The *Journal of Cotton Science 10:128–135 (2006)*
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BREEDING AND GENETICS

Effects of Mepiquat Pentaborate on Cotton Cultivars with Different Maturities

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ABSTRACT

Variation in the growth habit and maturity of cotton (*Gossypium hirsutum* L.) cultivars is a complicating factor in cultivar testing, which necessitates separate tests for early and full season cultivars. In conventional production systems, commercial cultivars often have a chemical growth regulator applied, but the interaction of these regulators with cotton cultivars of different maturities is not fully understood. This study evaluated the use of mepiquat pentaborate on a group of commercially available cultivars that differ in growth and maturity. Treatments were mepiquat pentaborate at 115 g a.i. ha^{-1} and 230 g a.i. ha^{-1} each applied in two sprayings during the season, and an untreated check. Treatments were applied to all cultivars on the same calendar dates, regardless of developmental stage. Four early and four late maturing cultivars were evaluated in 2003 and 2004 for the effects of mepiquat pentaborate on yield, yield components, and fiber properties. Analyzed across years, data showed significant interactions between mepiquat pentaborate treatments and cultivars for lint yield and lint percentage that resulted in a positive lint yield response in one cultivar, accompanied by varying reductions in lint percentage for all cultivars. Application of mepiquat pentaborate caused reductions in plant height, height to node ratio, and nodes above white flower. Mepiquat pentaborate treatments made small, but statistically significant improvements on fiber length, strength, micronaire, uniformity, and short fiber content. Significant variation in the short fiber content among cultivars was also detected. The results of this study support the perception that yield interactions may occur when plant growth regulators are used in cultivar testing.

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Testing cotton cultivars has become increasingly difficult with the introduction of cultivars with different maturities and value added traits related to crop management. Theoretically, each cultivar has an optimum management system that is different from other cultivars. The presence of both early and late maturing cultivars in the same test provides an additional challenge because the crop must be managed in a manner that does not favor one cultivar over another to avoid bias in testing. For instance, many current cultivars possess genes for resistance to the herbicide glyphosate. Obviously, the use of this herbicide would damage conventional cultivars that would give the transgenic cultivars a competitive advantage in the test. When testing a range of maturities, the problem is more subtle, but the potential for bias still exists (Bourland et al., 2000). In 1994, an ad hoc committee was formed to evaluate cotton cultivar testing practices and make recommendations to ensure that proper scientific methods were being used and that testing was performed in an unbiased manner (Bowman, 1997). The committee made specific recommendations regarding plot size, sampling, and statistical analyses, but left general production practices to be determined based on regional standards. Within the realm of production practices lies the issue of using plant growth regulators and their relationship to maturity, especially in tests containing both short and full season cultivars.

Differences in cotton maturity provide benefits and challenges to producers and breeders. Short season cultivars allow cotton to be produced in areas with shorter growing seasons and limited resources, while at the same time avoiding late season problems associated with insect pressure and moisture. The short season cultivars may have less opportunity to recover from episodic stresses. Full season cultivars are generally more popular in higher input production systems, and may have higher yield and better fiber quality potential.

Under certain conditions, cotton plants can become highly vegetative, often resulting in delayed maturity and reduced yield, particularly in later maturing cultivars (Holman and Oosterhuis, 1999).

To combat the excess growth, cotton growers often apply one of several mepiquat formulations as a plant growth regulator. The recent increase in acreage of full-season cultivars has prompted researchers to develop management systems tailored to particular cultivars in terms of soil fertility and plant growth regulator (PGR) applications (Cocarro et al., 2003; Jost and Dollar, 2004), but little is known about how cultivar specific management systems affect other cultivars with different maturities.

Studies comparing the effects of PGRs on early and late maturing cultivars have been conducted to determine the best management strategies for all types of cotton (Niles and Bader, 1986). While multiple studies have shown similar responses to mepiquat chloride in terms of reduced vegetative plant growth through shortened internode elongation, yield responses have varied (York, 1983; Kerby, 1985; Cathey and Meredith, 1988). These studies suggested that when plants encountered early season stress, the reduced vegetative growth from PGR application could lead to premature cut-out that reduce yield, but the yield of late-planted treatments tended to benefit from PGR application. Because of maturity-related responses to PGR, the potential exists for interactions to occur based on genotypic differences.

