AERIAL EVALUATION OF SOFTWARE BASED IMAGE CONVERSION FOR LOW COST PLANT HEALTH MONITORING

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Abstract

Characterizing canopy development in the past using Normalized Difference Vegetation Index (NDVI) was demonstrated to be an effective tool. However, digital conventional cameras that detect red, green, and blue (RGB) bands are incredibly common today and require a minimal investment compared to conventional NDVI equipment. These cameras are small enough to be lifted by current hobby grade Unmanned Aerial Systems (UAS), known commonly as drones, which are also becoming much more affordable. Furthermore, vegetative indices, such as the Green-Red Vegetation Index (GRVI) can be easily calculated from RGB image. The goal of our project was to evaluate the ability of a drone carrying a RGB camera to assess the utility of RGB-derived indices and chlorophyll fluorescence methodologies to detect water-induced differences in canopy development. Yield data were collected from two separate projects in 2014 and 2015 conducted at the University of Georgia's Stripling Irrigation Research Park (UGA SIRP) and the Lang-Rigdon research farm. This study included a total of eight irrigation treatments and 56 replicate plots. Infield physiological data (plant height, nodes above white flower, and main stem nodes) were collected biweekly, while remote sensing data was collected weekly which included Normalized Difference Vegetation Index (NDVI), chlorophyll fluorescence fast-transient analysis (OJIP), and aerial RGB photography. RGB images were converted with Imagej into vegetation index images and corresponding vegetative indices were derived for each plot. NDVI and G/R Index data suggested no significant differences between irrigated treatments, which was also exhibited by the yield data.