USING UNMANNED AIRCRAFT SYSTEMS TO EVALUATE APPLICATION TIMING OF HARVEST AIDS IN STRIPPER COTTON

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Abstract

As Unmanned Aerial Vehicles (UAV's) become more accessible and affordable, constant research is needed to determine how producers can use this technology for more efficient production practices. In this study, preliminary research was gathered to determine the usefulness of UAV's in determining harvest aid timing in stripper cotton. Current methods of determining maturity require random sampling across the whole field to give an accurate maturity rating. By using UAV's, maturity may be able to be determined locally as opposed to globally across the field, offering opportunity for variable rate application of harvest aids. A custom-built UAV was equipped with RGB, Red, Near Infrared, and thermal camera payloads to collect low altitude aerial images during this ongoing trial. A second consumer grade UAV was used to capture high quality RGB images. Images were collected on the day of harvest aid application for each test plot in the study. Image post processing utilized Python with the OpenCV and NumPy libraries. After determining usefulness of each sensor's data, it was decided to focus specifically on the RGB images. An algorithm was created to determine thresholds for identifying cotton bolls and determining coverage of cotton bolls in each image. Results show a general upward linear trend between percentage of open bolls/NACB rating vs. percentage coverage of cotton bolls in each image. Further data will be collected in 2021 to verify this trend, and potentially create a maturity index for maturity ratings from UAV images. NDVI values were calculated from the Red and Near Infrared sensors; NDVI data was unusable this year due to lack of calibration targets, however, these images highlighted large differences between pre and post application plots. NDVI data may be able to help in evaluating efficiency of harvest aid application and rates in research. This preliminary study suggests that timing of harvest aids may be able to be determined by consumer ready UAV's with simple post processing.