

PLANT GROWTH REGULATION STUDIES IN COTTON, 2004

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Introduction

Tennessee cotton producers commonly use mepiquat-type plant growth regulators (PGRs) to control plant height and enhance earliness. The general objective of this research was to determine if new PGR products under development by industry improve growth regulation of cotton relative to standard mepiquat chloride treatment.

Methods

ST 4892BR cotton was planted on 7 May 2004 at Jackson TN for two separate studies of new PGR products: (1) TADS15338 [8.4% mepiquat chloride + 2.1% cyclanilide]; and (2) Mepex GinOut [4.2% mepiquat chloride + 0.0025% kinetin]. Treatments were applied three times in both studies, at 42, 62, and 74 days after planting (DAP). Treatments were applied by high-clearance sprayer to 4-row plots arranged in a RCB design. Both studies included an untreated check.

In Study #1, Mepex and Pentia were each applied at 4, 8, and 12 oz/acre on successive dates. TADS15338 was applied at two fixed rates, 2.29 and 2.87 oz/acre, at each date. Mepex was also applied at 4.58 oz at each of the three dates. In Study #2, Mepex, Mepex GinOut, and Pentia were each applied at 8, 12, and 16 oz/acre on the three successive dates. Mepex was also applied at 4, 8, and 12 oz/acre on these dates. Another treatment consisted of 8+12+16 oz/acre Mepex GinOut, followed by 24 oz/acre Mepex at 87 DAP. Defoliant was applied to both studies at 136 DAP. Each plot was spindle-picked twice (at 145 and 152 DAP). Earliness was measured as percent of total yield picked at first harvest. Gin turnout of each plot was determined using a 20-saw gin assembly with two lint cleaners.

Results and Discussion

In Study #1, all PGRs reduced plant height relative to the untreated check (Table 1). The high rate of TADS limited growth significantly more than Mepex or Pentia. Total lint yields were equivalent in Mepex- and Pentia-treated cotton and in the untreated check (Table 2). Cotton treated with TADS15338 produced less lint than Mepex-treated cotton. The higher rate of TADS also reduced first harvest percentage, indicating delayed maturity. Gin turnout did not differ significantly, but the higher rate of TADS15338 tended ($p=0.06$) to reduce gin turnout relative to Mepex treated or untreated cotton. Results suggest that TADS15338 needs more research prior to its recommendation for commercial use.

In Study #2, all PGRs reduced plant height relative to the untreated check (Table 3). No additional growth control was achieved by the late (87 DAP) application of Mepex. All PGR treatments reduced the number of nodes above cracked boll (NACB), indicating enhanced earliness with PGR application. However, results in Table 4 indicate no significant differences in total lint yields, lint yield at first harvest, earliness of maturity, or gin turnout in this study.

Table 1. Late-season plant mapping data collected 124 DAP from PGR Study #1 at Jackson TN, 2004.

Treatment	Season Total	Plant Height	HNR	Fruiting Branches	P1 Boll Retention
	oz prod/A	in.	in./node	no.	%
Untreated	--	46.6 a	2.69 a	13.3 a	58.6 b
Mepex	24	36.5 bc	2.27 b	11.8 b	64.1 a
Mepex	13.74	35.3 bc	2.27 b	11.7 b	57.1 b
Pentia (BAS 130)	24	37.1 b	2.33 b	11.9 b	59.2 b
TADS15338	6.87	34.6 c	2.09 c	12.3 b	58.8 b
TADS15338	8.61	32.1 d	2.02 c	11.6 b	55.3 b
Signif. (F)		***	***	**	**
LSD (0.05)		2.24	0.16	0.72	3.97
CV (%)		4.0	4.6	3.9	4.5

*, **, *** indicate significant differences at $P < 0.05$, 0.01, and 0.001, respectively. n.s. = no significant differences ($P > 0.05$). Letters separate means at $p = 0.05$. Lack of mean separation letters indicates $p > 0.05$. Abbreviations: DAP = days after planting, HNR = height-to-node ratio, P1 = first-position.