Several formulations of mepiquat-based PGRs are available depending on the specific production desires of the producer. The most recent formulation of this type of PGR is mepiquat pentaborate that according to the manufacturer's literature provides a faster uptake of the active ingredient, which makes it a more effective product than previous formulations (Stapleton and Via, 2003). The faster uptake would likely allow a more immediate response to the compound and greater concentrations of the active ingredient to be available to the plant that would increase efficacy.

As the use of these compounds is becoming standard practice for many producers, a better understanding of their interaction with cotton of different maturities is needed. This study was conducted to determine the effects and interactions of mepiquat pentaborate applications on yield, yield components, and fiber quality of cotton cultivars that differ in maturity.

MATERIALS AND METHODS

This study was conducted in the field in 2003 and 2004 at the Delta Branch Experiment Station at Stoneville, MS, on a Bosket fine sandy loam soil (a fine-loamy, mixed, active, thermic Mollic Hapludalfs). Eight commercial cultivars of varying maturity were grown to determine the effects of mepiquat pentaborate on yield, yield components, and fiber properties. The study was constructed with 6 replications in a split plot design with PGR treatments as main plots and cultivars as sub-plots. The size of each experimental unit was 2 rows spaced 1.02 m apart and 15.2 m in length. While the level of maturity tended to be a continuous distribution, the cultivars grown were classified as either early or late maturing based on product literature and historical performance. The early cultivars were PayMaster 1218 BG/RR (PM; Delta Pine and Land Co.; Scott, MS), SureGrow 215 BG/RR (SG; Delta Pine and Land Co.), Phytogen 355 (PSC; PhytoGen Seed Co.; Corcoran, CA), and Stoneville 4892BR (ST; Stoneville Pedigreed Seed; Memphis, TN) The late cultivars were Deltapine 555 BG/RR, Deltapine 565 (Delta Pine and Land Co.), FiberMax 832 (FM; Bayer CropScience, Research Triangle Park, NC), and Stoneville 5599BR (Stoneville Pedigreed Seed). Mepiquat pentaborate (Pentia, BASF Corp.; Research Triangle Park, NC) was applied at 115 g a.i. ha^{-1} and 230 g a.i. ha^{-1}. An untreated control was also included. In both years, the PGR treatments were split and applied over two applications. The first application was made in late June (early flowering) and the second followed approximately 2 wk later. As the crop approached maturity, approximately 90 d after planting, the number of mainstem nodes above the uppermost first sympodial position white flower (NAWF) was counted on five random plants to determine the relative level of maturity among plots (Bourland et al., 1992). Percentage first pick, the portion of the total harvest taken in the first picking, was also used as a measure of relative maturity among cultivars. At harvest, plant heights and total number of mainstem nodes were taken on five randomly selected plants from each 2-row plot for calculation of height to node ratios.

Prior to harvest, a mixture of tribufos (DEF 6; Bayer CropScience; Research Triangle Park, NC) and ethephon (Prep; Bayer CropScience) was applied as a defoliant and boll opener to prepare the test for harvest. Plots were harvested with a mechanical spindle picker with a weighing system to determine plot yield. Prior to machine harvest, a 50-boll sample was hand-harvested from each subplot for determination of fiber properties and yield components. During this harvest, bolls were randomly picked from the bottom, middle, and tops of the plants to ensure a representative sample was taken. These samples were ginned on a laboratory gin, and the lint and seed portions were weighed to determine lint percentage. The derived lint percentage was then used to calculate lint yield for each subplot. Data collected from the fiber sample were also used to determine the yield components; seed index, boll weight, fibers seed $^{-1}$, and seed boll^{-1}. Seed index is defined by the weight of 100 fuzzy seed. Boll weight was determined by dividing the weight of the boll sample by 50, the number of bolls harvested. A 15-g sample of lint was saved and sent to Starlab, Inc. (Knoxville, TN) for HVI fiber property analysis, which consisted of fiber length, strength, uniformity, elongation, and micronaire. A 5-g lint sample was saved for AFIS (Zellweger-Uster) analysis, which determined short fiber content.

Statistical analyses were performed using Proc Mixed and Proc GLM programs of SAS (version 8.2, SAS Institute Inc.; Cary, NC). For traits in which interactions were not significant among treatments, cultivars, or years, data were pooled accordingly for analysis. Means were separated by Fisher's protected LSD at $P = 0.05$.

