

INTERACTION BETWEEN GLYPHOSATE AND *BRADYRHIZOBIUM JAPONICUM* IN GLYPHOSATE RESISTANT SOYBEAN. Lori J. Abendroth, Roger W. Elmore, Fred W. Roeth, Lenis A. Nelson, Graduate Research Assistant, Professor, Professor, and Professor, Department of Agronomy and Horticulture, University of Nebraska, Lincoln, 68583; Loren J. Giesler, Professor, Department of Plant Pathology, University of Nebraska, Lincoln, 68583.

Glyphosate competitively inhibits 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS), an enzyme which acts as a precursor to the synthesis of aromatic amino acids. Although glyphosate resistant (GR) soybean contains a resistant form of the enzyme, the bacteria which infect the roots, *Bradyrhizobium japonicum*, possess a sensitive form. After glyphosate application, the GR soybean translocates the chemical to metabolic sinks, which include young roots and nodules. Limited field research has been conducted concerning this interaction between *B. japonicum* and glyphosate. King, et al. (2001) found a negative trend in biomass and seed yield for GR soybean exposed to high glyphosate rates (1.12 lb ae/A) under a water-limited environment.

Field studies were designed using a randomized complete block design with four replications, at two locations (Clay Co. and Merrick Co.), with each location having non-irrigated and irrigated studies. Four varieties were included, 'NC+ 2A82RR,' 'NC+ 3N31RR,' 'Hoegemeyer 270RR,' and 'Hoegemeyer 340RR.' Three separate glyphosate rates and applications were used, with the control receiving no glyphosate. A "high stress" environment (similar to that used by King, et al.) was simulated for the second treatment, with glyphosate applied at .74 lb ae/A and 1.12 lb ae/A, at vegetative stage (V) of V1 and V4, respectively. A "normal" application was used as the third treatment with glyphosate applied at V4 and V9, with .74 lb ae/A used each time. Root nodulation and plant response was analyzed throughout the growing season with nodule counts, dryweight biomass, growth stage/height, and chlorophyll content collected at V1, V4, and V9. Yield data was collected for both locations.

Examining the Clay Co. irrigated site, treatments with inoculant showed a decrease in total nodulation during V4 for the high stress and normal treatments in 'NC+ 3N31RR' and 'Hoegemeyer 340RR.' Generally, no significant differences in total nodulation were present in V1 or V9 between the herbicide treatments. At V4, 'NC+ 3N31RR' had 26.3 nodules/plant (control) compared to 14.9 (high stress) and 14.1 (normal); with 'Hoegemeyer 340RR' following the same trend, 20.4 (control), 15.5 (high stress) and 16.0 (normal). Soybean yield was reduced in the normal treatment (3.65 Mg/ha) compared to the control (4.22 Mg/ha) for 'Hoegemeyer 340RR.'