Cotton Catchment Communities CRC
NSW DEPARTMENT OF PRIMARY INDUSTRIES

COTTON *TALES*

Walgett

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First in-crop irrigation

This can be the most difficult irrigation scheduling decision. It requires a balancing act of not stressing the crop while ensuring water stored in the soil profile is fully explored by the cotton roots. It is difficult to re-start a crop growing again if water stress has stopped growth.

On most heavy clay soils cotton shouldn't need irrigating earlier than half way between squaring and flowering (60-70 days from sowing). On lighter texture or compacted soils crops will need irrigating earlier.

Research by Constable and Hearn (1984) found with conventional varieties, 1st in-crop irrigation was required by 70 days (or roughly 12 nodes) however, Bollgard II® is more sensitive to stress and there can be significant yield loss if irrigation is not adequate.

Table 1 shows an example of the relative decrease in final yield of conventional cotton caused by delays in the first crop irrigation.

Days from sowing of first irrigation	Conventional Cotton Final Yield (%)
60	100
70	96
80	90
90	81
100	66

Table 1: Effect of timing of the first crop irrigation on yield. First flower occurred between 65-75 days after sowing (Source Hearn and Constable 1984)

The jury is still out on exactly when and how much water you apply at first irrigation for Bollgard II® cotton however research in this area is occurring.

To optimise yield, Bollgard II® needs to be irrigated sometime before flowering. Steve Yeates (CSIRO) says there is a definite yield benefit in applying an irrigation sometime after squaring but before flowering. The plant should be at 10 -12 nodes, that way you are setting the plant up prior to flowering.

Flowering is defined as 1 open flower per metre row. Bollgard II® doesn't stay at this stage long; flowers tend to bust open fairly uniformly, compared to conventional crops. Crops will be at around 15-16 nodes by 1st flower, and with warm weather the plant could be putting on 2 nodes per week, thus looking to irrigate 10 – 14 days before flowering.

Temperature plays a large role in plant development. Cooler climates result in smaller leaf area and hence less extraction compared to a plant in a warmer environment. Therefore timing of first irrigation largely depends on what region you are in.

Key points:

- Monitor your soil moisture, root extraction patterns, daily water use and general plant vigour.
- Check weather forecasts around this time.
- As a rule of thumb irrigate at 50 per cent available soil water within the root zone.
    - *For example, if roots have extracted water to 40 cm, the available soil moisture for a cracking grey clay from 0 – 40 cm is approx 80mm, therefore one would irrigate when the crop has used 40 – 50mm water.*
- 1st irrigation should occur when plant is at 10-12 nodes – roughly 10-14 days before flowering.
- It is best to irrigate at a time that coincides with a hot spell. If forecasts are for cool weather, then it is better to hold off irrigation during this time as water use by the plant will be minimal.

Acknowledgements: Information for this article was sourced from Steve Yeates, CSIRO, Narrabri and Roth, G. Gibb, D and Henggler, S (2004) Irrigation Scheduling of Cotton, WATERpak.

Andrew Parkes describes the things he takes into account when scheduling irrigations on Keytah (Gwydir Valley*):

- In some situations we may have to water well before any of the "tools" we use indicate that we need to and there may be all sorts of reasons for this!
- But generally - We use any soil moisture measurement system as a guide only. Our C probes we use as "alarm bells" to tell us when we should start looking more closely at the crop.
- In normal circumstances the first irrigation (**in Keytah soils**) usually coincides with the plants root systems reaching 40cm. Although we do check on plant health and function prior to this point.
- If all is well and the plant root systems are functioning well at 40cm we then start to check in the paddock for "stress symptoms". That may include looking at plants in the heat of the day for any signs of wilting, reddening of the main stem, digging with a shovel and/or using a soil probe, etc. We check more and more regularly as we allow additional days to go by before watering.
- Current and predicted weather conditions are also taken into account – particularly if hot conditions are predicted. We also check on predicted rainfall, but just as importantly we consider what would happen if predicted rainfall does not occur.
- We look at the irrigation system and how much country can be watered in a given time frame to ensure that the last fields to be irrigated are not allowed to stress too much before water can physically be applied.
- We also consider the crop variety mix in terms of Bollgard/Conventional as well as determinate/indeterminate varieties and their ability/inability to handle stress.
- Finally, or perhaps in the first place, consideration should be given to the total amount of water available for the crop! If less than full water is available for the crop some additional stress early on may have to be contemplated – this depends on the total water budget. This may also vary between Bollgard and conventional cotton in this situation.

* *This article is based on management practices, climate conditions and soil types in the Gwydir Valley. Root development and soil type will vary for different regions.*