# Soil Type And Fertility Effects On Cotton Performance

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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. Δ

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