

EFFECT OF SPRAYING SOME GROWTH REGULATORS ON YEALD, FIBER QULITY AND YARN PROPERTIES OF EGYPTIAN COTTON.

Ahmed, H. S.A. **, Zewail, R. M. Y* and Hassan, A. A. **

*Botany Department, Faculty of Agric., Benha Univ. Egypt.

**Cotton Research Institute, Agricultural Research Center, Ministry of Agriculture and Land Reclamation, 9 Gamaa Street, 12619 Giza, Egypt

ABSTRACT

Two field experiments were conducted at the Experimental and Research station Farm of the Faculty of Agriculture at Moshtohor, Benha University during 2012& 2013 seasons to study the effect of spraying some growth regulators paclobutrazol (PP₃₃₃) (Cultar25%_{sc}), at rates of 30, 40 and 50 mg/l and Mepiquat chloride 5%_{sc} (Pix) at rates of 100,200 and 300 mg/l on yield, fiber and yarn properties of Giza 86 cotton variety and promising crosse (Giza 86x10299) compared with Control.

A split plot design with three replicates was used whereas cotton genotypes were allocated in main plots while growth regulators in the sub-plots. The spraying time was at 60, 80, and 100 days after sowing. Results showed that, genotypes (Giza 86x10299) gave the best reading in some growth attributes such as, plant height, number of leaves /plant, total leaves area /plant and total chlorophyll in both seasons and some yield components i.e., seed cotton yield /plant, and Lint percentage, in the first season only. This strain superior in micronaire reading, Fiber and coefficient of variation length C.v% in both seasons. Genotype (Giza 86x10299) superior Giza 86 in skein strength, and number of neps /100 meter.

Use of 200 mg/l pix gave the highest average of plant height, number of leaves /plant, reflectance (Rd %) and coefficient of variation length (C.v%)in both seasons, but use 300 mg/l pix gave the best reading in number of leaves /plant, total dry weight /plant, total chlorophyll, skein strength, and number of thin, thick places /100 meter and number of neps /100 meter in both seasons. Giza 86 cotton variety with 200 mg/l pix gave the highest average of yield and its components and fiber properties, but Genotype (Giza 86x10299) with 300 mg/l pix gave the best reading in yarn properties.

Key words: Egyptian cotton, Giza86, Promising Crosse (Giza 86x10299) paclobutrazol (PP₃₃₃) (Cultar25%_{sc}), Mepiquat chloride 5%_{sc} (Pix), yield, fiber properties, yarn properties.

INTRODUCTION

Cotton (*Gossypium barbadense*, L.) is one of the most important fiber crops all over the world. In Egypt its importance is derived from being one of the main sources of foreign currency as well as the principle raw material for the national textile industry and one of the important sources of edible oil.

Since average yield is low there exists an enormous potential to increase yield through adoption of modern production technologies one of the technologies may be application of plant growth regulators are applied, enhancing fruiting bodies and increasing yields, reported to have imported relationships and rate of photosynthesis. The effect of growth regulators paclobutrazol (PP₃₃₃) at rates of 30, 40 and 50 mg/l,

Mepiquat chloride Pixat5%). Therefore, in the present study the growth regulator paclobutrazol (PP₃₃₃) was applied as foliar application separately. It influences the growth of fruit trees, **Bartuska (1982), Williams and Edgerton (1983), McDaniel (1983), Barrett, El-Desouky and Abd El-Dayem (1992), Dimitropoulou et al., (1997) and Ahmed (2002)**. The main effect of paclobutrazol upon plant growth and development takes place through the alteration of the hormone balance. It promotes treated plants to create more Cytokinins trees. Cytokinins (CYT) it has been reported to enhance flower set, boll retention, earlier maturity and yields in cotton

Growth regulators are one of the most important factors that affect crop growth, development processes and enhance yield. It is well known that vegetative characters, yield and its components and earliness measurements of cotton are governed by many environmental factors such as genotypes which ranks high among the important factors affecting the cotton production, while growth regulators application to cotton plants can modify some developmental activities such as boll setting in relation to yield and yield components treated (sprayed) cotton plants with Pix (mepepiquat) 0-100 mg / liter. **Sawan, and Sakr (2008)** Fond that, application of mepiquate chloride (pix) at rate 50 ppm, increased the yield and its components, i.e., boll weight, seed index and seed cotton yield /plant. **Emara et al., (2009)** Fond that, number of fruiting branches, seed index, lint%, boll weight and seed cotton yield per plant were increased significantly by applying mepiquate chloride (pix) at rate 150 ppm, they indicated that fiber strength, fiber elongation percentage, uniformity index, micronair reading, reflectance and yellowness were not affected by applying mepiquate chloride (pix) at rate 50 ppm. **Ahmed, (2010)** they reported that the number of open bolls / plant, boll weight, seed index, lint index, seed cotton yield and lint yield were greater than control(without Pix application) but differences between application rates and number of applications. Fiber quality was not significantly affected by number or rate of Pix applications but crop maturity was faster with increasing rate and number of applications the aim of this study make decapitation in cotton plants by compression paclobutrazol (PP₃₃₃) and pix and increased yield and yarn properties in Egyptian cotton varieties. **Niaka, et al., (2012)** Fond that, application of mepiquate chloride (pix) during the flowering period increased number of sympodia per plant, boll weight, seed index, lint%, and seed cotton yield per plant.

Abdel-Twab, Rania, (2014) Fond the growth regulators of effected significantly all growth and yield characters, whereas 50 ppm pix was superior in seed index, lint%, boll weight and seed cotton yield per plant. She also found that fiber properties showed no significant response due to spraying cotton with pix 50, 100 and 150 ppm.

