very unlikely that you have HLB on your tree. If you do, you'll be on the evening news.

### Resources:

Quarantine maps from the California Department of Food and Agriculture:  
<https://citrusinsider.org/maps-and-quarantines/>

Special CDFA presentation on ACP and HLB for Master Gardeners: <https://ucanr.edu/site/asian-citrus-psyllid-distribution-and-management/master-gardeners>

Trained dogs: <https://scientificdiscoveries.ars.usda.gov/explore-our-discoveries/southeast/fl-using-canines-to-detect-devastating-citrus-and-vegetable-pathogens>



## Redwood Barn Nursery

1607 Fifth Street Davis, California



Disease-sniffing dogs? A trained HLB disease detector dog, Mira alerts her trainer by sitting next to a citrus tree infected with Huanglongbing.



## Redwood Barn Nursery

1607 Fifth Street Davis, California



*Tamarixia radiata* is a predatory wasp that attacks Asian citrus psyllid nymphs. Releases of this beneficial insect have proven very successful in controlling the pest that spreads HLB disease.

Photo credit: CDFA



Trifoliate orange (*Poncirus trifoliata*) is often used as a rootstock for citrus trees. It turns out to be tolerant of, or resistant to, the HLB disease and has potential as a parent for resistant hybrids. The fruit is sour and bitter, so breeding and back-crossing will be necessary to produce good-flavored, disease-tolerant citrus varieties.

Photo by Don Shor