

2006 Florida Citrus Pest Management Guide: Huanglongbing (Citrus Greening)¹

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Huanglongbing (HLB), commonly called citrus greening disease, is caused by the bacterium, *Candidatus Liberibacter* spp. The name huanglongbing means “yellow dragon” which describes the symptom of a bright yellow shoot that commonly occurs on a sector of infected trees. HLB is a serious disease of citrus because it affects all citrus cultivars and causes rapid decline of trees. HLB has seriously affected citrus production in a number of countries in Asia, Africa, the Indian subcontinent and the Arabian Peninsula, and was recently discovered in July 2004 in Brazil. Wherever the disease has appeared, citrus production has been compromised with the loss of millions of trees. HLB has not been reported in Australia or in the Mediterranean Basin. In August 2005, the disease was found in the south Florida areas of Homestead and Florida City. Since that time, multiple residential and commercial citrus sites have been found infected with huanglongbing including commercial citrus groves. The HLB type found is the Asian form which occurs in warm low altitude areas and is transmitted by the Asian citrus psyllid (*Diaphorina citri* Kuwayama). The Asian citrus psyllid was discovered

in Florida in 1998 and now occurs throughout the state wherever citrus is grown.

The initial or early symptoms of HLB on leaves are vein yellowing and a variegated type of chlorosis referred to as a blotchy mottle. The blotchy mottle symptom is the most diagnostic symptom of the disease. Leaves might be small and upright with a variety of chlorotic patterns that often resemble mineral deficiencies such as those of zinc, iron, manganese, calcium sulphur and/or boron. Often some of the leaves may be totally devoid of green or with only islands of green spots. The blotchy mottle symptom also may be confused with other diseases such as stubborn, severe forms of *Citrus tristeza virus* (CTV), Phytophthora root rot, water logging or citrus blight. Root systems on infected trees are often poorly developed and new root growth may be suppressed. The early symptoms of yellowing may appear on a single shoot or branch. Hence the Chinese names of yellow shoot and yellow dragon are descriptive of this symptom. The yellowing usually spreads throughout the tree and affected trees may show twig dieback and the tree productivity may

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decline in a few years. Fruit are often few in number, small, may be lopsided with a curved central core and fail to color properly remaining green at the stylar end. The affected fruit often contain aborted seeds and have a salty bitter taste. Symptoms may be enhanced by the presence of other pathogens such as CTV.

The causal bacterium, *C. Liberibacter asiaticus* has not been cultured and diagnosis is by PCR. Detection of the bacterium is only possible from symptomatic tissues. Four different types of the HLB bacterium exist. One causes the Asian type, one causes the African disease and another causes a disease of Cape Chestnut in South Africa. A fourth type was found in Brazil where the Asian type also was found and has been named *C. Liberibacter americanus*. The host range includes all citrus species regardless of rootstock. Normally symptoms are severe on sweet orange, mandarins and mandarin hybrids; moderate on grapefruit, lemon and sour orange; lime, pummelo and trifoliate orange are listed as more tolerant. However in south Florida, the symptoms were severe on pummelo, lime and grapefruit.

When psyllids are abundant and conditions are favorable, HLB can spread, destroying existing groves and preventing the commercial production of oranges and other citrus cultivars. Infected mature trees may decline and become non-productive and young trees that become infected never come into full production. In China, the disease was reported to kill young trees in 1-2 years. HLB also can be transmitted with infected budwood. Therefore, use of certified disease-free planting materials is essential to minimize further spread.

Recommended Practices

1. HLB is difficult to manage and continued production of citrus has proven difficult and expensive in areas where it is widespread. Since HLB is transmitted by the Asian citrus psyllid which is well established in Florida, there is clearly a potential for the continued spread of HLB throughout Florida citrus. The use of clean budwood and certified healthy trees is essential. Budwood sources and nursery stock should be protected from psyllid infestation by screened

enclosures and the use of systemic insecticides such as imidacloprid (see Soft-Bodied Insects Attacking Foliage and Fruit section). Some biological control of the psyllid is available but the amount of psyllid control provided by introduced parasitoids has yet to be fully determined.

2. The Asian citrus psyllid feeds on many rutaceous plant species. The psyllid has a preference for the landscape ornamental, orange jasmine (*Murraya paniculata*). Even though this is not currently believed to be a host of the HLB bacterium, the plant can serve as a multiplication host for the psyllid. Another rutaceous ornamental, *Severinia buxifolia* or orange boxwood, is a host for the bacterium as well as the psyllid. Movement of these ornamentals is restricted under state compliance agreements and should not be moved from areas where the disease occurs.
3. Removal of infected trees is the only way to ensure that they will not serve as a source of the bacteria for psyllid acquisition and subsequent transmission. Prior to removal, the infected tree should be treated with a foliar insecticide (such as Danitol, fenprothrin) to kill all adult psyllids feeding on that tree. Failure to control these psyllids will result in the infected psyllids dispersing to new plants once the diseased tree is removed. Pruning of symptomatic limbs has been used in many countries to reduce the inoculum available to the psyllids. However, because the disease is systemic, pruning may not be useful since other parts of the tree may already be infected but not yet symptomatic. Additionally, if a tree is still infected after pruning, the new flush produced will serve as a feeding site for adult psyllids to acquire the greening bacteria. The infected psyllids may then disperse to uninfected trees once the new flush hardens off.
4. Integrated pest management strategies should focus on the following: use of disease-free nursery trees, reduction of the inoculum by periodic disease survey and removal of symptomatic trees, and suppression of Asian citrus psyllid populations through chemical,

biological and cultural controls. Refer to
ENY-604, Soft-Bodied Insects Attacking Foliage
and Fruit, in the Florida Citrus Pest Management
Guide for more information on management of
Asian citrus psyllid. Links to websites on citrus
greening disease can be accessed through the
Citrus Research and Education website at the
following address:

[http://www.crec.ifas.ufl.edu/CRECHOME/
citrus_greening.htm](http://www.crec.ifas.ufl.edu/CRECHOME/citrus_greening.htm) and EDIS
http://edis.ifas.ufl.edu/TOPIC_Citrus_Greening.