

FINAL REPORT TO COTTON RESEARCH COUNCIL**Project Number:** DAN 40L**Project Title:** EVALUATION OF PIX ON COTTON

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Objective: Instigate research into application strategies for Pix on cotton in Australia and compare results with similar experiments from California. Of particular interest was the recent discovery that multiple applications of Pix gave superior yield results compared with a single application.

Summary of results and benefits:

Dr W L Weir, a farm adviser with the University of California for the past 21 years, spent his sabbatical at Narrabri for 6 months from November 1988. Dr Weir has been involved in an extensive research program with Pix on cotton in California for the past 8 years. His involvement enabled a rapid up-to-date research program to be instigated in Australia. Pix experiments were located adjacent to some ACCT (Australian Cotton Cultivar Trial) sites. In this way, planting and harvesting equipment were used on both projects. In addition, larger and more detailed experiments were located on a site near the Research Station.

The growth regulator Pix (mepiquat chloride) has become a popular treatment on cotton. The role of the chemical is to restrict internode extension so that excessive vegetative growth is minimised. Research is needed to help decide which crops require spraying and particularly rates; timing and cultivar sensitivity. The chemical is relatively expensive, but potential benefits justify its use, at least on rank crops.

An overall yield increase of 6% was obtained with Pix in five experiments when applied within three weeks of flowering. The preferred application timing was at flowering. Plant height was reduced by 6 to 11 cm. There were trends for a greater set of lower bolls with Pix, but concomitant reductions in boll size cancelled those benefits and all treatments had similar maturity. There was no benefit from multiple applications of Pix over a single application.

Applications late in boll filling had no effect.

A detailed report is appended.

Detailed results

Seven Mepiquat chloride (Pix) experiments were conducted in NSW during the 1988-89 cotton growing season to test a new approach to application of growth regulators. In some areas in the USA, split applications of Pix have given better yield results than the traditional single application. Label recommendations in the USA have been changed to accommodate the new research findings.

Our objectives were to test Pix in various cotton growing areas. Rates of Pix ranged from 450 ml/ha to 2340 ml/ha, sprayed in multiple or single applications by hand sprayer, ground rig or aircraft. Treatments included multiple applications at early squaring, flowering and ten days after flowering. In the following Tables, these treatments are abbreviated as for example 150 x 3, meaning 150 ml/ha applied at three growth stages. All plots were machine harvested.

Table 1. Details of experiments.

Location	Cultivar	Timing	Method	Plot size (m)
Narrabri	Siokra	early	ground rig	8 x 620
Narrabri	Sicala	early	ground rig	8 x 20
Breeza	Siokra	early	hand spray	3 x 14
Moree	Siokra	mid	hand spray	3 x 14
Boggabilla	D P 90	mid	hand spray	3 x 14
Narrabri	Siokra	late	aircraft	120 x 600
Narrabri	Siokra	late	aircraft	120 x 600

Plant mapping

Plant mapping revealed that most applications of Pix, except the lowest rate of 150 ml/ha applied three times, resulted in more bolls set and/or retained on the first 8 mainstem nodes. There were from 3 to 5 bolls per plant with Pix compared to 2 bolls per plant in the untreated control. Conversely, there were significantly more bolls on nodes 13 and above (6 to 8 bolls per plant) on plants which received no Pix. Very high rates of Pix (1170 ml/ha applied twice) gave the fewest total number of bolls and fewest bolls on nodes 13 and above. Table 3 summarises these data.

Plant mapping on treatments with late application of Pix showed no significant differences between treatment means in any of the comparisons on these experiments. It is not surprising that Pix was unable to effect boll numbers when it was applied after plants cut-out and bolls had begun to open. Pix applied at this stage of growth might have the effect of reducing internode lengths in the top few centimeters of the plants or eliminating some of the squares and flowers above the last open boll. Late applications might also aid in conditioning the crop for defoliation. However, none of these possibilities were evident in these studies.

Table 3. Percentage of total bolls on the lower 8 nodes

Treatment	Application before or at flowering			Application within 3 weeks of flowering			Mean
	Narrabri Siokra	Narrabri Sicala	Breeze Siokra	Moree Siokra	Boggabilla DP90		
150x3	14	-	-	-	-	-	-
300x3	25	-	-	-	-	-	-
600x1	21	39	30	27	13	26	
600x2	20	-	-	-	-	-	-
1200x1	20	40	27	19	21	25	
1200x2	29	-	-	-	-	-	-
Control	13	35	13	19	16	19	

Summary and conclusions

There was an overall average yield increase of 6% with the 600 or 1200 ml/ha Pix treatment across the sites sprayed within 10 days of first flower. At average yield levels of 6.6 bales/ha, this small percentage yield increase is worth about \$150/ha, certainly economically attractive. The small percentage yield increase poses a problem for research: a large number of replicates (about 8) and low errors are needed to show statistical significance. It may be no coincidence that the 6% yield increase is the same as found in California: Pix alone will not take a 5 bale/ha crop to 7 bales/ha.

For the sites in these experiments:

- * The best timing was close to flowering. Split applications require further research; recent results from California show the benefits of split applications of Pix are most evident with narrow rows.
- * The most economical rate was 600 ml/ha.
- * It was expected that some cultivars may be more responsive to Pix. We need to do further research on this topic.
- * The 1988/89 season was not conducive to producing tall rank crops. These experiments need to be repeated in other seasons to confirm the trends obtained.

Acknowledgements

We are very grateful for the cooperation and assistance of a number of people who helped in various ways to make this research possible. The use of growers' land and harvesters were invaluable to these studies and we hope all growers find this research helpful in their future use of growth regulators.