RESPONSE OF GIZA B5 COTTON CULTIVAR TO THE GROWTH REGULATORS PIX AND ATONIK

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(Manuscript received 28 May, 1997)

Abstract

Two yield experiments were conducted at Obia-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, number 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 piperidinium 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).


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-nitroguaiacal) is an organic growth regulator substance. The active ingredients in Atonik are 0.2% sodium ortho-nitrophenolate (ONP), 0.3% sodium para-nitrophenolate (PNP), 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 m² 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 + 1 ml/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 Berrsem 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 Berrsem crop when compared with the cotton cultivated after fallow (Tables 1 and 2).

Concerning the vegetative 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 splitting 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 Armstrong 1990).
Table 1. Effect of spraying "Pix" and "Atonik" on cotton plants after 15 days from the peak flower treatments (Cotton cultivated after Berseem crop).

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Plant height (cm)</th>
<th>No. of internodes</th>
<th>No. of fruiting branches</th>
<th>Leaf area/plant cm²</th>
<th>No. of boills set/plant</th>
<th>Square and boil shedding (%)</th>
<th>Dry weight (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1</td>
<td>113.5</td>
<td>23.5</td>
<td>15.0</td>
<td>2710</td>
<td>10.0</td>
<td>37.3</td>
</tr>
<tr>
<td>Pix</td>
<td>2</td>
<td>99.5</td>
<td>23.5</td>
<td>14.5</td>
<td>2320</td>
<td>15.0</td>
<td>27.8</td>
</tr>
<tr>
<td>Pix</td>
<td>3</td>
<td>86.0</td>
<td>20.5</td>
<td>13.5</td>
<td>2315</td>
<td>15.0</td>
<td>32.7</td>
</tr>
<tr>
<td>Pix</td>
<td>4</td>
<td>102.0</td>
<td>21.0</td>
<td>14.0</td>
<td>2020</td>
<td>13.0</td>
<td>33.3</td>
</tr>
<tr>
<td>Atonik</td>
<td>5</td>
<td>113.9</td>
<td>22.5</td>
<td>14.0</td>
<td>3000</td>
<td>15.0</td>
<td>26.4</td>
</tr>
<tr>
<td>Atonik</td>
<td>6</td>
<td>114.5</td>
<td>23.5</td>
<td>14.9</td>
<td>3006</td>
<td>17.0</td>
<td>25.4</td>
</tr>
<tr>
<td>L.S.D. 5%</td>
<td>5%</td>
<td>6.9</td>
<td>N.S.</td>
<td>N.S.</td>
<td>120.1</td>
<td>1.4</td>
<td>2.2</td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Effect of spraying Pix & Atonik on cotton plants after 15 days from the peak flower treatments (Cotton cultivated after Fallow).

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Plant height (cm)</th>
<th>No. of internodes</th>
<th>No. of fruting branches</th>
<th>Leaf area/plant cm²</th>
<th>No. of bolls set/plant</th>
<th>Square and boll shedding (%)</th>
<th>Dry weight (gm) Roots/Leaves/plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1</td>
<td>90.0</td>
<td>21.5</td>
<td>12.5</td>
<td>2470</td>
<td>12.0</td>
<td>34.9</td>
</tr>
<tr>
<td>Pix</td>
<td>2</td>
<td>81.5</td>
<td>19.0</td>
<td>12.0</td>
<td>2106</td>
<td>14.0</td>
<td>25.1</td>
</tr>
<tr>
<td>Pix</td>
<td>3</td>
<td>86.0</td>
<td>19.0</td>
<td>12.0</td>
<td>2190</td>
<td>13.0</td>
<td>24.4</td>
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<tr>
<td>Pix</td>
<td>4</td>
<td>85.5</td>
<td>21.5</td>
<td>14.5</td>
<td>2005</td>
<td>15.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Atonik</td>
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<td>91.0</td>
<td>20.5</td>
<td>13.0</td>
<td>2602</td>
<td>11.5</td>
<td>25.7</td>
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<tr>
<td>Atonik</td>
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<td>22.5</td>
<td>13.0</td>
<td>2890</td>
<td>15.5</td>
<td>24.4</td>
</tr>
<tr>
<td>L.S.D. 5%</td>
<td></td>
<td>4.0</td>
<td>N.S</td>
<td>N.S</td>
<td>11.0,9</td>
<td>1.9</td>
<td>2.9</td>
</tr>
</tbody>
</table>
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 (Urwiller 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.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Cultivation after Berseem crop</th>
<th>Cultivation after fallow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boll weight (g)</td>
<td>Seed index (%)</td>
</tr>
<tr>
<td>Control 1</td>
<td>2.32</td>
<td>10.35</td>
</tr>
<tr>
<td>Pix 2</td>
<td>2.50</td>
<td>10.56</td>
</tr>
<tr>
<td>Pix 3</td>
<td>2.56</td>
<td>11.22</td>
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<tr>
<td>Pix 4</td>
<td>2.35</td>
<td>10.11</td>
</tr>
<tr>
<td>Atonik 5</td>
<td>2.41</td>
<td>10.70</td>
</tr>
<tr>
<td>Atonik 6</td>
<td>2.38</td>
<td>10.71</td>
</tr>
<tr>
<td>L.S.D. 5%</td>
<td>N.S.</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>2.31</td>
<td>10.09</td>
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<tr>
<td></td>
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<td>10.48</td>
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<tr>
<td></td>
<td>2.48</td>
<td>10.65</td>
</tr>
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<td></td>
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<tr>
<td></td>
<td>2.39</td>
<td>10.80</td>
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<tr>
<td></td>
<td>N.S.</td>
<td>0.40</td>
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</table>
REFERENCES


