CITRUS ADVANCED TECHNOLOGY PROGRAM

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

▶ INSTRUCTIONS

(●) *Quarterly Report* ( ) *Annual Report* ( ) *Final*

Required: What is the "headline" for this report (e.g. a one-sentence "newspaper headline" describing what you accomplished)

We are examining how greening in produced in citrus

Proposal Title

EXAMINE THE RESPONSE OF DIFFERENT GENOTYPES OF CTRUS TO CITRUS GREENING (HUANGLONGBING)

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
10/13/10	Citrus Research and Development Foundation	Infection Consequences

REPORT UPDATE (500 words; summarize your accomplishments)

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 have found that under some conditions Las appears not to be able to move through poncirus. We have plants with lower living inoculum that is highly infected with Las, but sensitive sweet orange shoots grafted on top of the poncirus plants have not become infected. 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 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.

We have developed 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 anti-psyllid 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 large experiment is underway.

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, so far do not look like they have resistance to HLB.

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Total Funds (current year) $226,931.00

SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.