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)

Antimicrobial compounds against Las Bacteria

Proposal Title

A RAPID SCREENING PROGRESS FOR CHEMICAL CONTROL OF HUANGLONGBING

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
4/2/11	Citrus Research and Development Foundation	Epidemiology and Cultural Control

REPORT UPDATE (500 words; summarize your accomplishments)

The objectives of the 3-year projects were: 1) Developing a system for screening antimicrobial molecules against Las bacteria; 2) Screening and evaluating anti-microbial molecules for suppression of Las bacteria. The major accomplishments are summarized as follows:

1. Development of two screening systems

(1) Regeneration system of Las-infected periwinkle cuttings: An optimized system using Las-infected periwinkle cuttings was developed to screen chemical compounds effective for controlling the bacterial population while simultaneously assessing their phytotoxicity. The optimal regeneration conditions were determined to be the use of vermiculite as a growth medium for the cuttings, and a fertilization routine using half-strength Murashige and Tucker medium supplemented with both naphthalene acetic acid (4 µg/ml) and indole-3- butyric acid (4 µg/ml). This system allowed a plant regeneration rate of 60.6% for Las-infected cuttings in contrast to the <1% regeneration rate with water alone.

(2) Grafting system of HLB-affected citrus scions: The HLB-affected scions from different phenotypic types (yellow shoot and Blotchy mottle) and different cultivars (lemon and grape fruit) were grafted onto Las-free citrus rootstocks (sour orange and grapefruit). The results showed that more than 60% of HLB-affected lemon scions survived and 70% of the inoculated rootstocks were infected at 6 months after grafted using HLB-affected scions with high Las bacterial titers. The results also showed that plant growth regulators (PGRs) increased the survival rates of the grafted scions, but had no effects on the infection rates.

2. Screening antimicrobial compounds against Las bacteria

Using the above two screening systems, several chemicals were evaluated for control of Las bacteria in the greenhouse, including antibiotics (Penicillin, Streptomycin, Oxytetracycline, Kasumycin, Metronidazole), a biocide (DBNPA), two peptides (D2A21 and D4E1), two fungicides (Zineb and captain) and Systemic Acquired Resistance (SAR) substances (SA, antiguard and ortho-phenylphenol). Some were effective, such as penicillin and streptomycin, both peptides and Oxytetracycline; some were partially effective, such as DBNPA. The SAR substances, Metronidazole and Zineb were not effective in this research. Kasumycin and Captain need to be tested further.

3. Monitoring the antibiotic effects in the field: Two kinds of antibiotic combinations, PS (Penicillin and Streptomycin) and KO (Kasumycin and Oxytetracycline), were tested in the field at the USHRL farm. The primary results showed that application of the PS via trunk injection eliminated or suppressed the Las bacterium in the HLB-affected citrus plants. The residues of antibiotics were also tested and were not detected in fruit after one months. The field trial is still in progress.

Two papers has been or will be published in Phytopathology 2010 and 2011. Four abstracts or posters have been or will be presented at International Citrus meetings or the APS annual meeting.

Future research: Continue to monitor treated, field trees; develop an improved method for treating trees with antibiotics; test additional antimicrobial compounds; test antimicrobial compounds in combination with growth enhancing molecules.

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SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.