12.3 Occurrence and management strategies for HLB in the State of Paraná, Brazil

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Huanglongbing (HLB) caused by *Candidatus Liberibacter asiaticus* is the most severe disease of citrus around the world. The disease was first reported in Brazil in 2004 in the state of São Paulo. In Paraná, HLB was first reported in citrus orchards in the municipality of Altônia, in the Northwest region of the State, in 2006. The disease was observed on 4 to 5 years old trees of sweet orange Folha Murcha sweet orange (*Citrus sinensis* (L.) Osb.) grafted on Rangpur lime (*Citrus limonia* Osb.). Typical symptoms of HLB on leaves were blotchy mottle, reduced size and yellowish color, and on fruits were lopsidedness, poor color and aborted seeds. By now, the disease has already been reported in at least 28 municipalities in the North and Northwest regions of the State of Paraná, which comprises the main citrus producing areas of the State (Fig. 1). The disease has been found in the sweet oranges IAPAR 73, Folha Murcha, Pera and Valencia, with similar symptoms severity. The psyllid *Diaphorina citri* (Kuwayana), vector of the bacterium *Candidatus Liberibacter asiaticus*, is widespread throughout the State. The presence of *Murraya paniculata* (L.) Jack as a preferential host for the vector, occurring in backyards and landscapes has also been associated with the occurrence of HLB in Paraná.

![Fig. 1. Municipalities with occurrence of HLB in the State of Paraná, Brazil.](image)

Several measures have been enforced in Paraná to reduce the spread of HLB and to keep the disease under control. The production, commercialization and planting of *M. paniculata* have been banned in Paraná since 2006 by a state regulation. Production of citrus nursery trees are allowed only under closed insect-proof conditions. Growers are obligated to carry out orchard inspections regularly to detect symptomatic citrus trees and to eliminate the infected trees. The growers who do not eliminate diseased trees may suffer legal penalty. Sprays of insecticides are also recommended to reduce the population of *D. citri*. Campaigns have been implemented by state and municipal personal to advise growers on the seriousness of HLB for the citrus industry and for the need to quickly adopt measures to control the disease. The involvement of growers...
associations and cooperatives in the actions has been key for reducing the spread and implementing a control program for HLB in Paraná State.