

Agroview: Drones and Artificial Intelligence to Determine Plant Nutrient Concentrations and Develop Fertility Maps

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Figure 1

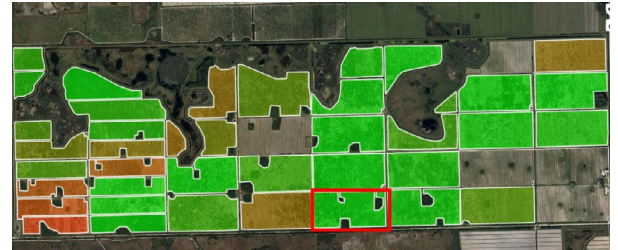


Figure 2

Figure 1. Potassium map based on UF/IFAS guidelines with 'Deficient' (red), 'Low' (brown), 'Optimum' (green), and 'High' (blue) zones, developed by Agroview.

Figure 2. Agroview, a cloud-based application developed by UF/IFAS SWFREC to convert UAV and ground-based collected data into practical information for growers.

A non-destructive method was developed to determine citrus leaf nutrients quickly and efficiently and to create fertility maps compatible with variable rate technologies. This novel method can complement or help overcome some of the limitations of the traditional methods of leaf nutrient analysis. We used the spectral reflectance data collected by a drone equipped with a multispectral camera to create an artificial intelligence (AI)-based model to determine plant nutrient concentrations. The developed AI model provides nutrient

concentrations for individual trees. To help visualize the data, a novel cloud-based application developed at UF/IFAS SWFREC, Agroview (www.agroview.ai), was utilized to create fertility maps with discrete management zones. An example of a fertility map for potassium can be seen in Figure 1. Five zones (Deficient, Low, Optimum, High, and Excess) were determined based on UF/IFAS guidelines. The 'Tree Ratio' for each zone is the number of trees divided by the number of tree spaces (= trees + gaps; a gap is a place with no tree). If the tree ratio is 100%, it

means that the entire area/zone has zero gaps. As can be seen in Figure 1, in this grove the tree ratio for the 'Deficient' and 'Low' zones are lower (60.8% and 82.6%, respectively) than the 'Optimum' and 'High' zones (89.9% and 87.8%, respectively). Similar patterns can be observed for the nitrogen and phosphorus in this area. That indicates that this area of the grove might be "problematic" and requires different management. Figure 2 presents a screenshot of the Agroview technology.

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