MATERIALS AND METHODS

Two field experiments were carried out at the Experimental and Research station Faculty of Agriculture, Moshtohor, Benha University during the two successive

seasons of 2012 and 2013, to study the response of Giza 86 cotton variety and Giza (86x10299) Promising Crosse to foliar application growth regulators paclobutrazol (PP₃₃₃) at rates of 30, 40 and 50 mg/l, Mepiquat chloride (Pix) at 5% at rates of 100, 200 and 300 mg/l compared with tap water as a control. Spraying took place 3 times at the age of 60, 80 and 100 days after sowing. The seeds were secured from the Agriculture Research Center, Institute of cotton Research. Sowing date at April 5th during 2012 season and at April 8th during 2013 season. The other cultural practices were carried out according to the usual practices in cotton field. The preceding crops were clover in both seasons. Nitrogen at a level of 60 kg/feddan, using ammonium nitrate 33.5% was side dressed before the first and second irrigations. Potassium sulfate 48% k₂O was given as nitrogen before the first and second irrigations. Phosphorus at level of 30 kg p₂O₅ /fed. As 15.5% was brood casted at planting. A split plot design with three replications was used with genotypes Giza 86 cotton variety and Giza (86x10299) Promising crosse in the main plots and growth regulators in the sub-plots. The plot size was 15 m² 3x5m consisted of 5 rows (60 cm apart) where two plants were left after thinning 37 days after planting ten guarded plants were taken at random from each plot at 100 days of plant age to measure plant height, number of leaves/plant, total leaves area/plant, number of fruiting branches/plant and total chlorophyll SPDS.

2-1 Sampling and collecting data:

At harvest ten guarded plants from each experimental unit were chosen randomly from the central row and the following traits were estimated, number of fruiting branches/plant, boll weight (g), seed cotton yield/plant (g), lint yield /plant (g), lint% and seed index(g.).

2.2 Fiber properties:

The following fiber properties were measured using high volume Instrument (HVI) High volume fiber test system according to A.S.T.M (1998).

2-2-1 Fiber bundle tensile

- (a) Fiber strength in gram / Tex
- (b) Fiber elongation %: the percentage of elongation, which occurs before a fiber bundle breaks.

2-2-2 Fineness characters

- (a) Fiber fineness (Micronaire reading) Fiber fineness was expressed as micronaire instrument reading, measured by (HVI).

2-2-3 Color attributes values

- (a) Reflectance (Rd %) (b) Yellowness (+b %)

2-2-4 KEISOKKI kcf-v/l version 1.29.3. The following fiber properties were measured using Keisokki (2013) kcf-v/l version 1.29.3. Instrument High volume fiber Length test system.

2-2-5 Fiber length parameters

- (a) Upper Half Mean Length (U.H.M).
- (b) Spain length at 50% (MI 50%).
- (c) Spain length at 66.7%, (S.L 66.7%).
- (d) Uniformity Ratio (UR%).
- (e) Uniformity, index (UI%).
- (f) Short Fiber Content (S.F.C%).

2-3 Yarn properties

The R.S.S second part was spun fiber into (R.S.S) ring spinning system 60^s carded count yarns at 3.6 (T.M.) for tests of yarn properties, skein strength was measured number of neps, number thick places, number thin places and yarn evenness (C.v %) per 100 meter were measured by Uster tester according to **ASTM (1998)**.

All fiber, yarn tests were performed at the laboratories of the cotton Research Institute, Agricultural Research Center, under constant conditions of temperature (21°C ± 2) and relative humidity (65 % ± 2).

2-4 Statistical procedures

This study was carried out using the split plot design with three repetitions of 2 seasons. The obtained results from treatments were subjected to statistical analysis as a split plot design. The L.S.D.at 5% level of probability was used to calculate the significant differences between the mean values of treatments according to the described by **Snedcor and Cochran (1980)**.

RESULTS AND DISCUSSION

1-Growth attributes:-

Data in Tables (1 and 2) showed that, genotypes growth regulators and the interactions between them had significant effect on most growth characters i.e plant height, number of leaves/ plant, total leaves area / plant, total dry weight /plant and total chlorophyll in both seasons, whereas promising cross Giza 86 x 10229 was superior to Giza 86 regarding their characters while genotypes did not differ significantly in number of sympodial branches/ plant

Regarding to growth regulators use of 300 mg/l pix gave the highest average of number of leaves /plant in the second seasons , total dry weight and total chlorophyll in both season compared with control , while use of 200 mg/l pix superior in plant height and number of leaves/plant in both seasons these result might have increased the leaf macro and micronutrient content this increased the production of metabolites, synthesized and then the plant had chance to bear more fruiting branches this result is agreement with those obtained by **Dimitrova, (1994), Abd El-Dayem, and El-Deeb, (2000). and Niaka, Maryam et al., (2012)**.

Table (1): Main effect of genotypes and some growth regulators, on some growth characteristics during 2012 and 2013 seasons.

Characteristics	Growth characteristics													
	Treatments		Plant Height (cm)		Number of leaves /plant		Total leaves area/plantcm ²		Number of Fruiting branches /plant		dry weight /plant (g)		Total chlorophyll SPDS	
Genotypes	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Giza 86	100.3	102.4	44.33	50.14	2120.2	2130.4	15.00	16.00	104.3	105.4	100.2	100.3		
10299*Giza 86	104.2	105.2	48.16	44.18	2040.3	2052.5	15.03	16.96	107.2	109.3	102.4	104.5		
LSD 5 %	0.12	0.18	1.15	1.12	0.25	0.30	0.23	0.35	1.0	1.3	0.20	0.25		
growth regulators														
Control	118	119	45.15	46.12	2210	2225	14.33	14.66	100.1	102.3	90.20	92.40		
pp ₃₃₃ 30 mg/l	100	101.2	46.12	47.18	2320	2315	15.66	16.33	105.4	108.1	95.30	100.2		
pp ₃₃₃ 40 mg/l	98.00	99.20	48.25	48.26	2445	2520	15.00	17.00	106.1	109.2	98.20	102.3		
pp ₃₃₃ 50 mg/l	95.20	96.63	49.15	49.52	2430	2533	15.00	16.66	108.3	110.3	100.4	104.2		
Pix 100 mg/l	97.40	97.33	49.15	49.75	2512	2580	16.00	17.66	103.4	106.2	98.20	101.3		
Pix 200 mg/l	92.52	93.62	50.52	51.25	2610	2612	19.66	19.00	105.6	108.4	100.3	105.7		
Pix 300 mg/l	91.30	92.25	48.25	48.69	2620	2635	17.33	17.00	110.2	111.5	101.2	106.1		
LSD 5 %	0.23	0.20	1.1	1.36	0.25	0.35	0.35	0.28	1.10	1.15	0.23	0.32		

Paclobutrazol (Cultar25%_{sc})(PP₃₃₃), Mepiquat chloride 5%_{sc}(Pix).

