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| Project Title | Spatial and temporal variation of soil sampling affect phosphorus and potassium recommendations for soybean |
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| Additional PIsFor this project | **Melissa Cater,** mcater@agcenter.lsu.edu; **Nathan Slaton**, nslaton@uark.edu; **Gerson Drescher**, gldresch@uark.edu; **Jagmandeep Dhillon**, jagman.dhillon@msstate.edu; |
| Research Locations (and states involved) | LSU AgCenter – Macon Ridge & Northeast Research Station, located in Winnsboro, Louisiana. UofA System Division of Ag – Pine Tree Research Station, located in Colt, Arkansas. Mississippi State University – Delta Research & Ext. Center, located in Stoneville, Mississippi. |
| **Timeline:** **Current Year - FY25** | **Multi-Year Project Information** (if applicable) |
| Year 1 | Year 2 | Year 3 |
| Start Date | **31 March 2024** | **31 March 2023** | **31 March 2024** | **31 March 2025** |
| End Date | **31 March 2025** | **31 March 2024** | **31 March 2025** | **31 March 2026** |
| Funds Requested | $ 30,000 | $ 20,000 | $ 30,000 | $ 30,000 |
| **Program Area (e.g., breeding, mngt.):** Fertility needs (especially P and K) for optimum and economical yield |
| Objectives | Characterize the effects of sampling time and position, rotational crop, and soil management practices on soil P and K concentrations and fertilizer recommendations for Mid-South soybean. |
| Justification | Since soil-test P and K concentrations fluctuate spatially and temporally, investigating the effects of soil sampling time and method across different crop rotations and soil management practices will help develop better soil-test-based P and K fertilizer recommendations that optimize soybean yield and profit across Mid-South states. |
| Exp Setup | Research trials to evaluate spatial and temporal effects of soil sampling on soil-test P and K concentrations will be conducted at the LSU AgCenter from 2025 to 2026 across different sampling positions, crop rotations, soil types, and soil management practices with the additional research sites in Arkansas and Mississippi during 2025. |
| Summary  | The multi-year/state research trials will help us develop the best time and way of soil sampling across crop rotation and soil management practices and adjust our fall soil-test values with the predicted maximum soil-test values following summer crop harvest for optimum fertilizer rate that maximizes soybean yield and profit and reduces associated offsite overfertilization impacts.  |
| Key Metrics | Measurements include soil and residue nutrient concentrations and summer crop yield. Results from each year's trials will be presented in extension and professional meetings to improve the knowledge and awareness of ag personnel regarding the best soil sampling strategies for maximum soybean yield and profitability. The final results will be published in a peer-reviewed journal.  |
| Expected Deliverables | We expect to develop research-based soil sampling guidelines for optimum P and K fertilizer recommendations that maximize soybean yield and profit. We also expect to develop regression models to predict the temporal variation of soil-testing values following summer crop harvest and tillage management practices. The outputs of these research trials will help producers adjust their fall soil-test values, minimize fertilizer input and cost, and reduce fertilizer losses.  |
| Benefit to midsouth farmers | Developing the best soil sampling strategies for optimum fertilizer rates that maximize soybean yield will directly benefit approximately 5.6 million acres of Mid-South soybean that receive fertilization, with the possibility of another 4.3 million acres that will likely require fertilization within a short period. The expected outcomes will also help reduce fertilizer amounts and costs.  |
| Progress Made | The project will start on 1 Sep. 2022 after summer crop harvest. We are developing protocols. |
| Signature of Principle Investigator | Date: 08/01/2024 |