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EFFECTS OF APPLICATION TIMES AND RATES OF PIX ON GROWTH, YIELD, EARLINESS AND CERTAIN FIBER TRAITS OF COTTON (G. hirsutum L.) UNDER DIFFERENT LEVELS OF IRRIGATION AND NITROGEN IN THE EGE REGION OF TURKEY*

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SUMMARY

In order to study the effects of three rates of Pix (control, 50 and 75 g a.i./ha) and two Pix application times (at the beginning and the peak of the flowering) on vegetative growth, seed cotton yield, earliness and certain fiber traits of cotton under two irrigation levels (three and six irrigations) and two rates of nitrogen (75 and 150 Kg N/ha) a two-year experiment was conducted in İzmir. The application of higher irrigation and nitrogen levels caused an abnormal and vegetative growth. But both rates of Pix (50 and 75 g a.i./ha) caused a reduction of height ranged from 3.0 % to 21.3 % and inhibited excessive growth of the plants. However, the difference between these two Pix rates was not significant. The Pix applications made at the beginning of the flowering were more effective and reduced the plant height more than those of made at the peak of the flowering. Additionally, Pix increased the earliness of cotton significantly by 2.0 % to 15.2 % when the applications were made at the beginning of the flowering. The effects of Pix applications on the seed cotton yield, some components of the yield and the fiber traits were insignificant.

The higher irrigation level (six irrigations) increased the plant height, the number of bolls per plant, the seed cotton yield and the seed index, but it reduced the earliness and lint percentage.

ÖZET

Ege Bölgesi Koşullarında Farklı Sulama ve Azot Seviyelerinde Pix Dozları ve Uygulama Zamanının Pamuğun Gelişmesi, Verimi, Erkenciliği ve Bazı Lif Özelliklerine Etkileri

Farklı iki suluma seviyesi (3 ve 6 kez sulama) ve iki azot dozu (75 ve 150 Kg N/ha) koşullarında üç Pix dozu (kontrol, 50 ve 75 g aktif madde/ha) ve iki Pix uy-

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gulama zamanının (çiçeklenme başlangıcı ve çiçeklenme doruğu) pamuk bitkisinin vejetatif gelişmesi, verimi, erkenciliği ve bazı lif özellikleri üzerine etkisini araştırmak için iki yıllık bir deneme yapılmıştır. Denemeler 1981 ve 1982 yıllarında İzmir'de yürütülmüştür. Yüksek derecede su ve azot uygulaması pamukta anormal gelişmeye sebep olmuştur. Ancak her iki Pix dozu da (50 ve 75 g aktif madde/ha) ana gövde internodilerini kısaltarak bitki boyunu % 3.0-% 21.3 oranında azaltmış ve anormal vejetatif gelişmeyi durdurmuştur. Ancak bu iki Pix dozu arasındaki farklılık önemli bulunmamıştır. Çiçeklenme başında yapılan Pix uygulamaları, çiçeklenme doruğunda yapılan uygulamalara göre, bitki boyunda daha yüksek oranda kısalmalara sebep olmuştur. Öte yandan Pix, % 2.0 ile % 15.2 arasında değişen fakat önemli düzeyde bir erkencilik sağlamıştır. Pix'in kütlü verimi, bazı verim komponentleri ve incelenen lif özellikleri üzerine etkisi önemli bulunmamıştır.

Yüksek sulama seviyesi (6 kez sulama) bitki boyunu, bitki başına koza sayısını, kütlü verimini ve tohum indeksini artırmış fakat erkenciliği ve lif randımanını azaltmıştır.

INTRODUCTION

Nitrogen and water are the most important factors influencing the yield in cotton (Aydemir, 1968; Cardosier, 1957; Emiroğlu, 1970; İncekara, 1971). They increase the yield enhancing vegetative development and producing more squares, flowers and bolls. However, water and nitrogen applied intimely and excessively cause an abnormal growth and the plants mature very lately (Aydemir, 1968; İncekara, 1971).

In the Ege region of Turkey early rainfalls and low temperatures during cotton harvesting in the fall reduce the yield and quality of cotton (Turan, 1979). These unfavorable conditions also extend the harvesting period until mid-winter in some years. In such years excessive nitrogen and water applications double these unfavorable conditions. Conversely, high temperatures with more soil nutritients and abundant moisture at the harvesting time induce the second growth of cotton producing new flowers and green bolls. This prepares a good medium for late-season insects and diseases which damage the cotton plants in the following growing season. Therefore, the regulation of excessive growth in cotton is a great problem limiting the extension of cotton growing area in this region (Turan, 1979).

