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RESPONSE OF GIZA 85 COTTON CULTIVAR TO THE GROWTH REGULATORS PIX AND ATONIK

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Abstract

Two field experiments were conducted at Ciba-Geigy Experiment Station in Qaha region during 1996. The first was after Berseem crop while the other was after fallow.

Pix was effective in limiting plant height and leaf area significantly decreased by any rate or time of application. Number of bolls set, dry weight of stem and branches and roots per plant were increased by spraying Pix. These increases were significantly attained by all treatments which cultivated after Berseem crop or fallow. However squares and boll shedding percentage were decreased significantly by Pix treatments. Seed index, numberr of open bolls, seed index, number of open bolls seed cotton yield/F and seed cotton yield/plant were significantly increased by Pix treatments. Number of internodes, fruiting branches, lint % and Earliness were not affected by spraying Pix.

Atonik foliar application was effective in increasing leaf area, number of boll set, dry weight of shoot, root and leaves, in both experiments significantly. Atonik also increased significantly seed index, number of bolls, seed cotton yield. Boll weight, lint %, and Earliness of yield, were not affected by Atonik treatments.

INTRODUCTION

Pix (mepiquat chloride or dimethyl piperidinum chloride) inhibits the synthesis of the plant hormone gibberellic acid (GA), which plays a major role in enhancing cell enlargement and thus general vegetative growth (Abdel-Al *et al.*, 1986).

Mepiquat chloride has been used as a systemic plant growth regulator for limiting vegetative growth of cotton plants (Guasman *et al.* 1979, Walter *et al.* 1980, Briggs 1980, York 1983, Abdel-Al *et al.* 1986, and Armstron 1990).

Hokinson *et al.* (1983), Abdel-Al *et al* (1986) and Azab *et al.* (1988), stated

that Pix had no effect on seed index, lint percentage, fiber strength, and length.

Atonik (sodium mono-nitroguaical) is an organic growth regulator substance. The active ingredients in Atonik are 0.2% sodium ortho-nitrophenolate (O-NP), 0.3% sodium para-nitrophenolate (P-NP), and 0.1% sodium 5-nitroguaiacolate (NG). Atonik stimulates plant growth by altering membrane-dependent plant systems as photosynthesis, respiration, hormone reception and degradation, translation, and ion accumulation (Urwiler and Stutte 1987). Atonik is used to promote germination, enhance vegetative growth, activates plant cell metabolism and thereby improves growth and yield. The beneficial effects of Atonik foliar application have been noted in rice, wheat, cucumber, and potato (Anonymous 1976).

The present study aimed to study the effect of Pix and Atonik on Egyptian cotton cultivar Giza 85 which was cultivated after fallow or/and after Berseem crop.

MATERIALS AND METHODS

Two field experiments were conducted at CIBA Experiment Station Qaha region (Kalyubia Governorate) during 1996 season, using the Egyptian cotton cultivar Giza 85, to study the effect of spraying Mepiquat chloride (Pix) and (Atonik), on cotton growth, yield and yield components. The first experiment was cultivated after fallow while the second was cultivated after Berseem crop.

Cotton seeds were planted in first April for the two experiments. The experimental design was complete randomized blocks with four replications. The size of the plot was 12 m^2 including 5 rows. All cultivation practices were done according to cotton practices of cotton growing.

The treatments of Pix (5% a.i) and Atonik solutions were as follows:

1. Control (spraying water only).
2. 500 ml/fed. Pix at the start of flowering.
3. 250 ml/fed Pix at the penhead square + 250 ml/fed Pix at the beginning of flowering.
4. 100 ml/fed Pix at the penhead square + 200 ml/fed at the beginning of flowering + 200 ml/fed at the peak of flowering.
5. 1 ml/L Atonik at the start of flowering.
6. 1 ml/L Atonik at the start of flowering + 1ml/L Atonik at the peak of flowering.

Random samples of four plants from each plot were taken at 15 days after spraying all treatments of the two studied growth regulators to record the following data:

a. Vegetative characters:

Plant height, Number of internodes, Number of fruiting branches, and Leaf area per plant.

b. Fruiting characters:

Number of squares/plant, Number of bolls set/plant, and Square and boll shedding percentages.

c. Dry weight/plant :

Dry weight of roots/plant and Dry weight of leaves.

Yield and yield components:

Total number of bolls/plant, Average of boll weight, Seed index, Lint percentage. Earliness of yield %, Seed cotton yield in kentar/fed, and Seed cotton yield/ plant.

