

# Diurnal Variation of Canopy NDVI in Maize and Soybean

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## Abstract

As the world's population grows and the demand for food rises, more attention has been paid to increase crop yields and enhance global food security. Modern remote sensing technologies enable us to capture spectral features (such as NDVI) of crop canopy, which are widely used to assess crop growth, health, and stress conditions. We noticed in the literature that crop NDVI shows short-term variation within a day. Therefore, in this study, we leveraged the Spidercam Field Phenotyping Facility at University of Nebraska-Lincoln to measure and quantify the diurnal variation of canopy NDVI for corn and soybean crops. The experiments and data collection were conducted in 2022 and 2023, with canopy reflectance measured by a spectrometer (400-1000 nm) at multiple days covering different growth stages. In each day, measurements were taken at multiple time points within a time window  $\pm 3$  hours centered around solar noon. Our analysis showed a clear concave-shaped, diurnal trend in NDVI for both crops, with the lowest NDVI at solar noon. More analyses will be performed to quantify this diurnal pattern and dissect the sources of variation due to solar angle and change in canopy morphology. This research will further improve the accuracy and relevance of NDVI in plant phenotyping and many other scientific disciplines and applications.

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