

## Get the Facts on Citrus Greening (Huanglongbing)



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**Figure 1**—Citrus greening-affected trees may take years to die from the disease. In this image, an infected citrus tree displays multiple symptoms of citrus greening, including twig dieback, leaf mottling, leaf yellowing, fruit drop, and poor fruit color.



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**Figure 2**—Trees infected with citrus greening produce bitter, misshapen fruit. Here, the asymmetrical development and aborted seed in this fruit are telltale signs of citrus greening.



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**Figure 3**—Tiny to the naked eye, adult Asian citrus psyllids are no bigger than common gnats.

Citrus greening disease, or huanglongbing, is one of the world's most serious citrus diseases. There is no known cure for citrus greening. While not a threat to human health, citrus greening greatly reduces citrus production. Once infected with the disease, citrus trees usually decline within 5 to 12 years (fig. 1), whereas healthy commercial citrus trees are typically productive for more than 50 years. Trees infected with citrus greening produce bitter, misshapen, unmarketable green fruit (fig. 2).

Because there is no cure for this disease, the U.S. Department of Agriculture (USDA) restricts citrus plants and plant material from moving outside of areas where citrus greening is present. USDA also restricts the movement of the same material from areas where the Asian citrus psyllid, a primary vector of the disease, is present.

Citrus greening is believed to have originated in China in the early 1900s. It has greatly reduced citrus production in all countries where it has become established. First detected in the United States in August 2005 in

Miami-Dade County, FL, citrus greening is now established throughout most citrus-producing counties in Florida, and the entire State is under Federal quarantine for citrus greening and Asian citrus psyllid. Federal law restricts the movement of live citrus plants, plant parts, budwood, or cuttings outside of Florida. Subsequent U.S. detections of the disease have occurred in numerous citrus-producing States and U.S. Territories. The most current information on disease-affected areas in the United States can be found online at [www.aphis.usda.gov/citrusgreening](http://www.aphis.usda.gov/citrusgreening).

### How It Spreads

Citrus greening is spread primarily by gnat-sized insects called Asian citrus psyllids (*Diaphorina citri* Kuwayama). These invasive pests transmit the disease to citrus trees and other host plants when they feed on the leaves and stems.

Adult psyllids resemble aphids in appearance, measuring about one-eighth of an inch. Their bodies are grayish-tan with brown markings and mottled brown wings. The last two segments of their antennae are black. They

feed with the posterior of their bodies raised at a 45-degree angle (fig. 3). When disturbed, they typically jump or fly a short distance. They are most likely to be found on new shoots, or young growth, of citrus plants.

In nymph form, Asian citrus psyllids' oval-shaped bodies are yellowish-brown. Difficult to see, nymphs cannot fly, and they move slowly. Most visible are the waxy, white excretions they produce (fig. 4).

Asian citrus psyllid eggs are yellow/orange in color and shaped like almonds. They are often tucked inside crevices and leaf folds.

Not all Asian citrus psyllids carry the disease-causing bacteria. But even non-infected psyllids can damage citrus plants and trees by stunting the growth of new shoots. On host plants and trees, these psyllid infestations result in burned shoot tips and twisted leaves on new growth. New shoots that are heavily infested by psyllids do not expand and develop normally, and they are more susceptible to breaking off. Insect populations increase during periods of active plant growth.



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**Figure 4**—One of the clearest indications of an Asian citrus psyllid infestation is the presence of psyllid nymphs and their white, waxy excretions on citrus plants.

Citrus greening can also be transmitted by grafting diseased budwood. Although the citrus greening pathogens are bacteria, the disease does not spread by casual contamination of personnel and tools or by wind and rain.

In June 1998, Asian citrus psyllids were discovered in backyard plantings of orange jasmine in Palm Beach County, FL—the first detection of this pest in the United States. Currently, psyllids are located in more than a dozen States and U.S. Territories. These areas are under a Federal quarantine. Visit [www.aphis.usda.gov/citrusgreening](http://www.aphis.usda.gov/citrusgreening) for the most current quarantine information.

## Symptoms

Trees and plants that are infected with citrus greening disease may not show symptoms for years. As the disease moves within the tree, it is not uncommon for whole branches, and eventually the entire tree, to turn yellow progressively. One of the most characteristic foliage symptoms of citrus greening is blotchy mottling (fig. 5) of the leaves and yellowing of leaf veins and shoots. The newest leaves may display symptoms that can be misdiagnosed as signs of zinc deficiency. Older leaves take on the mottling characteristic of greening. Other symptoms



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**Figure 5**—Trees infected with citrus greening may express numerous symptoms, including blotchy mottling and corky veins in leaves.

include twig dieback and poor flowering.

Fruit from diseased trees is small and often misshapen. Typically, some green color remains even on ripe fruit (fig. 6). Greening-affected fruit tastes bitter, medicinal, and sour. Seeds usually abort (fail to develop), and fruit set (formation) is poor. Symptoms vary according to the time of infection, stage of the disease, tree species, and tree maturity.

## Host Plants

Nearly all citrus species and many citrus relatives (e.g., orange jasmine, limeberry, and trifoliate orange) are susceptible to citrus greening. Sweet orange and mandarin orange are highly susceptible to the disease; sour orange, grapefruit, and lemon are moderately susceptible.

Greening-susceptible citrus plants may serve as reservoirs for citrus greening disease. However, because all citrus plant species are potential hosts for Asian citrus psyllids, all citrus plants are significant pathways by which infected psyllids can spread to areas that are not infected with citrus greening.

## How You Can Help

To report suspect disease symptoms or psyllid insect sightings, please contact your



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**Figure 6**—Infected fruit is discolored and bitter.

State department of agriculture. Do not transport plants you suspect to be infected with citrus greening or infested with Asian citrus psyllids. This may spread the disease and violate State and Federal quarantines. Before moving any citrus, contact your local USDA office (find yours at [www.aphis.usda.gov/StateOffices](http://www.aphis.usda.gov/StateOffices)).

## Learn More

For more information on citrus greening, please visit [www.SaveOurCitrus.org](http://www.SaveOurCitrus.org) or [www.aphis.usda.gov/citrusgreening](http://www.aphis.usda.gov/citrusgreening).

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