CITRUS ADVANCED TECHNOLOGY PROGRAM

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

SELECT PERIOD June 2016

Quarterly Report Final

Proposal Title

Metabolomic profiling to accelerate development of HLB tolerant rootstocks

Today's Date: 7/15/2016

Sponsoring Organization (drop-down): Citrus Research and Development Foundation

Category (drop down): Conventional Citrus Breeding

REPORT UPDATE (500 words-It is not necessary in this public report to disclose your institution's proprietary information or intellectual property.)

Good progress was made in the validation of the effectiveness of metabolite profiles for selection of HLB tolerant rootstocks. Focused studies were continued to identify key metabolic compounds in 12 specific rootstocks of known HLB-tolerance, as well as scions grafted on them, and collect the detailed information to be used in the validation process.

In this quarter, the second set of leaf and root samples from greenhouse and field tests with different rootstocks were processed and shipped to the West Coast Metabolomic Center for metabolomic analysis by gas chromatography-time of flight (GC-TOF) mass spectrometry (MS). The GC-TOF-MS analysis for the first cycle of samples will be completed in the next quarter and results available for detailed analysis by our research team in Ft. Pierce and Immokalee. The experimental design of the first and second set of samples collected in the first year of the project will allow comparison of metabolite profiles of the same genotypes in different seasons, in grafted and ungrafted trees, and in different ages and sizes of plants, providing critical information about how metabolite profiles change under different conditions.

In preparation for the second year of the project, clean seedlings and budded trees were prepared for greenhouse studies, and budded trees were prepared for field planting. Selected trees within the experiments were inoculated with Las, and tissue was collected to analyze for Las infection by qPCR. The material in this study will provide valuable insight into metabolite changes during the early stages of HLB disease development.

Following approval by CRDF, the project was revised to include a new researcher at University of Florida in Immokalee, Dr. Ute Albrecht, who has experience and special expertise in this research field. Grant funds will be provided through a Non-Assistance Cooperative Agreement to support this work in Immokalee. A post doc has been hired in Immokalee to work on the project. The project changes actually reduce the overall cost, but will significantly increase productivity and the opportunity for success.

In this quarter, a study by our team of metabolic differences among rootstocks was published, entitled "Metabolic variations in different citrus rootstock cultivars associated with different responses to Huanglongbing". That study used GC-TOF-MS analysis to compare metabolite profiles of six rootstock cultivars infected and not infected with Las. The study identified numerous chemical compounds that appeared strongly associated with Las tolerance, and offers good opportunities for further study and incorporating the tolerance behavior into other rootstocks. The study demonstrated large metabolic differences between an HLB-sensitive rootstock and the HLB-tolerant rootstocks US-897 and US-942, both with and without Las infection, and will serve as a foundation for continuing work under this grant.

PI First Name Kim

PI Last Name Bowman

Email kim.bowman@ars.usda.gov

Phone 772-462-5920

Organization USDA, ARS, USHRL

Project Number 15-003

Project Duration (years) 3 *Year of Project* 1

Total Funds (current year) $221,790.00