

Germinating ideas

By CSD Extension and Development Team

Welcome to this edition of Germinating Ideas. Cotton plantings for the 2008–09 season have been boosted by an improved market outlook and favourable planting conditions in many regions. Despite this, growers and consultants continue to face limited water scenarios and consider strategies to keep their options open. With this in mind, this issue will discuss early season crop monitoring and management implications.

Monitoring early season crop development

Plant monitoring techniques aim to provide a more objective assessment of the crop's development status. Carried out at the right time, the crop's progress relative to pre-determined benchmarks and yield targets can be assessed. This enables growers and consultants to monitor how crops are tracking and adjust management to correct any problems.

Plant mapping has become a more important management tool since the introduction of Bollgard II cotton. Mapping has primarily focused on first position fruit retention as an integral part of IPM. Vari-

ous measurements can be used at different growth stages to complement fruit retention counts and give a greater understanding of crop performance.

In a young cotton crop, the number of squaring nodes plotted against day degrees can provide an early indication of any stresses in the lead up to the critical flowering period. The squaring node is identified as the one where the squares subtending leaf, the leaf that starts near the square, is fully unfurled (normally three to four nodes below the growing terminal).

Measurements can be carried out from the commencement of squaring, around 500 day degrees, through to flowering at about 800 day degrees. By the time of first flower there will be about eight squaring nodes on a well grown crop (any less may reduce yield potential). Nodes above white flower can then be monitored to assess how crops are tracking from flowering through to cut out (three to four NAWF), at about 1100 day degrees.

Figure 1 illustrates two crop scenarios, one in which the accumulation of squaring nodes is ahead of schedule (right) and the

other crop where it is behind target (left). Optimal growing conditions or a lesser number of fruiting branches could account for the first scenario.

If associated with high fruit retention, growers need to monitor early demands for water and nutrition closely. Low retention may require the vegetative growth rate (VGR) to be assessed and Pix application considered.

In the second scenario, delayed squaring may have been a consequence of factors such as chronic plant stress, seedling disease, insect or herbicide damage. In this case it is important to identify the cause of any early crop set back and consider management options to improve plant growth, particularly nutrition and water management.

The Cotton CRC Crop Development Tool (CDT) incorporates all aspects of plant monitoring including squaring nodes, fruit development, nodes above white flower and vegetative growth rate. Further information can be found on the CCC CRC website: www.cotton.crc.org.au.

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FIGURE 1: Squaring node development scenarios for crops tracking ahead or behind schedule (above or below the target line)

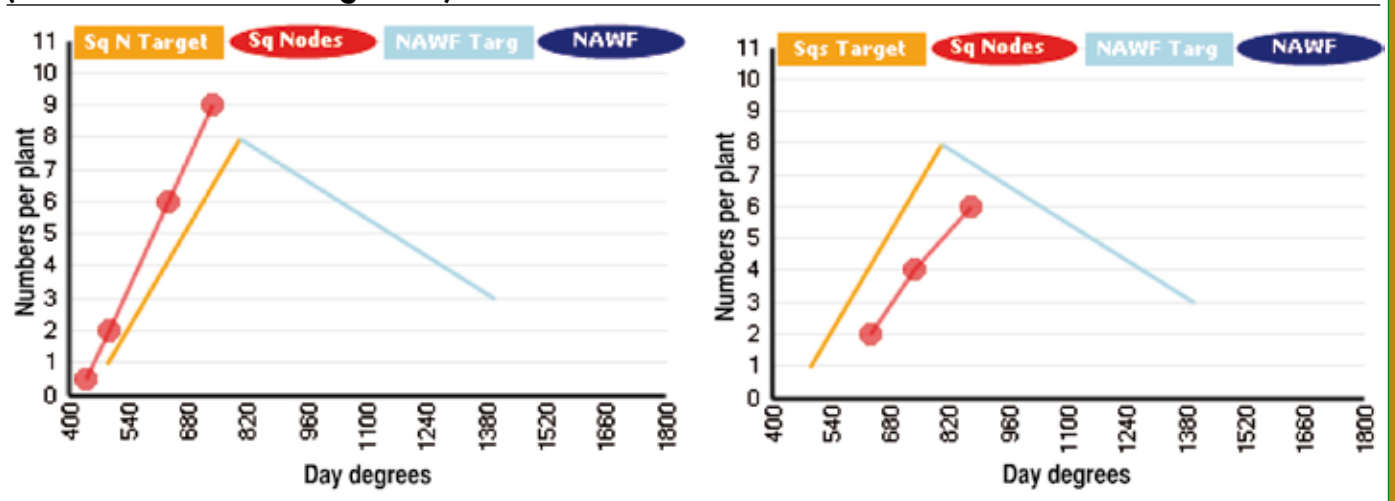
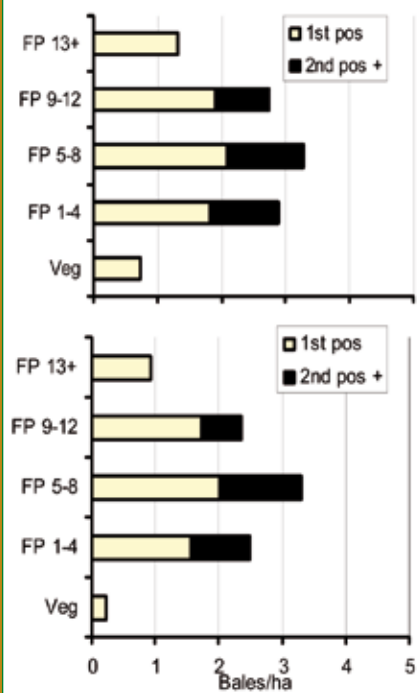


