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Thermotherapy and chemotherapy to control citrus HLB in the field

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Huanglongbing (HLB), a systemic and destructive disease of citrus, is associated with three species of α -proteobacteria, '*Candidatus Liberibacter asiaticus*' (Las), '*Ca. L. africanus*' and '*Ca. L. americanus*'. Previous studies have found distinct variations in temperature sensitivity and tolerance among these species¹. Las, the most prevalent and heat-tolerant species, can thrive at temperatures as high as 35°C¹. Our earlier work has shown that Las bacteria in potted HLB-affected citrus were significantly reduced or eliminated when exposed to continuous temperatures of 40 to 42°C for a minimum of 48 h². To determine the feasibility and effectiveness of thermotherapy in the field, various portable greenhouses were placed over commercial and dooryard citrus exposing trees to higher temperatures through solarization. Within weeks after treatment, most trees responded with vigorous new growth. Flush post-treatment had significantly less Las DNA present in leaves one year after treatment and trees continued to grow well. Unlike with potted trees, exposure to high heat through solarization was not sufficient to eradicate the Las population in field conditions, most flush after treatment was qPCR positive for Las. This may be attributed to fluctuating day and night temperatures, and the citrus roots imbedded in the soil being inadequately exposed to heat (temperature and duration). To further combat the systemic infection, chemicals such as penicillin and streptomycin used in conjunction with thermotherapy were applied to HLB-affected trees in the field. Plants post-treatment were monitored and leaves and roots were periodically sampled and tested for Las. Preliminary results indicate some treatment regimes are promising.

References

¹MCG Gasparoto, et al. *Plant Pathol* **61**, 658 (2012).

²MT Hoffman, et al. *Phytopathology* **In Press** (2012).