

Agronomic management under centre pivot and lateral move machines

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In recent years the installation of Centre Pivot and Lateral Move (CP&LM) irrigation machines with system capacities large enough to satisfy peak cotton water requirements has become more prevalent. This is an improvement on many older installations, where system capacity was often in the range of 6–10 mm per day (rather than 12–14 mm per day).

These older machines were unable to meet peak summer crop requirements and were often started at the beginning of the season and stopped only for significant rainfall events, if at all. An inability to fully replenish the crop root zone saw a gradual decline in available soil moisture during the peak season and reduced plant vegetative production.

New machines that are able to supply



Most growers tend to operate their machines at the 'wet-end' of the scale.

the peak crop water requirements do not have these same limitations. But most growers tend to operate their machines at

the 'wet end' of the available soil moisture scale. Often this is due to a perceived 56 ▷

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inability for these machines to 'catch up' during periods of high water use, or to minimise risk in case of machine failure.

The result of this management strategy is that cotton grown under high capacity CP&LM machines is usually supplied with sufficient water, and crops usually have high vegetative growth.

Managing crop growth under these machines to ensure an appropriate balance between vegetative and reproductive growth can therefore become very important.

THE AUSCOTT GWYDIR EXPERIENCE

Agronomic management has certainly been an integral component of the learning curve experienced by the management team at Auscott Midkin, Moree, following the installation of their first lateral move machine in 2002.

2002-03 season

In the first season (2002-03), over 4.5 litres per hectare of Pix was applied to a late planted cotton crop in an attempt to keep excessive vegetative growth in

check. The crop still ended up quite rank and over 1.2 metres in height.

Towards the end of January in that first season, 2.5 litres per hectare of Pix had already been applied, even though 30 per cent less water had been applied than to their furrow fields. The typical irrigation application strategy was to apply 20-25 mm per pass. Auscott staff and agronomists were concerned about the level of rank growth experienced.

2003-04 season

In the second season (2003-04), some 2,4-D damage and a failed early pesticide spray caused problems with fruit retention. Crop growth again ran away compounded by this lack of retention as well as the readily accessible fertigated nitrogen.

Again 3.5 to 4.0 litres per hectare of Pix were used heavy and early, and this was still not enough.

After that season, senior agronomist Tim Richards could see that a different approach was needed. "The crop got too big from too much water and highly effective nitrogen fertigations. We hit it hard and early with mepiquat chloride and it

still got too big. We will certainly be growing a short variety next year."

Total irrigation water applied in 2003-04 was around 4.5 megalitres per hectare for the whole season, which again represented a water saving of 30 per cent compared to adjacent furrow irrigated fields. Recommendations for the following season were to ensure a determinant variety was used, and to ensure that the Pix rate used was early and heavy.

2004-05 season

In the 2004-05 season, an additional two lateral moves were installed and varieties such as Sicala 71 BR and Sicot 60 BR were planted. Yields averaged around 10.3 bales per hectare, similar to the farm average. The previous rank growth issues were drastically reduced with the Bollgard varieties and Pix requirements were correspondingly much less. The total application of Pix was only slightly higher than furrow fields with the difference due to slightly higher early season applications.

2005-06 season

The current season (2005-06), the fourth season the Auscott Gwydir staff



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Laterals & Pivots Pump Stations



have been using the machines, was one of the hottest on record (see inset). These hot conditions did produce some adverse effects on the crop, although Tim suggests that these were related to management.

Again Bollgard varieties were grown (71BR/71B) with fantastic early season growth due to good spring rainfall. This crop was planted into the standing stubble from a sacrificed wheat crop, so soil moisture at planting was very low.

Enough water had been applied to just seal cracks to allow planting. Unfortunately early season Pix was applied just as the hot weather struck before Christmas, and at this stage the bottom of the soil profile had still not seen significant water.

Tim suggests that if they had paid more attention to building the soil moisture throughout the profile, they would have had no problems keeping up to the crop, even in this extremely hot year, with a system capacity of 13 mm per day. He suggests that they would have no problems starting with an empty profile providing they build soil moisture so that the profile is close to full by first flower.

Their issues were compounded this

season as one of their machines had a managed system capacity of 10mm per day instead of 13mm per day due to nozzle sizing, increased area and a fallow field in the middle of the run. Tim said that this system capacity was too low for such a hot season and this machine has been modified to give 13mm per day next season. An increase in capacity of this magnitude effectively means that an additional 21mm of water can be applied every week.

The experiences over the past four years have seen Auscott implement strategies such as early season soil moisture control and selection of Bollgard varieties to control situations of excessive vegetative growth and high rates of Pix application.

To date most growers have been hesitant to consider limiting water availability to limit vegetative and potentially increase reproductive growth.

By maintaining the soil moisture deficit under these machines within a narrow band at a level somewhere between field capacity and the typical furrow irrigation refill point, it should be possible to prevent

A very hot season

The accumulated Day Degrees for Narrabri West Post Office between October 1, 2005 and February 15, 2006 were 1852.

This compares with 1610 during the same period last season, and the historical average of 1666. In fact this figure is greater than the highest historical year, 1957, which accumulated 1810 day degrees during this period.

Accordingly, the number of hot days is also high at 58. The historical average is 35 hot days and last year's total for this period was 27. Again, this season has had more hot days than the 1957 high of 53.

excess vegetative growth whilst maintaining an adequate supply of moisture for fruit production. More research is required in this area to further increase production from CP&LM machines.



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