إيجابية نباتات القطن لتنظيم النمو بيككس وأنوك
محمد جامد عبد العال
مختبر بحوث القطن، مركز البحوث الزراعية، الجيزة

أجريت تجربتان خلال موسم 1991 في محطة بحوث سيبا جايجي بناحية قلقا، التجربة الأولى بعد برسيم والثانية كانت بعد بور. وقد نسق في التجربتين تأثير
استخدام منظمي النمو بيككس وأنوك رشًا على نمو ومحمول القطن صفيح في صفيح 80.
وقد كانت معدلات البيكس المستخدمة مرة واحدة في بداية التزهر 50 سلًا / فـ، وتمت رشات مرات في بداية الوسائط
واللبن في بداية وفترة التزهر بعد 100 سلًا / فـ، و 200 سلًا / فـ على الترتيب. أما معدل
الأنوك فقد استخدم بعد 100 سلًا / فـ مرة واحدة في بداية التزهر، مرتين الأولى في
بداية التزهر والثانية في نهاية التزهر للتحقق من النتائج.

النتائج: 
- في استخدم أطوال النباتات مساحة الأوراق مماثلة وذلك بسبب معدل خلال
  مراحل النمو المختلفة. زاد معدل الفوز والوزن الجاف للساق والأطراف والمذرور / نبات بعد
  استخدام البيكس ورثًا. وقد كانت هذه النسبة مماثلة بالنسبة لمحمول البيكس تحت
  ظروف نباتات القطن المزروعة بعد برسينم أو بعد بور. ومع ذلك فقد انخفض عدد
  الورقة النادرة والنسجية النادرة للوزن الساقط مماثلاً باستخدام معاملات البيكس
  المختلفة.

- متوسط وزن اللوز وعامل المذرة (وزن 100 بذر) بعد الفوز المتقطع ومحصول
  القطن الزهري قد زاد بنسبة ملحوظة بعد الري مع أطوال النباتات المتميزة وزيادة
  مماثلة بعد استخدام البيكس ورثًا. لم يتفاوت معدل الفوز والأطراف الشمالي، ومتواضع وزن الفوز
  ونسبة العقدة والتمكير في الحصول على مجموعات البيكس.

- أما بالنسبة لاستخدام الأنوك رشًا فقد أدى إلى زيادة كل من مساحة الأوراق وعدد الفوز
  والوزن الجاف للساق والأطراف وزيادة معنوية في كلا الاستجابتين تحت الدراسة
  بعد بريسسم أو بعد بور. وقد ربط أن الأنوك أيضًا إلى زيادة ملحوظة للوزن البذور (وزن
  100 بذر) بعد الفوز المتقطع ومحصول القطن وعامل المذرة ونسبة الشجرة / زوايا معنوية
  بالنسبة للمقارنة، ولم يكن الأنوك تأثيراً معنوية على صفة التكرر في
  الخصائص.