

8.9**Early root infection and damage in Huanglongbing disease development**

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Huanglongbing in grove trees is initially identified by foliar symptoms, most commonly blotchy mottle. Detection of *Candidatus Liberibacter asiaticus* (Las) in leaf tissue by qPCR early in disease development is usually limited to symptomatic leaves and proximal young leaves. Over multiple years, disease symptoms spread to the rest of the canopy. Although Las has been detected in root tissue, the decline of roots has been assumed to happen later in disease development when photosynthate production and transport have been significantly diminished in the tree canopy. Observations of initial spread of Las from the bud-inoculation site in the trunk of 1-yr-old potted trees have revealed that Las is frequently detectable in roots months before detection of Las in leaves and foliar symptom development. Even after symptom development Las is more evenly distributed in root tissue than in the canopy. Preliminary evidence suggests that Las is also more evenly distributed in roots of grove trees. Asymptomatic 9 year old grove trees with root Las infection had 26-41% lower root density than asymptomatic trees without detectable root Las. The loss of root density was independent of Las detection in leaves. Root loss precedes carbohydrate starvation as evidenced by root starch concentrations, suggesting the bacteria may play a more active role in root loss than phloem plugging. These results suggest that early invasion of roots by Las leads to root decline before the appearance of foliar symptoms and is likely the cause of larger than expected yield reduction on trees with limited foliar symptoms.