The main objective of this study is to determine the effects of different rates and application times of Pix on yield, vegetative growth, earliness and certain fiber traits of cotton under higher levels of irrigation and nitrogen.

Chemical and biological features of Pix, which is a sistemic plant growth retardant, were summarized in several reports (Jung et al., 1975; Pix, 1979; Schott ve Schroeder, 1979).

Several researchers have pointed out that Pix reduced plant height and inhibited vegetative growth shortening the length of the internodes of main stem and lateral branches in cotton. Pix application also resulted in a darker green coloration and thickening of the plant leaves (Follin, 1979; Gausman et al, 1978 b; Pix, 1979; Schott ve Schroeder, 1979; Willard et al., 1976; 1977 a and 1977 b). Additionally, Jung et al. (1975) have reported that Pix has also a strong regulating effect in several crops.

Pix rates recommended for cotton generally ranged between 20 and 100 g a.i./ha. However, single and split applications have been used depending on the growing conditions (Adana B. Pamuk Arş. Enst., 1981; Chambers and Mc Cutchen, 1977; Follin, 1979; Kerr and Royster, 1977; Loose, 1979; Nazilli B. Pamuk Arş. Enst., 1981; Schott ve Schroeder, 1979; Willard et al., 1977 a). Pix application times also varied greatly from the squaring to the end of the flowering (Erwin et al., 1979; Follin, 1979; Thomas, 1964; Willard et al., 1977 a; Wolfenbarger and Davis, 1976). However, it was mostly accepted that the most suitable time was at the beginning of the flowering time. When any plant growth retardant was sprayed at the earlier stages of the growth it reduced the yield significantly and dwarfed the plants (Emiroğlu and Turan, 1975). But the later applications did not show any inhibiting effect enough (Adana B. Pamuk Arş. Enst., 1981; Nazilli B. Pamuk Arş. Enst., 1981).

There were inconsistent result in literature whether Pix increased the yield or not. Several researchers have pointed out that the increases in yield varied from year to year (Erwin et al., 1979; Gausman et al., 1978 a; Namken and Gausman, 1978; Willard et al., 1976). Earlier studies in Turkey showed that Pix had not affected the yield (Adana B. Pamuk Arş. Enst., 1981; Nazilli B. Pamuk Arş. Enst., 1981). But Gausman et al. (1978 a, 1978 b, 1979 a, 1979 b, 1979 c and 1980) believed that the yield could be increased in the near future, due to favorable changes in mesophylle structure and in photosynthetic activities of Pix-treated leaves. On the other hand, Pix has not made any effect on fiber traits (Erwin et al., 1979; Follin, 1979).

Several researchers have also pointed out that Pix increased the earliness of cotton (Follin, 1979; Loose, 1979; Willard et al., 1977 a). The studies made in Turkey showed that an increase in earliness had been observed by 8 %.

MATERIAL and METHODS

Material

A commercial cotton cultivar, Nazilli 66-100, which is an Upland cotton selected from Coker 100A/2 in Turkey, was used in this study. It has a good yielding ability but it is a mid-late cultivar under the Ege conditions.

The experiments were conducted on a sandy-loam soil having sufficient potash and phosphorus for cotton at the Experiment Farm in İzmir in 1981 and 1982.

Methods

Two different irrigation levels, two rates of nitrogen, two application times and three rates of Pix were used as treatments in 1981. These were symbolized as follows.

Irrigation (I) : 3I : Three irrigations and 6I: Six irrigations
Nitrogen (N) : N_1 : 75 Kg N/ha and N_2 : 150 Kg N/ha
Pix application time (T): T_1 : At the beginning of the flowering
T_2 : At the peak of the flowering.
Pix rates (P) : P_0 : Control, P_1 : 50 g a.i./ha and P_2 : 75 g a.i./ha

A separate experiment for each irrigation level was conducted in 1981. A split-split plot design of experiment with four replications was used. Main plots were nitrogen rates. Sub plots and sub-subplots were Pix application times and Pix rates, respectively. The size of a sub-subplot was 11.2 m^2 at harvesting.

Same design of experiment was used in 1982, but P_2 and T_2 treatments were not taken into consideration. Therefore, two irrigation levels were consisted in main plots. Sub plots were nitrogen rates and sub-subplots were Pix rates. The size of a sub-subplot was 22.4 m^2 at harvesting. The plants were spaced 0.80 x 0.25 m in both 1981 and 1982.