Table (2):The effect of interaction of cotton genotypes and growth regulators, on some growth attributes during 2012 and 2013 seasons.

Characteristics	Growth characteristics													
	Treatments		Plant height (cm)		Number of Leaves /plant		Total leaves area/plant cm ²		Number of Fruiting branches /plant		Dry weight /plant (g)		Total chlorophyll SPDS	
Season 2012														
Growth regulators	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86
Control	118	119	45.15	46.15	2210	2214	12.33	12.66	100.1	100.2	90.20	92.2		
pp ₃₃₃ 30 mg/l	100	100.2	46.12	47.12	2320	2410	15.66	16.33	105.4	106.2	95.30	95.60		
pp ₃₃₃ 40 mg/l	98.00	99.00	48.25	49.25	2445	2515	15.00	16.00	106.1	107.6	98.20	98.40		
pp ₃₃₃ 50 mg/l	95.20	96.20	49.15	49.75	2430	2430	15.15	15.66	108.3	109.4	100.4	100.40		
Pix 100 mg/l	97.40	97.42	49.15	50.25	2512	2520	16.00	17.66	103.4	105.6	98.20	98.21		
Pix 200 mg/l	92.52	95.32	50.52	51.52	2610	2715	17.66	18.00	105.6	108.9	105.3	105.6		
Pix 300 mg/l	91.30	93.40	48.25	48.25	2620	2612	16.33	17.00	107.2	107.3	101.2	101.45		
LSD 5 %	0.23		1.1		0.25		1.25		1.10		0.23			
Season 2013														
Control	117	122	46.12	46.1	2225	2250	12.33	12.66	102.3	102.4	92.40	92.62		
pp ₃₃₃ 30 mg/l	101.2	100.3	47.18	47.5	2315	2454	14.66	15.33	108.1	109.2	100.2	100.56		
pp ₃₃₃ 40 mg/l	99.20	105	48.26	49.3	2520	2623	15.00	16.00	109.2	110.1	102.3	105.62		
pp ₃₃₃ 50 mg/l	96.63	106.0	49.52	50.2	2533	2582	15.00	16.66	110.3	109.4	104.2	106.21		
Pix 100 mg/l	97.33	100.1	49.75	50.8	2580	2541	16.00	17.66	106.2	107.2	101.3	105.33		
Pix 200 mg/l	93.62	92.1	51.25	52.2	2612	2645	16.66	17.00	112.4	111.2	105.7	108.94		
Pix 300 mg/l	92.25	94.2	48.69	49.8	2635	2620	17.33	17.00	111.5	109.6	104.1	110.50		
LSD 5 %	0.20		1.36		0.35		1.35		1.15		0.32			

Paclobutrazol (Cultar25%_{sc})(PP₃₃₃), Mepiquat chloride 5%_{sc}(Pix).

2-yield and yield components:

Data in Tables (3 and 4) cleared that genotypes, growth regulators and interaction between them had a significant effect on some yield traits i.e seed index and lint percentage in the first season. Promising strain (G86x10229) superior in seed cotton yield /plant, seed index and lint percentage in the first season. Use of Pix 200 mg/l superior of other treatments in most of traits under study like, boll weight, seed cotton yield/plant, seed index and lint percentage in the first season. The obtained results are in agreement with those obtained by **Emara et al., (2009), Frank et al., (2005) and Niaka, Maryam et al., (2012).**

Giza 86 with use of Pix 200 mg/ l superior in all characters under study, this result may be related to growth regulator produced higher number of open bolls/plant, heavier bolls and higher seed cotton yield /plant as compared with control treatment, this may be due to that sprayed cotton plants with growth regulators produced larger number of flowers /plant with a significant increase in boll set results are in agreement with those recorded by **Jonathan and Stewart (2006) and Dimitrova et al., (1997).**

Use the growth regulators increased the production of metabolites synthesized and thus the plant had the chance to bear more fruiting branches boll weight seed index lint % and seed cotton yield / plant, similar trend was found by **El- Sayed and El-Menshawi (2006), El- Sayed (2006) and Ahmed, (2002) & (2010).** The beneficial effect of spraying growth regulators could be attributed to role of growth regulators in fundamental metabolic reactions and acceleration of protein synthesis which effects boll development and hence promoting open boll number which resulted increased seed cotton yield, obtained results are in agreement with those of **Johnson (2005), Frank et al., (2005) Dimitropoulou et al., (1997), Jonathan and Stewart (2006), Steve et al., (2003) and Ahmed et al (2014).**

Table (3) Main effect of genotypes and some growth regulators, on some growth attributes during 2012 and 2013 seasons.

