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Screening of Transgenic Citrus for HLB Resistance

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Transgenic citrus scion (mostly grapefruit and sweet orange) and rootstock cultivars (Carrizo and experimental complex tetraploids) were transformed with gene(s) encoding antimicrobial peptides or systemic acquired resistance (SAR) proteins. Each transgene was under control of an enhanced CaMV 35S promoter. Several genes were also under control of a phloem specific *Arabidopsis* SUC2 (*AtSUC2*) promoter. A number of clones of each transgenic line (at least 3 replicate plants per clone) were evaluated for resistance to Huanglongbing (HLB, caused by *Candidatus* Liberibacter asiaticus). 650 clones, from over 180 individual transgenic lines planted in spring 2009 in a heavily HLB infected Martin County grove were tested using qPCR for infection to HLB after 30 months in field. 396 trees tested negative for the HLB bacterium. Approximately 200 clones were observed to be healthy and flushing after 40 months in the field and were again evaluated using qPCR during June 2012. We did not detect the *Ca. Liberibacter asiaticus* bacterium in a majority of these trees. In a separate trial in St. Lucie County, 300 clones, from over 80 individual transgenic lines planted during 2010 were evaluated in October 2012. Similar trends were observed to that seen in our Martin County site. 345 transgenic clones and controls containing the same transgene(s) were also placed in a greenhouse containing free flying HLB-infected Asian citrus psyllids (ACP) during April 2011. All trees were evaluated for infection after 12 months by qPCR, and 80% of the transgenic trees tested negative for the bacterium. These results suggest that some of the antimicrobial peptides and SAR-inducing proteins can provide long-term resistance against HLB.