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	4/15/10

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

New findings on pathogen transmission by psyllids and the potential for insecticides to 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 results of this project over the last year have shed new light on pathogen transmission by ACP, some of which is radically different from the outcomes of other previously published studies. We have demonstrated in both laboratory and field studies that psyllids acquire the Las pathogen more readily as nymphs than as adults when feeding on infected plants. Furthermore, just because a psyllid tests positive for the Las pathogen does not mean that it can successfully inoculate a healthy plant. In pathogen transmission experiments, a very low rate of successful pathogen inoculation occurred from feeding by single psyllids. Much higher numbers of Las carrying psyllids were required to successfully inoculate at an average rate of 70%. We have also demonstrated that low rates of transovarial passage (mother to egg) of Las does indeed occur. Thus, Las+ nymphs collected from plants not showing symptoms of HLB may not necessarily indicate that the plant is already infected, but could be the result of oviposition by a Las+ female. In studies where psyllids reared on Las+ plants were continually transferred to Las- plants over time, the percentage of psyllids retaining the Las pathogen decreased to as low as 20% after 24 days on Las- plants. This is evidence that Las may not replicate within the psyllid as previously suggested; psyllids may need continual access to Las+ plants for acquisition to be capable of vectoring the pathogen over extended periods of time. In experiments designed to determine the effects of Las presence on psyllid biology, there was a significantly higher rate of oviposition by Las+ female psyllids compared to female psyllids not carrying the pathogen. However, longevity of adult Las+ female psyllids was significantly reduced when compared with Las- females, perhaps as a consequence of increased energy expended for oviposition by Las+ females. We have completed two years worth of surveys determining the incidence of Las+ psyllids in commercial groves. The objective of the repeated sampling of ACP populations on a monthly basis was to determine if there was sufficient variation in the incidence of Las+ psyllids to adjust pesticide applications to only those times of the year when the potential for pathogen transmission was increased. While we observed variation in the incidence of Las+ psyllids throughout the year, the months with highest incidence of Las+ psyllids was not consistent year to year. While not accounted for in this study, we suspect that flushing patterns of HLB infected trees (which vary year to year) are the primary factor responsible for the fluctuations in Las+ psyllids. The sampling of citrus groves under different HLB/ACP management regimes also showed that there was a much higher incidence of Las+ psyllid in groves were little or no HLB management programs were in place thus providing some indirect evidence that HLB management programs are likely to be beneficial in terms of reducing rate of pathogen spread. In studies using an Electrical Penetration Graph (EPG) monitor to examine psyllid feeding behavior on insecticide treated versus untreated plants, we have found that the feeding behaviors responsible for pathogen transmission (inoculation) can be significantly disrupted or prevented for certain insecticides. Soil-applications of imidacloprid greatly reduced psyllid feeding behaviors including phloem salivation indicating that imidacloprid can reduce the likelihood of successful inoculation of uninfected plants with Las. However, soil-applications of aldicarb did not have any effect on psyllid feeding behaviors in the first 18 hours of feeding suggesting aldicarb will provide little protection from inoculation by Las+ psyllid migrating from surrounding areas. Thus growers should not rely solely on aldicarb for psyllid control but instead should incorporate foliar applications with the aldicarb which provides extended systemic control of developing nymphs. Foliar applications of fenpropathrin prevented phloem feeding (inoculation) behaviors due to the rapid mortality of adult psyllids exposed to residues.