Germinating ideas

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This edition of Germinating ideas will look at some segmented picking or box mapping work undertaken by the CSD extension and development team. This study allows for in depth analysis of yield and fibre quality components from different parts of the cotton plant and highlights several key points.

We will also look at the uptake of the now available 'second generation' of herbicide tolerant traits in the US and how to manage them for the best weed control.

Segmented picking

At the end of the 2004-05 cotton season the CSD extension and development team carried out segmented picking trials in 30 crops at picking time. In these crops a selected a number of metres of row were hand picked within the crops to try and get a good representative sample of the fields they were in. The bolls (seed cotton) were divided from those crops up into eight different segments.

The main stems of the plants were divided up into lots of four fruiting nodes and the fruit from those zones were kept separate. First position, second and third position and also the vegetative nodes were also counted and kept separated. Each plant had bolls from eight different sections of the plant kept.

An escaped weed situation.

These bolls were picked into boll boxes. The number of bolls going into the box were counted and the samples were kept and ginned on a 10-saw gin. This provided yield data from those samples and they were also HVI tested to get fibre quality information.

By analysing that data it allowed for information to be generated such as that shown in an example of a crop of high yielding 71BR grown on the Darling Downs (Figure 1). It can be seen that about a bale per hectare of that crop came from the vegetative nodes.

Most of the yield in that particular crop came from the centre of the plant. Between nodes one to 12 there is about nine bales per hectare. This gives a good picture of how these crops looked just prior to picking.

FIGURE 1: An example of a high yielding Darling Downs crop of Sicot 71BR

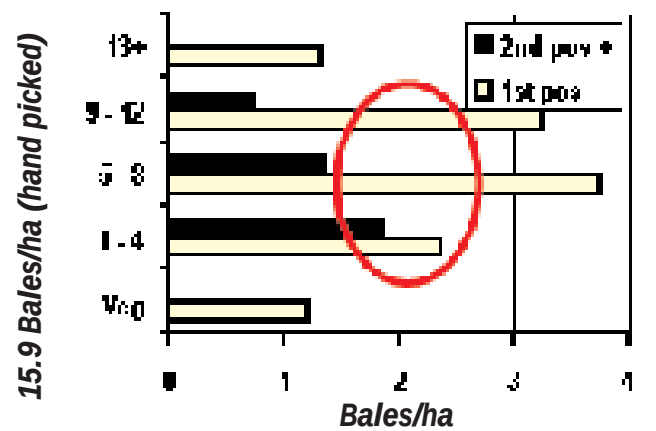

FIGURE 2: Yield comparisons of Sicot 71BR and Sicot 289BR

YIELD	Sicot 71BR	Sicot 289BR	difference
Bolls/m	141	143	-1%
Boll Weight (grams per boll)	2.03	1.91	+ 6%
YIELD (B/ha)	11.0	10.6	5%

Segmented picking was done in three of the replicated variety trials in the Border Rivers last year that included Sicot 71BR and Sicot 289BR.

The yield result from this comparison shows that both of the yields were exceptional — over 10 bales per hectare — but the Sicot 71BR was about five per cent higher yield than the 289BR. This difference is about the same as at the 28 replicated trial sites that included both of those varieties (see Figure 2).

The number of bolls per metre are very similar but the big difference is the Sicot 71BR has boll weight of about six per cent higher than the 289BR. This is a factor of the variety — its got heavier bolls. That is why so many crops achieved high yields last year (see Figure 3).

Another comparison between these two varieties is the fibre quality.

In strength and micronaire they are quite similar but there was a slight difference in fibre length.

Looking at fibre length (Figure 4), both are well above base grade but the Sicot 289BR is about 0.02 of an inch longer than the Sicot 71BR.

Sicot 289BR is a longer fibre variety than Sicot 71BR and in situations where water is limiting there is probably a little bit less room to move with Sicot 71BR than 289BR.

Comparing two Sicot 71BR crops

Looking at the yields of these two comparisons (Figure 5), there is a 56 per cent higher yield in the higher yielding crops.

