

2005 Project Report

Title: Evaluation of Variable-Rate Seeding for Cotton

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Objective: The objective of this project is to evaluate opportunities for increased yield or profits through variable-rate (VR) seeding for cotton production.

Procedures:

A cooperative farmer was identified in Northern Alabama to conduct this on-farm study. This farmer utilizes a cotton and corn rotation while also managing center pivot irrigation on a select portion of managed farmland. Irrigation permitted the comparison of irrigated and dryland cotton production. An irrigated and non-irrigated (dryland) field were selected to conduct this research. Selected seeding rates, for both the dryland and irrigated fields, included 55K, 65K, 75K, and 85K seeds/ac. These seeding rates were established based on the farmer's traditional seeding rates for the chosen cotton varieties and recommendations from consultants from the respective seed company with additional rates selected above and below the traditional seeding rate.

A 24-row planter equipped with a VR drive system was used in this study. The planter was calibrated based on the manufacturer's operators manual. The plot within each field was blocked to provide 3 replications for the cotton treatments. Treatments were then randomly assigned within each block with a single pass of the planter representing a specific population treatment within the block.

Subsequent to planting, stand counts were measured to determine the actual germinated population. These were collected by measuring the number of plants for two adjacent rows over a 10-ft length. Stand count measurements were gathered on each 12-row section of the planter, collecting counts at 3 or more places along each 12 rows depending upon terrain variability. A cotton picker equipped with an AgLeader yield monitor was used to obtain spatial performance data for the plots. Analyses included summarizing stand counts along with spatially segregating yields based on the various seeding treatments to determine the effect of seeding rate on cotton yields. All statistical analyses were conducted at a significance level of 0.05.

Results:

Poor growing conditions immediately following planting likely contributed to the final lower than expected plant populations. Weather directly following planting was not conducive to plant germination and emergence at the field sites. As a double-check, an evaluation is needed prior to planting in the spring of 2006 to compare the actual planted rates to the prescription map as a consequence of this year results to ensure that the planter and VR control system are properly functioning. In terms of performance, no significant difference in cotton yields (pounds of seed cotton per acre) were found between the seeding treatments in either the dryland or irrigated plots (Tables 1 and 2). As expected, irrigated cotton yields were significantly higher than dryland cotton yields. Irrigated yields were around 60% or higher for the various treatments.

It should be noted that 1) results reported only represents the first year of this study, and 2) the effect of terrain and soil variables were not considered for this analyses. The inclusion of terrain attributes and soil variables could impact results by possibly separating out yield differences between varying productivity areas. Plans include collecting elevation data and considering soil variables in future analyses.

Future plans are to repeat this investigation during 2006 and 2007.

Table 1. Field 1 summary for dryland cotton.

Treatment (Population - Seeds/ac)	Actual Population (Seeds/ac)	Yield (lbs seed cotton per acre)
55,000	16,597	1771a
65,000	36,068	1843a
75,000	41,876	1858a
85,000	42,979	1811a

Table 2. Field 2 summary for irrigated cotton.

Treatment (Population - Seeds/ac)	Actual Population (Seeds/ac)	Yield (lbs seed cotton per acre)
55,000	35,622	2792b
65,000	43,318	3126b
75,000	48,884	2985b
85,000	50,191	3125b