

Plant Growth Regulator/Foliar Nutrient Studies at the Safford Agricultural Center, 1995

L.J. Clark and E.W. Carpenter

Abstract

Methanol, Cytokin, Cytoplex, PGR IV and Foli-Zyme plant growth regulators were tested on long and short staple cotton on the Safford Agricultural Center in 1995. It was a follow up study on Methanol, Cytokin and PGR IV and a first time look at Cytoplex and Foli-Zyme. Trends toward increased lint yield were seen with Cytokin and Cytoplex with the other treatments yielding near or below the untreated check. Some increase in maturity was seen on the short staple plots by all of the treatments. Some differences in HVI data were also observed.

Introduction

There are several products that fit the category of plant growth regulators, methanol, Cytokin, Cytoplex, Foli-Zyme and PGR IV are a few that are of interest to area cotton producers. Many of the plant growth regulators have foliar nutrients included in the formulation and others are placed in a protocol that includes foliar nutrients. This study is a continuation of previous trials to determine which can be of benefit to cotton growers in the high deserts of southeastern Arizona.

Materials and Methods

Both long and short staple fields were planted and made available for this study. The crop history is included below to define the cultural practices. Further information is given in Table 1.

Crop history

Soil type: Pima clay loam variant

Previous crop: Cotton

Planting date: 2 May, 1995 Rate: 25 lbs/ac

Herbicide: Triflurilin preplant incorporated

Fertilizer: 100 lbs/ac urea side dressed 8 June, 10 July

Irrigation: Watered up plus 6 irrigations (28.5 ac in + 4.6" rain) Last date: 8 September

Defoliation date: 19 October, Ginstar

Harvest: 1st pick: 1 November 2nd pick: 29 November

Heat units at harvest: 3557

Plots were harvested with a modified two-row cotton picker which collected cotton from each plot in a large bag. Weights were then obtained by weighing the bags on a hanging scale. Grab samples were taken from two of the replications to determine percent lint turnout and to send for HVI analyses of the fiber.

Results and Discussion

Table 1 shows the growth stage, date and heat unit (HU) accumulations and materials applied of the various treatments. The check plot serves as an untreated comparison with the other treatments and the Sol-U-Gro (SUG) plot serves as a check for the Methanol treatment and for the Cytokinin and Cytoplex treatments which have lots of foliar nutrients applied. The last treatment was delayed 2 weeks from its proposed application because of rainy weather.

Results of the plant growth regulator studies on long and short staple cotton are found in Table 2. Looking first at the effects on long staple, there is a difference of 50 to 70 pounds of lint between the check plots and the Cytokinin and Cytoplex plots. This difference is not statistically significant at the 5%, nor 10% level of probability, but is large enough to be intriguing. The Foli-Zyme and Sol-U-Gro treatments matured slightly faster than the check, but not significantly. Cytoplex and Foli-Zyme treatments produced the tallest plants with the highest node numbers, but not significantly. Differences in the short staple part of the trial were similar, with differences being small and not significant. It may be noted that Foli-Zyme was not included in the short staple part of the study. Space was limiting so it was not included.

HVI values for grab samples taken from each treatment are found in Table 3. The numbers are averages from two samples analyzed from each treatment. Statistical analyses were not run on the number, so inferences of statistical significance can not be made. Length and strength of Foli-Zyme and PGR IV treated long staple lint had values higher than the untreated check. In the short staple part of the study, none of the treatments produced a fiber better than the check plots.

Data comparing the yields of similar treatments over the previous two studies (references 1 and 2) are found in Table 4. For the effects of plant growth regulators and foliar nutrients on Pima S6, there is a trend toward increased yields with all of the treatments listed. The statistics are not adequate to recommend the use of a particular product, especially since an economic analysis is not included in the study. The trends do, however, indicate that the study should continue and that an economical analysis should be made. In the case of short staple cotton, DP 90 and DP 5690 were used in the studies. The trends indicated that the treatments did not increase the yield for these cultivars.