RESULTS AND DISCUSSION

Analysis of variance was conducted on multiple traits to determine if interactions were present among cultivars, treatments, and years (Tables 1 - 3). While cultivars, treatment, and years were statistically significant for many variables, few year by treatment interactions were significant, so data were pooled across years. Significant year effects were likely because testing was done in two contrasting years. Delta Research and Extension Center rainfall data showed that total precipitation for June and July 2003 was 24.8 cm compared to 39.3 cm for June and July 2004. The high rainfall total for the 2004 season was more conducive to excessive vegetative growth, making effects from the use of a plant growth regulator more likely. Traits of interest were chosen based on information that would likely be sought in a cultivar testing.

Analysis of variance indicated that the cultivar and mepiquat pentaborate application interaction had a significant impact on lint yield (Table 1). Examination of the cultivar means for lint yield indicated that

Table 1. Results of analysis of variance for yield and agronomic variables

Source	df	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*
		Lint yield		Percentage first pick		Nodes above white flower		Plant height		Height to node ratio	
Year (Y)	1	2.26	0.1485	2.93	0.1027	31.46	0.0001	10.94	0.0035	16.00	0.0007
Treatment (T)	2	0.75	0.4859	3.14	0.0650	42.25	0.0001	107.09	0.0001	79.93	0.0001
Y x T	2	1.16	0.3347	1.17	0.3310	0.52	0.5996	1.46	0.2553	6.76	0.0057
Rep(Year)	10	5.03	0.0011	3.97	0.0042	0.94	0.5209	3.75	0.0057	7.05	0.0001
Cultivar (C)	7	64.48	0.0001	39.28	0.0001	30.48	0.0001	17.66	0.0001	11.08	0.0001
C x Y	7	6.48	0.0001	11.63	0.0001	1.14	0.3419	2.76	0.0093	0.85	0.0800
C x T	14	1.83	0.0001	1.24	0.2508	1.78	0.0425	1.47	0.1244	1.21	0.2697
C x Y x T	14	0.46	0.9514	0.41	0.9706	0.79	0.6744	0.56	0.8919	0.38	0.9792

Table 2. Results of analysis of variance for yield component variables

Source	df	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*
		Lint percentage		Boll weight		Seed index		Seeds boll^{-1}		Fibers seed^{-1}	
Year (Y)	1	187.17	0.0001	37.95	0.0001	9.09	0.0068	0.02	0.8831	38.12	0.0001
Treatment (T)	2	10.34	0.0008	8.25	0.0024	41.73	0.0001	0.47	0.6341	1.24	0.3103
Y x T	2	0.57	0.5762	0.84	0.4473	1.13	0.3431	4.70	0.0213	1.28	0.2990
Rep(Year)	10	2.07	0.0792	3.30	0.0110	1.76	0.1354	2.90	0.0206	1.05	0.4388
Cultivar (C)	7	138.78	0.0001	102.24	0.0001	290.89	0.0001	17.22	0.0001	91.07	0.0001
C x Y	7	6.18	0.0001	4.24	0.0002	4.63	0.0001	0.73	0.6478	6.80	0.0001
C x T	14	2.69	0.0012	1.26	0.2370	23.32	0.0054	0.66	0.8083	1.09	0.3639
C x Y x T	14	0.44	0.9614	0.89	0.5655	1.71	0.0560	0.15	0.3183	0.68	0.7970

Table 3. Results of analysis of variance for fiber properties

Source	df	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*	*F* value	*P*
		Length		Strength		Elongation		Micronaire		Uniformity		Short fiber content	
Year (Y)	1	6.53	0.0189	74.15	0.0001	0.20	0.6610	179.44	0.0001	187.17	0.0001	56.00	0.0001
Treatment (T)	2	14.22	0.0001	7.132	0.0046	0.44	0.6516	1.84	0.1846	10.34	0.0008	4.32	0.0316
Y x T	2	1.89	0.1767	1.72	0.2047	0.78	0.4734	1.29	0.2974	0.57	0.5762	0.27	0.7688
Rep(Year)	10	2.53	0.0371	2.52	0.0377	2.52	0.0378	2.37	0.0483	2.07	0.0792	2.46	0.0599
Cultivar (C)	7	176.62	0.0001	113.45	0.0001	111.42	0.0001	29.32	0.0001	34.02	0.0001	26.40	0.0001
C x Y	7	9.79	0.0001	2.20	0.0355	2.41	0.0218	7.62	0.0001	2.78	0.0086	2.75	0.0099
C x T	14	2.11	0.0123	1.32	0.1945	1.62	0.0757	1.57	0.0884	1.56	0.0942	0.98	0.4749
C x Y x T	14	1.27	0.2249	0.66	0.8097	0.85	0.6109	1.68	0.0617	0.87	0.5915	0.31	0.9924

