CITRUS ADVANCED TECHNOLOGY PROGRAM

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

SELECT PERIOD September 2013

(●) *Quarterly Report* ( ) *Final*

Proposal Title

Sensing system for symptomatic citrus greening infected leaves using polarized light

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
10/9/13	Citrus Research and Development Foundation	Pathogen/Disease Detection

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

Using the on-the-go HLB detection imaging system, a dataset including the real tree images was created on July 2nd in CREC . The analysis on this dataset showed that the object depth in a frame had a big influence on the object intensity. Since the detection approach in this project is highly dependent on the intensity, the tree images without depth information could not help the detection process. Two lab experiments were conducted on July 19th and September 4th to study the effect of depth on the object intensity in a monochrome image. It was determined that regardless of the camera settings, there was a relationship between the object distance and the object histogram of gray scale pixel values. This relationship was formulated by two functions for the histogram mean and standard deviation. These functions enabled us to calibrate the objects with different distances in an image and remove the effect of depth on the system performance. Analyzing these two datasets showed that the HLB symptomatic areas on the citrus leaf were very obvious and highlighted in the images acquired with the new image acquisition system. A new 3D imaging approach for on-the-go HLB detection system was designed and proposed in which the depth information is measured when the monochrome image is captured, however unfortunately this proposal was not selected for funding extension. As well as the 3D imaging approach for on-the-go HLB detection system, two other proposals were designed and prepared based on the smartphone and tablet application.

The other solution was to acquire tree images from the same distance using the current image acquisition system. Another dataset was created for this purpose on September 25th, 2013. This dataset included 20 healthy, 20 HLB, and 20 zinc deficient samples. The leaf images were acquired in three different positioning conditions and with a black panel as the background. The leaves samples were then attached to an artificial tree to evaluate performance of the system in a simulated condition. All these images were captured in three different distances of 60 cm, 80 cm, and 100 cm to determine the best imaging distance. The next step is to analyze this dataset to design and perform an experiment in a real citrus grove.

The reviewers' comments for the ASABE Transaction manuscript were received and the revisions were made. The results of the Valencia variety dataset including an additional class of manganese deficiency samples were also added to the manuscript.

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Form PR-12 Quarterly Reports **SUBMIT REPORT**

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