

# Bollgard 3 flexibility bears early fruit in Emerald

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CENTRAL Queensland (CQ) growers have been quick to realise the opportunities of Bollgard 3 with a more flexible planting window in 2016. Picking in late January is underway for cotton sown during August and many growers also took the opportunity to plant much later during November and December following profitable chickpea crops that were harvested in October.

The development of tactics to improve the reliability of cotton production has been the focus of CRDC-funded research that commenced in 2013 in response to a series of wet years that had caused significant yield and lint quality losses for Central Highlands growers.

The project began with a simple question – “In a location east of the Great Dividing Range with a humid sub-tropical climate, what is the best approach for growing cotton and why?” A detailed analysis of the Emerald climate was conducted and comparisons with other regions such as Dalby or Narrabri highlighted stark differences in terms of temperatures, rainfall and radiation. The analysis suggested that a different approach for cotton production may be warranted compared to the usual temperate climate approach of spring sowing and early autumn picking enshrined with the Bollgard 2 planting window that spanned mid-September to the end of October.

The climate analysis highlighted that the period between late December and late February is subject to elevated climatic variability, with humid heat waves or extended cloudy and/or wet weather due to monsoonal influences. These weather events are virtually impossible to predict with any certainty when making planting decisions (three to five months earlier) and therefore present growers with a conundrum. The Bollgard 2 planting window inadvertently placed crops at the greatest risk during this period as cut-out from late December through to mid-January



Paul Grundy.

eliminated the opportunity for crop compensation should a week of bad weather occur, and boll opening in February coincided with the highest frequency of rainy days, increasing the potential for boll rots or lint downgrades.

The climate analysis did highlight an opportunity. The spring and early summer period from September through until mid-December had the best radiation, fewer rain days, less humidity and milder temperatures underpinned by the lowest levels of inter-seasonal variability. To realise this potential for spring boll filling would require much earlier planting in August.

This option did not solve the problem of possible rainfall at picking but it does nearly halve the period of crop exposure compared to the Bollgard 2 planting window status quo. Historical accounts of cropping in the region suggested instances of very late August sowing prior to Bollgard cotton when *Helicoverpa* was a driver for decision making. But August sowing had not been generally practiced as it was considered to be unreliable for crop establishment due to cool temperatures.



Picking of early sown cotton commences at Argoon (owned by Neek and Robyn Morawitz). An October sown crop after chickpeas is in the background and pigeon pea refuges are also in the background.



Sharna Holman (L) and Gail Spargo (DAF) collecting plant samples from the planting date study site.

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**Plants from the August sowing showing the compact structure of the plant canopy and retention to the top.**

With cool temperature limitations in mind, trials during 2013 used degradable plastic films in a bid to lift soil temperatures and improve establishment reliability. During the first three seasons cotton was sown at the beginning of August (to push the boundaries) and mid-August as well as mid-September (start of the Bollgard 2 window) with and without film. The first three seasons were characterised by a warm, average and then cold August period and despite seasonal differences, cotton established well both with and without the film.

The surprise during the first three years was the stability in soil temperatures at Emerald. Despite some cold nights down to 1–2°C, soil temperatures remained at or above 14°C due mainly to cool nights being followed by warm sunny days. Emerald's radiation during August warmed the soil enough during the day to provide a buffer against the evening cold. Despite numerous cold shocks post emergence, crop development continued and August sown crops each season flowered by late October.

During the first two years, cut-out occurred during early December and picking commenced by 20 January (well before September-October sown crops). Yield and quality from the August sowings were good, although a key characteristic was the



**August cotton just after cutout in early December - capitalising on still lengthening days, increasing radiation and favourable temperatures.**

very compact canopy with a high harvest index, reduced nodes (21–22) and failure to close the rows.

After two seasons we concluded that sowing early was indeed capitalising on the better weather in spring, but to fully realise the yield potential of this period required some modifications to close the rows and more effectively capture available radiation. Two options seemed plausible – utilise narrower row spacing (75–80 cm) to account for the more compact canopy or deploy management tactics to encourage additional node production, although the latter approach would delay maturity.

Alternative row spacings were going to be very difficult to accommodate for a commercial scale trial, so the second option of modified agronomic management that aimed to force canopy expansion on conventionally spaced metre rows was selected. To offset the impacts that cooler conditions were having on the canopy expansion of the August sowings, we reduced irrigation deficits, brought forward the scheduled nitrogen side dressing by several weeks, and did not take action to control pests such as mirids before first flower until retentions fell below 70 per



**Picking of early sown cotton commences at Argoon (owned by Neek and Robyn Morawitz). An October sown crop after chickpeas is in the background.**



**Picking the early August sown plots from the CQ planting date experiment at Orana 30 January 2017.**



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**Humid hot weather or cloudy conditions has resulted in boll shedding for the September sown crops each season, reducing yield potential.**

cent and by doing so freed up assimilates for additional canopy expansion.

The result during the past two seasons has been a plant with more vigour and a larger leaf area by first flower that has gone on to close the rows at cut out. Yields with this approach also increased markedly (14.2 bales per hectare in 2015–16 and as yet picked but unginned cotton that should be in the 11+ range for 2016–17) compared to the 10 to 10.5 bales per hectare yields of the first two seasons.

The yields from the August sowings have been as good as or significantly better than the September sowing throughout the four year experiment. The simplest explanation for this is that each season the September planting cuts out at Christmas time with excellent yield potential, only to fall at the last hurdle due to inclement weather during late December or early January (2013: heatwave, 2014: cloudy weather, 2015: cloud followed by rain, 2016: cloud followed by heat wave) that causes extensive shedding. On each occasion the early August sowings have largely escaped the impacts of these weather events as the



**Shed bolls littering the ground from the September sowing, due to cloudy weather during late December.**



**Processing cotton biomass samples in the lab – Sharna Holman (DAF).**

majority of bolls were mature by the time these weather events occurred.

A number of growers opted to try August sowing for themselves this season. Most crops have fared well although extreme insect pressure and a bout of cool weather during October has delayed maturity by 7–14 days resulting in early February picking.

August planting has shown excellent promise for the Emerald region. While there is still the risk of rainfall at picking and the likelihood that in some years cold conditions will delay planting, compared to the September to October traditional planting window it would appear to offer significant advantages across the majority of seasons. Work will continue in the coming seasons to benchmark both early (August) and late (November–December) sown crops to build a better understanding of how the planting window flexibility offered by Bollgard 3 can be used to best long term effect by growers.

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**Drone photo of the planting date trial at Cowal Ag’s property Orana showing early August, mid August and September sowings (January 29).**