

# Using Pix on UNR cotton

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There is significant industry interest in the development of ultra-narrow row (UNR) cotton production systems in Australia. Recent interest in UNR has focused on high input, high yield systems but the UNR concept was originally conceived for low input systems in areas where growth was limited by rainfall, season length or temperature.

In theory, if cotton is planted in ultra-narrow rows (less than 40 cm apart), the time to crop maturity would be reduced, as the increased plant density means fewer bolls per plant need to be produced to gain comparable yield to conventionally spaced cotton. This theory has been difficult to achieve consistently in UNR trials in Australia and the US.

Advances in precision planting and harvesting equipment, as well as new traits in cotton varieties, have renewed interest in UNR. Information on the growth and development of UNR cotton is needed to assess its potential as an alternative to conventionally spaced cotton.

Detailed experiments in 2001–02 and 2002–03 comparing UNR and conventionally spaced cotton in Hillston, Breeza and Narrabri indicated no statistically significant differences in yield, maturity or fibre quality compared to existing production practices. But numerically higher yield and boll numbers in UNR systems suggest that there is some potential, and new management options need to be explored to optimise this system.

The use of Pix as a means of controlling growth in UNR is a popular management option. Most trials comparing UNR crops and conventionally spaced crops have used different Pix strategies for each row spacing. This means direct comparisons of the effects of Pix between UNR and conventionally spaced crops are difficult.

It is important to understand how UNR crops respond to growth regulators in order to tailor management. So we compared the effects of Pix on both UNR and conventionally spaced cotton at Hillston over the 2003–04 cotton season.

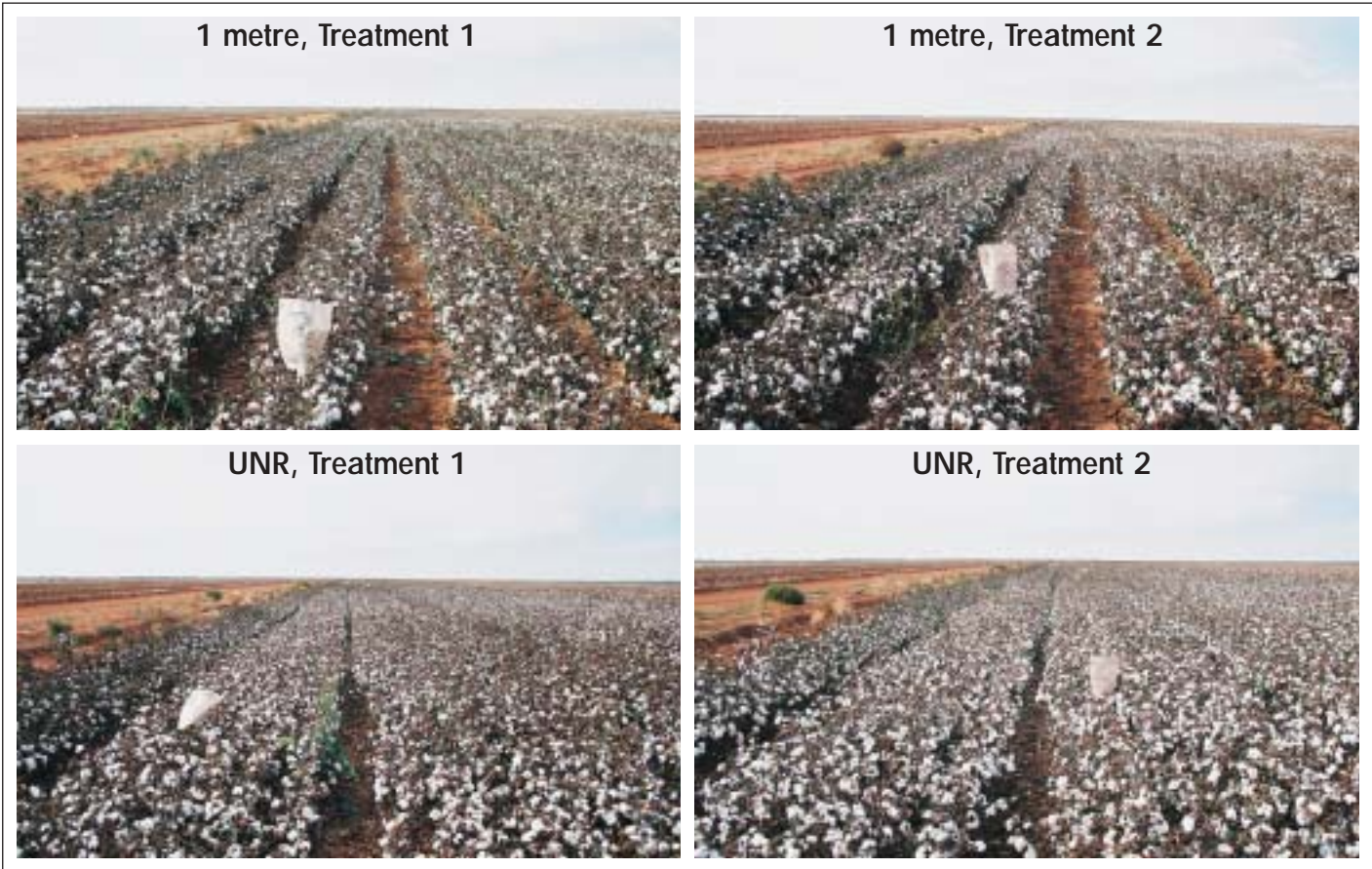
## The experiment

The experiment was grown at Merrowie Station (Twynam Pastoral Co). We compared UNR and conventionally spaced cotton with two Pix treatments.

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The UNR/Pix trial site.



