COTTON PLANT GROWTH REGULATORS AND YIELD ENHANCERS

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Introduction

There is no shortage of products that are marketed as plant growth regulators or yield enhancers. Undoubtedly, the most successful and consistent of these products has been Mepiquat chloride which is sold under various trade names, but is most synonymous with Pix. Despite the success and wide use of this product, yield responses have been erratic at best.

Mepiquat chloride has proved to be most useful as a crop management tool, with any observed yield increases almost being secondary in nature. When use correctly this product will reduce plant height and leaf area, promote earlier boll set, and increase ease of harvesting. Reduction in plant height and leaf area allows for easier penetration of insecticide sprays and harvest-aids and may potentially reduce boll rot since airflow will not be as restricted throughout the canopy. While currently not perceived to be of a real benefit in Georgia, earlier boll set and more rapid crop maturity is advantageous in many parts of the cotton belt, and may lead to yield increases by allowing for earlier harvest prior to fall rains.

Usage of mepiquat chloride has been on the forefront of many Georgia producers minds subsequent to the rapid adoption of DP 555 BGRR. This variety as the potential to be very growthy and management with mepiquat chloride is almost mandatory. However, the issue becomes muddled with the now vast array of mepiquat-type products available.

Products now on the market place include the original mepiquat chloride, and other formulations which include yield enhancers such as *Bacillus cereus* and kinetin. To further confuse the issue another product consists of mepiquat pentaborate which is supposedly more effective. Another material has also been developed which consists of mepiquat chloride with twice the amount of active ingredient as other materials and contains cyclanilide as an added active ingredient. This product, Stance, is unique in that it is being marketed at a single use rate of 3 oz/A. The more traditional mepiquat containing materials have varying rates depending on crop size and growth conditions.

The objective of this study was to determine if any differences exist in vegetative growth control, yield, or quality of cotton treated with various PGR products.

Materials and Methods

Large plot trials were established across Georgia in growers' fields on cotton variety DP 555 BGRR. Locations included Evans Co., Colquitt Co., and Jefferson Co. Rate for rate comparisons were made with the various plant growth regulating products, with the exception of Stance which was applied at 3 oz/A at all times. Specific rates of application at each location are listed in Table 1. Treatments were replicated 3 or 4 times and arranged in a randomized complete block design. All treatments were applied with commercial equipment. Timing of application was based on growth stage and crop needs according to UGA Extension recommendations.

Data collected included plant height at harvest, yield and quality. Quality was documented in two ways. First a 30 lb subsample of machine picked cotton was collected from each plot. This cotton was ginned at the UGA Microgin in Tifton. HVI data was obtained via the International Textile Center in Lubbock, TX. Secondly, all individual plots from each treatment were combined into a module in the Colquitt and Jefferson Co. locations. These modules were ginned on local commercial gins and all bales were classed with HVI equipment at the Macon classing office.

Results and Discussion

Vegetative Growth

There were no significant interactions for plant height or total nodes of cotton treated with the individual products across locations. At harvest no differences between the products were observed (Table 2).

Yield

There were no significant interactions for yield with the individual products across location. No differences in cotton yield were observed between the products (Table 2).

Fiber Quality

Microgin Samples

There were no significant interactions for any fiber quality parameter for cotton treated with the individual products across locations. Furthermore, micronaire, uniformity and strength were not different between any of the treatments (Table 3). Fiber length, however was significantly greater in the cotton treated with Stance. On average fiber length was increased by .016 inches which is equivalent to 0.5 staple.

Moduled Cotton

Similar trends were noted for the fiber quality parameters in the moduled cotton as were observed with the subsamples ginned at the UGA microgin. Micronaire, uniformity and strength appear to be unaffected by the individual treatments. Staple tended to be greater with the Stance treatment.

CONCLUSIONS

These data suggest that in terms of vegetative growth control, yield and the majority of fiber quality parameters there is no difference in the performance of the plant growth regulators evaluated. These observations are consistent with previous research conducted and validate the recommendation that choice of plant growth regulator product should be made on price alone. The issue of Stance increasing fiber length will need to be examined further. As a word of caution, this is the first year that Stance has been widely evaluated across Georgia.

Table 1. Rate and Timing of plant growth regulator application, 2005.

	Colquitt Co.				Evans Co.			Jefferson Co.		
	6/6	6/22	7/6	7/26	7/6	7/25	8/10	7/8	7/25	8/17
	Oz/A									
Mepichlor	8	10	10	14	8	12	16	8	16	16
Mepex Ginout	8	8	10	14	8	12	16	8	16	16
Pentia	8	8	10	14	8	12	16	8	16	16
Stance	3	3	3	3	3	3	3	3	3	3

Table 2. Vegetative growth, turnout, and yield as influenced by 4 mepiquat containing plant growth regulators. Data combined over 3 locations Evans Co., Colquitt Co., and Jefferson Co., 2005.

	Height Inches/plant	Nodes #/plant	Turnout %	Seed Cotton	Lint
				Lbs/A	
Mepichlor	48.5 a	25.7 a	41.4 a	3061 a	1240 a
Mepex Ginout	48.3 a	25.7 a	40.5 a	3141 a	1272 a
Pentia	48.9 a	26.6 a	40.6 a	3111 a	1263 a
Stance	47.3 a	25.6 a	40.1 a	3094 a	1245 a
Pr>f	*0.7394*	*0.4232*	*0.2343*	*0.3442*	*0.2348*
CV	5.5	6.0	1.5	4.3	4.4

Table 3. HVI data as influenced by 4 mepiquat containing plant growth regulators. Data generated via ginning 30 lb samples from each plot at the UGA microgin and classed at the International Textile Center in Lubbock, TX. Data combined over 3 locations Evans Co., Colquitt Co., and Jefferson Co., 2005.

	Micronaire	Length Inches	Uniformity %	Strength g/tex
Mepichlor	4.3 a	1.098 b	81.3 a	29.6 a
Mepex Ginout	4.3 a	1.094 b	81.4 a	29.9 a
Pentia	4.3 a	1.100 b	81.3 a	29.9 a
Stance	4.3 a	1.113 a	81.6 a	30.0 a
Pr>f	*0.7005*	*0.0011*	*0.2915*	*0.1619*
CV	2.5	1.2	0.8	2.6

Table 4. HVI data as influenced by 4 mepiquat containing plant growth regulators. Data generated via combining cotton from all replications for each treatment into separate modules. Cotton was classed at the Macon classing office. Data combined over 2 locations Colquitt Co. and Jefferson Co., 2005.

	Micronaire		Staple		Uniformity		Strength	
			——32nds——		——%——		——g/tex——	
	Jeff.	Col.	Jeff.	Col.	Jeff.	Col.	Jeff.	Col.
Mepichlor	4.5	4.7	33.9	34.6	80.0	79.5	28.7	29.5
Mepex Ginout	4.5	4.7	34.4	34.4	80.1	79.8	29.0	29.6
Pentia	4.5	4.7	34.3	34.7	80.4	80.3	30.5	29.4
Stance	4.5	4.8	34.4	34.9	80.4	79.4	29.1	29.6