About 800 tons water per hectare for each irrigation were applied. One-third of nitrogen was given during sowing and the remaining part was used with first irrigation. An aqueous solution of Pix including 0.03 percent of Sandovit was sprayed at the application times.

The plant height, the numbers of sympodial and monopodial branches, the number of bolls per plant, boll size (seed cotton weight per boll), lint percentage, seed index, seed cotton yield, first picking percentage, 2.5 % fiber length, fiber finenes and fiber strenght were measured in the trials. The statistical analysis of data was made using a computer program except the fiber traits of 1981 which were measured for only two replications.

RESULTS

Effects of Irrigation, Nitrogen, Pix and Pix Application Time on the Vegetative Growth of Cotton

Plant Height

The plant height in the trials was measured at different dates of the growth in 1981. When the Pix applications were made at the beginning of the flowering (T_1) 72 days after sowing under three irrigations, as expected, no differences in height among the treatments were noted (Fig. 1a). But both of the Pix rates began to reduce the plant height significantly up to 121st day after sowing. The Pix applications made at the peak of the flowering (T_2) 92 days after sowing were not found effective. The effects of application times and rates of Pix on the plant height for six irrigations were similar to those of three irrigations (Fig. 1 b).

Pix (P), Pix application time (T) and TxP interaction affected the final plant height significantly under both irrigation levels (Table-1a). P_1 and P_2 rates of Pix, as compared with control (P_0), caused a reduction in final plant height at three irrigations by 8.1 % and 9.4 %, respectively. But the difference between P_1 and P_2 was not significant (Table-2a). On the other hand, the reducing effects of Pix doses were different at the T_1 and T_2, due to significant TxP interaction. Thus, P_1 and P_2 treatmens sprayed at the T_1 reduced the final plant height by 12.4 % and 15.4 %, respectively. But the corresponding values of Pix doses applied at the T_2 were significantly lower than those of obtained at the T_1 (4.0 % for P_1 and 3.0 % for P_2). Similar results were also obtained under six irrigations. Therefore, P_1 and P_2 doses of Pix decreased the final plant height by 6.1 % and 8.3 %, respectively. The Pix

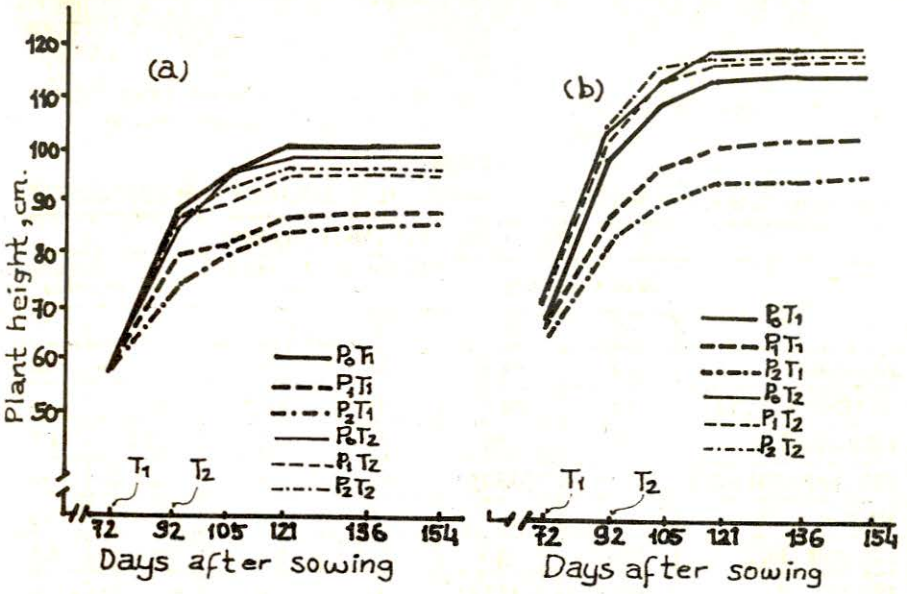

Fig.: 1
Effects of Pix and Pix application times on the plant height under three irrigations (a) and six irrigations (b) in 1981

applications were also more effective when they were sprayed at the T_1 (11.3 % for P_1 and 17.1 % for P_2).

Although there was not made any statistical analysis for the irrigation levels in 1981, it was clear that the plant height had been increased by the higher level of irrigation (Table-2a).

