

Project: Soybean yield components and seed nutrient concentration responses among nodes to phosphorus fertility

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Time: Year 1

Period: 2nd Quarter, 2021

Objectives:

The project's objectives are to evaluate the effects of P fertility on soybean seed yield, selected yield components (individual seed weight, pod and seed numbers, and seed abortion among nodes), the patterns of tissue-P concentration across time, and seed nutrient concentration among nodes. Specifically, we seek to identify whether seed yield, individual yield components, leaflet-P concentration, and seed nutrient concentration are affected differently by P deficiency.

Report:

Two field trials were established in Louisiana and Arkansas to address the study objectives. A phosphorus (P) fertilization trial was established on a Gigger-Gilbert silt loam soil at the LSU AgCenter – Macon Ridge Research Station, Winnsboro, LA. Pioneer P48A60X soybean was planted on April 27th on 40-inch spaced beds. Each experimental plot was 35-foot long × 13.33-foot wide (4 rows). Five fertilizer-P rates (0, 40, 80, 120, and 160 lb P₂O₅/acre as TSP; 0-46-0) were broadcast on the top of the seedbed at planting. The entire trial was also fertilized with 80 lb K₂O/acre (MOP; 0-0-60), 20 lb S/acre (Gypsum; 16% S), 10 lb Zn/acre (Zinc Sulfate; 20% Zn and 5% S) at planting. Eleven soybean tissue samples (15 uppermost mature trifoliolate leaflets from the 3rd node from the top) from each plot were collected weekly beginning at the R1 (beginning of flower) until the R6 (full-seed) stage (June 4th to August 16th, respectively). Leaf samples are currently being analyzed to evaluate the patterns of tissue-P concentration across time. Six soybean plants were collected on September 9th to evaluate selected yield components among nodes and seed nutrient concentration. Soybean will be harvested at maturity (R8) to assess grain yield and seed nutrient exportation.

The Arkansas trial is being conducted within a long-term trial established in 2007 at the Rice Research Extension Center in Stuttgart, AR on a Dewitt silt loam. The trial is cropped to rice and soybean rotation and receives five fertilizer-P rates (0, 40, 80, 120, and 160 lb P₂O₅/acre as TSP; 0-46-0) that are applied to the same plots annually. A blanket application of 90 lb K₂O/acre as muriate of potash was applied preplant. The annual fertilizer-P treatments were applied on May 21st and Pioneer 52A43L soybean was planted on May 26th. Soybean leaf samples were collected at V4/V5 and V6/V7 (June 30th and July 8th, respectively) and then weekly starting at R1 (July 21st) from the 0, 40, and 80 lb P₂O₅/acre treatments. Preliminary results are showing different tissue-P concentrations across time and soybean has visual growth differences within fertilizer-P rates. Leaf samples will be collected until the end of R6 growth stage. At soybean maturity (R8), plant samples will be collected to evaluate yield components among nodes and seed nutrient concentration, and harvest will be performed to assess grain yield and seed nutrient exportation.