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Evaluation of two crop canopy sensors for nitrogen variability determination in irrigated maize

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Abstract Advances in precision agriculture technology have led to the development of ground-based active remote sensors that can determine normalized difference vegetation index (NDVI). Studies have shown that NDVI is highly related to leaf nitrogen (N) content in maize (*Zea mays* L.). Remotely sensed NDVI can provide valuable information regarding in-field N variability and significant relationships between sensor NDVI and maize grain yield have been reported. While numerous studies have been conducted using active sensors, none have focused on the comparative effectiveness of these sensors in maize under semi-arid irrigated field conditions. Therefore, the objectives of this study were (1) to determine the performance of two active remote sensors by determining each sensor's NDVI relationship with maize N status and grain yield as driven by different N rates in a semi-arid irrigated environment and, (2) to determine if inclusion of ancillary soil or plant data (soil NO_3 concentration, leaf N concentration, SPAD chlorophyll and plant height) would affect these relationships. Results indicated that NDVI readings from both sensors had high r^2 values with applied N rate and grain yield at the V12 and V14 maize growth stages. However, no single or multiple regression using soil or plant variables substantially increased the r^2 over using NDVI alone. Overall, both sensors performed well in the determination of N variability in irrigated maize at the V12 and V14 growth stages and either sensor could be an important tool to aid precision N management.

Keywords Crop canopy sensors · Remote sensing · NDVI

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