Raingrown cotton: row spacing options

Performance of alternate row (1 in 1 out) and super single compared to double skip

Introduction

Raingrown cotton is often grown using skipped rows because of variable summer rainfall.

Skip row configurations help to:

- Increase the amount of soil-water available for the crop, especially during flowering, helping to influence lint yield and quality;
- Reduce the level of variability or risk associated with production; and
- Reduce input costs.

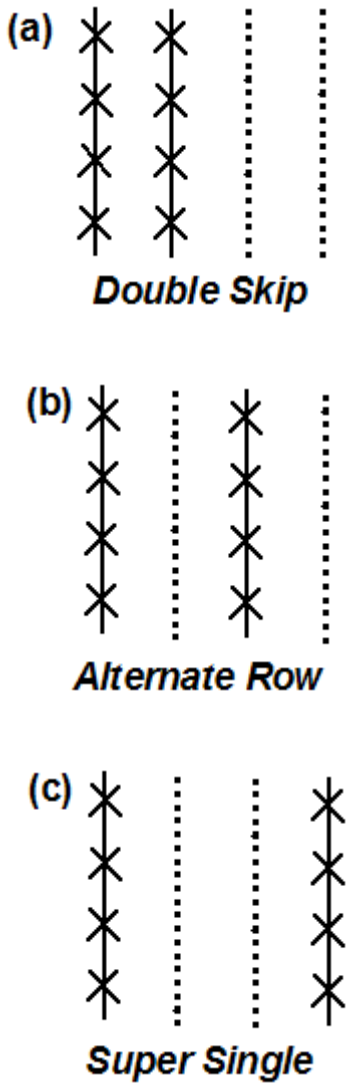
Expansion of raingrown cotton into new areas and the need for flexibility in farm equipment set up has meant that a greater range of skip row configurations are being considered. To date, single (67 per cent planted area) or double skip (50 per cent planted area) configurations have been most popular.

However, there has been an increase in the use of super single (33 per cent planted area) rows in areas where rainfall is unreliable; and alternate row (50 per cent planted area) configurations instead of double row to take advantage of equidistant spacing to improve yield and quality.

To allow growers to choose the appropriate row configurations, information on differences in relative yield and quality potential is important.

This fact sheet summarises research conducted by a team from CSIRO, CSD and Macpherson Agricultural Consultants into row configuration options for raingrown cotton: comparing the differences in yield between double skip, alternate row, and super skip row configurations (figure 1).

Figure 1: The three row configurations in this study. Solid lines represent rows with plants present, while dotted lines represent skipped rows.



Best Practice

The study

Field comparisons of these three row configurations were conducted at various sites in NSW and QLD from 2005 to 2011 (table 1), with comparisons conducted at the Australian Cotton Research Institute in Narrabri and in commercial fields.

Location/Year	Rainfall	Double	Super	Alternate
Rowena NSW 2005-06	106	✓	✓	
Narrabri NSW 2006-07	199	✓	✓	
Tulloona NSW 2006-07	66	✓	✓	
Bongeen QLD 2006-07	88	✓	✓	
Narrabri NSW 2007-08	358	✓	✓	
Narrabri NSW 2008-09	413	✓	✓	
Narrabri NSW 2009-10	515	✓	✓	✓
Spring Ridge NSW 2009-10	451	✓		✓
Moree NSW 2009-10	Partially irrigated	✓		✓
Narrabri NSW 2010-11	493	✓	✓	✓
Moree NSW 2010-11	356	✓	✓	
Macalister QLD 2010-11	545	✓		✓
Toobeah QLD 2010-11	Partially irrigated	✓		✓
Narrabri 2011-12	755	✓	✓	✓
Bongeen 2011-12	172	✓		✓
Moree 2011-2012	804	✓	✓	✓

Table 1.

The results: yield

Yields across the sites ranged from 130 to 1,725kg per hectare for the double skip configuration, reflecting differences in seasonal conditions, including rainfall.

In comparing super single to double skip there were instances when the super single row configuration significantly outperformed double skip and vice versa.

In alternate row configurations there were no significant differences for the Narrabri comparisons however, the alternate row outperformed double skip at Spring Ridge. When all data was combined across all comparisons, there was a significant association between yield of super single versus double skip yield (figure 2).