Because the difference between P_1 and P_2 rates of Pix was not significant and the Pix applications made at the T_2 did not affect the plant height significantly, the treatments, T_2 and P_2 were not used in the trial of 1982.

Pix was sprayed only at the beginning of the flowering (T_1) 78 days after sowing in 1982 (Fig. 2). The decreasing effect of Pix in height appeared immediately within eleven days after the application. The other behaviours of Pix were similar to those of found in 1981. In the trial of 1982 the effects of irrigation (I), Pix (P) and IxP interaction on the final plant height were found significant (Table-1b). The high level of irrigation (6I) increased the final plant height more than the low level of irrigation (3I) by 10.6 % (Table-2b). Pix (P_1), as compared with control (P_0), decreased the plant height by 15.8 %. However, the reducing effect of Pix was higher under six irrigations (21.3 %) than obtained under three irrigations (9.4 %), due to significant IxP interaction.

According to the results obtained in the trials Pix decreased the plant height significantly when it was sprayed at the beginning of the flowering (Fig. 3).

Table: 1

Results of Analysis of Variance for the Growth Characteristics in 1981 and 1982

a - Results of 1981 (Mean Squares)						
Item	Final Plant Height		Number of Monopodial Branches		Number of Sympodial Branches	
	3I	6I	3I	6I	3I	6I
BLOCKS	ns	ns	ns	ns	ns	ns
NITROGEN (N)	ns	ns	ns	3.9*	ns	ns
ERROR(E_1)	77	113	1.1	0.3	13.7	4.2
PİX APP.TIME (T)	679*	2823**	ns	ns	ns	ns
NXT	ns	ns	ns	ns	ns	ns
ERROR (E_2)	110	20	0.2	0.5	0.9	5.5
PİX (P)	401**	416**	ns	ns	ns	ns
NXP	ns	ns	ns	ns	ns	ns
TXP	159*	400**	ns	ns	ns	ns
NXTXP	ns	ns	ns	ns	ns	ns
ERROR (E_3)	20	41	0.2	0.2	10.9	1.6

b - Results of 1982 (MS)			
BLOCKS	173*	ns	ns
IRRIGATION (I)	406*	ns	ns
E_1	18	0.13	3.99
NITROGEN (N)	ns	ns	ns
IXN	ns	ns	ns
E_2	41	0.04	0.66
PIX (P)	1174**	ns	ns
IXP	250**	ns	ns
NXP	ns	ns	ns
IXNXP	ns	ns	ns
E_3	23	0.10	3.57

*, ** : Significant at the 5 % and 1 % probability levels, respectivey.
ns : Nonsignificant.

Table: 2

Effects of Nitrogen, Pix and Pix Application Time on the Vegetative Growth Characteristics of Cotton Under Two Irrigation Levels in 1981 and 1982

a - Results of 1981

Rates of nitrogen	Rates of Pix	Pix appl. time	Final plant height cm		Number of monopodial branches		Number of sympodial branches	
			3I	6I	3I	6I	3I	6I
N_1	P_0	T_1	100.3	113.7	2.3	2.5	15.0	17.8
		T_2	97.8	122.4	2.4	2.8	15.3	17.5
	P_1	T_1	83.6	105.0	2.7	2.8	14.4	17.4
		T_2	96.7	118.2	2.6	2.5	14.7	17.1
	P_2	T_1	78.4	97.8	2.7	2.5	14.0	17.0
		T_2	96.0	122.4	2.3	3.1	14.7	17.5
N_2	P_0	T_1	99.8	117.2	2.3	2.4	16.0	16.1
		T_2	100.5	118.2	2.6	2.1	19.4	16.1
	P_1	T_1	92.6	99.9	2.4	2.0	19.1	15.3
		T_2	94.1	119.1	2.3	2.5	15.7	16.7
	P_2	T_1	91.1	93.4	2.5	1.5	15.2	15.3
		T_2	96.3	118.3	2.7	2.2	15.4	15.9

LSD VALUES (5 %)

