Response to Pix of cotton varieties in Greece

T. Veloukas[1], C. Le Rumeur[2], V. Laios[3] and G. Vassiliou[3]
[1]Hellenic Cotton Board, Lamia, Greece
[2]Agrevo, Paris, France
[3]Agrevo, Hellas, Marousi, Greece

ABSTRACT

The climatic conditions in Greece, especially in the north of the country, limit crop duration. Maturing the crop early is frequently needed to avoid the risk of rain and cool temperature at the time of harvest. In these conditions it is important to secure the bottom and the first position bolls on the plants. The studies conducted in Greece during the last three years indicate that among the different techniques inducing earliness, the split use of a plant growth regulator (PGR) namely Pix, not only limits plant height but also induces early fruit set, better bottom boll production and earliness. The plant mapping technique is of great interest to ensure precise field follow up from early plant development to harvest. Preharvest mapping has given a clear indication of the plant production structure with different Pix application regimes. The best results were obtained either with three applications starting at pinhead square, i.e. 60 days after planting (DAP), then first flower (70 DAP) and 7 to 10 days later at the rate of 250, 250, 500 ml per hectare, respectively, or two applications 70 and 80 DAP at the rate of 500, 500 ml per hectare. Higher average yield (25%) and earlier maturity (one week) were obtained on two sites.

Introduction

Cotton is cultivated in Greece from South to North and the climatic conditions during the cropping season varying greatly. Crop duration is especially limited in the North, (Central Macedonia, Thrace) by low temperature during planting time, and low temperature and rain at the time of maturation and harvest (Cotton Board Report 1996). Furthermore very hot spells can occur during the months of July and August that also tend to limit plant growth and fruit setting. The need to establish and mature a crop early is obvious and the target of the study conducted during the last three years was to determine the effect of Mepiquat chloride (Pix) on plant development, production structure and maturity. Low temperatures in spring, limit the possibility of planting early (Cotton Board Report, 1996). The use of plastic film to permit earlier planting was quite frequent in the past but is becoming less popular, mainly due to cost.

Materials and Methods

The main varieties DP-20, Eva, Acala SJ2, Aria, and DP-50 were tested in for their response to Pix (mepiquat chloride 5%) at two locations Giannitsa in North Greece and Larissa in Central Greece. The application period was from the pinhead square stage to first flower. Pix rates as well as frequency are shown in Tables 1 and 2. The following parameters were assesssed on 20 plants per treatment: plant height (PHT), open bolls per position, open bolls in the base

Early flower production and early fruit retention

*Impact of sucking pests***.** Due to frequent low temperature and risk of rain at the end of the season, it is crucial to mature the crop as early as possible. It is then extremely important to avoid early pest damage. Chemical control sometimes has to be envisaged when the damage is severe .The selection of the chemicals

section (Nodes 6-10), open bolls in the middle section (Node 11-15), total percentage of open bolls. Seven assessments were carried out during the season. Plant density in the trials was 15 plants per meter of row.

Results and Discussion

Impact of Pix on Plant Height

Pix is frequently considered as a means of limiting plant height at the end of the season (more or less as a chemical pruning). This is still the case even though earlier, split applications are becoming more popular. Excessive vegetative development may be the result of numerous causes such as excessive and/or incorrect timing of fertilizer application, mainly Nitrogen and inadequate irrigation (schedule, volume).

In short season production, plant height has to be tackled *early* in order to influence growth rate as *early* as possible. Vegetative development is naturally limited. In an experiment in Thessaloniki, two varieties were followed through to harvest. It was noted that even one application 83 days after planting (DAP) had affected plant height (Table 1). Farmers often apply higher rates of Pix even later in the season.

Similar trials conducted in Larissa on DP 50, Acala SJ2 and Aria had similar results with bigger height reductions than in Thessaloniki (Table 1). This was due to a longer season, more irrigation and N fertilizer, and different varieties.

