REMOTE SENSING OF CORN CANOPY DYNAMICS AND BIOPHYSICAL VARIABLES ESTIMATION IN MICHIGAN

Mohamad Elwadie
Department of Crop and Soil Sciences
Michigan State University

Abstract

This study was initiated to evaluate sensor-based nitrogen and water application for corn (*Zea mays* L.) in Michigan. The specific objectives of this study were: 1) to identify wavelengths that are more sensitive to N deficiency in corn, 2) to determine when to predict corn grain yield from spectral remote sensing data, and 3) to estimate biophysical variables of corn such as leaf area index (LAI) and fractional cover (Fc) from spectral vegetation indices (SVI) obtained from radiometric measurements over corn canopy. Nitrogen treatments included; control, at-planting, pre-sidedress nitrate test (PSNT), and sensor-based N treatment based upon chlorophyll meter readings. Corn was either irrigated or non-irrigated. Sensitivity to N status centered around the 560 and 810 nm. These two wavelengths provided the best separation between different N treatments. Corn grain yield was correlated with the NDVI (normalized difference vegetation index), the GNDVI (green normalized difference vegetation index), and with chlorophyll meter readings. The highest correlation between SVI and corn grain yield was achieved at the R2, R3, R4 and R5 growth stages. There was a very high correlation between the GNDVI and chlorophyll meter readings. These results suggested that GNDVI could be used to substitute for chlorophyll meter readings in N scheduling. While NDVI and GNDVI reasonably estimated corn the LAI, SAVI overestimated the LAI for all N treatments. All spectral vegetation indices performed very well in estimating Fc over the growing season.

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Program Chair:
Larry Bundy
University of Wisconsin
Madison, WI 53706
(608) 263-2889

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