Nitrogen (N)	8.0	9.8	1.0	0.5	3.4	1.9
Pix appl. time (T)	5.4	3.1	0.3	0.5	0.7	1.7
Pix (P)	3.3	4.7	0.3	0.3	2.4	0.9
NXT	9.7	8.1	0.8	0.6	2.7	1.6
NXP	6.5	8.3	0.7	0.5	3.6	1.6
TXP	7.3	6.0	0.9	0.6	2.8	1.8
NXTXP	9.8	10.3	0.8	0.7	4.6	2.4

b - Results of 1982

Levels of irrigation	Rates of nitrogen	Rates of Pix	Final plant height cm	Number of monopodial branches	Number of sympodial branches
3I	N_1	P_0	67.3	1.3	8.9
		P_1	64.2	1.1	9.0
	N_2	P_0	73.6	1.2	9.5
		P_1	63.7	1.2	8.2
6I	N_1	P_0	82.2	0.9	9.9
		P_1	65.2	0.7	8.8
	N_2	P_0	84.1	1.2	10.3
		P_1	65.7	1.0	9.3

LSD VALUES (5 %)

Irrigation (I)	4.8	0.4	2.2
Nitrogen (N)	5.5	0.2	0.7
Pix (P)	3.7	0.3	0.8
IXN	7.8	0.2	1.0
IXP	5.2	0.3	0.8
NXP	5.2	0.3	0.8
IXNXP	7.3	0.5	1.2

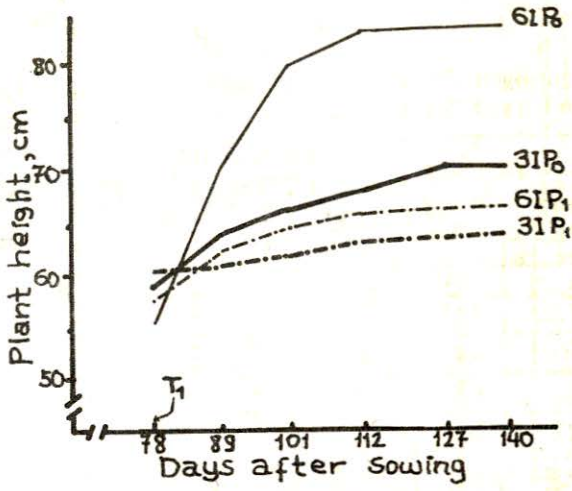

Fig.: 2
Effects of irrigation and Pix on the plant height in 1982

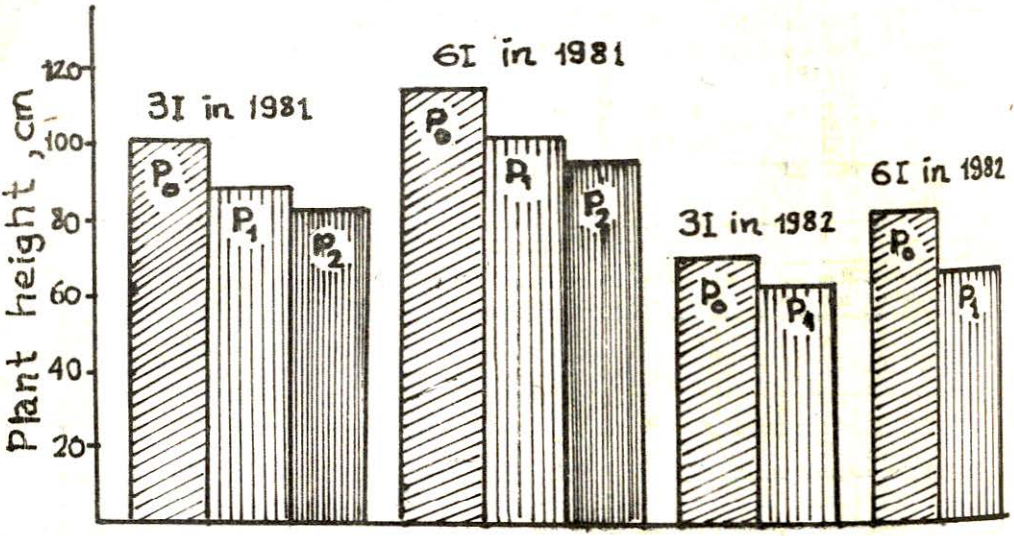

Fig.: 3
Effects of different rates of Pix on the final plant height when they were sprayed at the beginning of the flowering in 1981 and 1982

Numbers of Monopodial and Sympodial Branches

The effects of all of the treatments on the numbers of monopodial and sympodial branches were not statistically significant in both 1981 and 1982 (Table-1

and Table-2). Although, the length of the lateral branches was not measured, it was observed that the length of them was reduced by Pix.

Effects of Irrigation, Nitrogen, Pix and Pix Application Time on the Yield, Yield Components and the Fiber Traits

The results of analysis of variance for these traits were given in Table-3. But the mean values of them were presented in Table-4 and Table-5.