the interaction came from the increase in lint yield of ST 5599BR as mepiquat pentaborate treatments increased, while most of the other cultivars showed a reduction or no change (Table 4). All cultivars maintained their rank in lint yield, except for ST 5599BR, demonstrating a typical crossover interaction as the mepiquat pentaborate level increased. In fact, had this cultivar not been tested, it is likely that no interaction effect would have been detected, which may be a reason for the lack of consistency in the outcome of tests of this nature. These results tend to support the premise that a given cultivar may be placed at a yield advantage or disadvantage through the use of plant growth regulators. The fact that no significant treatment effect was detected is misleading, because it measured the cumulative effects of all cultivars tested. The positive result of one entry was cancelled by slightly negative effects on others, particularly the late maturing DP 565, resulting in a net effect that was not statistically significant. The presence of opposite effects within a maturity group suggests maturity alone is not a good predictor of how cultivars will react to mepiquat pentaborate applications. These results also substantiate the need to look beyond treatment effects alone and examine potential interaction effects to determine how PGR applications may influence the outcome of a test.

Another potential effect of using growth regulators is earlier maturity, which would also confound results, especially when a range of maturities are present in the same test. For example, early maturing cultivars may be penalized because they may not be allowed to achieve an adequate level of vegetative growth that causes them to stop fruit production prematurely. Conversely, later cultivars could gain an advantage by shortening their fruiting period, thus allowing a greater quantity of cotton to be harvested in a test performed in a short season environment. For these reasons, in this study two methods were used to evaluate differences in maturity in the cultivars tested, percentage first pick and number of nodes above white flower (NAWF). Mepiquat pentaborate application did not affect percentage first pick, nor were there any significant interactions with cultivars to affect percentage first harvest. No significant cultivar by treatment ef-

Table 4. Mean lint yields for cultivars by rate of mepiquat pentaborate

Cultivar	Lint yield (kg ha^{-1})		
	Mepiquat pentaborate[z]		
	0 g a.i. ha^{-1}	115 g a.i. ha^{-1}	230 g a.i. ha^{-1}
ST 5599BR	1486	1628	1646
SG 215 BG/RR	1587	1501	1580
DP 555 BG/RR	1566	1488	1534
ST 4892BR	1467	1402	1506
PM 1218 BG/RR	1449	1407	1376
PSC 355	1379	1295	1322
DP 565	1352	1198	1217
FM 832	1086	1052	1063
LSD (*P* = 0.05)	124	143	138
Mean	1421	1380	1406
CV%	10.8	12.8	12.1
R^2 x 100	62.0	57.7	65.0

[z] Rates of mepiquat pentaborate were split and applied over two applications. The first application was made in late June (at early flowering) and the second application followed approximately 2 wk later.

fects ($P = 0.2508$) were observed, indicating that little difference in maturity at the time of harvest related to PGR treatment was detected. Cultivars and the interaction between years and cultivars were significant, indicating that maturity differences were present at harvest. Nodes above white flower, however, showed that both cultivars and mepiquat pentaborate treatment effects were different (Table 1). A cultivar by treatment interaction was also significant ($P = 0.0425$). These results are consistent with those of Biles and Cothren (2001) and Briggs (1981) in which earliness and ease of harvest were improved by the use of a plant growth regulator. These results indicate that when these measures are used to determine the management of a test, the use of a plant growth regulator has the potential to confound results.

The agronomic variables, plant height and height to node ratio, performed as expected based on previous reports (Cathey and Meredith, 1988; Stuart et al., 1984; Wallace and White, 1990). Mepiquat pentaborate treatments effectively reduced plant height and internode length. There was also significant variation for these traits among the cultivars used in this study. Because no interactions were observed, it can be concluded that all cultivars experienced a similar reduction in plant height when treated with the plant growth regulator.

Variation in the percentage first pick and nodes above white flower indicate that the cultivars tested could be divided into two maturity groups as previously classified (Table 5). The early group had a 91.2% first pick compared with 84.2% for the late group, and the NAWF count was 4.3 for the early group compared with 4.9 for the late group. The early group had significantly higher yield (1445 kg ha^{-1}) than the later cultivars (1360 kg ha^{-1}).