Characteristics	yield components									
	Boll weight (g)		Seed cotton yield/plant (g)		Lint cotton yield /plant (g)		seed index (g)		Lint %	
Treatments	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Genotypes										
Giza 86	3.08	3.08	33.18	34.24	12.93	13.54	10.03	10.29	37.98	37.08
10299*Giza 86	3.06	3.07	34.14	35.53	13.56	13.41	9.98	10.02	36.17	36.76
LSD 5 %	NS	NS	0.354	0.63	0.13	0.204	0.199	0.265	0.480	NS
Growth regulators										
Control	2.53	2.50	23.62	24.02	7.55	7.75	9.17	9.37	35.88	33.80
pp ₃₃₃ 30 mg/l	3.07	3.11	30.24	29.50	10.29	10.06	9.91	10.11	36.95	35.08
pp ₃₃₃ 40 mg/l	3.13	3.18	31.67	32.62	13.72	13.59	10.05	9.95	37.64	36.63
pp ₃₃₃ 50 mg/l	3.20	3.21	32.41	39.03	15.70	15.08	10.49	10.06	38.36	36.56
Pix 100 mg/l	3.18	3.16	39.02	39.55	15.59	15.59	10.19	10.28	37.92	38.85
Pix 200 mg/l	3.20	3.21	39.91	40.27	15.60	16.45	10.01	10.38	38.92	38.73
Pix 300 mg/l	3.17	3.14	38.75	39.22	14.14	15.83	10.25	10.93	33.87	38.80
LSD 5 %	0.019	0.189	0.662	2.034	2.059	0.383	0.374	0.496	0.899	1.088

Paclobutrazol (Cultar 25%_{sc})(PP₃₃₃), Mepiquat chloride 5%_{sc} (Pix)

Table (4) The interaction between genotypes and some growth, regulators on yield its during 2012 and 2013 seasons.

Characteristics Treatments	yield components									
	Boll weight (g)		Seed Cotton yield/plant (g)		Lint yield/plant (g)		seed index (g)		Lint %	
Season 2012										
Growth regulators	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86
Control	2.46	2.60	22.23	25.01	7.50	7.60	9.040	9.30	35.69	36.06
pp ₃₃₃ 30 mg/l	3.16	2.98	29.48	31.01	10.38	10.21	10.40	9.43	37.62	36.27
pp ₃₃₃ 40 mg/l	3.17	3.09	31.35	31.99	12.77	14.68	9.96	10.13	37.72	37.55
pp ₃₃₃ 50 mg/l	3.15	3.26	32.02	32.79	15.85	15.55	10.43	10.55	38.35	38.37
Pix 100 mg/l	3.23	3.14	38.50	39.53	15.65	15.53	10.12	10.26	37.79	38.04
Pix 200 mg/l	3.27	3.13	40.17	39.64	15.85	15.36	10.13	9.90	39.75	38.09
Pix 300 mg/l	3.13	3.22	38.49	39.01	12.46	15.82	10.16	10.33	38.93	38.81
LSD 5 %	0.272		0.936		2.912		0.529		1.272	
Season 2013										
Control	2.44	2.56	21.69	26.35	7.8	7.63	9.27	9.46	33.80	33.80
pp ₃₃₃ 30 mg/l	3.13	3.10	28.87	30.13	9.86	10.26	10.16	10.06	34.83	35.33
pp ₃₃₃ 40 mg/l	3.19	3.16	30.43	34.80	13.00	14.18	9.86	10.03	36.67	36.60
pp ₃₃₃ 50 mg/l	3.21	3.20	38.93	39.13	15.43	14.73	10.26	9.86	35.79	37.33
Pix 100 mg/l	3.16	3.16	39.53	39.57	16.06	15.12	10.70	9.86	39.27	38.43
Pix 200 mg/l	3.23	3.20	40.73	39.80	16.36	16.53	10.73	10.03	39.77	37.70
Pix 300 mg/l	3.1	3.10	39.50	38.93	16.23	15.43	11.03	10.84	39.47	38.13
LSD 5 %	0.268		2.877		0.541		0.701		1.539	

Paclobutrazol (Cultar25%_{sc}) (PP₃₃₃), Mepiquat chloride 5%_{sc} (Pix),

3- Fiber properties:-

Statistical results of the study showed that genotypes and the application rates of growth regulators significantly affected on some studied fiber properties (Tables 5,6,7 and 8) i.e., upper half mean length (U.H.M), 50% span length, (66.7span length), uniformity ratio (UR%), uniformity index (UI%) in the first season and short fiber content (SFC%) in both seasons. Whereas, the response of this traits is positive in both seasons. Use of 200 mg/l or 300mg/l pix superior in all this traits under study.

Promising strain (G86x10229) superior in Giza 86 cotton variety in micronaire reading, (Mic.), fiber strength (g/tex.)and coefficient of variation length (C.v%)in both seasons. Giza 86 cotton variety superior in reflectance (Rd %) and yellowness (+b%) in both seasons. There was significant variation in fiber elongation % between two genotypes in both seasons.

Use of 200 mg/l pix gave the best reading in reflectance (Rd%) and coefficient of variation length (C.v%) in both seasons, while use of 50 mg/l PP333 gave the best reading in yellowness (+b). Fiber elongation % had a negative response with use of growth regulators in both seasons. Pix 300 mg/l scored the best value in micronaire reading, (Mic.)in the first season only these results are agreement with **Ahmed, (2010).**

Table (5) Main effect of genotypes and some growth regulators, on fiber properties during 2012 and 2013 seasons.

