



Limited Water & Planting Decisions.

Source: WaterPAK sec 3.4 Steve Milroy & Dirk Richards

How much cotton should I plant and irrigate:

Firstly you have already prepared a certain area in anticipation of the 2007 cotton season to take advantage of any changes in water availability.

Which leaves you to consider –

- How much of this area should be planted?
- What proportion of this area should be irrigated?

The answers are a function of the total water supply available for application to the crop from all sources, from the river and bore allocation, on-farm storage and any expected off-allocation pumping - ultimately aiming for a minimum 5 to 6 ML of supply per Ha.

Where your irrigation efficiency is less than 75% (that is, $\frac{3}{4}$ of the water supplied is used by the crop as evapotranspiration accounting for storage, distribution and application losses.), the figures will need to be adjusted accordingly.

Field selection:

The efficiency with which water is supplied to the field is more variable than the efficiency with which a crop uses the water delivered to it.

- **Efficiency of water supply**

Therefore proximity to the best storages or being supplied by the best channels is the first factor to consider in field choice.

- **Yield expectation**

Fields with a history of high yield may be valuable, but reference to water use records may show that yield is commensurate with water use.

Pre-plant agronomic considerations:

Ideally agronomic management does not promote excessive crop vigour or delay maturity too much.

- **Nitrogen rate**

Under limited water the crop response to N is less, further there is a risk that excessive fertiliser will promote early growth potentially increasing WU early on and delay maturity.

- **Variety**

Work by W.N. Stiller, CSIRO have shown that the cultivars which do best under irrigated conditions are generally those which do best under dryland or reduced irrigation conditions also, so choose a maturity type suited to your region. Cultivars with inherently long fibre provide a buffer against reductions in fibre length which may occur due to water stress. Okra-leafed cultivars as a group do relatively better under dryland conditions and may offer an advantage under limited water situations also.

- **Sowing date**

Cotton yield declines with delayed sowing due to the shorter time available to initiate and mature an adequate number of bolls. As a general rule, as the available water supply decreases, the expected decline in yield potential with sowing date begins somewhat later. This is because the crop is already yield-limited and so doesn't need as much season length to achieve the new water-limited yield potential. Excessive delay, however, may increase the risk of quality downgrades due to increased risk of late maturing bolls under cool conditions.

- **Irrigation strategy**

Watering-up is preferred to pre-irrigation, bearing in mind general management difficulties associated with watering-up.

Don't risk stretching the irrigation interval beyond the target deficit. This may pay off in some seasons, it is better to skip the last irrigation to allow maximum chance of catching rainfall or increased allocation before locking in to a reduced yield potential.

With very severe shortages there may be some advantage in delaying first irrigation a little, which is preferable to stress during flowering, when the crop is more sensitive. (WATERpak Topics 2.1 and 3.1)

As Steve Yeates and Dirk Richards report "In research conducted at Narrabri, Bollgard®II was found to accumulate yield faster than conventional cotton due to higher retention combined with a very low proportion of tipped plants. This meant that late in flowering and at cut-out Bollgard®II was less able to compensate for water stress equal to a depletion of ≥ 120 mm of soil water ($\geq 58\%$ plant available soil water) and yields were lower relative to conventional cotton stressed at the same time. Therefore, stretching water late in the season as a result of limited water will have a larger impact on Bollgard than a conventional crop."

For further information on optimal planting area under limited water scenarios check out HydroLOGIC

For further information to estimate your Whole Farm Irrigation Efficiency check out WaterPAK topics 2.1 Assessing Whole Farm Efficiency

For further information check on optimal N rates check out NutriLOGIC:
<http://tools.cotton.crc.org.au/CottonLOGIC/NutriLOGIC>

For further information on variety comparison check out CSD Agronomic tools:
<http://www.csd.net.au/>