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*	HLB Pathology	1/14/10

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

Different citrus genotypes respond differently to HLB and psyllids. Psyllids can pick up Las long before PCR detection.

TITLE and CONTACT INFORMATION

Proposal Title Examine the response of different genotypes of citrus to citrus greening (Huanglongbing) under different conditions

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Organization UF, IFAS, CREC	*Total Direct Funds (current year)* $226,391

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

A major objective of this project is to develop an understanding of how the HLB bacterium (Las) interacts with citrus genotypes to cause disease. After finding that different citrus genotypes respond differently to Las from extremely sensitive (sweet orange and grapefruit) to tolerance with minor symptoms, we have focused on the one citrus genotype that is most resistant to citrus. Las is restricted to very low levels in Poncirus trifoliata. Most plants remain PCR negative, but a few have barely detectable levels of Las. We are determining whether this is due to plant genetics, Las variation, or randomness. Some Poncirus hybrids are more susceptible than others suggesting that resistance to Las is segregating. We are beginning experiments to map citrus genes that provide Las resistance. Las also appears to have difficulty spreading in Poncirus. We are examining the value of using Poncirus rootstocks and interstocks to reduce or prevent spread of the disease in sweet orange or grapefruit.

We have developed a containment plant growth room to examine natural infection of citrus trees by psyllid inoculation. We already have made several significant observations: First, we have found that the time period between when plants first become exposed to infected psyllids and the time that new psyllids can acquire Las for those plants can be as little as 6 weeks. We are examining this process in more detail now. Second, when we allowed the infected psyllids a choice of different citrus genotypes, there was a large difference in the time and number of plants that were inoculated by the psyllids: (Citrus macrophylla >> Swingle citrumelo >> Volkamer lemon = Duncan grapefruit > Madam Vinous sweet orange >> Carrizo citrange). Most of the Citrus macrophylla plants became infected with only 2 months of exposure in the epidemic room, whereas only a few of the sweet orange and grapefruit became infected after 4 months. Since there was such a clear preference, we are now investigating its cause – whether the preference is related to genotype, growth habit, flushing, or other possible differences. It is clear that psyllids reproduce on new flush, but feed on older leaves. We are examining whether and how well the psyllid can transmit the disease in the absence of flush. Third, these results have led to the development of methods to greatly speed up results of field tests for transgenic or other citrus trees or trees being protected by the CTV vector plus antibacterial or antipsyllid genes. In order to interpret results of a field test, most control trees need to become diseased. Under natural field pressure in areas in which USDA APHIS will allow field tests, this level of infection could take 2-3 years. By allowing the trees to become adequately inoculated by infected psyllids in a containment facility, we can create the level of inoculation that would naturally occur in the field within 2-3 years in 2-5 months in the containment room, after which the trees are moved to the field test site.

Another objective is to provide knowledge and resources to support and foster research in other laboratories. A substantial number of funded projects in other labs are based on our research and reagents. We supply infected psyllids to Mike Davis's lab for culturing of Las and Kirsten Pelz-Stelinski's lab for psyllid transmission experiments. Among the plants being screened for resistance or tolerance to HLB for other labs are: 1) a series of elite lines for the citrus improvement group; 2) a series of transgenic plants designed to examine the relationship of pectin production to disease development for Jude Grosser, Gene Albrigo, and Nian Wang; 3) we are testing a series of transgenic plants that we made in collaboration with Zhonglin Mou to have increased disease resistance. The trees, which have high resistance to citrus canker, are presently being tested against HLB; and, 4) a series of lemonine trees reported to be resistant to HLB for Gene Albrigo.