Characteristics	Fiber properties											
	U.H.M		S.L50 (%)		S.L66.7 (%)		UR (%)		UI (%)		S.F.C (%)	
Treatments	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Genotypes												
Giza 86	36.32	36.16	17.13	17.43	12.46	12.27	48.29	48.40	86.19	85.91	4.07	17.43
10299*Giza 86	36.56	36.29	17.11	17.39	12.70	12.82	47.58	47.66	86.57	86.28	4.37	17.39
LSD 5 %	0.17	NS	0.17	NS	0.15	0.29	0.079	0.77	0.35	NS	0.11	0.25
Growth regulators												
Control	35.69	35.43	16.94	17.39	12.57	12.38	47.72	48.02	86.66	86.52	4.56	17.39
pp ₃₃₃ 30 mg/l	36.60	36.36	16.82	17.15	12.77	12.54	48.08	48.04	86.43	86.29	4.05	17.15
pp ₃₃₃ 40 mg/l	35.95	35.75	16.49	16.84	12.25	12.33	47.69	47.88	86.36	86.25	4.73	16.84
pp ₃₃₃ 50 mg/l	36.48	36.39	17.09	17.48	12.72	12.81	48.19	48.47	86.38	85.92	4.23	17.48
Pix 100 mg/l	37.08	36.56	17.52	17.83	12.76	12.61	48.18	48.31	86.26	85.84	4.06	17.83
Pix 200 mg/l	38.37	36.95	17.73	17.98	12.89	12.94	48.68	48.64	86.91	85.98	4.87	18.98
Pix 300 mg/l	36.92	36.85	17.85	18.11	12.60	12.58	48.01	47.86	86.44	86.30	4.04	18.11
LSD 5 %	0.31	0.24	0.35	0.46	0.29	NS	0.15	0.52	NS	0.84	0.20	0.48

Paclobutrazol (Cultar25%_{sc})(PP₃₃₃), Mepiquat chloride5%_{sc} (Pix): Upper Half Mean Length (U.H.M), Spain length at 50%, Spain length at 66.7%, (S.L 66.7%) , Uniformity Ratio (UR%),Uniformity, Endex(UI%) and Short Fiber Content (S.F.C%).

Table (6) The interaction between genotypes and some growth regulators, on fiber properties during 2012 and 2013 seasons.

Characteristics	Fiber properties											
	U.H.M mm		S.L50 (%) mm		S.L66.7 (%) mm		UR (%)		UI (%)		S.F.C (%)	
Season 2012												
Growth regulators	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86
Control	34.68	36.71	16.45	17.43	12.23	12.90	47.82	47.63	86.20	87.12	4.93	4.19
pp ₃₃₃ 30 mg/l	36.93	36.27	17.22	16.42	12.65	12.89	48.65	47.50	86.33	86.53	3.75	4.35
pp ₃₃₃ 40 mg/l	35.25	36.64	16.55	16.44	12.28	12.22	47.55	47.82	85.52	87.21	4.73	4.73
pp ₃₃₃ 50 mg/l	36.04	36.93	17.03	17.14	12.55	12.89	48.15	48.23	86.03	86.72	4.30	4.16
Pix 100 mg/l	36.92	37.23	17.55	17.50	12.65	12.87	48.65	47.70	86.37	86.14	3.75	4.37
Pix 200 mg/l	38.30	39.44	17.65	18.60	13.46	13.32	49.44	49.79	89.40	84.83	4.02	4.73
Pix 300 mg/l	37.12	36.72	17.45	18.25	12.38	12.81	48.61	47.42	86.45	86.44	4.04	4.03
LSD 5 %	0.44		0.44		0.35		0.20		0.81		0.03	
Season 2013												
Control	34.45	36.41	16.90	17.87	11.82	12.93	48.21	47.82	86.30	86.74	16.90	17.87
pp ₃₃₃ 30 mg/l	36.62	36.10	17.55	16.75	12.00	13.07	48.43	47.65	86.22	86.36	17.55	16.75
pp ₃₃₃ 40 mg/l	35.10	36.40	17.00	16.69	12.19	12.48	47.87	47.89	85.35	87.14	17.00	16.69
pp ₃₃₃ 50 mg/l	36.17	36.61	17.45	17.51	12.70	12.92	48.76	48.18	85.70	86.14	17.45	17.51
Pix 100 mg/l	36.31	36.80	17.97	17.70	12.33	12.89	48.77	47.86	85.92	85.75	17.97	17.70
Pix 200 mg/l	39.23	37.27	17.87	18.72	12.83	12.95	48.38	46.90	85.93	85.22	17.47	16.70
Pix 300 mg/l	37.25	36.45	17.70	18.53	12.30	12.87	48.41	47.31	85.97	86.63	17.70	18.53
LSD 5 %	0.64		0.67		0.78		0.73		0.19		0.67	

Paclobutrazol (Cultar25%_{sc})(PP₃₃₃), Mepiquat chloride5%_{sc} (Pix): Upper Half Mean Length (U.H.M)Spain length at 66.7%, (S.L 66.7%) Spain length at 50%, Uniformity Ratio (UR%), Uniformity Index(UI%) and Short Fiber Content (S.F.C%).

Table (7) Main effect of genotypes and some growth regulators, on fiber properties during 2012 and 2013 seasons.

Characteristics	Fiber properties											
	Mic.		Strength (g/tex.)		Elon. (%)		Rd		+b		C.v (%)	
Treatments	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Genotypes												
Giza 86	4.34	4.50	43.40	43.69	7.40	7.34	68.88	66.10	10.34	10.17	25.15	25.01
10299*Giza 86	4.15	4.22	46.50	46.57	7.34	7.33	62.08	62.08	10.54	10.58	26.14	26.00
LSD 5 %	0.10	0.21	2.19	2.14	NS	NS	6.38	4.05	0.15	0.17	0.53	0.10
Growth regulators												
Control	4.46	4.43	43.93	43.86	7.53	7.36	55.85	56.18	10.84	10.77	26.19	26.13
pp ₃₃₃ 30 mg/l	4.29	4.35	45.49	45.66	7.29	7.33	67.91	67.99	10.11	9.96	25.50	25.34
pp ₃₃₃ 40 mg/l	4.29	4.49	47.86	48.08	7.35	7.24	67.60	67.69	10.77	10.81	25.68	25.62
pp ₃₃₃ 50 mg/l	4.33	4.43	43.47	43.65	7.23	7.30	67.90	67.97	9.79	9.79	25.40	25.27
Pix 100 mg/l	3.99	4.14	45.66	45.94	7.33	7.22	66.84	67.09	10.68	10.50	25.04	24.86
Pix 200 mg/l	4.17	4.26	43.98	44.27	7.40	7.45	68.47	68.43	10.26	10.23	26.51	26.34
Pix 300 mg/l	4.12	4.36	44.23	44.49	7.48	7.45	65.80	55.26	10.63	10.57	25.20	24.97
LSD 5 %	0.18	0.40	2.19	4.01	NS	NS	11.95	10.52	0.23	0.32	0.01	0.19

Paclobutrazol (Cultar25%sc)(PP333), Mepiquat chloride 5%sc (Pix): Micronaire reading(Mic.), Fiber strength in gram / Tex(FS g/tex.), Fiber elongation (Elon.%), Percentage reflectance degree (Rd%), Yellowness degree (+b) and Coefficient of variation length(C.v%).