Boll Size

All of the treatments did not make any effect on the boll size in 1981 and 1982.

Seed Index

The high irrigation level only tended to increase the seed index values (100-seed weight) in 1981. But this effect of irrigation was significant in 1982 and the high irrigation level gave higher seed index value than the low irrigation level by 8.0 %. Additionally, there were significant effects of Pix, Pix application time and NxT interaction on the seed index under six irrigations, but they were not big enough.

Lint Percentage

The high irrigation level, as compared with the low level of irrigation, decreased the lint percentage in contrast to the seed index.

Boll Numbers per Plant

The effect of nitrogen on this trait was statistically significant at the both irrigation levels in 1981. However, the high introgen rate (N_2) at three irrigations increased the boll numbers per plant, but the low nitrogen rate at six irrigations increased this trait. Besides these findings it was also found that the high irrigation level produced more bolls per plant than the low level of irrigation by 10.3 %. In the 1982 trial Pix tended to reduce this trait slightly.

Seed Cotton Yield

All of the treatments did not make any significant effect on the seed cotton yield in 1981 and 1982. But it was of interest that the high level of irrigation tended to increase the seed cotton yield. For example, a 11.4-percent increase in seed cotton yield was ensured by the high irrigation level in both years. The seed cotton yield as well as the number of bolls per plant in 1982 lowered greatly, due to unfavorable climatic conditions and to heavily boll rot attack.

Fiber Traits

A statistical analysis was not made for three fiber traits (2.5 % fiber length, fiber fineness and fiber strenght) in 1981. But it was seen that there were no significant differences among the treatments. The statistical analysis of 1982 data confirmed this result.

Table: 3

Results of Analysis of Variance for Different Agronomic Traits, Seed Cotton Yield, First Picking Percentage and Three Fiber Traits in 1981 and 1982

a - Results of 1981 (MS)

ITEM	Boll size		Seed index		Lint percentage		Boll number per plant		Seed cotton yield		First picking percentage		2.5 % fiber length	Fiber fineness	Fiber strenght
	3I	6I	3I	6I	3I	6I	3I	6I	3I	6I	3I	6I			
BLOCKS	ns	ns	ns	ns	ns	ns	80.3**	65.2*	ns	ns	ns	ns	—	—	—
NITROGEN (N)	ns	ns	ns	ns	ns	ns	23.7**	99.2*	ns	ns	ns	ns	—	—	—
E_1	0.08	0.01	0.5	0.2	0.4	0.5	1.3	6.4	8899	13430	156	31	—	—	—
PIX APPL.TIME(T)	ns	ns	ns	2.8**	ns	ns	ns	ns	ns	ns	ns	ns	—	—	—
NXT	ns	ns	ns	0.8**	ns	ns	ns	ns	ns	ns	ns	ns	—	—	—
E_2	0.11	0.06	0.3	0.1	0.2	0.4	12.2	12.2	2094	2726	140	66	—	—	—
PIX (P)	ns	ns	ns	1.4*	ns	2.7*	ns	ns	ns	ns	ns	ns	—	—	—
NXP	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	—	—	—
TXP	ns	ns	ns	1.2*	3.0*	ns	ns	ns	5086*	ns	ns	ns	—	—	—
NXTXP	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	—	—	—
E_3	0.09	0.16	0.3	0.3	0.7	0.5	6.1	8.3	1106	1043	69	40	—	—	—

b - Results of 1982 (MS)

BLOCKS	ns		0.66*		ns		ns		ns		ns		ns	ns	ns
IRRIGATION (I)	ns		5.95**		ns		ns		ns		3076**		ns	ns	ns
E_1	0.13		0.04		0.7		8.9		3143		100		2.72	0.08	1.7
NITROGEN (N)	ns		ns		ns		ns		ns		ns		ns	ns	23.7*
IXN	ns		ns		ns		ns		ns		ns		ns	ns	ns
E_2	0.12		0.29		1.3		4.6		3486		45		4.10	0.06	1.9
PIX (P)	ns		ns		ns		25.9*		ns		421*		ns	ns	ns
IXP	1.03*		ns		ns		ns		ns		ns		ns	ns	ns
NXP	ns		ns		ns		ns		ns		ns		ns	ns	ns
IXNXP	ns		ns		ns		ns		ns		ns		ns	ns	ns
E_3	0.14		0.13		0.5		2.8		1243		70		1.15	0.07	8.6

*, ** : Significant at the 5 % and 1 % probability levels, respectively.
ns : Nonsignificant.