References

1. Clark, L.J. and E.W. Carpenter. 1995. Plant growth regulator studies at the Safford Agricultural Center, 1994. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-99, pp. 69-72.
2. Clark, L.J. and E.W. Carpenter. 1994. Plant growth regulator studies at the Safford Agricultural Center, 1993. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-96, pp. 143-150.

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Table 1. Treatment and crop development information for the plant growth regulator study at the Safford Agricultural Center, 1995.

Growth Stage/Treatment		S-U-G	Methanol	Cytoplex	Cytokin	PGR IV	Foli-Zyme GA
1-3 leaf stage	June 1 30 DAP ¹ 418 HU ²			2.5 lbs SUG 1pt ZMC .5 pt Phi 2oz cytoplex 4oz Nufilm		1 oz PGR IV	
Pin Head Square stage	June 14 43 DAP 671 HU	5lb/ac SUG	5lbs/ac SUG 25% MeOH 40 gallons	5lb/ac SUG 2 pt ZMC 1 pt Phi 4oz cytoplex 4 oz Nufilm	5 lb/ac SUG 2 pt ZMC 2 pt Phi 4 oz Cytokin 4 oz Nufilm	4 oz PGR IV	1 gal/ac
Early Bloom stage	July 5 64 DAP 1113 HU	5lb/ac SUG	5lbs/ac SUG 25% MeOH 40 gallons	5 lb NtrLf60 2 pt Gamma 1 pt Phi 6 oz cytoplex 4 oz Nufilm	5 lb NtrLf60 2 pts ZMC 2 pt Alpha 8 oz cytokin 4 oz Nufilm	4 oz PGR IV	1 gal/ac
EB plus 2 weeks	July 21 80 DAP 1507 HU	5lb/ac SUG	5lbs/ac SUG 25% MeOH 40 gallons	5 lb NtrLf60 2 pts Gamma 1 pt Phi 8 oz cytoplex 4 oz Nufilm	5 lb NtrLf60 2 pt Alpha 8 oz cytokin 4 oz Nufilm		1 gal/ac
EB plus 4 weeks (+2 week rain delay)	August 17 122 DAP 2181 HU	5lb/ac SUG	5lbs/ac SUG 25% MeOH 40 gallons	5 lb CtnFinish 2 pt Gamma 1 pt Phi 4 oz Nufilm	5 lb CtnFinish 2 pt Gamma 4 oz Nufilm		1 gal/ac

1. Days After Planting.

2. Heat units (86/55°F) after planting.

Table 2. Yield and other agronomic data for plant growth regulator, micro nutrient and methanol treatments on long and short staple cotton at the Safford Agricultural Center, 1995

Treatment	Lint Yield (lbs/ac)	Percent 1st Pick	Plant Height (inches)	Nodes	HNR
Long staple cotton (Pima S-6)					
Cytokin + MP ¹	683.7 a ²	53.1 a	32.6 a	22.7 a	1.45 a
Cytoplex + MP	679.8 a	56.4 a	34.3 a	23.4 a	1.48 a
Check	622.6 ab	56.7 a	31.4 a	21.5 a	1.49 a
Foli-Zyme	617.2 ab	57.8 a	34.0 a	23.2 a	1.49 a
Sol-U-Gro	615.1 ab	58.3 a	31.7 a	21.3 a	1.51 a
Methanol + Sol-U-G	589.9 ab	56.7 a	31.8 a	22.5 a	1.41 a
PGR IV	548.3 b	55.2 a	32.4 a	22.8 a	1.45 a
Average	622.4	56.3	32.6	22.49	1.47
LSD(05)	95.4	5.55	3.69	3.44	0.23
CV(%)	11.7	7.5	8.68	11.7	12.5
Short staple cotton (DPL 5690)					
Cytokin + MP	1337.1 a	85.6 a	33.7 a	21.9 a	1.58 a
Cytoplex + MP	1325.6 a	84.2 ab	35.7 a	24.4 a	1.47 ab
Sol-U-Gro	1317.5 a	84.6 ab	33.3 a	22.2 a	1.51 ab
Check	1297.3 a	79.5 b	34.1 a	22.1 a	1.56 ab
Methanol + Sol-U-G	1289.3 a	83.7 ab	34.9 a	24.4 a	1.45 ab
PGR IV	1281.2 a	84.7 ab	33.5 a	20.6 a	1.63 a
Average	1308.0	83.7	34.2	22.6	1.53
LSD(05)	125.3	3.86	3.63	3.15	0.26
CV(%)	7.49	3.48	8.32	10.6	13.5