The high yielding crops had bolls that were about five per cent heavier but also had 43 per cent more bolls than the lower yielding crops. That's 43 bolls per metre and these boll numbers are reflected in a big difference in the first position retention.

By looking at where both crops set their bolls, it can be seen the number of vegetative branches is similar in both. The number of bolls at the very top of the plant is very similar in both, meaning that they didn't have to grow an enormous plant to achieve these yields. The area where there is a big difference is the first position bolls between fruiting branches one to 12.

The high yielding crops have about 85 bolls per metre in this section while the lower yielding crops have about 45 bolls per metre. This big difference probably can't really be fully explained by insects because the number of bolls on the vegetative and the top of the plant are still very similar (see Figure 6).

It means that these crops were probably

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FIGURE 3: Bolls weights comparing Sicot 71BR and Sicot 289BR

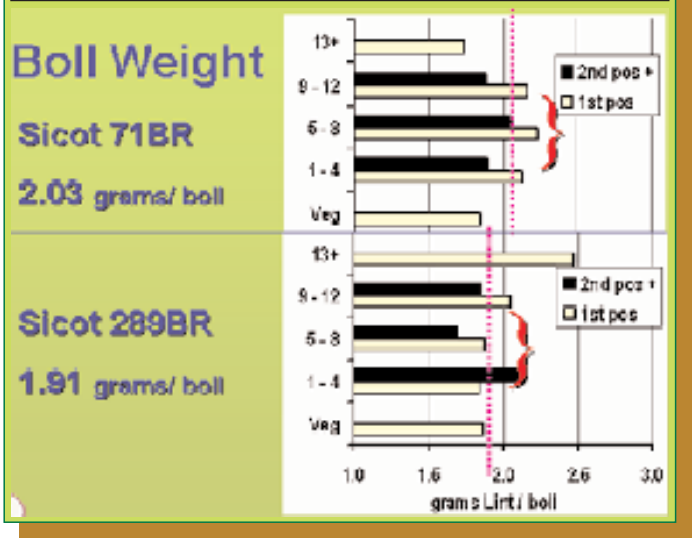


FIGURE 4: Fibre length comparison between Sicot 71BR and Sicot 289BR

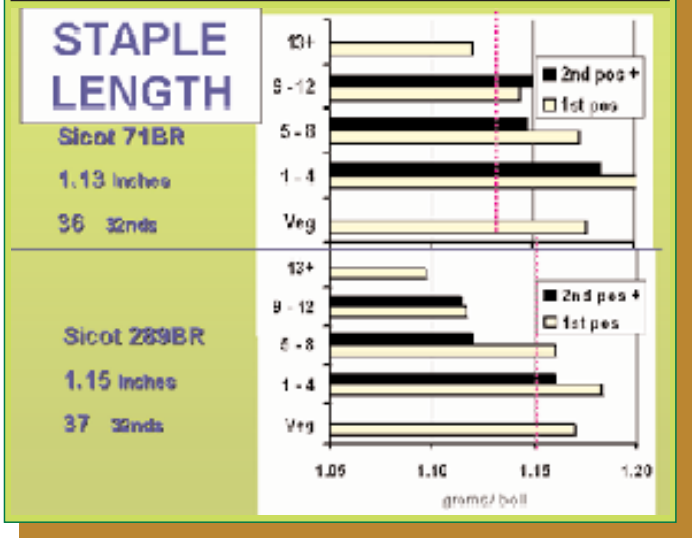
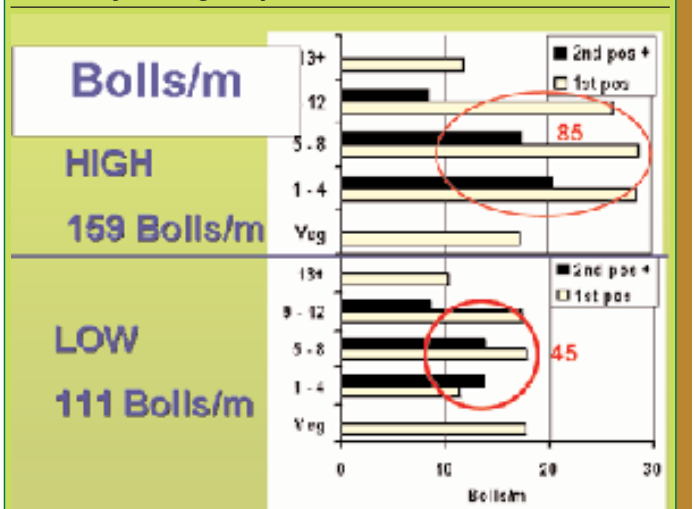