Tennessee Agricultural Experiment Station data collected by C.O. Gwathmey. This study was supported in part by Bayer CropScience.

Table 2. Lint yield, earliness and gin turnout in the PGR Study #1 at Jackson TN, 2004.

Treatment	Season Total	Lint Yield, Total	Lint Yield, 1st Harv.	First Harvest	Gin Turnout
	oz prod/A	lb/ac	lb/ac	%	%
Untreated	--	1568 ab	1330 bc	84.8 ab	38.0
Mepex	24	1656 a	1429 ab	86.2 a	37.8
Mepex	13.74	1675 a	1468 a	87.7 a	38.3
Pentia (BAS 130)	24	1562 ab	1360 abc	87.1 a	36.4
TADS15338	6.87	1504 bc	1281 cd	85.2 a	36.7
TADS15338	8.61	1403 c	1152 d	82.0 b	35.7
Signif. (F)		**	**	*	n.s.
LSD (0.05)		137	136	3.1	—
CV (%)		5.8	6.7	2.4	3.3

*, **, *** indicate significant differences at $P < 0.05$, 0.01, and 0.001, respectively. n.s. = no significant differences ($P > 0.05$). Letters separate means at $p = 0.05$. Lack of mean separation letters indicates $p > 0.05$.

ST 4892 BR cotton planted 7 May 2004. Defoliant applied 20 Sept 2004. Harvested 29 Sept and 6 Oct 2004.

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Table 3. Late-season plant mapping data collected 124 DAP from PGR Study #2 at Jackson TN, 2004.

Treatment	Season Total oz prod/A	Plant Height in.	HNR in./node	Fruiting Branches no.	NACB nodes
Untreated	–	47.3 a	2.69 a	12.7 a	6.2 a
Mepex	24	33.8 b	2.18 b	10.9 b	4.9 b
Mepex	36	30.7 cd	2.03 cd	10.6 b	4.3 b
Pentia (BAS 130)	36	29.9 d	1.96 d	10.6 b	4.6 b
Mepex Gin Out	36	31.5 cd	2.05 cd	10.8 b	4.4 b
Mepex Gin Out f.b. Mepex	36 24	32.3 bc	2.09 bc	10.7 b	4.3 b
Signif. (F)		***	***	***	**
LSD (0.05)		1.65	0.11	0.82	0.89
CV (%)		3.2	3.3	4.9	12.4

*, **, *** indicate significant differences at $P < 0.05$, 0.01, and 0.001, respectively. n.s. = no significant differences ($P > 0.05$). Letters separate means at $p = 0.05$.

Abbreviations: DAP = days after planting, HNR = height-to-node ratio, NACB = nodes above cracked boll.

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Table 4. Lint yield, earliness and gin turnout in PGR Study #2 at Jackson TN, 2004.

Treatment	Season Total oz prod/A	Lint Yield, Total lb/ac	Lint Yield, 1st Harv. lb/ac	First Harvest %	Gin Turnout %
Untreated	–	1568	1318	84.0	37.4
Mepex	24	1536	1346	87.6	37.0
Mepex	36	1521	1317	86.6	36.1
Pentia (BAS 130)	36	1579	1344	85.1	36.3
Mepex Gin Out	36	1583	1386	87.5	36.7
Mepex Gin Out f.b. Mepex	36 24	1599	1386	86.7	37.5
Signif. (F)		n.s.	n.s.	n.s.	n.s.
LSD (0.05)		–	–	–	–
CV (%)		4.7	5.7	2.4	3.3

*, **, *** indicate significant differences at $P < 0.05$, 0.01, and 0.001, respectively. n.s. = no significant differences ($P > 0.05$). Lack of mean separation letters indicates $p > 0.05$.

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