Florida Citrus Advanced Technology Program

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

Instructions Complete the fields based on your project specs. When finished, save the form to your local disk using a unique name. Then, go to **http://research.fcprac.com**, and log in with your user name and password using Researcher Login in the lower left. Find this project title and click on **Submit a Report**. Update your profile information if needed, then upload this report as directed.

2009-2010 REPORT	CATEGORY (drop-down)	TODAY'S DATE (m/d/yr)
(●) *Quarterly Report* ( ) *Annual Report* ( ) *Final*	Psyllid	1/14/10

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

Transovarial transmission proven, low retention of Las in ACP, and certain insecticides may prevent pathogen transmission

TITLE and CONTACT INFORMATION

Proposal Title Huanglongbing: Understanding the vector-pathogen interaction for disease management

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Organization UF / IFAS / CREC	*Total Direct Funds (current year)* 519,429

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

The relationship between the Asian citrus psyllid (ACP) and Candidatus Liberibacter asiaticus (Las) continues to be studied to optimize disease management strategies. In laboratory studies of Las acquisition by ACP, nymphs reared on infected plants were more likely to acquire the pathogen than adults. Acquisition by nymphs ranged from 60-100%, whereas acquisition by adults only reached 40% after 5 weeks of feeding on infected plants. Transmission of Las from parent to offspring (transovarial) occurred at a rate of 2-6% in ACP eggs, nymphs, and adults. Experiments to determine the rate of Las transmission to healthy citrus by ACP were assessed one year after inoculations. Transmission of Las by individual ACP ranged from 4-10%, depending on amount of time Las(+) ACP spent feeding on plants, while groups of 100 or more ACP transmitted the pathogen at a rate of approximately 88%. The proportion of Las(+) adult ACP decreased over time when held on healthy plants. Due to the low rate of acquisition and long time period required for successful transmission by adult ACP, experiments to determine the latent period require for Las replication and transmission by ACP have not produced any Las (+) plants after more than one year of incubation following inoculation. Collectively, these results indicate that healthy adult ACP are poor potential vectors of Las but may, after continuous access to Las followed by oviposition on infected plants, give rise to highly infective nymphs. In subsequent experiments designed to evaluate the fitness of Las(+) ACP reared on infected citrus compared with healthy ACP reared on healthy citrus, Las(+) ACP produced significantly more eggs although adult longevity was reduced. Ongoing studies have thus far indicated no differences in the fertility of infected versus healthy ACP. These results underscore the importance of controlling ACP nymphs to reduce secondary disease spread within a grove. Additionally, oviposition on infective citrus plants, rather than adult acquisition feeding, appears the most important component of the Las transmission cycle. Preventing oviposition on Las-positive plants may provide significant disease control if included as part of an integrated pest management (IPM) strategy. Investigations continue into the seasonality of Las(+) ACP. During 2009, monthly sampling at 5 study sites across the state showed that % Las(+) ACP fluctuated throughout the year, with a season-long average of <1-5% LAS(+) ACP at our central Florida study sites. At our Homestead site where 100% of the trees are Las(+), fluctuations in %Las(+) psyllids were present but the overall % infection rate was much greater (64%). Comparing the results from years 1 and 2 of this study, the months with greatest % Las (+) ACP were not consistent between years. However, we hypothesize that plant flushing patterns, as influenced by climatic conditions, may be a key factor influencing shifts upward in %Las(+) ACP. In 2010, this study will focus specifically on plant-related factors.The effects of insecticides on the feeding behaviors of Las(+) ACP were examined using an electrical penetration graph (EPG) monitor with waveforms produced characterized based on the studies of Bonani et al (2009) and Youn et al (unpublished). For ACP feeding on plants with imidacloprid levels ranging from 7.8-20.7ppm, there was significant reduction in non-probing behaviors (np), stylet penetration (C), phloem salivation (E1), phloem ingestion (E2) and xylem ingestion (G) thus suggesting that pathogen transmission should be significantly reduced on imidacloprid treated plants. However, for aldicarb treated plants, the only statistically significant difference found was an increase in (E2) on aldicarb treated plants. These results suggest that aldicarb applications will not prevent pathogen transmission prior to causing mortality of adult ACP. Plants used in EPG studies are currently being held for subsequent Las analysis to compare actual rate of pathogen transmission between treatments. We are currently determining the level (PPM) of imidacloprid that is required in a plant (degradation studies) to provide effective disruption of psyllid feeding behaviors responsible for pathogen transmission.