RESULTS AND DISCUSSION

The effect of spraying Pix on cotton plants cultivated after fallow was almost similar to its effect on cotton plants cultivated after Berssem crop, except few exceptions (Tables 1 and 2). However there was an increase in incidence of vegetative growth and fruiting characters for the cotton cultivated after Berssem crop when compared with the cotton cultivated after fallow (Tables 1 and 2).

Concerning, the vegtative growth, Pix application was effective in limiting cotton plant height. These result caused some decrease in number of internodes, number of fruiting branches but it was significant for leaf area/plant, and dry weight of leaves/plant (Abdel-Al *et al.*, 1986 and Azab *et al.*, 1988).

It is worth to notice that spliting Pix doses was less effective in decreasing plant height specially in the last treatment.

Regarding fruiting character, Pix application increased number of boll set/ plant, dry weight of stem and branches and dry weight of root/plant. However, Pix decreased square and boll shedding percentage, and this was reflected on number of open bolls/plant which increased significantly in both experiments (York 1983, Abdel-Al *et al.*, 1986 and Armstron 1990).

Table 1. Effect of of spraying Pix and Atonik on cotton plants after 15 days from the peak flower treatments (Cotton cultivated after Berseem crop).

Treatments		Plant height (cm)	No. of interno-des	No. of fruiting branches	Leaf area/ plant cm^2	No. of bolls set/ plant	Square and boll shedding (%)	Dry weight (gm) Stem & branc-hes	Roots/ plant	Leaves/plant
Control	1	113.5	23.5	15.0	2710	10.0	37.3	31.4	23.1	26.1
Pix	2	99.5	23.5	14.5	2320	15.0	27.8	35.9	30.3	23.6
Pix	3	86.0	20.5	13.5	2315	15.0	32.7	37.9	25.2	19.4
Pix	4	102.0	21.0	14.0	2020	13.0	33.3	34.2	24.0	21.7
Atonik	5	113.9	22.5	14.0	3000	15.0	26.4	34.6	31.1	31.1
Atonik	6	114.5	23.5	14.9	3006	17.0	25.4	42.6	33.7	30.9
L.S.D.	5%	6.9	N.S.	N.S.	120.1	1.4	2.2	3.5	2.9	2.3

Table 2. Effect of spraying Pix & Atonik on cotton plants after 15 days from the peak flower treatments (Cotton cultivated after Fallow).

Treatments		Plant height (cm)	No. of interno-des	No. of fruiting branches	Leaf area/ plant cm^2	No. of bolls set/ plant	Square and boll shedding (%)	Dry weight (gm) Stem & branc-hes	Roots/ plant	Leaves/plant
Control	1	90.0	21.5	12.5	2470	12.0	34.9	23.8	20.4	21.6
Pix	2	81.5	19.0	12.0	2106	14.0	25.1	24.5	29.6	20.3
Pix	3	86.0	19.0	12.0	2190	13.0	24.4	28.1	32.9	20.8
Pix	4	85.5	21.5	14.5	2005	15.0	28.0	25.5	27.6	19.3
Atonik	5	91.0	20.5	13.0	2602	11.5	25.7	28.2	22.6	23.3
Atonik	6	92.0	22.5	13.0	2890	15.5	24.4	29.4	25.2	27.6
L.S.D.	5%	4.0	N.S	N.S	110.9	1.9	2.9	2.2	2.4	2.1

Seed cotton yield/plant and per feddan increased by Pix application but the increase was significant only by the treatment of 500 ml/f once at the beginning of the flowering stage.

Number of bolls/plant increased significantly in all treatments of Pix, however seed index was significant only for splitted Pix application : (250 ml/f) at the beginning of flowering and 250 ml/fat the peak of flowering.

Boll weight, lint percentage and earliness of yield was not affected significantly by Pix treatments (Hoskinson *et al.*, 1983, Abdel - Al *et al.*, 1986 and Azab *et al.*, 1988).

The effect of spraying Atonik was not effective and insignificant on vegetative growth except for leaf area/plant. Also, there was an increase in vegetative and fruiting characters of cotton cultivated after Berseem crop compared with cotton cultivated after fallow. There was a significant increase in all fruiting characters by Atonik treatments.

However seed cotton yield/plant and per feddan, seed index and number of open bolls increased by Atonik treatments, the effect was significant only for the twice application of Atonik, for the cotton cultivated after fallow. The effect was significant also in both first and second treatments of Atonik, for cotton cultivated after Berseem crop. Atonik stimulated plant growth by altering membrane-dependent plant systems as photosynthesis, respiration, translocation (Urwiler and Stutte, 1987).

Malik (1982) reported that Atonik foliar spray caused only a slight increase in seed cotton yield and its components. Abdel-All and Ismail (1990) noted that Atonik applications tended to increase number of bolls/plant, seed index, seed cotton yield and earliness percentage.