Table: 4

Effects of Nitrogen, Pix and Pix Application Time on the Seed Cotton Yield, Certain Yield Components, First Picking Percentage and Three Traits of Cotton Under Two Irrigation Levels in 1981.

Rates of nitrog.	Rates of Pix	Pix appl. time	Boll size g		Seed index g		Lint percentage		Boll number per plant		Seed cotton yield KG/ha		First picking percentage		2.5 % Fiber length mm		Fiber fineness mic./ind.		Fiber strenght Pressl.	
			3I	6I	3I	6I	3I	6I	3I	6I	3I	6I	3I	6I	3I	6I	3I	6I	3I	6I
N_1	P_0	T_1	5.9	5.9	10.9	11.1	42.3	41.1	22.2	27.8	3836	4453	74.5	69.0	30.3	31.7	4.4	4.2	84.1	81.9
		T_2	5.8	5.8	10.7	11.4	41.4	41.5	23.0	27.3	3924	4152	68.9	70.5	30.3	31.7	4.4	4.1	86.6	85.2
	P_1	T_1	6.0	6.0	11.5	12.5	41.8	40.8	23.4	28.3	3522	4364	76.4	77.5	30.9	31.1	4.2	3.9	84.0	85.2
		T_2	6.0	5.9	10.9	11.7	41.9	40.4	23.6	25.7	3958	4286	70.2	70.5	30.5	31.5	4.4	4.3	77.0	81.2
	P_2	T_1	6.1	6.1	11.4	11.8	41.2	40.3	21.0	27.1	3567	4799	77.5	69.5	32.0	31.8	4.6	4.3	85.1	77.9
		T_2	5.8	5.9	10.9	11.6	41.8	40.6	22.0	26.5	4337	4085	74.2	68.2	31.5	30.2	4.4	4.1	79.7	76.4
N_2	P_0	T_1	5.9	6.3	10.9	11.8	42.6	41.6	24.2	20.9	4103	4330	73.8	71.1	30.9	31.7	4.4	4.3	77.4	77.2
		T_2	6.0	6.3	10.8	11.5	41.9	40.5	24.1	24.4	3995	4453	74.6	71.8	29.3	31.2	4.5	4.3	84.6	77.5
	P_1	T_1	5.8	5.8	10.9	12.5	41.2	40.4	24.8	27.1	4312	4949	77.8	77.1	31.0	31.7	4.1	4.3	82.5	80.8
		T_2	5.8	5.9	11.0	11.3	41.1	40.9	24.2	26.0	4216	4553	77.7	76.4	30.5	32.2	4.2	4.2	78.2	82.9
	P_2	T_1	5.9	5.9	11.4	11.8	41.3	40.7	22.7	22.0	3748	4375	83.1	74.6	31.2	31.3	4.4	4.2	87.6	80.9
		T_2	5.7	6.2	10.9	11.0	42.5	40.4	23.7	25.1	4296	4386	74.0	76.0	29.6	31.5	4.4	4.3	83.9	77.6
LSD VALUES (5 %)																				
Nitrogen (N)			0.3	0.1	0.6	0.4	0.5	0.7	1.1	2.3	867	538	11.5	5.1	—	—	—	—	—	—
Pix.appl. time (T)			0.2	0.2	0.4	0.2	0.3	0.4	2.5	3.3	323	369	8.3	5.8	—	—	—	—	—	—
Pix (P)			0.2	0.3	0.4	0.4	0.6	0.5	1.8	2.1	243	236	6.1	4.6	—	—	—	—	—	—
NXT			0.3	0.2	0.6	0.4	0.6	0.7	2.6	3.8	741	554	12.1	7.0	—	—	—	—	—	—
NXP			0.3	0.3	0.6	0.5	0.8	0.7	2.2	2.9	443	443	10.2	6.3	—	—	—	—	—	—
TXP			0.3	0.4	0.8	0.5	0.8	0.7	2.9	3.7	391	413	9.9	7.2	—	—	—	—	—	—
NXTXP			0.4	0.5	0.8	0.7	1.0	1.0	3.7	4.7	740	606	14.3	9.6	—	—	—	—	—	—

Table: 5

Effects of Irrigation, Nitrogen and Pix on the Seed Cotton Yield, Certain Yield Components, First Picking Percentage and Three Fiber Traits in 1982.

