

SENSING SOYBEAN CANOPY DEVELOPMENT RESPONSES TO P AND K NUTRITIONAL STRESS

Martin M. Navarro and J.H. Grove
University of Kentucky

Abstract

Normalized difference vegetative index (NDVI) has been correlated with physiological plant parameters and used to evaluate plant growth. Recently, active canopy reflectance sensors have been used to determine N nutritional needs of corn, wheat and forage grasses. There is little information about the use of this technique to detect soybean nutrient deficiencies. The objective of this work was to determine the ability of the NDVI sensor to detect P and K deficiencies, and grain yield reduction, in soybean. In 2010, at the West Kentucky Research and Education Center at Princeton, NDVI measurements were made on a soybean field trial site known to exhibit yield responses to both P and K nutrition. Four replicates of 8 levels each of P and K nutrition were evaluated. The NDVI measurements were made with an active proximal sensor held parallel to the soil surface, at two different heights (1 and 1.5 m above the canopy), every seven days after V2, and until R2. A mean NDVI value was found for each plot. Phosphorus deficiency was detected with the first NDVI measurement, though visible differences were not discernable. Potassium deficiency was first detected just after V4, again before visual detection was possible. Differences in NDVI values due to P or K nutrition increased with continued crop development. There were significant R1 leaf composition and grain yield responses to improved P or K nutrition. The active proximal sensor was able to detect soybean growth differences due to P or K deficiencies in soybean before these could be seen by the human eye.

PROCEEDINGS OF THE

40th

NORTH CENTRAL

EXTENSION-INDUSTRY

SOIL FERTILITY CONFERENCE

Volume 26

November 17-18, 2010
Holiday Inn Airport
Des Moines, IA

Program Chair:

Richard Ferguson
University of Nebraska - Lincoln
Lincoln, NE 68583
(402) 472-1144
rferguson@unl.edu

Published by:

International Plant Nutrition Institute
2301 Research Park Way, Suite 126
Brookings, SD 57006
(605) 692-6280
Web page: www.IPNI.net