

# Narrow rows widen chance of higher yields

*Rows of cotton planted closer together than normal have the potential to produce higher lint yields according to six years of CSIRO Plant Industry field trials. The research is part of an ongoing effort to determine when 'ultra-narrow row' (UNR) plantings can be used to optimise the growth and development of cotton to improve yield and quality.*

## Planting spacings

Typically cotton is planted in rows spaced one metre apart. This distance has been determined by practical or traditional reasons rather than purely scientific reasons for optimising yields.

Historically this spacing was the narrowest spacing that would facilitate the use of draft animals. When tractors started to mechanise production, rows were kept at one metre for hand picking, then, when harvesting was mechanised, rows needed to be at least 91cm apart to accommodate equipment.

New precision planting equipment and spindle harvesters able to pick narrower row spacings has enabled alternative cotton row spacings to be considered.

Previous research with 'ultra-narrow row' (UNR) spacings – row spacings of less than 40 centimetres apart – in Australia and the USA have been inconclusive about their yield and maturity benefits. It has been difficult to compare row spacings in large-scale experiments under controlled conditions without different farming practices influencing the comparison.

Research completed by Ms Rose Roche at Narrabri as part of her PhD with The University of Queensland and CSIRO Plant Industry has sought to unravel the complexity of the growth and development of cotton in UNR systems to provide cotton growers with guidelines to determine the best planting space to optimise yield and quality.



*CSIRO Plant Industry is researching ultra-narrow row (UNR) row spacings (rear) in cotton and comparing them to conventional 1m spacings (foreground).*

## The field experiments

Data gathered from 12 field experiments at CSIRO's cotton research station in Narrabri, and growers' farms in Breeza and Hillston over a six year period showed that the average lint yield was 15.9 per cent higher when cotton was planted in rows 25 centimetres apart compared to conventional spacing.

Importantly, however, yield differences were not consistent. They ranged from 4 bales per hectare higher per year to no difference at all.

Individual UNR plants compared to conventional plants were smaller due to increased competition.

This extra competition caused slower growth producing fewer bolls per plant and reduced boll size of 9 per cent in the UNR system, but this was more than compensated for with a 21 per cent increase in boll numbers in UNR plantings due to the higher number of plants per unit area.

There was no difference in the time it took for the crops to mature – a previously reported benefit associated with UNR.

### Effects of competition

This research shows that competition for resources between plants occurs very early and is much higher than expected in UNR plantings, so plants don't grow as quickly or as big. This restricted plant growth leads to plants with fewer bolls per plant that are also smaller in the UNR plants.

Early fruit production, however, is enhanced at a crop level, mostly likely because of increased early light interception and crop growth early in the crop cycle leading to enhanced allocation of resources to fruit compared with vegetative production in the UNR crop.

The light conversion efficiency of the UNR plants was reduced due to the different spatial arrangements of the crop. Most of the light in the UNR canopy is intercepted in the top parts of the canopy. Less light penetrating through to the lower parts of the canopy has implications for growth of bolls lower in the canopy.

### When to use UNR

UNR looks like a higher yield option for some growers, but there are still significant issues of reliability and economic benefits to be resolved.

Further research and evaluation of agronomic requirements and economic benefits are needed to understand under which circumstances growing UNR would be a consistently better option than conventionally spaced cotton.

CSIRO Plant Industry is now investigating if early competition can be overcome by increasing inputs to the crop early in growth.

By comparing row spacings of 38 and 25 centimetres with different plant populations CSIRO Plant Industry is now identifying the critical factors driving competition – such as early season water, nitrogen and light use – that may slow early growth in UNR plantings.

Identifying these limiting factors will provide information to determine the specific recommendations on row spacings and associated management to help farmers choose the most suitable option for their situation to optimise yield.

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### Scientific reference

Roche R, Bange M. (2006) Do ultra-narrow row cotton systems offer any benefits to Australian farmers? Proceedings of the 13th Australian Agronomy Conference, Perth. Australian Society of Agronomy.  
[www.regional.org.au/au/asa/2006/concurrent/systems/4568\\_rocher.htm](http://www.regional.org.au/au/asa/2006/concurrent/systems/4568_rocher.htm)

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