IMPACT OF STRATIFIED POTASSIUM AND WATER CONTENT OF NO-TILL SOILS ON SOYBEAN GROWTH AND YIELD

Fabian Fernandez, Purdue University

Abstract

Low potassium (K) concentrations in subsurface soil and reduced water content in the K-enriched surface soil are thought to cause K-related yield reductions in rain-fed soybean (*Glycine max* L. Merr.). Our objectives were to examine root-to-shoot ratios through ontogeny and yield components in relation to stratified soil water and K. Soil and plant samples were collected at V6, R2, R4, and R6 from a 2-year field study. Additionally, a greenhouse split-root pot study in a complete factorial design, with two soil exchangeable K (Ex-K) levels (160 mg kg^{-1} and 80 mg kg^{-1}) and two water contents (85 to 95% field capacity and 55 to 65% field capacity) was conducted. In the field, initial soil Ex-K levels ranged from 60 to 290 mg kg^{-1} at the 0 to 0.1 m depth and from 50 to 90 mg kg^{-1} at the 0.1 to 0.2 m depth. Seed yield of plants grown on low-K soils was significantly lower when compared to plants grown on K-sufficient soils. Tissue K content revealed that there was no translocation of K from tissues into the seed, and luxury K consumption did not result in higher seed K content. Greatest root length density occurred in the surface 0.1 m of soil and root density was unaffected by K stratification. Greater root-to-shoot ratios were observed for low-K soils compared to medium- and high-K soils. The response of soybean to the interrelationship of soil water and K levels in a stratified profile will be presented.

PROCEEDINGS OF THE

THIRTY-FIFTH NORTH CENTRAL EXTENSION-INDUSTRY SOIL FERTILITY CONFERENCE

Volume 21

November 16-17, 2005
Holiday Inn Airport
Des Moines, IA

Program Chair:
Brad Joern
Purdue University
West Lafayette, IN
(765) 494-9767

Published by:
Potash & Phosphate Institute
772 – 22nd Avenue South
Brookings, SD 57006
(605) 692-6280
Web page: www.ppi-ppic.org

Our cover: To world food security and agricultural production, the Haber-Bosch process has been the most economical means for fixation of nitrogen for fertilizer. Fritz Haber won the Nobel Prize for Chemistry in 1918 and Carl Bosch shared the prize in 1931.