Table 5. Cultivar means for yield, yield component, and agronomic traits

Cultivar	Lint yield (kg ha^{-1})	Percentage first pick	NAWF (no.)	Plant height (cm)	Height to node ratio	Lint percentage	Boll weight (g)	Seed index (g)	Seed boll^{-1} (no.)	Fibers seed^{-1} (no.)
ST 5599BR	1588	88.8	4.5	99	5.38	39.8	6.07	11.5	31.7	17012
SG 215 BG/RR	1578	89.9	4.4	101	5.47	39.6	5.95	10.8	30.5	15916
DP 555 BG/RR	1529	78.1	5.6	106	5.09	43.9	4.92	8.6	32.0	14839
ST 4892BR	1458	89.6	4.5	98	5.21	41.2	5.18	11.0	27.5	16336
PM 1218 BG/RR	1411	95.8	3.6	92	5.27	39.4	5.60	11.4	29.6	17096
PSC 355	1332	89.7	4.6	94	5.19	39.7	4.77	10.3	27.6	14384
DP 565	1256	84.7	4.6	93	4.91	40.4	5.02	9.6	30.2	13551
FM 832	1066	85.1	4.9	93	4.90	38.3	5.95	11.5	31.5	15941
LSD (*P* = 0.05)	74	2.4	0.3	4	0.22	0.5	0.15	0.4	1.2	265
Mean	1403	87.7	4.6	97	5.18	40.3	5.37	10.5	30.1	15635
CV%	12.8	5.8	13.9	9.4	9.1	2.7	5.8	9.9	8.5	9.4
R^2 x 100	55.8	60.3	65.1	69.3	55.8	78.7	74.8	16.1	39.0	12.9
Mepiquat pentaborate										
0 g a.i. ha^{-1}	1421	87.5	5.3	112	5.72	41.06	5.47	10.1	30.2	16781
115 g a.i. ha^{-1}	1380	88.6	4.4	91	5.03	40.02	5.37	10.7	29.9	15772
230 g a.i. ha^{-1}	1406	87.1	4.2	87	4.79	39.80	5.28	10.9	30.1	15619
LSD (*P* = 0.05)	NS	NS	0.2	3	0.13	0.31	0.09	0.1	NS	NS
$P > F$	0.4859	0.0650	0.0001	0.0001	0.0001	0.0008	0.0024	0.0001	0.6341	0.4939
Maturity group										
Early	1445	91.2	4.3	96	5.3	40.0	5.3	10.9	28.8	15933
Late	1360	84.2	4.9	98	5.1	40.6	5.5	10.3	31.4	15336
LSD (*P* = 0.05)	51	1.5	0.2	NS	0.1	0.4	0.1	0.3	0.6	340

Analysis of variance for yield component variables showed that significant treatment effects for lint percentage ($P = 0.0008$), boll weight ($P = 0.0024$), and seed index ($P = 0.0001$), but not for seeds boll^{-1} and fiber seed^{-1} (Table 2). Lint percentage and boll weight were negatively impacted by the plant growth regulator, while seed index increased (Table 5). The decrease in lint percentage and the increase in seed index were consistent with results reported by Cathey and Meredith (1988) and Biles and Cothren (2001). The cultivar by treatment interaction for lint percentage ($P = 0.0012$) was also significant. This interaction may be partially responsible for the lint yield interaction in ST 5599BR and will require further exploration. The seed index, fiber seed^{-1}, and seeds boll^{-1} were significantly different among cultivars, which demonstrates the wide genetic diversity available in these traits (Table 2).

All fiber properties measured were significantly different ($P = 0.0001$) among cultivars (Table 3). Significant cultivar effects were the result of the expected genotypic variation found in cultivar testing; however, the variation in short fiber content is noteworthy, because the genetic variation for this trait is not well documented. Statistically significant treatment effects were found for length, strength, uniformity, and short fiber content. As the mepiquat pentaborate rate increased, all of these traits improved. While Cathey and Meredith (1988) did not see improvements in quality with mepiquat chloride application, although statistically significant, the results in this study are small in magnitude and likely have little economic meaning. Fiber strength was significantly affected by cultivar, treatments, and years, but the cultivar by treatment interaction was not significant (Table 3). Again, the cultivar effects were the result of normal variation in cultivars, but strength increased slightly with mepiquat pentaborate application (Table 6). Fiber uniformity followed the similar pattern of response as strength, in