Table (8)The interaction between genotypes and some growth regulators, on fiber properties during 2012 and 2013 seasons.

Characteristics	Fiber properties											
	Mic.		Fiber Strength (g/tex.)		Elon. (%)		Rd		+b		C.v(%)	
Season 2012												
Growth regulators	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86
Control	4.65	4.27	38.43	49.44	7.63	7.44	68.02	63.68	11.40	10.28	26.06	26.33
pp ₃₃₃ 30 mg/l	4.33	4.25	41.73	49.25	7.38	7.20	70.52	65.30	9.93	10.30	24.68	26.28
pp ₃₃₃ 40 mg/l	4.33	4.26	47.23	48.50	7.30	7.40	69.02	66.17	10.46	11.08	25.28	26.08
pp ₃₃₃ 50 mg/l	4.34	4.33	45.23	41.72	7.30	7.15	70.07	65.72	10.02	9.57	25.12	25.68
Pix 100 mg/l	4.23	4.75	43.20	48.13	7.41	7.24	68.02	65.65	10.20	11.16	24.68	25.40
Pix 200 mg/l	4.28	4.06	42.85	45.11	7.38	7.42	67.60	65.34	10.18	10.34	26.48	27.55
Pix 300 mg/l	4.25	4.17	45.12	43.35	7.41	7.55	68.90	62.71	10.20	11.07	24.78	25.63
LSD 5 %	0.26		5.80		0.32		NS		0.38		NS	
Season 2013												
Control	4.43	4.44	38.07	49.64	7.42	7.29	68.35	64.01	11.27	10.28	26.03	26.22
pp ₃₃₃ 30 mg/l	4.52	4.18	42.82	48.50	7.25	7.40	70.35	65.62	9.62	10.30	24.45	26.24
pp ₃₃₃ 40 mg/l	4.72	4.25	47.49	48.67	7.03	7.45	69.51	65.87	10.30	11.32	25.19	26.06
pp ₃₃₃ 50 mg/l	4.53	4.33	45.49	41.81	7.50	7.09	70.23	65.71	10.01	9.57	25.06	25.45
Pix 100 mg/l	4.46	4.82	43.47	48.42	7.29	7.16	68.35	65.84	9.83	11.16	24.45	25.27
Pix 200 mg/l	4.49	4.03	43.12	45.41	7.62	7.28	67.73	65.13	10.12	10.34	25.32	27.37
Pix 300 mg/l	4.25	4.47	45.41	43.57	7.27	7.66	68.17	62.36	10.07	11.07	24.52	25.41
LSD 5 %	0.58		5.66		0.58		NS		0.46		NS	

Paclobutrazol (Cultar25%sc)(PP333), Mepiquat chloride 5%sc (Pix): Micronaire reading(Mic.), Fiber strength in gram / Tex(FS g/tex.), Fiber elongation (Elon.%), Percentage reflectance degree (Rd%), Yellowness degree (+b) and Coefficient of variation length(C.v%).

4- Yarn properties:-

Data in Tables (9 and 10) revealed that, genotypes differ significant in sken strength, number of thick places, number of neps /100meter in both seasons while did not differ significant in number of thin places /100meter in both seasons and yarn evenness (C.v %) in the second season only.

Use of 300 mg/l pix gave the best reading in skein strength, number of thin places, number of thick places and number of neps /100 meter in both seasons.

The interaction between genotypes and application treatments showed that promising crosse (G86x10229) with 300 mg/l pix gave the best reading in the thin places, number of thick places and number of neps /100 meters in both seasons, similar trend was found **Ahmed *et al.*, (2014).**

Table (9) Main effect of genotypes and some growth regulators, on yarn properties during 2012 and 2013 seasons.

Characteristics Treatments	yarn properties									
	Skein strength		Yarn Evenness (C.V.%)		Number of thin Places/100m		Number of thick Places/100m		Number of Neps /100m	
Genotypes	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Giza 86	2635	2600	16.67	16.47	5.86	5.71	16.90	16.43	7.90	8.5
10299*Giza 86	2785	2800	16.48	16.32	4.90	4.62	14.24	13.10	6.76	6.3
LSD 5 %	51.24	49.55	0.14	NS	NS	NS	1.88	2.19	0.95	1.48
Growth regulators										
Control	2575	2590	16.68	16.77	6.17	6.17	12.45	12.67	8.83	10.17
pp ₃₃₃ 30 mg/l	2595	2605	16.34	16.34	7.50	7.17	15.83	14.50	7.50	7.17
pp ₃₃₃ 40 mg/l	2660	2650	16.56	16.53	5.33	5.00	14.00	13.33	7.33	7.33
pp ₃₃₃ 50 mg/l	2745	2760	16.72	16.32	6.83	7.33	17.50	16.67	7.83	7.33
Pix 100 mg/l	2715	2725	16.66	16.44	5.17	4.67	16.00	14.83	7.00	7.50
Pix 200 mg/l	2785	2795	16.59	16.23	3.50	3.00	14.17	12.83	7.00	6.50
Pix 300 mg/l	2885	2910	16.49	16.16	3.17	2.83	13.83	13.50	5.83	5.83
LSD 5 %	92.58	92.70	0.26	0.57	2.69	2.84	3.51	4.09	1.76	2.26

paclobutrazol (Cultar25%_{sc})(PP₃₃₃), Mepiquat chloride 5%_{sc} (Pix),

Table (10)The interaction between genotypes and some growth regulators, on yarn properties during 2012 and 2013 seasons.

