Program 3C-2

Soil Type And Fertility Effects On Cotton Performance

Presented by Dr. John Kruse
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The objective of this three year study was to survey cotton fields to identify inherent soil traits that affect cotton yield and establish soil amendment experiments with different soil types.

Cotton growth and performance varies substantially with soil type. The required fertilizer inputs to cotton also vary with soil type and with other factors such as inherent fertility, previous crops and cropping practices. Many of the factors that affect cotton growth and its response to fertilizer inputs change from year to year, making it difficult to establish the practices that will, more often than not, provide consistent measurable agronomic and economic benefits. When large nutrient deficiencies occur, symptoms are obvious and corrective action can be applied that produce substantive results. However, when nutrient deficiencies are not large, they may be hidden and cause yield loss without symptoms. The development of information for managing soils and the use of needed inputs will establish reasonable expectations for productivity of fields and increase profits through efficient use of inputs.

Three large cotton fields were selected representing major areas where cotton is grown -- a loessial silt loam soil and alluvial silt loam and clay soils in the Mississippi River and Red River Valleys. Twenty sites were selected within each field. Soil electrical conductivity was determined by Veris. Each miniplot was 14 feet wide by 25 feet long. Plots were sampled for determination of extensive categorization of soil characteristics and fertility. Lint yield was determined at each site by hand harvesting small areas of about 6 m2. Seedcotton samples were collected and ginned to determine lint percentage and quality. Once the soil was categorized in 2009 and the relationships of yield with sampled variables analyzed for each field site, experiments were established beginning in 2010 to evaluate applications of the apparent limiting resources and determine if yields can be increased through such applications and were applied according to soil test recommendations. Yields in 2011 of supplemented plots were compared to yields of adjacent plots not receiving inputs. The experiments were analyzed as replicated trials on a field basis, then as paired comparisons at each site in each field. Analysis of variance by whole field showed a significant treatment effect for the Mississippi alluvial field, but not the other two. Within-field pairwise comparisons in the Mississippi alluvial soil demonstrated significant yield response to Phosphorus (P), sulfur (S), poultry litter and P + S. The loessial soil pairwise comparisons showed significant yield responses to P, P + potassium, and P + S. The Red River alluvial soil pairwise comparisons resulted in no significant yield responses to fertilizer inputs.

Program 9C-2

Response Of Irrigated And Non-Irrigated Cotton To Furrow Diking Tillage

Presented by Dr. L. Jason Krutz
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There is concern over the decline in the Mississippi alluvial aquifer and the impact that irrigation management has on this phenomenon. Today, 70% of the acreage within the Mississippi Delta is irrigated, and researchers have suggested that the decline in the alluvial aquifer can be stabilized if a 25% reduction in the application of irrigation water is adopted in this region. Furrow diking, a tillage system where soil is plowed into ridge-like barriers

Figure 1. Cotton Furrow diking plots near Elizabeth, MIsissippi, Note water ponding behind dikes

running alongside row crops, is a management practice with potential to save irrigation water and reduce irrigation costs. This management practice, however, has received little research attention in the Mid South. Cotton furrow diking experiments were initiated by USDA-ARS and Mississippi State University researchers near Elizabeth, MS to determine if this practice could potentially reduce irrigation levels by the targeted value, 25%, while maintaining and/or improving yields when compared to a conventional tillage system. Physiological data were collected at early bloom, cut-out and harvest for both irrigated and non-irrigated studies. Twenty-six percent less irrigation water was applied to furrow dike systems when compared to the conventional tillage system. At early bloom, no difference between plant heights, number of main stem nodes, leaf area index, stem weight and total plant weight were noted between tillage systems. Similarly, at cut-out, no difference in aforementioned physiological measurements was observed, nor did we detect differences in boll or square weights between tillage systems. At harvest, box mapping indicated no difference in plant height, node number, number of occupied positions or seed lint weight within position. Consequently, cotton lint yields between tillage systems were not different, averaging 989 lbs/acre. Similar results were noted for our non-irrigated cotton furrow diking experiments. Our preliminary data indicate the potential for furrow diking to reduce irrigation levels by 25% while maintaining yields equivalent to that of conventional tillage/irrigation systems.

Program 18C-1

Weed Control Systems For Controlling Glyphosate Resistant Palmer Pigweed In Cotton And Soybeans

Presented by Dr. Anthony Mills

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Glyphosate resistant palmer pigweed is an extremely prolific weed. Seed production can exceed three hundred thousand seeds per plant and germination occurs over several months. Under optimum conditions palmer pigweed can grow more than 2 inches in a single day. This makes glyphosate resistant pigweed the most difficult weed to manage in cotton and soybean production systems today. Weed control systems that utilize multiple residual herbicides with different modes-of-action are most effective. Post-emergence herbicides can also be effective with appropriate application timing.

Farmers rapidly adopted Roundup Ready Technology in cotton and soybeans because it made weed control easy, effective and economical. Many farmers today do not have experience with weed control systems that are not based entirely on glyphosate. While glyphosate is still effective on many weeds today, it is imperative that other chemistries are used; especially in areas where palmer pigweed is prevalent.

A cotton palmer pigweed control system proven to be effective in the Mid-south is as follows: