CITRUS ADVANCED TECHNOLOGY PROGRAM

QUARTERLY & FINAL PROGRESS REPORT FORM: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

▶PROJECT QUARTER END April 2025 ● *Quarterly Report* ○ *Final*

Proposal Title

Determining the effect of oxytetracycline when rotated with additional crop antimicrobials on citrus phytotoxicity and CLas reduction (23-014)

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
11/14/2024	Citrus Research and Development Foundation	CLas Bacteria

ABSTRACT (Executive Summary-public report-do not disclose proprietary information or intellectual property)

1. Please state project objectives and what work was done this quarter to address them:

The objectives of this project are to determine the phytotoxicity of OTC and other potential partner antibiotics 1) by a citrus leaf assay in the lab (completed), 2) by a greenhouse assay in seedling trees (completed), and 3) to compare OTC with other antibiotics' efficacy against CLas on mature trees in the grove (in progress).

All objectives are completed for this year. We have successfully completed the first objective, where we screened all experimental antibiotics and imidacloprid, along with OTC (Table 1), to evaluate their phytotoxicity to citrus. In these lab experiments, we used a detached-leaf assay to assess 'exaggerated' concentrations quickly and to document any potential phytotoxicity. In repeated (at least three times) experiments, only oxolinic acid and nalidixic acid at 600 ppm caused light phytotoxicity, including petiole and midvein necrosis; whereas other antibiotics, namely OTC, kasugamycin, streptomycin, gentamicin and validamycin A, all at 600 ppm, and an insecticide imidacloprid at 800 ppm, did not show any phytotoxicity. Further evaluation of these two phytotoxic antibiotics revealed that the solvent used for dissolving them per the manufacturer's recommendations (NaOH 0.01M) was a potential culprit behind this phytotoxicity. Therefore, we concluded that none of the tested antibiotics and imidacloprid were phytotoxic to citrus leaves at these exaggerated concentrations. Additional data for this objective is available upon request.

Next, we conducted similar phytotoxicity assays, this time on greenhouse-grown healthy Valencia seedlings in the greenhouse (Objective 2). Here, all the treatments we used in the leaf assays from above were used in 10X more exaggerated concentrations (i.e., 6000 ppm) per tree and an additional 3000 ppm for gentamicin after seeing high phytotoxicity in that treatment in the first repetition. We used the drill-based trunk injection (Chemjet) technique to deliver these treatments to the seedling trunk. All treatments were taken up by the trees without any issues except for the imidacloprid (8000 ppm), which was in a formulation that was not recommended for trunk injection. In the subsequent trial, we replaced this formulation with the brand, Xytect (Rainbow Ecoscience, Minnetonka, MN), which was formulated specifically for the trunk injection of forest and ornamental trees. No uptake issue for this new formulation was observed.

Regarding phytotoxicity in the greenhouse, at least one out of five trees per treatment in repeated trials showed some level of phytotoxicity, particularly in the drill site on the trunk, including on the trees that were injected with water. This suggested that drilling a hole in the trunk of young (1.5-2 years old) seedlings is very damaging; 10-70% of the drill sites showed signs of oozing, regardless of the treatment. Nevertheless, only a small number of trees showed some phytotoxicity on the leaves, including dieback, leaf discoloration, defoliation, and leaf curling. Among them, gentamicin was the most phytotoxic to citrus at 6000 ppm, as three out of five treated plants showed severe dieback, and eventually, those plants died in the first repetition.

PI First Name Ozgur

PI Last Name Batuman

Email obatuman@ufl.edu

Phone (239) 658 3408

Organization University of Florida

Sponsor Project Number 23-014

Project Duration (years) 3 *Year of Project* 2025

% Completion of Objectives (FDACS requirement) 75.00%

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.