Germinating ideas

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With a large proportion of the Australian cotton crop planted as Bollgard II and Roundup Ready, this edition of Germinating Ideas will look at how to best manage those crops, particularly with irrigation management to ensure maximum yield and to optimise fibre quality.

Irrigation management

In situations where crops have high fruit retention, there may be more competition for crop assimilates between cotton roots and bolls and leaves — especially lower leaves. With high fruit retention and rapid boll set, there is a possibility that root growth may be reduced in comparison to lower retention crops (Figure 1).

With this is mind there may be a need to reduce irrigation deficits and bring irrigations forward, particularly under high evaporative demand and on lighter soils.

Correct monitoring of crop water use and irrigation efficiency will help determine irrigation requirements in these high

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TABLE 1: Delaying the timing of the first crop irrigation can have the following affect on yield (Hearn and Constable 1984)

Timing of irrigation	Final yield %
Correct timing	100
10 days delay	96
20 days delay	90
30 days delay	81
40 days delay	66

TABLE 2: Effect of stress at different stages on cotton yields (Hearn and Constable)

Growth stage	Reduction in yield with one day of stress (kg/ha)
Squaring	9.2 kg lint
Peak lowering	18.8
Late flowering	16.1
Boll maturation	3.6

15 inch cotton being irrigated.

FIGURE 1: Possible changes in distribution of assimilates between roots and fruit on the main stem nodes under high retention and conventional systems

retention crops. Water monitoring in conjunction with crop monitoring can help understand how the crop is using water. Tools such as the Crop Development Tool (available on the Cotton CRC website) tracking squaring nodes, bolls and monitoring nodes above white flower (NAWF) can also be very useful in getting it right with water management.

It is important to know that a crop without stress should commence flowering at about eight nodes above white flower. If the first square is on node six to seven, the first flower should be on nodes 14–15. An understanding of the crop's water needs in early development will help determine the first and subsequent irrigations.

Boll development is triggered by a rapid demand for carbohydrates soon after flowering. The majority of fruit is shed as flowers or two to three day old bolls.

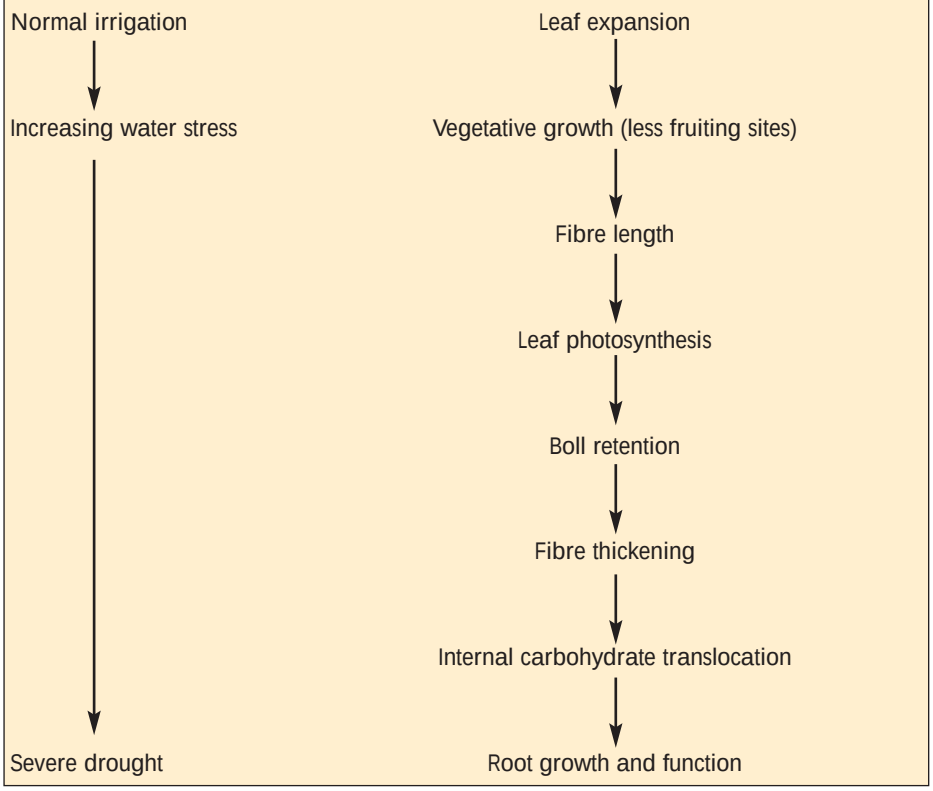
Shedding of bolls can occur up to an age of 10–14 days. After this the cell wall has thickened enough between the boll and the stem to prevent shedding. In a rapid water stress situation, young bolls in which growth has stopped may be retained on the plant and appear to be mummified. (Source: *Cotton Production During Drought*, Cotton CRC.)

Table 2 shows yield reductions resulting from each day of stress at different growth stages. It clearly shows that water stress during peak flowering can double yield losses compared to early or late seasonal stresses. The impact of any one stress period is increased if followed by further stresses.

Hydrologic is a computer based support tool developed by the Australian Cotton CRC and CSIRO. By using Hydrologic, growers and consultants can investigate options to maximise water use efficiency in crop.

Reducing the time the water is on the field can also help maximise production while reducing the risk of waterlogging.

TABLE 3: The sequence by which plant growth is reduced in response to increasing water stress (*Cotton Production During Drought*, Cotton CRC)



Managing for maximum yield and fibre length

Merchants have increased the base staple length for Australian cotton to one to $1^{1}/_{8}$ (36) for the 2005–06 growing season. It is important to ensure that crops are managed to achieve this new base staple length.

Moisture stress during the fibre elongation period (first 20 days after flowering) is one of the most important factors most commonly associated with short fibre. As fibre elongation occurs over approximately 20 days it only takes very small changes in conditions to make large changes in the fibre length.

Table 3 shows the effect of increasing water stress on plant growth. Fibre length is the first characteristic affected in response to stress.

Planting a 15 inch Stack trial in southern NSW.

While managing the crop for length, it is important to consider the other fibre characteristics including strength and micronaire.

CSD trials program expanded

CSD has over 60 fully replicated variety trials located from Emerald to Hay. These trials cover conventional, Roundup Ready, Bollgard II and Bollgard II Roundup Ready (Stack) cotton varieties. All trials will be registered with the CRDC and will be carried out in accordance with the CRDC trials protocol.

Many row configurations are being trialed, both irrigated and dryland, as part of the program including:

- Solid plant;
- Single skip;
- Double skip; and,
- 15 inch.

Selected trials from many areas will be monitored during the season and their development details will be available on the CSD website *csd.net.au*.

A full range of agronomic trials has also been planted including:

- Seed treatments;
- Boost trials; and,
- Plant population trials in both irrigated and dryland and in 15 inch.

These trials will be monitored through to picking and ginning when information will be made available to the cotton industry.