ON FARM COOPERATIVE RESEARCH AT THE CENTRAL SAVANNAH RIVER AREA CONSERVATION TILLAGE DEMONSTRATION FARM

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The Central Savannah River Area Conservation Tillage Demonstration Farm (CSRA-CTDF) near Waynesboro, GA, was established in 1996 to develop and demonstrate sustainable cropping and tillage systems suitable for Coastal Plain soils. The project was undertaken as a joint effort of Monsanto's Crop Division, Monsanto's Nutrasweet Kelco Company and BioGro Inc. Board members selected from the three companies and members of the surrounding area agriculture community worked together to create a systematic farm plan to demonstrate the benefits of conservation tillage on Coastal Plain soils. Key members of this team are Richard McDaniel, the Burke County Extension Director, who serves as a production advisor, and Eddie Mallard who is the farm manager.

The farm has 640 acres of arable land comprised of 260 acres of row crops, 130 acres of Coastal bermudagrass hay, and 250 acres of Bahia grass and woodland. Two ponds were constructed in 1998 to provide water for two center pivot systems and a drip irrigation area. Major summer cropsinclude cotton, soybean, corn, and peanuts. Wheat and rye are grown during the winter as cover crops or cash crops. Proceeds from crop sales are used for farm improvements, 4H activities, and to fund a scholarship program targeted at Burke County farm children

Parts of the farm are used to demonstrate long-term effects of conventional and conservation tillage practices. Tillage comparisons are made on side-by-side 5 to 10 acre fields using standard farm machinery. Conservation tillage practices on these areas started in the spring of 1997. Prior to this time the whole farm had been managed under conventional tillage for more than 50 years.

Limited information is available on cropping and tillage system effects on indicators of soil quality for Coastal Plain soils. Multiple cropping and tillage systems at CSRA-CTDF provide a unique on-farm opportunity to evaluate changes in soil quality with contrasting management. Because practices implemented on certain fields are to remain in place and have recently begun we can monitor the expected changes and relate them to management, biomass inputs, and prior cropping practices. The long growing season in the Coastal Plain allows winter and summer cropping which increases the potential for biomass (organic matter) inputs. We expect the large biomass inputs will increase soil organic matter near the soil surface and improve soil physical, chemical and biological properties.

We are measuring soil quality changes under the following conditions:

- Conservation and conventional tillage continuous cropping following long term Bermuda grass sod.
- Conservation and conventional tillage peanut following corn.
- Conservation and conventional tillage cotton-rye.

Soil samples are collected during the winter and divided into 0 to 1, 1 to 3, 3 to 6, 6 to 12 and 12 to 24 inch (0 to 2.5, 2.5 to 7.5, 7.5 to 15, 15 to 30 and 30 to 60 cm) depths for physical, chemical, and biological analysis.

Chemical
CEC, pH, exchangeable acidity, NO_3, NH_4, total N and C, inorganic and organic P, K, Ca, and Mg.

Biological
Soil respiration (C mineralization), N mineralization, microbial biomass C and N

Physical
Soil texture and bulk density.

The first samples were collected in March of 1999 and will be analyzed this summer (preliminary results to be presented in the poster text).

ADDITIONAL FUTURE PLANNED STUDIES

1.) At the end of 5 and 10 yr of continuous conservation and conventional tillage comparison, we will measure infiltration and runoff using rainfall simulators.

2.) Evaluate N availability from commercial by-products, fertilizer, and poultry litter in conventional and conservation tillage systems.

3.) Determine effects on soil quality following

conversion of highly erodible land from Bahia to continuous cropping.

IMPLICATIONS

We plan to use the results from this work to demonstrate how quickly changes in soil carbon and nutrient holding capacity occur for Coastal Plain soils following conversion of conventional tillage land to conservation tillage. Also effects of conventional and conservation tillage systems following conversion of grassland to crop land will be determined. By measuring soil quality changes under various cropping systems producers will be able to see how effective conservation tillage systems are in conserving soil C and increasing productivity. Because of the increased need for information on C storage the data will be helpful in quantifying tillage and cropping system effects on soil C sequestration in the Coastal Plain.