

Comparing Small Unmanned Aircraft Systems (sUAS) with Modified NDVI cameras Values to GreenSeeker NDVI Values and Estimating Corn Yields

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Small unmanned aircraft systems (sUAS) were used to acquire sub-centimeter resolution color infrared imagery concurrently with the Trimble® GreenSeeker® crop sensing system across a corn field managed under various nitrogen application rates. The imagery was collected using a fixed wing aircraft and a normalized difference vegetation index (NDVI) converted Canon S100 camera (blue, green, NIR bands). This imagery was collected at approximately 60 m above the ground. A second set of imagery was collected at 30 m above the ground using a DJI S800 hexcopter and a NDVI converted Canon T4i with an L-series 24 mm lens.

Results show the sUAS imagery to be highly correlated with the GreenSeeker NDVI values ($r^2 = 0.93$). Correlation values for the relationship between corn yields and GreenSeeker, Canon S100 blue NDVI and Canon T4i red and green NDVI varied considerably, but were all high ($r^2 > 0.7$) with the green NDVI from the T4i camera exceeding $r^2 = 0.9$

These results are promising, but represent a single field. They suggest considerable potential for the use of sUAS and NDVI modified cameras as a means of rapidly monitoring field nitrogen status and for forecasting yields for corn, with the likelihood that encouraging results will also be found for other row crops.