Table 3. Effect of growth regulators Pix and Atonik on yield and yield components of Giza 85 cotton variety.

Treatments		Cultivation after Berseem crop							Cultivation after fallow						
		Boll weight (g)	Seed index	Lint (%)	Earl-iness	No.of open bolls	Seed cotton yield (kentar/f)	Seedcott on yield/ plant	Boll weight (g)	Seed index	Lint (%)	Earl-iness	No.of open bolls	Seed cotton yield (kentar/f)	Seedcott on yield/ plant
Control	1	2.32	10.35	33.8	62.9	17	8.86	31.44	2.31	10.09	34.0	53.4	15	7.53	27.95
Pix	2	2.50	10.56	34.5	65.9	22	10.33	38.50	2.35	10.48	34.1	55.4	18	8.71	32.30
Pix	3	2.56	11.22	33.5	68.7	18.5	9.28	33.80	2.48	10.65	34.8	59.8	16	8.00	29.70
Pix	4	2.35	10.11	34.9	65.2	19.0	9.24	33.65	2.35	10.21	34.3	56.9	17	8.07	29.95
Atonik	5	2.41	10.70	34.2	66.1	19.0	9.54	35.79	2.40	10.73	35.4	55.4	16.5	7.98	29.60
Atonik	6	2.38	10.71	33.9	65.7	20.5	10.01	37.79	2.39	10.80	35.3	56.2	17.5	8.58	31.83
L.S.D.	5%	N.S	0.30	N.S	N.S	0.8	0.65	2.37	N.S	0.40	N.S	N.S	0.6	0.61	2.55

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إستجابة نباتات القطن لمنظمى النمو بيكس وأتونك

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أجريت تجربتان حقليتان خلال موسم ١٩٩٦ فى محطة بحوث سيبا جايجى بناحية قها، التجربة الأولى بعد برسيم والثانية كانت بعد بور. وقد درس فى التجربتين تأثير إستخدام منظمى النمو بيكس والأتونك رشاً على نمو ومحصول القطن صنف جيزه ٨٥ , وقد كانت معاملات البيكس المستخدمة مرة واحدة فى بداية التزهير بمعدل ٥٠٠ سم٣ / ف، ومرتين فى بداية وقمة التزهير بمعدل ٢٥٠سم٣ /ف، وثلاث مرات فى بداية الوسواس وبداية التزهير وقمة التزهير بمعدل ١٠٠سم٣ /ف ، ٢٠٠سم٣ /ف ، على الترتيب أما معدل الأتونك فقد استخدم بمعدل ١سم٣ / لتر مرة واحدة فى بداية التزهير، مرتين الأولى فى بداية التزهير والثانية فى قمة التزهير على الترتيب. ويمكن تلخيص أهم النتائج المتحصل عليها فيمايلى :

- أثر البيكس على تحديد أطوال النباتات ومساحة الأوراق معنوياً وذلك بأى معدل خلال مراحل النمو المختلفة. زاد عدد اللوز والوزن الجاف للساق والأفرع والجذور / نبات بعد إستخدام البيكس رشاً وقد كانت هذه الزيادة معنويه بالنسبة لمعاملات البيكس تحت ظروف نباتات القطن المزروعة بعد برسيم أو بعد بور. ومع ذلك فقد إنخفض عدد الوسواس الناتج والنسبة المئوية للوز الساقط معنوياً بإستخدام معاملات البيكس المختلفة.
- متوسط وزن اللوزة ومعامل البذرة (وزن ١٠٠ بذرة) وعدد اللوز المتفتح ومحصول القطن الزهر/فدان وبالنسبة للنبات الواحد قد زاد أيضاً بإستخدام البيكس رشاً زيادة معنوية بينما لم يتأثر معنوياً عدد العقد والأفرع الثمرية، ومتوسط وزن اللوز ونسبة الشعر٪ والتبكير فى المحصول بمعاملات البيكس.
- أما بالنسبة لإستخدام الأتونك رشاً فقد أدى إلى زيادة كل من مساحة الأوراق وعدد اللوز والوزن الجاف للأفرع والجذور والأوراق زيادة معنوية فى كلاالتجربتين تحت الدراسة (بعد برسيم أو بعد بور). وقد أدى رش الأتونك أيضاً إلى زيادة معامل البذرة (وزن ١٠٠ بذرة) وعدد اللوز المتفتح ومحصول القطن ومتوسط وزن اللوزة ونسبة الشعر ٪ زيادة معنوية بالنسبة للمقارنة. ولم يكن للأتونك تأثيراًمعنوياً على صفة التبكير فى المحصول.