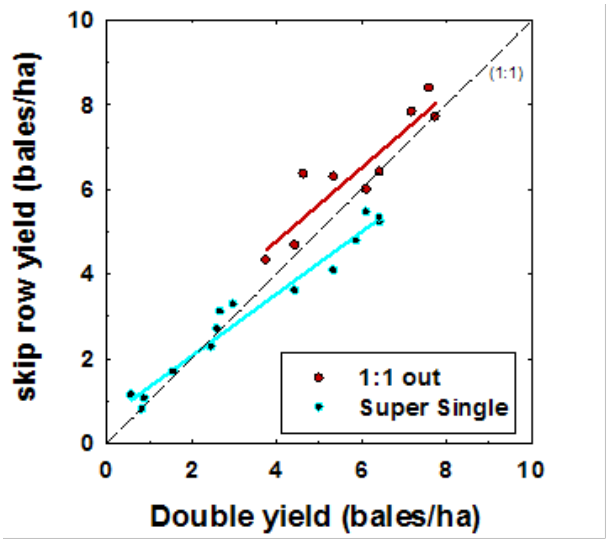


Figure 2. Comparison of lint yield of skip row configurations – super single, alternate row and double skip.

Double skip vs super single:
Super single performed better when yield potential for double skip was low, and this was generally associated with low seasonal rainfall (figure 3).

Double skip vs alternate row (one in one out):
Although there were no significant differences in comparisons conducted in Narrabri investigating alternate row configurations, four of the commercial sites had improved yield when compared to double skip. This suggests that in certain circumstances (especially at higher yield potential for double skip) this configuration may offer opportunities to improve yield (figure 4).

Figure 3. Double skip vs super single

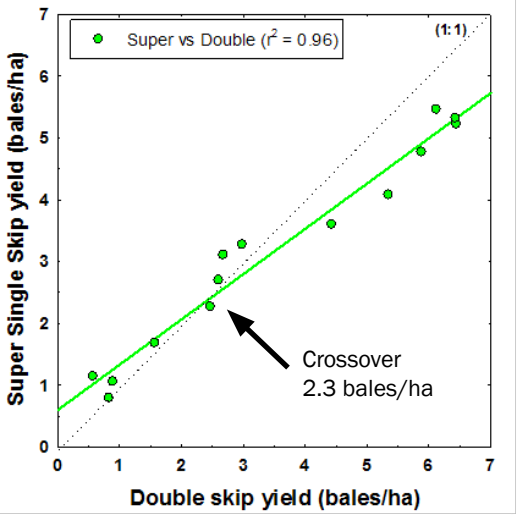
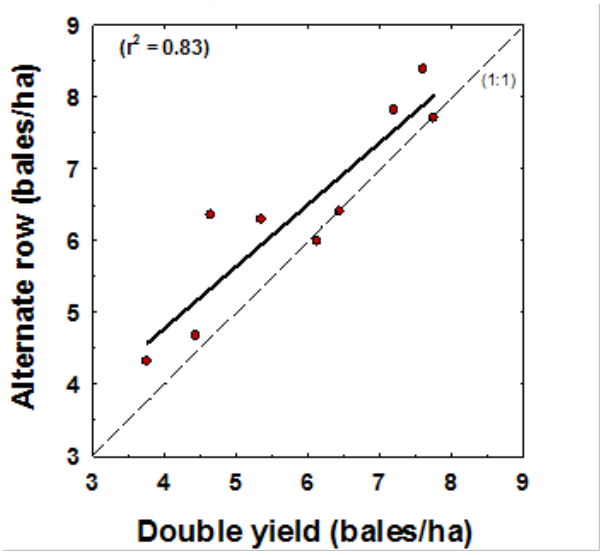


Figure 4. Double skip vs alternate row (one in one out)



The results: fibre quality
In this study fibre quality was improved or unaffected in the super single configuration reflecting greater access to soil water during flowering and boll filling. The alternate row configuration had fibre quality similar to the double skip configuration.

The results: moisture use
Changes in soil water were measured by a neutron probe moisture meter to a depth of 1.2m in both alternate row and double skip row configurations. The probes were placed at two locations: 0.5m & 1m from the plant line.

Despite increased water use in the alternate row configurations once substantial rainfall had ceased, there was no suggestion that the crop became more stressed later as yield was unaffected. Final water extraction at harvest was greater in both the 0.5m and 1m locations compared to double skip which may have assisted growth. The equidistant row spacing in the alternate row configuration may have contributed to better access to soil moisture.

For more information:
- Download the research paper on this study, *Expanded row configuration options for Australian rain-fed cotton*, authored by Michael Bange, Jane Caton, Darin Hodgson and Rose Brodrick of CSIRO, David Kelly of Macpherson Agricultural Consultants and Robert Eveleigh, John Marshall and James Quinn of CSD: www.regional.org.au/au/asa/2012/crop-production/8090_bangempb.htm.
- Read the Australian Cotton Production Manual's raingrown cotton chapter (chapter four): www.cottoninfo.com.au/publications/australian-cotton-production-manual
- Watch a video on row spacing in raingrown cotton, featuring CSIRO's Michael Bange: www.youtube.com/watch?v=0mc0jMVtdz4&feature=youtu.be.
- Contact Dr Michael Bange, CSIRO Narrabri, 02 6799 1540 or michael.bange@csiro.au.