

COTTON RESEARCH ANNUAL REPORT
Alabama Cotton Commission

PROJECT TITLE: "NITROGEN AND PLANT GROWTH REGULATOR RATES ON COTTON YIELD AND FIBER QUALITY"

AGREEMENT NUMBER: ALCTNCOM-FIBER QUALITY

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PROJECT OBJECTIVE:

Determine the effect of two plant growth regulator (PGR) strategies with and without a high application PGR rate, prior to harvest, on cotton yield and fiber quality across two N rates for a cotton conservation tillage system.

PLAN OF WORK:

Nitrogen rates and PGR strategies were implemented at the Wiregrass Research and Extension Center (WREC) in Headland, AL and the Field Crops Unit (FCU) of the E.V. Smith Research Center near Shorter, AL. Treatments arranged in a split-plot design with 4 replications were:

Nitrogen Rates

1. 90 lb ac⁻¹
2. 120 lb ac⁻¹

Plant Growth Regulator Strategies

1. No PGR
2. Low rate, multiple PGR applications according to label directions
3. High rate, infrequent PGR applications according to label directions
4. No PGR plus a late season PGR application
5. Low rate, multiple PGR applications plus a late season PGR application
6. High rate, infrequent PGR applications plus a late season PGR application

REPORT:

An oat cover crop and a rye cover crop were drilled across the experimental areas in early Nov. 2005 at the WREC and the FCU. Both were seeded at 90 lb ac⁻¹. In early spring, 30 lb N ac⁻¹, as NH₄NO₃, were applied to the cover crop at both locations to enhance biomass production. Biomass samples were collected at each location approximately 3 wks before anticipated cotton planting dates. Biomass productions averaged 3900 lb ac⁻¹ at WREC and 4800 lb ac⁻¹ at FCU. This difference in biomass production can be attributed to the different cover crop species and different termination dates. Immediately prior to cotton planting, all plots, at both locations, were in-row subsoiled with a KMC Ripper Stripper® equipped with rubber pneumatic tires to minimize surface disruption. DPL 455® BG/RR was planted on April 21, 2006 at WREC and DPL 555® BG/RR was planted on May 18, 2006 at the FCU. The experiment was abandoned at the FCU due to a very poor stand and subsequent extremely dry growing conditions.

Rates of PGR application (Mepex Ginout®) were selected based on the label directions and the growing conditions. Table 1 summarizes the total amounts of PGR applied, which ranged from 0 to 32 oz ac⁻¹ across the 6 PGR strategies examined at the WREC. The initial low rate, frequent application consisted of 4 oz ac⁻¹ per application, while the high rate, infrequent application consisted of 12 oz ac⁻¹ per application. The late season application consisted of a single 8 oz ac⁻¹ application.

Table 1. Plant growth regulator (PGR) amounts and application times across six PGR strategies at the Wiregrass Research and Extension Center in Headland, AL during the 2006 growing season.

Application time	None			Late season application		
	None	Low rate	High rate	None	Low rate	High rate
	-----oz. ac ⁻¹ -----					
60 DAP†		4			4	
70 DAP		4	12		4	12
80 DAP		4			4	
89 DAP		4	12		4	12
98 DAP				8	8	8
Total	0	16	24	8	24	32

† Days after planting

Immediately prior to defoliation, plant heights, whole plant biomass, and final node counts were collected from each plot. Plant heights were the average of 10 randomly selected plants within each plot. The nodes on each of the 10 randomly selected plants were counted at the time of plant height measurement collection to estimate final node production. Whole plant biomass consisted of clipping the aboveground portion of all the plants within a 1-meter section of a non-harvest row from each plot. The plant material collected was dried at 55 degrees Celsius for 72 hours and weighed to estimate the plant biomass of each plot. The experimental area was defoliated with 1.5 pt ac⁻¹ Finish® and 3 oz ac⁻¹ Ginstar® on September 12, 2006 and harvested with a spindle picker equipped with a bagging attachment. The seed cotton was collected from the two center rows of each 40 ft. plot and weighted on Sept. 20, 2006. A sub-sample of seed cotton from each plot was ginned in a 20-saw tabletop micro-gin to determine ginning percentage. Lint yields were determined by weighting lint and seed collected from each plot and multiplying corresponding seed cotton by the ginning percentage of each plot. The values obtained from a tabletop gin can be used for comparative purposes but may not necessarily coincide with values obtained by a grower from a full-scale gin. Values obtained for lint percentage and quality will likely be above typical averages, but any differences between treatments should be detectable. No fiber properties will be reported at this time.