¹ MP = Miller's protocol

² Values within columns followed by the same letter are not significantly different using Duncan's Multiple range test at the 5% level of probability.

Table 3. HVI values for plant growth regulator, foliar nutrient and methanol treatments on long and short staple cotton at the Safford Agricultural Center, 1995

Treatment	Length	Uniformity	Strength	Elongation	Micronaire	Grade
Long staple cotton (Pima S-6)						
Cytokin + MP ¹	1.33	86.7	39.0	11.0	4.0	3
Cytoplex + MP	1.33	85.9	38.8	11.0	4.0	3
Check	1.34	86.9	38.2	11.0	4.1	3
Folizyme	1.35	86.8	40.9	11.0	3.9	3
Sol-U-Gro	1.34	86.7	39.2	11.0	3.9	3/4
Methanol + Sol-U-G	1.30	85.5	39.9	11.0	3.8	3
PGR IV	1.35	87.4	41.5	11.0	3.9	3
Average	1.33	86.6	39.6	11.0	3.94	
Std Dev	0.02	0.64	1.19	0	0.1	
Short staple cotton (DPL 90)						
Cytokin + MP	1.10	80.3	30.2	9.9	4.2	31
Cytoplex + MP	1.12	81.8	31.6	9.8	3.9	21/31
Sol-U-Gro	1.13	81.4	31.4	9.9	4.0	21
Check	1.15	82.3	32.5	9.8	3.8	31
Methanol + Sol-U-G	1.14	82.6	32.7	9.8	3.8	31
PGR IV	1.14	81.5	32.1	9.9	4.0	21
Average	1.13	81.65	31.75	9.85	3.95	
Std Dev	0.02	0.81	0.91	0.05	0.15	

Table 4 Yield comparisons for plant growth regulator, micro nutrient and methanol treatments on long and short staple cotton at the Safford Agricultural Center, 1993-1995

Treatment	Lint Yield 1993	Lint Yield 1994	Lint Yield 1995	Average
Long staple cotton (Pima S-6)				
Cytokinin + MP ¹	672	953.0 a	683.7 a ²	769.6
Check	554	828.3 b	622.6 ab	671.3
Sol-U-Gro	654 a	877.8 ab	615.1 ab	715.6
Methanol + Sol-U-Gro	564 a	879.8 ab	589.9 ab	677.9
PGR IV	--	869.2 ab	548.3 b	708.8
Average	613	883	622.4	706.1
LSD(05)	--	100.2	95.4	
CV(%)	--	7.5	11.7	
Short staple cotton (DPL 90 and DPL5690)				
Cytokinin + MP	1434	1341.2 ab	1337.1 a	1370.9
Sol-U-Gro	1284	1323.0 ab	1317.5 a	1308.3
Check	1449	1392.0 a	1297.3 a	1379.4
Methanol + Sol-U-Gro	1272	1352.1 ab	1289.3 a	1304.6
PGR IV	--	1235.9 b	1281.2 a	1258.6
Average	1359.8	1323.7	1308.0	1330.5
LSD(05)	--	115.1	125.3	
CV(%)	--	5.77	7.49	

¹ MP = Miller's protocol

² Values within columns followed by the same letter are not significantly different using Duncan's Multiple range test at the 5% level of probability.