Characteristics Treatments	yarn properties									
	Skein strength		Yarn Evenness (C.V.%)		Number of thin Places/100m		Number of thick Places/100m		Number of Neps /100m	
Season 2012										
Growth regulators	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86	G 86	10229 x G86
Control	2545	2610	16.83	16.54	8.33	4.00	20.00	15.33	11.33	6.33
pp₃₃₃ 30 mg/l	2520	2670	16.41	16.26	7.00	8.00	14.67	17.00	7.00	8.00
pp₃₃₃ 40 mg/l	2590	2735	16.55	16.57	5.67	5.00	18.67	13.33	8.00	6.67
pp₃₃₃ 50 mg/l	2710	2785	16.72	16.72	5.67	8.00	17.00	18.00	7.00	8.67
Pix 100 mg/l	2590	2835	16.81	16.51	7.00	3.32	18.67	13.33	9.00	5.00
Pix 200 mg/l	2690	2880	16.75	16.43	3.33	3.67	16.00	12.33	5.00	9.00
Pix 300 mg/l	2815	2975	16.62	16.36	4.00	2.33	17.33	10.33	8.00	3.67
LSD 5 %	130.93		0.38		3.80		4.99		2.49	
Season 2013										
Control	2530	2645	16.84	16.69	8.67	3.67	21.67	13.67	14.33	6.00
pp₃₃₃ 30 mg/l	2525	2685	16.52	16.16	6.67	7.68	14.33	14.66	7.35	7.00
pp₃₃₃ 40 mg/l	2560	2745	16.36	16.70	5.33	4.67	14.34	12.32	8.33	6.33
pp₃₃₃ 50 mg/l	2725	2795	16.14	16.49	6.00	8.66	16.35	17.00	7.31	7.34
Pix 100 mg/l	2595	2855	16.54	16.34	6.67	2.66	17.33	12.33	9.33	5.67
Pix 200 mg/l	2695	2895	16.50	15.96	3.00	3.00	14.00	11.67	5.33	7.61
Pix 300 mg/l	2835	2985	16.41	15.91	3.67	2.00	17.00	10.00	7.67	4.00
LSD 5 %	131.14		0.80		4.03		5.80		3.92	

paclobutrazol (Cultar25%_{sc})(PP₃₃₃), Mepiquat chloride 5%_{sc} (Pix),

REFERENCES

- A.S.T.M.(1998). American Standard Testing and Materials On materials. D:1578-67: D:1425-60,D:1440-65,D1445-67,D:1448-68,D:2812-95. Annu. Book of ASTM Standard. ASTM. Philadelphia, PA.
- Abd El-Dayem, H.M.M. and El-Deeb, A.E.A. (2000). Effect of some plant growth regulators on growth, yield components and some chemical constituents of cotton plants. Ann. Agric. Sci., Moshtohor, Zagazig Univ. 38 (2): 907-925.
- Abdel-Twab Rania, M.M. (2014). Effect of planting date and some growth regulators on yield and fiber properties in Egyptian cotton. PhD. Thesis Dept. of Agro. Fac. of Agri. Cairo Univ., Egypt.
- Ahmed, H.S. A. (2001). Effects of reproductive growth, anatomy of flower pedicel and yield components. Annals of Agric. Sc., Moshtohor. Zagazig Univ. 39(4): 2109-2125.
- Ahmed, H.S.A. (2002). Botanical studies on growth and flower abortion in cotton (*Gossypium barbadense*) Plants. MsC. Thesis Dept. of Botany. Fac. of Agric. Moshtohor, Zagazig Univ. Benha branch.

- Ahmed H.S.A. (2010). Effect of some treatments on growth and productivity in Egyptian cotton. PhD. Thesis Dept. of Agric Botany. Fac. of Agric. Moshtohor, Benha Univ.
- Ahmed H.S.A., Zewail, R. M. Y. and Hassan, A. A.(2014). Effect of Pix and potassium citrate on growth, productivity, Fiber quality and yarn on Egyptian cotton. Egypt. J. of Okto. Sci., (16) 122-131.
- Barrett J. E. and Bartuska C.H. (1982). Effects on stem elongation dependent on site of application. Hort. Sci., 17:737 – 738.
- Dimitropoulou, D.K.; Angelakis, C.; Patsialis, C.; Tsamasiotis, T. and Kostantinidis, G. (1997): Effect of three plant growth regulators (PGR-IV, CYTOKIN, PHCA) on cotton in Greece. Proc. FAO-IRCRNC; joint meeting of the working groups (cotton nutrition & growth regulators); Cairo-Egypt,. 195-206.
- Dimitrova L. Peeters M.C. Bojinov B. and Celis C. (1997). Effect of pgriv, Cytokine and phca on Bulgarian cotton (*G. Hirsutum L.*) Proc. FAO-IRCRNC: Joint Meeting of the working groups (cotton nutrition & growth regulators); 20-23. March, 1995, Cairo-Egypt,.213-222.
- Dimitrova, L. (1994). Cotton growth regulators research and practical use in Bulgaria pp. 25-29 In FAO inter-regional cooperative research network on cotton. Proceedings of the consultative meeting of the working group 3 on growth regulatory 1994, Athens, Greece.
- El- Desouky, S.A. and Abd El-Dayem, H.M.M. (1992). Response of Egyptian cotton plant to foliar spray with some Macro- nutrients (NPK) and the growth regulator Paclobutrazol (PP₃₃₃). Annals of Agric. Sc., Moshtohor. 13 (2): 807-825.
- EL-Sayed E.A. (2006). Effect of Indol Acetic Acid (IAA) and Mepiquat chloride 5% (PIX) application under different planting date on growth and yield in cotton. Egypt. J. Agric. Res., 84 (2):102-113.
- EL-Sayed, E.A. and EL-Menshawi M. (2006). Influence of Indol Acetic Acid (IAA) application under different planting date on growth and yield of Giza 88 cotton cultivar. Egypt. J. Agric. Res., 84 (2):505-521.
- Emara M.A Makram, E.A. Elbagory, Olfat H. and El-Marakby A.M. (2009). Effect of Mepiquat chloride 5% and nitrogen fertilization application time on the Egyptian cotton cultivar Giza 80. Egypt. J. Agric. Res., 87 (1):187 -202.
- Frank G.; Bill R. and Rock L. (2005). Evaluation of mepiquat chloride treatments at cutout or the latest possible cutout date. Proc. Beltwide Cotton Conf., New Orleans LA., U.S.A., (Jan. 4-7) (2): 2161.

