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Preliminary Evidence for Rootstock Effects on HLB Infection Frequency and Disease Severity in Sweet Orange and ‘SugarBelle’ Trees

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Evidence is accumulating that root system collapse is involved with HLB-induced tree decline, especially with trees on Swingle and Carrizo. Phytophthora resistance appears to be breaking down in HLB-infected trees on Swingle. Other stresses caused by blight, nematodes, cold, etc. also appear to be interacting with HLB to increase HLB disease frequency and severity. Improved rootstocks could help to mitigate these problems, allowing for sustainable production under appropriate nutrition. We are testing complex hybrid rootstock candidates (diploid and tetraploid) to determine their affect on HLB disease establishment and severity in trees grafted with sweet orange scions; field and greenhouse experiments are underway. Rootstocks differentially translocate nutrients, phytohormones (plant growth regulators), micro-RNAs, small proteins (pathogenesis related?), and other metabolites to the scion. This could have both direct and indirect, quantitative and quantitative affects on scion gene expression, and possibly Liberibacter pathogenesis in citrus – especially with unique complex allotetraploid rootstocks. Data from two young field trials (both with the ‘bad neighbor’ effect) established to evaluate new rootstock candidates, previously not screened for HLB tolerance, will be presented. These include a trial of 3.5 year old trees of ‘SugarBelle’ that is nearly 100% infected with HLB, and a trial of 4.5 year old trees of sweet orange on >50 rootstocks that is approximately 15% infected. Rootstock differences regarding HLB disease frequency and severity are emerging. Complex ‘tetrasyg’ rootstock Orange #19 (Nova+HBPummelo x Cleopatra+Argentine trifoliolate orange) is showing more HLB tolerance at both locations. Data on percentages of symptomatic fruit and fruit drop per rootstock will be presented.

We have also adjusted our rootstock breeding/greenhouse screening program to focus on HLB. Following a preliminary calcareous soil/Phytophthora screen, selected individual hybrid rootstock candidates are grafted with HLB-infected budsticks of Valencia sweet orange. The remaining rootstock top is then removed, forcing flush from the HLB- infected budstick. Trees are monitored for HLB symptoms, and healthy appearing trees are entered into a ‘hot psyllid’ house for 4 weeks, followed by field planting at Picos Farm (under DPI permit). Rootstocks capable of growing off healthy sweet orange trees are identified for further study (10 have been identified so far). Our goal is to develop rootstocks that will facilitate sustainable and profitable citriculture in an HLB-endemic Florida.