

## **DETERMINATION OF CITRUS PLANT PARAMETERS FROM UAV IMAGES**

*Sunil K Mathanker<sup>1</sup>, Andres M Pagan Lopez<sup>1</sup>, Consuelo Estévez de Jensen<sup>2</sup>, and Alberto Beale<sup>2</sup>*

<sup>1</sup>Department of Agricultural & Biosystems Engineering, University of Puerto Rico at Mayaguez

<sup>2</sup>Department of Agro-Environmental Sciences, University of Puerto Rico at Mayaguez

Department of Agricultural & Biosystems Engineering, University of Puerto Rico at Mayaguez

Email: [sunil.mathanker@upr.edu](mailto:sunil.mathanker@upr.edu)

Citrus crops are important fruit crops in Puerto Rico and US. In 2010-2011, 51.57 million fruits valued at \$4.46 million were produced in Puerto Rico. However, citrus yields declined by about 50% because of citrus greening disease. Presently, investigators make, visual in-person, plant to plant observations for mapping infected plants. This process is quite cumbersome and time consuming. The objective of this study is to automate the process. The study employed a color camera onboard a unmanned aerial vehicle (UAV) to acquires images of a citrus orchard located at the Substation Fortuna, Puerto Rico. The images were taken from the UAV at an altitude of 100 feet. Plant height, canopy coverage area and stem diameter were manually recorded for comparison with the parameters determined from the UAV images. The observed plant parameters correlated well with the determined plant parameters from the color UAV images. The average errors in measurements were 22.4%, 14.5% and 47.5% for the plant diameter, plant height and plant canopy volume. Plant health indices are being investigated to identify severity of citrus greening and nutrient deficiency.