FIGURE 2: Yield of crop segments in an irrigation trial conducted by Yeates (2005–06): Top — normal irrigation; bottom — miss first irrigation



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First irrigation timing

Achieving high cotton yields requires careful water scheduling from the very first irrigation. This sets the crop up for the critical flowering and boll fill growth period. Being late with the first irrigation will place the plant under stress and adversely impact the performance of the crop.

Research conducted by Steve Yeates and Dirk Richards, CSIRO/Cotton CRC, over the past few seasons indicates that being late with the first irrigation will have a similar impact on Bollgard II and conventional cotton. Yield reductions in the order of 15–23 per cent were observed due to moisture stress in the lead up to flowering. Stretching subsequent irrigations was found to have a greater impact on Bollgard II crops, attributed to differences in retention and tipping out.

Recovery from early season moisture stress can be difficult even after irrigation management returns to optimal. The segmented picking results in Figure 2 show that although fibre length did recover, boll weights were affected all the way up the plant.

The timing of the first irrigation can be one of the hardest to schedule. A balance is

required to keep vegetative growth in check while promoting the development of new fruit to ensure yield potential is achieved. While important to avoid stressing the young crop before the first irrigation, withholding watering for as long as possible will encourage better root development and exploration of the soil profile.

Aiming to have the soil profile full and avoid any visual signs of plants stress is important in the lead up to first flower. In higher water holding capacity soils, the first irrigation will normally occur about half way between squaring and flowering. Encouraging crop growth during this critical stage will help to ensure NAWF is high (seven to eight) at the commencement of flowering.

As every season and situation differs from the next, HydroLOGIC can be a very helpful tool in scheduling the first irrigation for furrow irrigated cotton crops. Inputting specific field and crop information can assist in comparing the potential impact on crop growth and yield of a range of first irrigation date and soil moisture deficit scenarios. For the latest information on HydroLOGIC visit www.cotton.crc.org.au.

Early weed management

The release of new herbicide tolerant (HT) technologies including Roundup Ready Flex and Liberty Link cotton has eliminated early season constraints for controlling weeds caused by a narrow over-the-top (OTT) spray window (5th true leaf stage). While providing a number of key advantages for managing different weed burdens, the need for careful monitoring of weed germinations and timeliness of control becomes a greater focus.

A wider application window offers growers a range of benefits for early season weed management, including:

- Good early seedling vigour, by avoiding residual herbicide damage;
- Flexibility in limited water situations;

- Targeting weeds where and when they appear, rather than the crop stage;
- Greater scope to wait for the appropriate spray conditions; and,
- More efficient weed control operations, particularly around wheat harvest.

But these benefits will only be fully realised with a well-planned weed control strategy. The use of residual herbicides at planting has declined with the widespread adoption of HT cotton varieties, particularly in limited water years when growers want to keep their options open. Favourable conditions can bring on heavy infestations of weeds.

Cotton seedlings compete poorly with vigorous weed growth, particularly in the first six to eight weeks after planting. Without timely control, carry-over fallow weeds combined with new weed germinations can result in patchy cotton stands and retarded early crop growth. A clean start to the cropping phase takes the pressure off future weed control operations and avoids setting the crop back.

The approach of delaying applications to save money and clean up multiple germinations needs to be weighed up carefully in each situation against its potential impact on crop yield and increased weed escapes. Regular monitoring of the type, size and density of weeds present is critical for selecting the right spray rate and timing. Assessing the level of control after an application is equally important.

Moisture stress and spray coverage issues can arise where heavy weed infestations occur. Often the first application will need to be made earlier when weeds are small (one to two leaf), and a follow up application close behind the first required to control any weed escapes and subsequent weed flushes. This will generally clean up the tougher or more easily stressed weed species before they are able to develop a stronger root system or set seed.



The level of weed control achieved and any subsequent weed germinations should be monitored closely.