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| 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:**  | Spatial and temporal variation of soil sampling affect phosphorus and potassium recommendations for soybean |
| **Organization:**  | Louisiana State University Agricultural Center |
| **Project Lead Name:** | Md. Rasel Parvej, mrparvej@agcenter.lsu.edu**Colaborators:**F M Jamil Uddin, fmjuddin@agcenter.lsu.eduMelissa W. Cater, mcater@agcenter.lsu.eduNathan A. Slaton, nslaton@uark.edu Gerson L. Drescher, gldresch@uark.eduJ. Larry Oldham, larry.oldham@msstate.eduJagmandeep Dhillon, jagman.dhillon@msstate.edu |
| **Report Date:** | 1st Quarter, 2023 |
| In the Progress Summary section below, please provide a brief summary of project progress in lay language that will be shared publicly in the [National Soybean Checkoff Research Database](https://www.soybeanresearchdata.com/). Do not include any confidential or proprietary information. If no lay language is provided, the contents of this entire report will be published in the [National Soybean Checkoff Research Database](https://www.soybeanresearchdata.com/). |
| **Progress Summary (in non-proprietary lay language suitable to be shared publicly):** |
| The project's objective is to characterize the effects of soil sampling time and position, rotational crop, and soil management practices on soil-test phosphorus (P) and potassium (K) concentrations and fertilizer recommendations for soybean production in Mid-South states. We expect to develop research-based soil sampling guidelines for optimum P and K recommendations that maximize soybean yield and profit. Also, we expect to develop a regression model to predict the temporal variation of soil-testing values following summer crop harvest and tillage management practices. In 2023, the research trials are being conducted at the LSU AgCenter – Northeast Research Station across different crop rotations, soil types, and soil management practices and will be continued in 2024 and 2025 in Louisiana with the additional research sites incorporated in Arkansas and Mississippi in 2023 and 2024. |
| **Detailed Progress Status** – Expand upon the above section. What key activities were undertaken and what were the key accomplishments during this reporting period? List each key deliverable from the proposal and describe progress made (or not made) toward achieving it, including metrics were appropriate. |
| A field trial was established on commerce silt loam soils at the LSU AgCenter – Northeast Research Station for corn, soybean, and cotton as a rotational crop side by side with two P and K rates (0 and 80 lb P2O5 and K2O/acre) and two tillage treatments (no tillage and conventional tillage) in mid-March 2023. Before applying fertilizer treatments, a composite soil sample consisting of 10 soil cores from 0- to 6-inch soil depth was collected from each no-fertilizer control plot of each replication. Dekalb DKC65-99 corn was planted on March 31, 2023, and Progeny 4604XFS soybean and PhytoGen 411 W3FE cotton were planted on June 4, 2023 on 38-inch spaced seed beds. Soybean and cotton were planted late due to lack of soil moisture from no rain for 3 weeks. Each experimental plot is 35-ft long x 12.67-ft wide and consists of 4 rows. Trial for each rotational crop was designed as strip-split plot treatment structure with 4 replication including soil tillage practices as strip plot and fertilizer treatments as split plot. A separate paddy rice trial with CLL 18 was established in early May at the Northeast Research Station. The rice experimental plot is 24-ft long x 5-ft wide with 7.5-inch spacing. The experimental treatment, design, and soil sampling procedures were same as mentioned for corn, soybean, and cotton. Conventional and no-tillage practices for each crop will be established after summer crop harvest. A series of soil sample from 0- to 6-inch depth will be collected from each plot of each replication using regular *AMS* soil probe (7/8-inch diameter) starting immediately after summer crop harvest and continued on a 15-day interval until the next year-summer crop planting. Each composite soil sample will consist of at least 10 soil cores. Soil samples will be collected from the top of the bed (around 6-inch apart from crop row) and middle of the furrow for furrow-irrigated system for corn, soybean, and cotton. For flood-irrigated rice – soybean system with <15-inch row spacing, soil sample will be collected only from the middle of crop rows since there is minimum spatial variation. Each composite sample will be air-dried and sent to the LSU AgCenter Soil Testing and Plant Analysis Laboratory, Baton Rouge, LA for Mehlich-3 routine soil analysis (pH, Mehlich 3 extractable P, K, Ca, Mg, Na, S, Fe, Mn, Zn, Cu, B).Besides soil sampling, summer crop residue from each no-tillage plot of each replication will also be collected at harvest and continued on 3-4 weeks interval until the next year soybean planting. The harvested crop residue will be dried and analyze for nutrient concentrations (P, K, Ca, Mg, Na, S, Fe, Mn, Zn, Cu, B) at LSU AgCenter Soil Testing and Plant Analysis Laboratory, Baton Rouge, LA to determine the amount of nutrient release from crop residue following summer crop harvest. A mean difference of soil and residue P, K, and other nutrient (S and Zn) concentrations for each sample time will be calculated by subtracting the soil and residue nutrient values from initial soil and residue nutrient values of soil and plant samples collected at summer crop harvest. The mean difference of soil and residue nutrient values will be regressed across sampling time (days after summer crop harvest, DAH) using a GLIMMIX procedure of SAS to develop a regression model to predict the temporal variation of soil-testing values following summer crop harvest and tillage management practices. Rainfall data along with soil sampling will be collected and will be used as a co-variate for the regression model. |