

Screening Aid for Huanglongbing (HLB) or Citrus Greening Disease Symptoms

By Hilda Gomez, Plant Pathologist, USDA, APHIS. PPQ CHRP Program

Huanglongbing (HLB) or citrus greening is a serious disease of citrus and some citrus relatives. The Asian form of the disease is currently present in the U.S. The causal pathogen, a phloem-limited bacterium *Candidatus Liberibacter asiaticus*, was first reported in Southeast Florida in 2005. The vector responsible for the spread of the disease is the Asian citrus psyllid, *Diaphorina citri* Kuwayama, which was first reported in the U.S. in 1998.

Asymmetric blotchy leaf mottle is the most diagnostic symptom and is observed on both sides of the leaf. The mottling normally crosses leaf veins, but will not cross the mid vein. Other symptoms include yellowing of the leaf veins which can become enlarged, swollen, and corky. In advanced stages of the disease it is possible to observe thicker, leathery leaves; the result of starch accumulation. The presence of small pointed, erect, leaves known as “rabbit ears”, and “green islands”, where the green areas on the leaf are reduced to small circular spots, are also indicators of a severe and advanced infection.

HLB affected fruit are small and lopsided. They commonly fail to color properly when mature, hence the name “citrus greening” for the disease. A color inversion occurs when the stylar end tends to remain green, while the stem end turns yellow or orange. The dark, shriveled remains of aborted seeds may also be present, and the vascular columella may show an orange-brown stain. Juice of HLB infected fruits has been described as salty and bitter or simply off-taste. Symptoms on trees include the random presence of yellow shoots (*which the Chinese refer to as “yellow dragons” or Huanglongbing, the yellow dragon disease*) known as sectoring, twig dieback, severe leaf and fruit drop, and off-season flowering. Nutrient-like deficiency symptoms can also be observed on HLB affected branches.



Asian citrus psyllids,
Diaphorina citri.



Asymmetrical pattern
of the HLB mottling
on Alemow
(*Citrus macrophylla*)



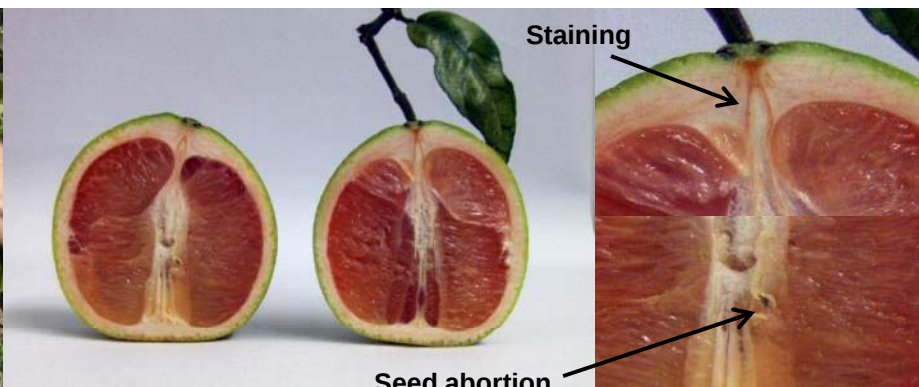
Mottling that
crosses the
leaf veins



Mottling limited
by the leaf
mid vein



Top and bottom surfaces of sour orange (*Citrus aurantium*) leaves showing classic HLB mottling



Lopsided fruit showing seed and staining of the vascular columella and seed abortion



HLB classic mottling on tangerine (*Citrus reticulata*) leaves



Pummelo (*Citrus maxima*) tree showing twig dieback



Pummelo (*Citrus maxima*) tree with yellow shoots (sectors)



HLB symptoms on pummelo leaves (*Citrus maxima*)



"Rabbit ears" on a sour orange (*Citrus aurantium*) tree



Corky veins on sour orange (*Citrus aurantium*) leaves



"Green islands" on sweet orange (*Citrus sinensis*) leaves



Yellow veins of a HLB infected tangerine (*Citrus reticulata*) leaf



Notching resulting from the Asian citrus psyllid feeding damage



HLB symptoms on Kafir lime (*Citrus hystrix*) leaves



HLB mottling on the citrus relative trifoliate orange (*Poncirus trifoliata*)



HLB symptoms on Persian lime (*Citrus aurantiifolia*) leaves



HLB symptoms on the citrus relative calamondin (*Citrofortunella microcarpa*)



Zinc-like deficiency symptoms

HLB symptoms

**HLB mottling progression on
Persian lime (*Citrus aurantifolia*)
leaves**



Early



Middle



Advanced

**All photos by Hilda Gomez, Plant Pathologist
USDA, APHIS, PPQ Citrus Health Response Program
Plantation, Florida
November 2009**