Florida Citrus Advanced Technology Program

QUARTERLY & FINAL REPORTS: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

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2009-2010 REPORT	CATEGORY (drop-down)	TODAY'S DATE (m/d/yr)
◉ *Quarterly Report* ○ *Annual Report* ○ *Final*	Psyllid	1/15/10

WHAT IS THE "HEADLINE" FOR THIS REPORT (e.g. a one-sentence "newspaper headline" describing what you accomplished)

Acquisition efficiency of Liberibacter asiaticus by the Asian citrus psyllid is related to pathogen population in infected citrus

TITLE and CONTACT INFORMATION

Proposal Title Factors influencing acquisition and inoculation of Candidatus Liberibacter asiaticus by Diaphorina citri

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Organization University of Sao Paulo	*Total Direct Funds (current year)* $63,200.00

REPORT UPDATE (650 words; provide details about your headline)

We are conducting a series of studies to determine the impact of various factors on the efficiency of acquisition of Candidatus Liberibacter asiaticus (CLas) by the Asian citrus psyllid (ACP), Diaphorina citri, such as vector development stadia (study 1) and leaf age, pathogen titer and symptom expression in infected citrus (studies 2 and 3). We are also investigating how transmission efficiency varies depending on the duration of the inoculation access period (study 4), and if a systemic insecticide can prevent transmission (study 5). We have started experiments related to studies 1-4, and the research is progressing as expected in the original plan. In the previous quarterly reports (July/09 and Oct/09), we presented partial results of studies 1 and 2, indicating that nymphs in all development stadia (1st-5th instars) can efficiently acquire the pathogen; adults can also acquire it, but efficient acquisition depends on the availability of young leaves in infected plants, apparently because phloem sap ingestion (and thus pathogen acquisition) by ACP adults is more frequent and last longer on the younger leaves.

In this report, we present new and interesting findings about CLas acquisition rate by D. citri adults on infected citrus with variable pathogen population (study 3). Fifty potted sweet orange on Rangpur lime rootstock trees (5-month old) were graft-inoculated with Clas at the same time, and groups of five independent plants were used as source for acquisition assays at 60, 130, 145, 165, 180, 200, 235, and 280 days after inoculations (DAI). In the last three periods most of the source plants were symptomatic. In each assay, a group of 50 lab-reared healthy D. citri adults was confined on young shoots of each source plant (inside sleeve cages) for an acquisition access period (AAP) of 7 days, and then kept on healthy citrus seedlings for a latency period of 21 days. Three to 15 psyllid samples (three psyllids per sample) from each source plant were subsequently tested for infectivity using real-time PCR. Clas population in the source plants was quantified right after the AAP by RT-PCR, using DNA extracted from leaves of the shoots used for acquisition. Clas was acquired by D. citri from both symptomatic and asymptomatic citrus, and a positive linear relationship was observed between pathogen population within the source plant and the percentage of infective psyllid samples [y (Ct) = -0.114 x (infectivity rate) +28.36; R2 = 0.33]. Similarly, the bacteria population within the plant increased over time [y (Ct) = -0.045 x (DAI) +28.43; R2 = 0.34) and became stable (t test, P = 0.010) at 235 and 280 DAI when HLB symptoms became more evident. Considering all source plants tested, acquisition efficiency by D. citri ranged from 0 to 100%, with a success ratio of 95% on symptomatic plants (n=17) against 64% on non-symptomatic but infected plants (n=24).