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1. Accession 0220299	Agency Identification No. 2. CSREES 3. LA.B	5. Work Unit/Project No. LAB04008	6. Status Annual Report
7. Title An Integrated Canopy Structure Characterization for Sugarcane Grown on Alluvial Soils of Louisiana Using Remote Sensing Technology			
12. Investigator Name(s) (Last Name and Initials) Tubana, B.			
20. Termination Date 12/31/2012		40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011	
Outputs: The project generated outputs in the form of presentations at several venues attended by producers, extension agents, students, and researchers. Presentations were delivered at LSU AgCenter Sugar Research Station's Field Day, American Society of Sugar Cane Technologists Annual Meeting, 8th European Conference on Precision Agriculture, and the ASA-CSSA-SSSA International Annual Meeting. Dissemination of information was accomplished through publications of results in annual reports, proceedings, and abstracts.			
Outcomes/Impacts: Sugarcane trials were continued at two sites (St. Gabriel and Jeanerette, LA) using four nitrogen (N) rates (0, 40, 80, and 120 lbs/A) and the three most prevalent cane varieties in Louisiana (HoCP 96-540, L99-226 and L01-283) as treatments. The outcomes of this project provide a fundamental understanding on the potential use of remote sensing technology towards the development and adoption of remote sensor-based decision tools specifically managing N fertilizer in Louisiana sugarcane production systems. Different wavelengths of the color spectrum, red edge and near infrared regions, obtained the highest association with biomass across varieties with correlation coefficient (r) values ranging from 0.73 to 0.93. Several indices using these wavebands showed that simple ratio (SR), normalize difference vegetation index (NDVI), and perpendicular vegetation index (PVI) using the red and red edge wavebands established high associations with biomass across varieties three weeks after nitrogen fertilization. The associations of biomass and these vegetation indices declined at later sampling times in varieties with wider leaf angle and shorter stature (droopy-leaf canopy structure - L99-226). This observation was not evident for the variety with narrow leaf angle and taller stature (erect-leaf canopy structure - HoCP 96-540). Categorizing variety according to canopy structure improved the accuracy of the biomass predictive model. Integrating canopy height in the model substantially improved the ability of NDVI to predict cane biomass. Non-destructive evaluation of sugarcane N health status addresses the need to improve nitrogen use efficiency in sugarcane production in Louisiana through provisions of robust N fertilization guidelines. In addition, a survey determined the perception of sugarcane producers on remote sensing technology, their criteria for full-scale adoption of new production technology. The survey obtained responses from 76 sugarcane producers farming an estimated total area of 130,000 acres (1/3 of the Louisiana sugarcane acreage). The profitability and cost of investment for new production technology are main driving forces for adoption. Enhanced adoption of new technology relies on assured increase in cane tonnage (5 tons/A) or sugar yield (1000 lbs/A). Among these respondents, 71% confirmed that nitrogen remains the major nutrient of concern in sugarcane production. Less than 50% of these respondents own a variable rate applicator or a GPS unit. A small fraction (21%) showed awareness on remote sensing technology and 67% showed interest in using variable rate technology. Conducting extension and outreach programs may address the lack of producers' awareness on several precision agriculture-based technologies such as remote sensing.			
Publications: Kanke, Y., J. Lofton, J. Teboh, M. Dalen, P. Jaa, H. Viator, and B. Tubana. 2011. Relationship of sugarcane biomass and nitrogen uptake with canopy reflectance at different nitrogen fertilizer rates. ASA-CSSA-SSSA International Annual Meetings. 16-19 October, San Antonio, TX. Kanke, Y., H. Viator, J. Lofton, J. Kraska, J. Teboh, and B. Tubana. 2011. Quantitative relationship of sugarcane biomass and canopy reflectance as a function of nitrogen supply. In 8th European Conference on Precision Agriculture. Czech University of Life Sciences Prague, Prague, Czech Republic. July 11-14, 2011.			

B. Tubana, H. Viator, J. Teboh, J. Lofton, and Y. Kanke. 2011. Feasibility of using remote sensing technology in nitrogen management in sugarcane production. In ASSCT Abstracts. American Society of Sugar Cane Technologists Joint Annual Meeting, New Orleans, LA, June 8-10, 2011.

Participants:

Brendy Tubana (PI), S. Viator, J. Teboh, Y. Kanke, and J. Lofton, LSU AgCenter.

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
		