Levels of irrigation	Rates of nitrogen	Rates of Pix	Boll size g	Seed index g	Lint percentage	Boll number per plant	Seed cotton yield KG/ha	First picking percentage	2.5% fiber length mm	Fiber fineness mic./ind.	Fiber strenght Pressl.
3I	N_1	P_0	6.6	11.2	41.0	10.4	2830	55.9	28.5	4.6	81.2
		P_1	5.9	11.1	41.2	9.7	2609	67.5	30.3	4.1	80.3
	N_2	P_0	6.1	11.5	41.9	10.1	2892	61.1	29.6	4.3	79.7
		P_1	6.0	11.6	41.9	8.3	2479	64.5	28.6	4.5	79.2
6I	N_1	P_0	6.5	12.0	42.4	12.6	2963	39.3	31.1	4.1	81.0
		P_1	6.5	12.4	43.0	10.0	2925	49.0	30.7	4.1	80.3
	N_2	P_0	6.0	11.8	41.5	13.1	2943	38.7	31.3	3.9	77.6
		P_1	6.7	12.7	42.3	11.1	3214	43.4	30.0	4.0	79.5
LSD VALUES (5 %)											
	Irrigation (I)		0.4	0.2	1.0	3.3	629	11.2	1.8	0.4	1.4
	Nitrogen (N)		0.3	0.5	1.0	1.9	509	5.8	1.8	0.2	1.2
	Pix (P)		0.3	0.3	0.5	1.3	271	6.4	0.8	0.2	2.2
	IXN		0.4	0.7	1.4	2.6	720	8.1	2.5	0.3	1.7
	IXP		0.4	0.4	0.7	1.8	383	9.1	1.2	0.3	3.2
	NXP		0.4	0.4	0.7	1.8	383	9.1	1.2	0.3	3.2
	IXNXP		0.6	0.6	1.0	2.6	542	12.9	1.7	0.4	4.5

Effects of Irrigation, Nitrogen, Pix and Pix Application Time on the Earliness of Cotton

We observed the earliness of cotton using first picking percentage in the trials. The plants were harvested very lately in 1981, due to early rainfalls. Therefore the effects of Pix and the other treatments on the earliness were not observed clearly. However, P_1 and P_2 doses of Pix increased the first picking percentage under three irrigations by 3.6 % and 5.8 %, respectively. But under six irrigations the corresponding values were 6.7 % and 2.0 %, respectively (Table-3 and Table-4). Additionally, the increasing effect of Pix on the earliness was relatively low when the Pix applications were made at the peak of the flowering. The increase of earliness by Pix application was more clear in 1982 (Table-3 and Table-5). Pix increased the first picking percentage for three and six irrigations by 12.8 % and 15.2 %, respectively. On the other hand, six irrigations reduced the first picking percentage than three irrigations by 31.6 %.

DISCUSSION

As expected, the cotton plants had a more excessive growth and the highest plant height under high levels of irrigation and nitrogen. The plants overlapped and a lodging problem occured in some plots (especially in 1981), due to the excessive growth. The application of Pix sprayed at the beginning of the flowering, however, inhibited abnormal growth reducing the internode length of main stem and lateral branches. Pix gave more compact plants than control. A darker green color and thickening of the Pix-treated plant leaves were observed within seven to nine days after the applications. On the other hand a better penetration of sun light into the Pix-treated rows and an easier air circulation were also observed.

Pix did not affect the seed cotton yield and the fiber traits. These results agreed with the early findings obtained in Turkey (Adana B. Pamuk Arş. Enst., 1981; Nazilli B. Pamuk Arş. Enst., 1981). But the high levels of irrigation and nitrogen tended to increase the seed cotton yield.

More water and nitrogen, as expected, resulted in a late maturation of cotton in the trials. However, Pix increased the earliness. The amount of increase in earliness ranged from 2.0 % to 15.2 %.

Pix may increase the efficiency of harvesting and reduce the harvesting cost. The opened bolls on the Pix-treated plants could be seen easily and harvested by hand in a shorter time than usual. Additionally, the bolls on the Pix-treated plants form more closely and this also provides an advantage during the cotton harvesting made by man power in Turkey.

During the period of this study especially in 1982 the boll rot invaded the bolls in all of the plots. But there were no significant differeneces between Pix-treated and -untreated plants in boll rot resistance.

Although more information is needed on this subject, it is possible to recommend the application of 50 g a.i. of Pix/ha at the beginning of the flowering when abnormal growth was predicted.

Pix will be helpful to increase the earliness and reduce the vegetative growth. But the application time and rate of Pix must be adjusted correctly.

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