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and application rates are critical to limit the impact on beneficials. Observations made in 1997 indicated that one application of Endosulfan allowed the plants in treated plots to resume normal vegetative development with far less production delay and loss than the untreated plots.

Impact on fruit setting: The impact of split application on early boll setting has been clearly demonstrated every year. Rain and cold temperature in early October made harvest nearly impossible except on early matured fields. The treatment and the spray regime had an impact on the total number of bolls per plant and on the positioning of bolls on the plant. The earlier the application started, the greater the number of bolls on the bottom of the plant (nodes 6-10) and the number of first position bolls.

Compared with the untreated control, the application of Pix had no influence on the weight of seed cotton per boll (Table 4). The average boll weight varies according to the position of the bolls on the fruiting branches. Therefore the impact of the treatments on yield is a function of the number of bolls per position. The results shown in Table 5 confirm this observation where two Pix applications showed an average 25% yield increase over control. Similar results were reported by Johnson and Edmisten (1997). There tended to be a greater response in Acala SJ2 than in local varieties Eva and Aria.

Impact on earliness: Selective pickings made on the different regimes showed that picking could be made at least one week earlier on split applications compared to untreated control and single, late application. This one week earliness allowed harvest

to avoid late rains. (Phipps *et al.*, 1997; Oosterhuis and Steger, 1997).

Conclusions

The impact of split applications on plant height, fruit setting and earliness has been clearly demonstrated in the studies. Demonstration trials were conducted in 12 locations in the different cotton belts from North to South, confirming the benefits of the technique, especially in the north.

Plant growth regulators applied at high rates at the end of the season are mainly considered by farmers in Greece to limit plant height. Greater benefits, such as improved yield and earliness could be obtained by earlier applications.

References

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Table 1. Effect of different Pix regimes on plant height at north Greece and central Greece on a range of varieties.

Pix ml/ha	Plant height at harvest				
	North Greece		Central Greece		
	DP20	Eva	DP50	Acala SJ2	Aria
0/0/0	85.2	94.8	112.2	119.6	109.4
0/0/1000	79.1	88.4	93.7	103.4	96.2
0/500/500	77.1	86.3	83.8	93.6	87.1
250/250/500	78.7	85.0	77.2	85.8	79.3

Table 2. North Greece . Average number of open bolls per node, per plant.

Cultivar	Pix Regime	Open bolls Nodes 6-10	Open bolls Nodes 11-15	Total Open bolls	Open bolls P1	Open bolls P2
DP 20	Control	1.7	2.4	4.1	1.8	2.3
	1 application	2.5	3.1	5.6	3.2	2.4
	2 applications	3.6	2.1	5.7	4.5	1.2
	3 applications	4.5	1.4	5.9	4.7	1.2
Eva	Control	2.7	2.6	5.3	2.2	3.1
	1 application	3.6	2.7	6.3	3.4	2.9
	2 applications	4.8	2.4	7.2	4.9	2.3
	3 applications	5.2	2.1	7.3	5.6	1.7

Nodes refer to mainstem nodes, numbered from the bottom of a plant.
P1 and P2 refer to first and second positions respectively on a fruiting branch.

Table 3. Effect of the different Pix regimes at 1 litre per hectare on boll size of DP20 in north Greece.

	Seed cotton gm/boll P1	*Seed cotton gm/boll P2*
Control	6.1	4.6
1 application	6.1	3.6
2 applications	6.2	3.5
3 applications	6.1	3.8

Table 4. Yield of seed cotton per plant (grams).

	Gianitsa		*Larissa*			
	DP20	Eva	Acala SJ2	Aria	DP50	mean
Control	21.3	33.8	39.5	42.2	41.1	35.6
1 application	26.5	36.3	44.8	43.4	38.0	37.8
2 applications	34.5	42.5	52.8	45.6	4635	44.4
3 applications	34.9	38.5	-	-	-	-