- Johnson J. T. (2005). Effects of Mepiquate pent borate on genotypes of varying maturity. Proc. Belt wide Cotton Conf., New Orleans LA. U.S.A., (Jan. 4-7) (1): 885.
- Jonathan D. S., and Stewart A. M. (2006). Influence of plant density on cotton response to Mepiquat chloride 5% application. Agron., J. 98 (6):1634-1639.
- Keisokki kcf-v/l/s version 1.29.3. The following fiber properties were measured using Keisokki (2013) kcf-v/l/s version 1.29.3. Instrument High volume fiber Length test system.
- Mc Daniel G.L. (1983). Growth retardation activity of paclobutrazol on chrysanthemum. Hort. Sci., 18: 199-200.
- Niaka, Maryam A. Habibi A. and Mahlagha G. (2012). Study of Pix regulator effect on physiological responses in cotton plant. Annals of Biological Res., 3 (11): 5229-5235.
- Sawan, Z.M. and Sakr, R.A. (1990). Response of Egyptian cotton (*Gossypium barbadense*) yield to 1, 1-dimethyl piperidinium chloride (Pix). J. of Agri. Sci. 114: 3, 335-338.
- Snedecor G.W., Cochran W.G. (1980). Statistical Methods, seventh ed., Iowa State University Press, Ames, Iowa. USA, 1980.
- Steve P. N. Charles E. S. and Mike A. J. (2003). Evaluation of row spacing and mepiquat chloride in cotton. J. Cotton Sci., (7): 148-155.
- Williams M.W. and L.J. Edgerton (1983). Vegetative growth control of apple and pear trees with PP₃₃₃ (paclobutrazol), a chemical analog of Bayleton. Acta. Hort., 137: 111-116.

تأثير الرش ببعض منظمات النمو على المحصول وجودة التيلة والغزل

حامد سيد احمد احمد * رضا محمد يوسف زويل** عبدالباسط عبدالكريم حسان*

*مركز البحوث الزراعية - معهد بحوث القطن - الجيزة-مصر

**قسم النبات الزراعي - كلية الزراعة بمشتهر - جامعة بنها

الملخص العربي

أجريت تجربتان حقليتان بمحطة التجارب والبحوث الزراعية بكلية الزراعة جامعة بنها خلال موسمي الزراعة ٢٠١٢-٢٠١٣ لمعرفة تأثير الرش ببعض منظمات النمو على صفات النمو والمحصول وجودة صفات التيلة والغزل وكانت النتائج كالآتي:-

تفوق السلالة (G 86 x10299) على الصنف (Giza 86) في معظم صفات النمو مثل عدد الأوراق/النبات، مساحة الأوراق/النبات، والكلوروفيل الكلي، في كلا الموسمين وفي معظم صفات مكونات المحصول والتيلة ونعومة ومثانة التيلة ودرجة إصفرار اللون ومعامل الاختلاف في الطول.

كان لإستخدام البكس بمعدل ٣٠٠ مللى جرام / لتر (pix 300 mg/l) أعلى متوسطات لكلا من عدد الأوراق /النبات والوزن الجاف الكلى للنبات والكلوروفيل الكلى مقارنة بالنباتات غير المعاملة. بينما أدى إستخدام البكس بمعدل ٢٠٠ مللى جرام / لتر (pix 200 mg/l) إلى نقص طول النبات وزيادة عدد الأوراق /النبات.

وبالنسبة للمحصول ومكوناته :-

تفوقت السلالة (G 86 x10299) فى محصول النبات الفردى ووزن اللوزة ومحصول القطن الشعير /النبات، وكان لإستخدام البكس بمعدل ٢٠٠ مللى جرام / لتر (pix 200 mg/l) أفضل النتائج فى معظم صفات المحصول ومكوناته مثل وزن اللوزة ومحصول النبات الفردى ودليل البذرة ومحصول القطن الشعير /النبات خلال الموسم الأول.

تفوق الصنف (Giza 86) عند الرش بالبكس بمعدل ٢٠٠ مللى جرام / لتر (pix200mg/l) فى معظم صفات المحصول ومكوناته وصفات جودة التيلة كما تفوق الصنف (Giza 86) فى درجة إنعكاس اللون (Rd%) ومعامل الإختلاف (cv) عند الرش بالبكس بمعدل ٢٠٠ مللى جرام / لتر (pix 200 mg/l) بينما أدى الرش بالباكلوبيوترازول بمعدل ٥٠ مللى جرام / لتر (PP₃₃₃50 mg/l) إلى أفضل قراءة فى (+b). أما الصفات الغزلية:-

فقد تفوقت السلالة (G 86 x10299) فى متانة الشله، مع نقص عدد المناطق الرفيعة والسميكة والعقد/١٠٠ متر من الخيط عند الرش بالبكس بمعدل ٣٠٠ مللى جرام / لتر (pix 300 mg/l).