Table 6. Cultivar means for fiber properties

Cultivar	Length (cm)	Strength (cN tex^{-1})	Elongation (%)	Micronaire	Uniformity (%)	Short fiber content (%)
ST 5599BR	2.93	31.4	8.0	4.7	83.7	6.24
SG 215 BG/RR	2.79	27.6	8.6	4.9	84.0	5.23
DP 555 BG/RR	2.93	30.0	7.6	4.8	83.1	6.54
ST 4892BR	2.89	30.4	8.5	5.0	84.3	4.80
PM 1218 BG/RR	2.79	28.3	8.2	4.7	83.7	5.49
PSC 355	2.89	31.7	9.1	5.0	84.5	4.52
DP 565	2.99	31.9	8.4	4.8	84.7	4.68
FM 832	3.10	34.0	8.0	4.4	85.4	4.60
LSD ($P = 0.05$)	0.01	0.6	0.1	0.1	0.4	0.43
Mean	2.90	30.7	8.3	4.78	84.2	5.26
CV%	1.72	4.2	3.4	4.89	0.9	16.1
R^2 x 100	82.2	77.1	76.0	70.1	67.0	60.3
Mepiquat pentaborate						
0 g a.i. ha^{-1}	2.90	30.2	8.3	4.8	83.9	5.51
115 g a.i. ha^{-1}	2.92	30.7	8.3	4.8	84.1	5.21
230 g a.i. ha^{-1}	2.92	30.6	8.3	4.7	84.4	5.06
LSD ($P = 0.05$)	0.02	0.4	NS	0.1	0.2	0.26
$P > F$	0.0001	0.0046	0.6516	0.1846	0.0008	0.0316
Maturity group						
Early	2.84	29.5	8.6	4.9	84.1	5.00
Late	3.00	31.8	8.0	4.7	84.2	5.52
LSD ($P = 0.05$)	0.03	0.5	0.1	0.1	NS	0.27

that cultivars, treatments, and years were significantly different (Table 3). Micronaire values showed typical variation in cultivars with a significant cultivar effect most likely related to variation in maturity but showed little response to mepiquat pentaborate (Table 6).

As with yield components and agronomic traits, variation in fiber properties among cultivars was evident, so cultivars were pooled into two groups based on maturity (Table 6). As a group, the late maturity cultivars tended to have significantly longer fibers, higher strength, and higher short fiber content. Of lesser, but still statistically significant magnitudes, the late maturing cultivars had lower elongation and micronaire.

Short fiber content was particularly divided between early and late cultivars. While the two groups are distinctly different, it should be noted that the two highest short fiber content values were obtained from cultivars that are typically characterized by high yields and late maturity. Short fiber content and length uniformity has become of increasing importance with recent developments suggesting that poor quality fiber is associated with a particular growing region, most recently Georgia (Meredith, 2005). A better understanding of this trait is needed, as it is likely affected by multiple factors, including genetics and crop production systems.

In conclusion, this study showed that the applications of the plant growth regulator, mepiquat pentaborate, had a significant effect on plant height, height to node ratio, and fiber length, as previously reported in other studies (Kerby, 1985; Stuart et al., 1984, Reddy et al., 1990). This study also showed a significant cultivar by treatment interaction and demonstrated potential cultivar by maturity interactions. Many studies have been conducted that showed no yield response to mepiquat products (Cathey and Meredith, 1988; Stuart et al., 1984; Wallace and White, 1990), but Biles and Cothren (2001) and Briggs (1981) reported increased yield and earliness, and the ease of harvest was improved from the use of a plant growth regulator. There have been few studies reporting major cultivar by growth regulator interactions for any trait. The results of this study support the argument that cultivars, such as ST 5599BR, have the potential to differ in their response to growth regulators, such as mepiquat pentaborate. The recommendations by the ad hoc committee on cotton cultivar testing (Bowman, 1997) left the use of plant growth regulators as a management decision to the discretion of individual researchers, based on accepted growing practices of their particular region. Because of the potential for yield related interactions, researchers should exercise caution when applying plant growth regulators to cultivar trials, as they could induce an additional level of bias in favor of a particular genotype over another. Cultivar testing is becoming an increasingly complex process. As new traits emerge, management schemes change that provide producers and researchers a multitude of options for producing a crop. All management inputs have the potential to interact differently within a group of genotypes, leaving it to researchers to conduct as fair a test as possible and for producers to discern which cultivar best meets their needs based on all available information.

DISCLAIMER

Trade names are necessary to factually report available data; however, the USDA neither guarantees nor warrants the standard of the product or service, and the use of the name by USDA implies no approval of the product or service to the exclusion of others that may also be suitable.

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