U.S. Department of Agriculture
Work Unit Description AD-416
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1. Accession No.	Agency Identifiers		5. Work Unit/Project No.	6. Status
	2. NIFA	3. LA.B	LAB94108	A = New Project

7. Title
Assessment of the Carbon Sequestration Potential of Common Agricultural Systems on Benchmark Soils Across the Southern Region Climate Gradient

8. Performing Organization 3780 - 2010
School of Plant, Environmental, and Soil Sciences
Agricultural Experiment Sta, Louisiana State Univ

9. Cooperating Departments within State Performing Institution

10. Multistate Project No. S1048

11. Cooperating States

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

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14. Project Type	15. Contract/Grant/Agreement No.	16. Amount	17. FY
Hatch/Multistate			

18. Award Date (Month/Day/Year)	19. Start Date (Month/Day/Year)	20. Termination Date (Month/Day/Year)
	10/01/2011	09/30/2016

Goals/Objectives/Expected Outputs

The major goal of this study is the direct assessment of soil carbon sequestration potential with these specific objectives: (i) To evaluate the effects of land use, crop rotation, tillage practice, soil texture, and ecosystem age/rotation duration on soil carbon concentration, content, and sequestration and related soil physical and chemical properties. (ii) To quantify and understand the physical and chemical processes that relate to and control soil carbon sequestration, and (iii) To investigate spatial variability issues associated with soil carbon content and sequestration. Expected Outcome: By documenting soil organic carbon accumulation under different climates, land uses, and soils, it is expected that the results of this project will provide producers, and policy makers, comprehensive information on the environmental merit of adopting different land uses, such as bio-energy crops and conservation-tillage practices, in the southern USA. It is also expected that the project will facilitate the establishment of a C-trading farm economy in the southern USA by providing credible and realistic data on soil C sequestration potentials.

Methods

A 60-m transect will be established at each new site selected for soil sampling. A soil core with an approximate diameter of 4.8 cm will be collected from the 0- to 10- and 10-20-cm depths. Soil bulk density and selected physical and chemical properties be determined on these samples. All samples will be collected following crop harvest and before field manipulations the following year. New soil cores will be air-dried, weighed, and subsequently crushed and sieved through a 2-mm mesh screen for soil physical and chemical analyses. A sub-sample of the air-dried soil will be oven-dried for soil moisture correction and will be used for additional soil physical and chemical analysis, except that all carbon analysis will be performed on air-dry samples. Soil sampling efforts will focus on the top 20 cm, the zone most that will be most influenced by varying management practices. In addition, to quantify deeper-soil accumulation of C, a sub-set of sampling sites will be sampled to a depth of 60 cm. These additional deep-soil samples will be collected from the 20-40 and 40-60 cm depth intervals at a minimum of two of the sample locations (i.e., the beginning and end of the transect) along the established 60-m transect. To minimize potential compaction, if there is more than a 5% difference in the length of the collected deep core compared to the actual target length, then the sample will be discarded and re-collected. Oven-dry, sieved soil will be extracted with Mehlich-3 extractant solution in a 1:10 (w/v) soil-to-extractant solution ratio and analyzed for extractable soil nutrients (i.e., P, K, Ca, Mg, Na, S, Fe, Mn, Zn, and Cu) via inductively coupled argon-plasma spectrophotometry. Soil pH and EC will be determined with an electrode on a 1:2 (w/v) soil-to-water paste. Soil organic matter will be determined by weight-loss-on-ignition

after 2 hrs at 105 degrees C and 2 hrs at 360 degrees C. Total soil C and N will be determined on all samples collected by high-temperature combustion through a single laboratory to be determined at a later date based on the availability of funding. Soil particle-size analysis will be conducted using the 12-hr hydrometer method. In addition, spatial and temporal analysis will be used to quantify spatial structure of the results and implication on C-sequestration.

23. Non-Technical Summary

This proposal outlines a multi-state, regional project that is designed to improve our understanding and knowledge regarding the complex relationships among climates, soils, land uses, and C. The specific objective is to assess the soil carbon sequestration potential of common agricultural and natural ecosystems of varying ages on benchmark soils across the southern region climate gradient. This objective can be achieved relatively easily in the context of current research activities being conducted by all participating individuals despite not all individuals presently working on soil C sequestration or the bio-fuel issue. This project will generate essential, scientifically based field data to support accurate projections of soil C sequestration potentials across the climate gradient of the southern US

24. Keywords

Carbon Sequestration ; Spatial variability; Temporal Variability;

****** The Original signed document is on file at this institution. ******

Signature	Title	Date
Dept: Admin:	*Associate Director*	7/7/11