Crop at maturity for each treatment in an experiment at “Merrowie” Hillston 2003–04. [Photos: Evan Brown]

**TABLE 1: Summary of results from the row spacing Pix experiment at Merrowie, 2003–04**

| Variable                                  | One metre |          | UNR      |          | Differences?             |
|---|-----------|----------|----------|----------|--------------------------|
|   | Treat.1   | Treat. 2 | Treat. 1 | Treat. 2 |                          |
| Handpicked lint yield (g/m <sup>2</sup> ) | 220       | 208      | 230      | 242      | No difference            |
| Boll size (g/boll)                        | 4.8       | 4.5      | 4.3      | 4.1      | UNR <; Pix Treatment 1 > |
| Number of bolls/m <sup>2</sup>            | 117       | 116      | 135      | 149      | UNR >                    |
| Days to 60% maturity                      | 166       | 166      | 168      | 171      | No difference            |
| Length of fibre (inches)                  | 1.14      | 1.14     | 1.16     | 1.14     | No difference            |
| Micronaire                                | 4.6       | 4.7      | 4.4      | 4.4      | No difference            |

Significant difference indicated by UNR > or < (UNR higher or lower than one metre rows) and Pix Treatment 1 > or < (Treatment 1 higher or lower than treatment 2).

**TABLE 2: Results of final plant maps from the row spacing Pix trial at Merrowie, 2003–04**

| Variable                       | One metre |          | UNR      |          | Differences?  |
|--------------------------------|-----------|----------|----------|----------|---------------|
|                                | Treat.1   | Treat. 2 | Treat. 1 | Treat. 2 |               |
| Final height                   | 64.7      | 57.9     | 49.0     | 49.3     | UNR <         |
| Final nodes                    | 19.1      | 19.3     | 17.8     | 18.8     | UNR <         |
| Total fruit per plant          | 8.78      | 8.3      | 5.54     | 5.71     | UNR <         |
| Total fruiting Sites per plant | 12.20     | 13.05    | 9.04     | 10.25    | UNR <         |
| Total retention %              | 67.9      | 61.4     | 61.6     | 54.1     | No difference |
| 1st position retention %       | 55.7      | 50.2     | 41.3     | 38.8     | UNR <         |
| Ratio of 1st position fruit %  | 66.6      | 64.5     | 78.9     | 74.0     | UNR >         |

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Pix treatment 1 had three applications of Pix — an early application on December 12 around first square (600 ml/ha); the second on December 22 (300 ml/ha); and a ‘cut-out’ application on January 19, 2004 (1.5 L/ha). Pix treatment 2 did not have the early application on December 12, 2003.

The experiment was sown using Sicala V-3RRi on October 14 and watered up on October 16. The ultra-narrow rows were 0.25 metres apart and conventionally spaced plots one metre apart. All plots were sown on two metre beds with 12 plants per linear metre. A randomised complete block design with four replicates was used.

Standard on-farm sowing and crop management practices were used. There were nine irrigations and seven pesticide applications. The crop was defoliated on April 20, 2004.

At the end of the season crop maturity (60 per cent bolls open) and yield were determined from weekly hand picks as the design did not enable machine harvest (UNR yields do not take into account any differences in turnout).

Fibre quality measurements on ginned

lint samples were performed using a high volume instrument (HVI) to obtain fibre length and micronaire. Final fruit distribution was determined by plant maps.

## RESULTS

There were no differences in yield or maturity between the UNR and one metre row crops or between the Pix treatments (Table 1). The effects of Pix were the same regardless of row spacing (no interactions).

The only significant difference between the Pix treatments was an increase in boll size. When comparing yield components in UNR and one metre row spacings, the only significant difference was smaller boll size and higher boll numbers in the UNR crop.

The lack of a significant difference in yield across the Pix and row spacing treatments was due to the significant linear trend for higher boll numbers when boll size was reduced.

The final plant maps showed that the extra early Pix application (Treatment 1) had no effect on plant height or nodes or fruit distribution (Table 2). But plants in the UNR row spacing were shorter and had fewer nodes (and fewer fruiting sites) than one metre spacings.

No differences in time to maturity were observed in the UNR crop or the Pix treatments. A smaller plant with fewer bolls would be expected to set and mature fruit earlier.

However, because the UNR crop had significantly lower first position retention, early fruit were lost and so the UNR plants needed to compensate later. Because of the smaller size of the plant, the UNR plant does not have the same ability to develop 2nd or 3rd position fruit as in one metre spacings.

If those bolls are shed in a UNR crop, the plant replaces them later on first positions higher in the plant, whereas a larger more branched plant in a one metre row crop may develop 2nd or 3rd position fruit instead (76 per cent of bolls 1st position in UNR plants compared with only 65 per cent in the one metre row crop).

Retention of early first position bolls is therefore very important to avoid delaying maturity. Other experiments looking at UNR boll distribution in more detail support these outcomes.

High early fruit shedding in UNR is most likely due to low light levels resulting from early canopy closure. Although light interception was not measured in this experiment, our other experiments have shown this to be the case.

This experiment showed that although there are differences in the growth and fruit distribution of UNR plants compared with plants in one metre row spacings, this does not result in any major differences in yield and maturity.

There were no maturity or yield benefits in early Pix applications in this experiment and any response to Pix was similar in both row spacings.

A similar experiment in Narrabri also found no significant yield or maturity differences between row spacings with applications of Pix. But analyses looking at a number of experiments over a few seasons have indicated there may be some yield benefit in UNR compared with one

metre spacing.

Further research on how the crop develops and experiments to manipulate the crop through narrow row systems and plant population may allow us to gain better yield or maturity benefits. Management options such as high fruit retention (Bollgard II), water management and nutrition need to be considered as part of these systems. Pix did not promote the benefits expected by many users.

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