U.S. Department of Agriculture
Work Unit Description AD-416
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	2. NIFA	3. LAB	LAB94176	A = New Project

7. Title
Improving Row-crop Production Systems in Northeast Louisiana

8. Performing Organization 1941 - 2010
Northeast Research Station
Agricultural Experiment Sta, Louisiana State Univ

9. Cooperating Departments within State Performing Institution

10. Multistate Project No.

11. Cooperating States

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12. Investigator Name(s) Last Name and Intitials)

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Hatch			

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	01/01/2013	12/31/2016

Goals/Objectives/Expected Outputs

The objective of this research are: 1) Determine the propor management of poultry litter as an organic amendment for cotton production on highly degraded loess soils of northeast Louisiana, 2) Investigate the effects of periods of saturation on soil N levels, crop growth, and yield on heavy clay soils in northeast Louisiana, and 3) Develop a system-based approach for agronomic management of crops in northeast Louisiana to improve crop yield, yield quality, and environmental sustainability. Expected outputs are to identify key concepts for poultry litter management in crop production in northeast Louisiana, specifically for application of the material and its effects on crop growth and yield. Additionally, determine not only how periods of saturated soil conditions effects soil N availability but also how crop growth is effects, especially when the saturation events occur at different growth stages. Finally, to identify key management agronomic management strategies for optimal production and minimizing environmental impact of crop production in Louisiana

Methods

1) The trial will be a randomized complete block design investigating two poultry litter application timings (fall and spring applied) and three application sources (fresh litter, composted litter, and pelletized litter). Additionally, traditional producer's practices will be incorporated. Soil and plant samples will be collected throughout the growing season to determine total nutrient analysis both in the soil and plant systems. At harvest, cotton will be mechanically harvested, ginned, and total lint yield will be determined. Cotton lint sub-samples will be collected and used to determine cotton lint quality. The effects of poultry litter application timing and source on nutrient concentration as well as lint yield and quality will be determined using multivariate and uni-variate means through means separation tests. 2) Field experiment will be conducted on the Sharkey clay at the NERS near St. Joseph to determine the influence of periods of saturation on plant available N as well as corn growth and yield. Two saturation events under recommended and high-application N rates will be evaluated. Additionally, a check plot that has received zero N will be investigated for each saturation event. Experiment will be implemented in a split-plot design with saturation event as the main plot and N-rate as the sub-plot. The three saturation events will be no implemented saturation, saturation at early growth stage (V2-V3), and saturation implemented during mid-vegetation stages (V6). Each main plot saturation event will be bermed to allow for complete saturation during specified timing. Saturation conditions will be determined through the use of soil moisture probes and saturation conditions will be

maintained for a 24-hour period. Following the saturated period the water will be allowed to infiltrate prior to removal of the berms. Soil samples will be collected prior to saturation and immediately following saturation to determine the flux in ammonium and nitrate levels. Additionally, tissue samples will be collected every other week throughout the season to determine variation in N uptake affected by the saturation events. However, tissue samples will be collected the week prior to and follow each saturation event. At maturity, corn will be mechanically harvested and yield will be determined. Corn grain samples will be sent in for total N analysis and N-uptake and NUE will be determined. Mean separation tests will be conducted to determine difference in saturation events and soil N concentration, N-uptake, and corn yield. 3) Field experiments will be conducted whenever production problems arise. Appropriate and statistically sound treatments and experimental designs will be used for each proposed project, with a minimum of three to four replications. Data will be analyzed using the appropriate statistical analysis using Procs Regression, Mixed, MANOVA, and PC. Data for all projects will be disseminated through appropriate means and will often include producer-friendly publications. Additionally, data will be disseminated through oral presentations at all levels, from growers meeting through international meetings.

23. Non-Technical Summary

With reducing productivity of our arable lands, continually increasing public interest in environmental concerns, and continued increasing cost of agricultural inputs, optimum management will be essential for achieving agronomically optimum yields while minimizing environmental impact. While there is no one management practices that will increase yields and minimize loss in our production systems certain fertility, irrigation, and tillage/residue management practices have the potential to not only increase/maintain yields but also increase production efficiency. This project includes experiments evaluating agronomic management such and the use of alternative fertilizer sources, environmental effects on applied N fertilizer and crop growth, and proper fertility, tillage, irrigation, as well as residue management will increase the wealth of knowledge and provide producers information on row-crop production in northeast Louisiana. Trails for poultry litter management will identify proper management, including application timing and application source, for crop production in northeast Louisiana. This will allow producers to more properly management organic soil amendments to not only increase productivity but attempt to minimize environmental impact. Also, with the dependence of the region's corn production on summertime irrigation and the frequent occurrence of high rainfall conditions shortly after planting, the knowledge of how applied N, crop N uptake, and corn growth are effected by periods of soil saturation is essential. Information from this trial could allow producers to better manage N inputs around these uncontrollable environmental conditions. In addition, determining how to properly manage fertilizer and irrigation inputs as well as proper tillage and residue management and how these management strategies are effected by constantly change cultivars and hybrids, different soil types, and other management strategies will be essential for continue optimum agronomic production in Louisiana.

24. Keywords

Poultry Litter; Nitrogen Management; Crop Nitrogen Uptake; Tillage; Residue Management; Irrigation; Corn; Cotton; Grain Sorghum; Soybean; Row-crop Production; Nutrient Management

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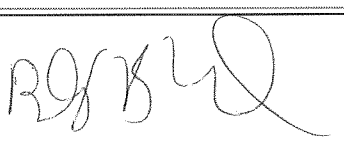
Signature	Title	Date
Dept: Admin:	 *Associate Director*	12/12/12