▶ 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)

Volatile biomarkers for HLB detection

Proposal Title

Detecting citrus greening (HLB) using multiple sensors and sensor fusion approach

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
1/17/12	Citrus Research and Development Foundation	Pathogen/Disease Detection

REPORT UPDATE (500 words; summarize your accomplishments)

Volatiles-based HLB detection: We are planning to conclude the yearly study at the CREC facility (Lake Alfred, FL) for the collection of SPMEs, Twisters (GC/MS) and DMS data on HLB infected and healthy control trees with the last trip in January, 2012. As it was determined that sampled orchard trees are co-infected with CTV, a parallel small-scale study is carried out using CTV-free greenhouse seedling trees at CREC. Also, PCR testing was conducted for orchard trees used in the study to confirm healthy/infected status. The data analysis of all of the collected data is ongoing. For Twister GC/MS studies spanning two time points few months apart, a set of 16 discriminating biomarkers compounds was compiled; 11 compounds were chemically identified. Systematic accuracy for diseased vs. healthy trees discrimination using these biomarkers exceeded 80%.

In addition, the large volume leaf volatile purge and trap sample collection procedure has been modified to improve reproducibility. Approximately 60 volatiles have been monitored on consecutive days in recent months. All sampling for both healthy and HLB trees has been taken from the Kinsey block at the CREC. The data is still be analyzed, but initial findings indicated there was a late eluting peak that appears to be a marker for HLB infection even though the tree is non-symptomatic. There was also an early eluting peak (LRI = 948) that was exclusively and consistently found only in apparently healthy trees. This compound has been tentatively identified as pentanal. Sampling in other groves and non-Valencia trees will be carried out to see if these trends continue.

Aerial HLB detection: Different detection algorithms were tested including decision tree, modified isomap, shortest distance k-nearest neighbor, and support vector machine. The detection accuracies ranged 56%-78%, and improvements are being investigated. A new set of aerial hyperspectral images were acquired for the CREC and North 40 groves located at the CREC, Lake Alfred, FL on December 14, 2011. Corresponding ground truthing data were also collected during December 13-15, 2011. The images turned out to be of excellent quality with 0% cloud cover. The ground truthing included field spectral measurement, infection status investigation and GPS locations for a total of 386 healthy and infected trees. An 8-band multispectral WorldView-2 satellite images were also acquired for a comparison study. For ground-based remote sensing studies, hyperspectral and thermal data collected using multispectral and thermal cameras are being analyzed. Our research article on fluorescence spectroscopy as a tool for HLB detection has been accepted for publications in 'Transactions of the ASABE'.

PI First Name Reza

PI Last Name Ehsani

Email ehsani@ufl.edu

Phone 863-956-8770

Organization Citrus Research and Education Center

Project Number 57

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

Total Funds (current year) $250,687.00

SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.