Final plant heights, biomass, and nodes

Nitrogen rates had no effect on the observed plant heights, however, the PGR strategy did affect ($Pr > F = <0.0001$) plant heights. No PGR or the late season application applied alone resulted in the tallest plants (Table 2). No difference in plant height was observed between the low and high PGR strategies or when the late season application was included. Nitrogen rates or PGR strategies had no effect on plant biomass at defoliation, while final node count was only influenced by PGR strategy (Table 3). The final node count was analogous to plant height with more nodes present when no PGR or the late season application was applied alone (Table 2).

Table 2. Plant heights, biomass at defoliation, and final node count across nitrogen rates and plant growth regulator strategies at the Wiregrass Research and Extension Center in Headland, AL during the 2006 growing season.

	Nitrogen rate, lb ac ⁻¹		Plant growth regulator strategies					
			None			Late season application		
	90	120	None	Low	High	None	Low	High
Plant height, inches	35.0	36.7	40.9	33.5	33.3	41.9	32.4	33.0
Biomass at defoliation, lb ac ⁻¹	942	1028	980	937	971	1066	991	964
Final nodes, #	20.4	21.0	22.0	20.7	19.9	21.7	19.9	19.9

Table 3. Least significant difference for plant heights, biomass at defoliation, and final node count across nitrogen rates and plant growth regulator strategies at the Wiregrass Research and Extension Center in Headland, AL during the 2006 growing season.

	Plant height	Biomass	Final nodes
	-----Pr > F-----		
Nitrogen	NS†	NS	NS
PGR	2.8	NS	1.1
Nitrogen*PGR	NS	NS	NS

† Not significant at 0.05 level of probability.

Lint yields

An interaction was observed for lint yields between nitrogen rates and PGR strategies. The high PGR strategy that included a late season application produced the lowest yields, regardless of N rate (Fig. 1). However, lint yields measured from the other nitrogen and PGR strategies were similar to each other. Interestingly, cotton that received the recommended rate of 90 lb N ac⁻¹ with no PGR produced the highest lint yields. This observation along with similar yields observed between other nitrogen and PGR combinations may be attributed to the dry growing season experienced during the 2006 growing season. The conditions experienced during the 2006 growing season indicate PGRs were not beneficial, regardless of application strategy.

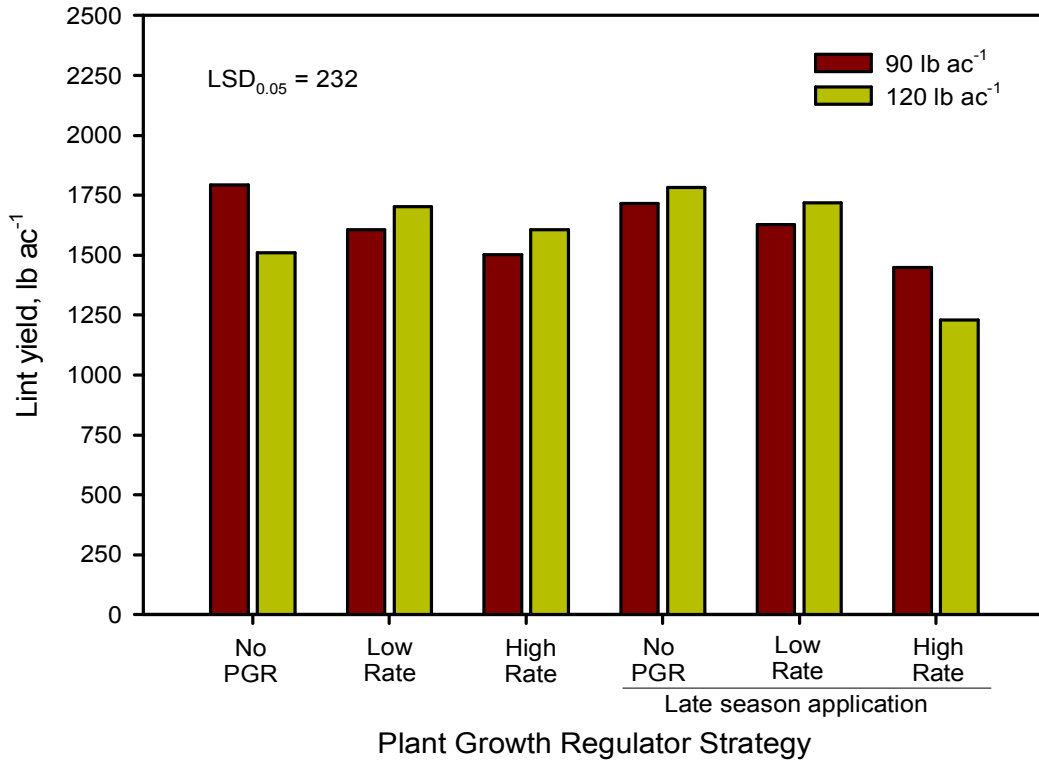


Figure 1. Lint yields measured across nitrogen rates and plant growth regulator strategies at the Wiregrass Research and Extension Center in Headland, AL during the 2006 growing season.