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	7/13/09

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

Possible Chemical of Citrus Greening

TITLE and CONTACT INFORMATION

Proposal Title A Rapid Screening Process for Chemical Control of Huanglongbing

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Organization University of Florida	*Total Direct Funds (current year)*

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

(1) Screening of chemical compounds that eliminate or suppress the Las bacteria in periwinkle using the optimized regeneration system. Antibiotics (penicillin G and streptomycin, oxytetracyclin), a biocide (DBNPA), a fungicide (zineb) and two peptides (D4E1 and D2A21) were tested for their ability to eliminate or suppress Las bacteria and to promote the growth of severe HLB-affected cuttings using the optimized regeneration system.

More than 75% of plants could be regenerated from the severe HLB-affected periwinkle cuttings treated with a combination of penicillin and streptomycin (PS). All regenerated plants from the HLB-affected cuttings treated with PS tested negative for Las, even by nested PCR. The Las bacteria were undetected in these regenerated plants with average Ct value of 39.33.

When treated with oxytetracyclin or peptides (D4E1 or D2A21), the regenerated plants also tested negative by nested PCR or qPCR with Ct values over 32. However, the regeneration percentage was low (30%). The regenerated control plants treated with water tested positive for Las by PCR and qPCR with low Ct values <26.0, indicating that the bacteria titers were at least 100-fold higher than those in the antibiotic or peptide-treated, regenerated periwinkle.

DBNPA can also suppress the Las bacteria. The severe HLB-affected cuttings had a regeneration rate of 33.1 %. The Ct values of the regenerated plants ranged from 27 to 30.

The fungicide zineb was not effective in controlling Las bacteria. Whether treated with zineb or not, the Las bacteria can keep reproducing. The Ct value was lower in the zineb-treated, regenerated plants than those treated with antibiotics or peptides, and similar to the water control. Zineb is not very soluable. The water solubility is only 10 mg/L.

(HLB-affected periwinkle was treated using PS, oxytetracyclin or DBNPA three times a week by foliar spray (previous treatments were by root soaking). The results were same as for the HLB-affected cuttings treated by root-soaking. Antibiotics PS and oxytetracyclin effectively suppressed or inhibited Las bacteria, and DBNPA partially suppressed Las bacteria.

(2) Effect of screened chemical compounds on HLB-affected citrus.

Nutrition and HLB development in citrus. The nutrients K, Zn, N, and Ca were tested for their ability to suppress HLB symptoms in citrus. Potassium and Zn, but not N or Ca, delayed HLB symptoms. Neither treatment affected Las bacterium after 9 months. K and Zn reduced titers of Las at 5 months after treatment.

Effect of SAR-inducer on HLB development. Seven months after treatment with SAR-inducer (SA and antiguard), grafted, HLB-affected citrus tested positive for Las by PCR with an average Ct value of lower than 28, indicating SAR was not effective in suppressing or inhibiting the Las bacterium. This had also been the case with a perwinkle host.

Effect of antibiotics on HLB-affected citrus by root soaking. HLB-affected citrus was soaked in the PS or oxytetracyclin solutions three times a week. One month post-treatment, the HLB-affected citrus tested negative for Las by nested PCR, and undetected by real-time Q-PCR, Oxytetracyclin and water control treatments were positive for Las.

(3) Conclusions

Antibiotics PS (penicillin and streptomycin) and oxytetracyclin are very effective in control of liberibacter, especially PS. Peptides are also effective, but expensive for field use. Transgenic citrus expressing these peptides may provide effective HLB control. DBNPA can reduce Las titers. Zineb is ineffective.