ASSESSING THE UTILITY OF RGB PHOTOGRAPHY FROM AN UNMANNED AERIAL VEHICLE AND CHLOROPHYLL *A* FLUORESCENCE FOR DETECTING WATER-INDUCED DIFFERENCES IN CANOPY DEVELOPMENT AND YIELD IN COTTON

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Abstract

Normalized Difference Vegetation Index (NDVI) is considered a useful tool for characterizing canopy development. However, digital conventional cameras that detect red, green, and blue (RGB) channels 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 Vehicles (UAV), known commonly as drones, which are also becoming much more affordable. Furthermore, vegetation indices, such as the Green-Red Vegetation Index (GRVI) can be easily calculated from RGB images. 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 as well as yield Data were collected from two separate projects conducted at University of Georgia's Stripling Irrigation Research Park (UGA SIRP). This study included a total of eight irrigation treatments and 56 replicate plots. Infield physiological data (chlorophyll fluorescence, plant height, and mainstem nodes) were collected biweekly, while remote sensing data was collected weekly and 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 vegetation indices were derived for each plot.