FIGURE 5: Comparing the yield factors of 'high' and 'low' yielding crops

YIELD	HIGH	LOW	difference
Retention	73%	46%	+ 27%
Bolls/m	159	111	+ 43%
Boll Weight (grams lint/ boll)	2.16	2.06	+ 5%
YIELD (B/ha)	15.6	10.0	+ 56%

FIGURE 6: Boll distributions across 'higher' and 'lower' yielding crops



grown in a near stress-free environment with a good climate, good soil conditions, good everything, to be able to maintain the high retention in the middle of the crop as well as putting on some of the later fruit.

Growing high yielding crops

The key to high yields is having good boll size (plenty of lint per boll) which comes back to variety but it also comes down to management. Total boll numbers through high fruit retention is also an important component of the final yield.

Also being able to manage that crop so it holds onto a lot of those bolls is vital. This comes down to more than insect control — its about managing a crop so that it is healthy enough to be able to sustain a big boll load.

This data has really shown the enormous potential of Sicot 71BR, even at moderate boll counts. Crops with around 110 bolls per metre were still achieving good yields around four bales an acre or 10 bales a hectare. By increasing those boll numbers up to 140–160 bolls per metre, significant yield increases can be achieved.

More segmented picking work will be carried out in the 2005-06 season to gain more information on crop physiology and yield and fibre quality characteristics.

New herbicide traits in the US

Many growers across the US cotton belt have adopted the new herbicide traits available there this season — Roundup Flex and Liberty Link cotton. With weed control being a major issue, particularly in the Mississippi Delta region with rainfall of up to 1500mm (60 inches), the uptake of these wider application window type traits has been rapid. Having a wider window of over the top (OTT) applications can allow control of weeds up to, and past row closure by spraying the applicable herbicide to target specific weeds present.

Weed trials by conducted at the LSU Ag Centre at St Joseph, Louisiana.

The reliance on pre-emergent herbicides has decreased although they are still used in particular situations where heavy weed pressure is experienced. Weed size and species type can be assessed and decisions made as to timing and herbicide rates that are to be used.

With these new traits available the key to their uptake is the availability of them in suitable varieties that have shown yield and fibre quality suitability and regional adaptation. Growers will not simply choose a variety because it has the desired genetic traits if it is not a proven variety in their production area.

It is sometimes inviting to delay spraying weeds to allow for more to germinate in order to get more value from each spray. This can lead to a false economy because the bigger weeds are actively competing with the crop, particularly in the first 8–10 weeks after planting. Diligence is required to target small weeds to achieve maximum control and then spray a second or third time. This is now possible with both Roundup Flex and Liberty Link cotton which have much wider OTT windows than the existing Roundup Ready technology.

Marestail in a Mississippi crop.

The rotation of both Roundup Flex and Liberty Link cotton may help decrease the risk of weed resistance. Marestail, or Fleabane in Australia (*Conyza bonariensis*) has shown signs of being resistant to glyphosate while Ignite containing glufosinate ammonium has good activity on it.

Extensive weed control trial work is being carried out in many locations including the work carried out by Associate Professor Donnie Miller at the LSU Ag Centre at St Joseph, Louisiana where up to 30 different weed control systems are being trialed in an extensive range of experiments.

Targeting of small weeds and correct timing of applications has been found to be the most effective in these plots. Having a much wider application window with both technologies allows for subsequent sprays to also be correctly timed.

With the adoption of these new herbicide traits there are still situations where delayed applications can lead to escapes requiring salvage or cleanup applications with associated yield losses through weed competition.

By looking at how these new herbicide traits are being managed in the US we will then be able to assess our needs here in Australia to gain the most from their introduction into the Australian cotton industry.