

## 2006 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:

The cooperative farmer identified in 2005 allowed for the on-farm study in Northern Alabama to continue during the 2006 growing season. 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 35K, 50K, 65K, and 80K 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. A plot within each field was blocked to provide 4 replications for the cotton treatments for this study. 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 each plot. At harvest, seed cotton samples were also collected per plot and lab analyze to assess quality for each treatment.

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. Quality data was also statistically analyzed to determine if differences existed between seeding treatments. All variables were analyzed using T-tests and Least Significant Difference (LSD) tests at a significance level of 0.10.

### Results:

Results showed that stand counts were all significantly lower, in both irrigated and non-irrigated fields than the targeted seeding rate with the exception of one (35,000 seeds/ac treatment within the non-irrigated plot). The seed populations being consistently lower than the target application rate may be tied to calibration and planter setup along with poor germination and emergence. The reason for the lower than expected actual populations is unknown at this time.

Statistically comparing the actual populations indicated differences existed between the four average populations for each field (Table 1 and 2). For example, the actual population of the 50K treatment was significantly different than the actual population of the 65K treatment. This result for each field was expected considering the differences between the seeding rate treatments.

In the non-irrigated field, there was not a significant difference in lint yield between the four seeding rates (Table 1). These results reflect the same outcomes as in 2005 for the non-irrigated field. It should be noted, as stated above, that there was a significant difference in actual population between the four treatments. So, it is interesting that there was not a significant difference between yields at these four seeding rates. For the irrigated plots, some differences in lint yield existed between the different seeding treatments (Table 2). The highest seeding rate (80K) was significantly different than the 50K and the 65K treatments. However, there was not a significant difference in yield between the lowest seeding rate (35K) and the three higher seeding rates.

As expected, irrigated cotton yields were significantly higher than dryland cotton yields. Irrigated yields were around 51% or higher for the various treatments.

The cotton quality was analyzed for both the irrigated (Table 1) and non-irrigated (Table 1) fields at the four seeding rates. Cotton quality features that were analyzed were Micronaire, Strength, Leaf Grade, Uniformity, and Length. Color was also reported but not compared. In the non-irrigated field, there were not any significant differences between quality features at the varying seeding rates except for Leaf Grade (LG). The LG of the 50K, 65K, and 80K were significantly higher than that of the 35K treatment.

The results for the irrigated field differed from the non-irrigated field. In the irrigated field, there was not a significant difference between any of the treatments for the LG and Length variables. For Micronaire, there was a significant difference between the lowest seeding rate (35K) and the three higher seeding rates. Significant differences were found with Strength. The only significant difference in Uniformity was between the 35K and 65K.

This concludes the 2<sup>nd</sup> year of data collection and analysis. Future plans are to repeat and conclude this investigation during the 2007 growing season.

**Table 1. Field 1 summary for dryland cotton.**

Treatment (Seeds/ac)	Actual (Seeds/ac) <sup>1</sup>	Yield (lbs lint per acre)*	Mic. <sup>1</sup>	Color	Leaf Grade <sup>1</sup>	Length (in.) <sup>1</sup>	Strength (g/Tex) <sup>1</sup>	Uniformity (%) <sup>1</sup>
35,000	33,251 d	660 c	4.83 a	75% 42's; 25% 41's	1.5 b	108 a	29.7 a	82.1 a
50,000	40,874 c	621 c	4.78 a	100% 41's	3.0 a	107 a	28.9 a	81.6 a
65,000	54,813 b	624 c	4.85 a	75% 41's; 25% 42's	2.5 a	108 a	29.2 a	81.6 a
80,000	62,944 a	645 c	4.78 a	75% 41's; 12.5% 42's; 12.5% 32's	2.4 a	108 a	29.1 a	81.4 a

**Table 2. Field 2 summary for irrigated cotton.**

Treatment (Seeds/ac)	Actual (Seeds/ac) <sup>2</sup>	Yield (lbs lint per acre)*	Mic. <sup>2</sup>	Color	Leaf Grade <sup>2</sup>	Length (in.) <sup>2</sup>	Strength (g/Tex) <sup>2</sup>	Uniformity (%) <sup>2</sup>
35,000	26,455 d	1383 ab	4.37 a	100% 31's	1.1 a	107 a	27.1 bc	81.9 b
50,000	37,679 c	1093 b	4.26 b	91% 31's; 9% 21's	1.3 a	109 a	27.0 c	82.0 ab
65,000	47,335 b	1171 b	4.29 b	91% 31's; 9% 21's	1.3 a	108 a	27.6 ab	82.5 a
80,000	52,199 a	1592 a	4.22 b	91% 31's; 9% 21's	1.3 a	108 a	27.9 a	82.0 ab

<sup>1</sup> Means with similar letters in this column for field 1 indicates they are not statistically different at the 90% confidence level.

<sup>2</sup> Means with similar letters in this column for field 2 indicates they are not statistically different at the 90% confidence level.

\* Mean lint yields with similar letters in each column for Fields 1 and 2 indicate they are not statistically different at the 90% confidence level.