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7. Title Improving Nutrient Management for Sustainable Crop Production Systems in Louisiana			
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Outputs: <p>The project generated outputs in the forms of: 1) presentations at different venues attended by producers, extension agents, students, and researchers, and 2) publications in peer-reviewed journals, trade journals, proceedings, conference abstracts, and annual reports. In addition, two M.S. students completed their studies. Presentations were delivered at the LSU AgCenter's Research Station Field Days and Annual Staff Conference, American Society of Sugar Cane Technologists Annual Meeting, Nitrogen Use Efficiency Workshops, Beltwide Cotton Conference, Louisiana Cooperative Soil Survey Conference, Rice Technical Working Group Meeting, National Conservation Systems Cotton and Rice Conference, and ASA-CSSA-SSSA Annual Meeting. Seven peer-reviewed and three editor-reviewed journal articles were published. Dissemination of information was also made through media/press coverage. The algorithms to run sensor-based nitrogen (N) decision tools for rice, corn, cotton and sugarcane were established. The performance of these decision tools was evaluated in research plots and producers' field. Data from the correlation/calibration research were used 1) to validate the current guidelines for phosphorus (P) and potassium (K) fertilizer recommendation for corn and soybean, and 2) to establish the critical P level and soil test interpretation for Louisiana soils based on Mehlich-3 procedure. Also, results were presented (oral or written) to the members of the funding agencies which include International Plant Nutrition Institute, and Louisiana Soybean Research and Promotion Board, Louisiana Board of Regents, Cotton Incorporated, and American Sugar Cane League.</p>			
Outcomes/Impacts: <p>Outcomes of this project are essential to update and validate fertilizer management and guidelines for essential nutrients to ensure profitable and environment-friendly crop production systems in Louisiana. Greenhouse and field studies for calibration research showed that the critical soil test P level for Louisiana based on the Mehlich-3 extraction procedure is 35 mg/kg. These studies were used to validate and update the fertilization guidelines for major row-crops in Louisiana for primary nutrients like phosphorus and potassium. Liming program should be prioritized in production areas with acidic soils especially if P and K fertilization will be required. A long-term P, K and lime study for an acidic upland soil under corn-soybean rotation showed that with sufficient P and K level, limed plots consistently yielded higher than unlimed plots which can be attributed to better plant population, higher available basic cations, and lower extractable Al and Mn. Soils in Louisiana common to corn production have high amounts of extractable Ca. Soil pH should be maintained at optimum levels as most applied P fertilizer can be transformed into more insoluble forms of inorganic phosphate (Ca-bound and reductant) if pH>6.5. The linear-plateau analysis was conducted between N rate and yield for sugarcane, corn, rice and cotton. The current N recommendation is sufficient for sugarcane, rice and cotton. Corn, on heavy textured soil, may require application of the higher recommended N rates (>240 lbs/ac). In general, there was little benefit from N fertilization to plant cane. For remote sensing and N management, sensor readings (normalized difference vegetation index- NDVI), biomass, and yield data were collected in multiple studies. The data analyses confirmed that 1) sensor readings collected early in the season can be used to predict crop yield potential and probability of crop response to N fertilization, and 2) the optimal time of sensor data collection was within the mid-season N fertilization schedule. The working algorithms were established for the sensor-based N decision tool for sugarcane, rice, corn and cotton. N fertilizer use efficiency was generally improved with the sensor-based system but the increase in net return to N fertilizer was inconsistent across site-years. In three of five producers' fields, the sensor based system provided an average net return to N fertilizer of \$19/acre. This evaluation highlighted not only the potential of this decision tool to improve</p>			



N fertilizer use efficiency and profit, but also the areas that need to be improved to ensure higher probability of obtaining positive returns. Refining recommendations using soil productivity management zones and economic parameters (e.g., cost of commodity and fertilizer), and improved predictive models for crop yield potential and probability of crop response to N fertilizer are benefits to producers.

Publications:

Tubana, B., C. Kennedy, A. Arceneaux, J. Teboh, D. Weindorf, and J. Wang. 2008. Analysis of sugarcane yield response to annual nitrogen fertilization. In ASSCT Abstract. American Society of Sugar Cane Technologist Annual Joint Meeting, Orlando, FL, June 18-20, 2008.

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Lofton, J., B. Tubana, D. Boquet, E. Clawson, J. Teboh, Y. Kanke, and T. Udeigwe. 2010. The use of plant indices for in-season prediction of cotton lint yield response to nitrogen fertilization. In *Agronomy Abstracts*. ASA, Madison, WI.

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Participants:

Brenda Tubana (PI), Jim Wang, John Kruse, Cheston J. Steven, Donald Boquet, Henry Mascagni, Ernie Clawson Theophilus Udeigwe, Dustin Harrell, Sonny Viator, Jasper Teboh, Jim Hayes, Payton Dupree, Josh Lofton, Marilyn Dalen, Yumiko Kanke, LSU AgCenter; Timothy Walker, Mississippi State University Delta Research and Extension Center.

Target Audiences:

Target audiences include producers, consultants, extension agents, researchers/scientists and general public who are interested in production agriculture and environmental science.

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date
		