Please use this form to clearly and concisely report on project progress. The information included should reflect quantifiable results that can be used to evaluate and measure project success. Comments should be limited to the designated boxes. Technical reports, no longer than 4 pages, may be attached to this summary report.

Project Number:	
Project Title:	Soybean yield components and seed nutrient concentration responses among nodes to phosphorus fertility
Organization:	University of Arkansas & Louisiana State University
Project Lead Name:	Nathan A. Slaton, nslaton@uark.edu **Colaborators:** Gerson L. Drescher, gldresch@uark.edu Rasel Parvej, mrparvej@agcenter.lsu.edu
Report Date:	1st Quarter, 2022

National Soybean Checkoff Research Database https://www.soybeanresearchdata.com/ (public website funded by USB). Please include a non-technical project status along with your project status. The non-technical project status will be published to the website. If a non-technical project status is not provided, the contents of this entire report will be published.

Project Status: On-going (year 2)

Objectives: The project's objectives are to evaluate the effects of phosphorus (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, leaf-P concentration, and seed nutrient concentration are affected differently by P deficiency.

2022 Project Update

Two field trials with five fertilizer-P rates (0, 40, 80, 120, and 160 lb P_2O_5/acre) applied as triple superphosphate (TSP, 0-46-0) were established in Louisiana and Arkansas to address the study objectives.

A P fertilization trial was established in 2022 on a Gigger-Gilbert silt loam soil with Low soil-test P at the LSU AgCenter – Macon Ridge Research Station (MRRS), Winnsboro, LA. Burndown herbicides were sprayed in early March at the experimental site. Fertilizer-P treatments were broadcast on the top of the seedbed on March 31, 2022. The Progeny 4806 XFS soybean variety was planted on May 10, 2022, with 130,000 seeds/acre on a 40-in. spaced seed bed. Each experimental plot is 35-ft long x 13.33-ft wide and consisted of 4 rows. Soybean emerged around 6 days after planting. The experiment was designed as a randomized complete block with 4 replications. A composite soil sample from the 0- to 6-in. depth from each no-P fertilized control plot was collected on May 27, 2022, with a 1-in. diameter AMS soil probe. Based on initial soil-test results from soil samples collected in fall 2021, the entire trial was fertilized with 120 lb K_2O/acre (muriate of potash; 0-0-60) and 10 lb Zn/acre (zinc sulfate; 20% Zn and 5% S) on May 30, 2022, to provide adequate amount of these nutrients for soybean growth.

The Arkansas trial is being conducted within a long-term trial established in 2007 at the Rice Research Extension Center (RREC) in Stuttgart, AR on a Dewitt silt loam with mean soil-test P varying from Very Low to Above Optimum among fertilizer-P rate treatments. The trial has a randomized complete block design with 6 blocks, is cropped to rice and soybean rotation under no-tillage, and

fertilizer-P treatments are applied to the same plots annually. Individual plots measure 15-ft wide and 25-ft long, which allows at least two passes with a small plot (8- or 9-row) drill with 7.5-in. row spacings. A composite soil sample was collected from each plot at the 0- to 4-inch depth, using a custom-manufactured cone probe (0.87-in. inner diameter) on May 19, 2022. Fertilizer-P treatments (0, 40, 80, 120, and 160 lb P_2O_5/acre as TSP) were applied on May 19, 2022, followed by a blanket fertilizer-K application of 90 lb K_2O/acre across the entire trial area. The Pioneer 52A14SE soybean variety was planted on June 6, 2022, and plants emerged on June 11.

Soybean leaf samples will be collected at both locations at the V4/5 and V6/7 stages and thereafter from R1 through R6 at one-week intervals to assess leaf-P concentrations. Soybean will be harvested and selected yield components and seed-P concentration among node sections (two nodes and two internodes/node section) will be evaluated at maturity (R8).

Non-technical project status:

The project's objectives are to evaluate the effects of phosphorus (P) nutrition on irrigated 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. The project is being conducted on soils having very low soil-test P at the LSU AgCenter's Macon Ridge Research Station in Winnsboro, LA, and the University of Arkansas Division of Agriculture's Rice Research Extension Center near Stuttgart, AR. The project was started in 2021 with year 1 results at both sites showing plants receiving no-fertilizer P consistently had lower individual seed weight and fewer pods and total seed across node sections than the fertilized treatments. Seed abortion followed a similar trend as soybean yield components, with the highest yielding node sections also having the greatest seed abortion indicating potential competition for P or other resources among developing seeds.