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Relationship between Ct values, HLB symptoms and CLas titer

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We determined the frequency of Ct values for 20,000 HLB diagnostic samples collected by field scouts in Florida. The Ct frequency distribution revealed that the vast majority of samples produced no amplicon (Ct values > 40) and were therefore considered negative for CLas, indicating that scouts were commonly sampling leaves that exhibiting symptoms that mimicked HLB, but were not actually HLB. However, these samples were collected fairly early in the Florida HLB epidemic when symptoms were more ambiguous than is the current situation. Of the samples that did produce amplicons, Ct = 22 was by far the most frequent value and was the peak of a perfectly symmetrical bell shaped curve with a leading edge of Ct=28 and a tailing edge of Ct=18. Because scouts collect samples based on visual HLB symptoms we can conclude that Ct values between 28 and 18 represent the range of Ct values most typical of symptomatic leaves. Conversion of Ct values to CLas genomes·g^{-1} fwt based on a standard curve reveals that: 1) the majority of samples were CLas-negative (Ct > than 38); 2) CLas-infected, asymptomatic leaves have CLas titers of 10^2 to 10^4 genomes g^{-1} fwt (Ct 38-30); 3) the titer of CLas in HLB-symptomatic fwt is 10^6 to 10^7 genomes· g^{-1} fwt (Ct 24-19) and 4) no samples exceed 10^8 CLas genomes g^{-1} fwt (Ct < 18). These results provide insights into the relationship between Ct values, CLas titers and HLB symptoms.