Risk management strategies for growing canola in the low rainfall zone

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Why do the trial?

For canola to be a sustainable, long-term break crop option for low rainfall farmers, low risk management systems need to be investigated. This project was undertaken to identify strategies that minimise the risk of canola production in the low rainfall zone. This will improve the long term profitability of canola in low rainfall farming systems.

How was it done?

Two trials were established in the low rainfall zone in 2015; at Ouyen in the Victorian Mallee and Minnipa on the Eyre Peninsula. Treatments were a combination of three factors:

- Timing of Sowing-early (21-22 April) or later (6-7 May) sowing;
- Variety- Hybrid (Hyola 450) or open pollinated (stingray) variety;
- Timing of nitrogen (N) application- N applied either at seeding, early post emergent, bolting or flowering.

Key Messages

- Contrasting canola yields were observed at two sites in 2015 highlighting both the potential and the risks of growing canola in the southern Australian low rainfall zone.
- Sowing at the earliest opportunity and applying N at seeding or early in the crop's development produced the highest grain yields.
- Purchasing hybrid canola instead of using farmer retained open pollinated canola provided no advantage in 2015.

Background

Recent research and farmer experience throughout the southern Australian low rainfall zone has demonstrated the benefits that canola can have as a break crop within intensive cropping rotations. Through a reduction in root disease and weed burdens, cereal crops following canola in the low rainfall zone have consistently yielded up to 0.4 t/ha more than maintaining continuous cereal. While the rotational benefits provided by canola have been evident, many growers in the low rainfall zone have been frustrated by the highly variable profitability of canola as a stand-alone crop. Over the past five years, the productivity and profitability of canola has been impacted by dry springs, high input costs and episodic pest incursions.

For canola to be a sustainable, long-term break crop option for low rainfall farmers, low risk management systems need to be investigated. Therefore, trials were established at two locations (Ouyen, Victorian Mallee and Minnipa, Upper Eyre Peninsula) in 2015 to identify if management strategies could be employed to lower the risk of growing canola in the low rainfall zone while enhancing the profitability of canola as stand-alone crop. These trials are part of the GRDC funded Optimising Canola Profitability Project currently underway across New South Wales, Victoria and South Australia (CSP00187).

Methodology

In 2015 replicated trials were established at Ouyen (Victoria) and Minnipa (South Australia) were established using a common set of treatments. Treatments were a factorial combination of the following management strategies:

- **Time of sowing:** fixed date (sowing regardless of moisture in mid-late April) or waiting until after the break of the season.
- **Variety:** open pollinated (low cost grower retained seed) seed compared to hybrid (higher cost) seed.
- **Timing of N application:** Four N application timings: at sowing, post emergent; bolting and flowering.

Sowing occurred at Ouyen on the 22nd of April and 7th May for the early and late sowing dates respectively. Sowing at Minnipa occurred exactly one day earlier for sowing treatments. Canola was sown at a seeding rate of 2.5 kg/ha with treatments sown to either the hybrid variety Hyola 450 or the open pollinated (OP) variety Stingray. Both varieties are triazine tolerant (TT) and stingray seed, which was graded to extract large seeds (>1.8 mm), was sourced from a farmer near to the Minnipa site.

Nitrogen was applied as urea at the same rate (150 kg urea/ha) at all application times. At Ouyen, concerns about the likelihood follow up rainfall post application led to N being applied simultaneously for the both early and late sowing dates of sowing treatments for each of the three in-crop application timings. The in-crop N application dates for Ouyen were the 26th May (post emergent), 10th July (bolting) and 31st July (flowering) with at least 4 mm of rain falling in the two days following each N application. At Minnipa, N timing matched the target growth stage for each time of sowing treatment. Nitrogen was applied to the fixed sowing date treatments on 12th June, 7th July and 21st July and the later sowing date on 7th July, 31st July and 10th August for the respective post emergent, bolting and flowering N application.

Both trials received 100kg/ha of single superphosphate at sowing to supply phosphorus and sulfur. Weeds were controlled in each trial using group A, C and D herbicides. Multiple products were used during the season to control insects including aphids in spring.

Results

Both sites received timely rainfall to ensure moist seeding conditions and good establishment for both sowing dates. The Ouyen site received 35 mm of rain in April and a further 23 mm in May while 35 mm of rainfall also fell at Minnpa in April with a further 16 mm in May. However, growing season rainfall (GSR) was vastly different between the two sites. At Ouyen, GSR was 140 mm which is approximately 50 mm below the long term average. Minnipa received 250 mm of GSR of which is close to the long term average. Both sites experienced extreme temperatures in October with maximum temperatures above 35°C for 5 days at Ouyen and 7 days at Minnipa.
Canola yields at Minnipa were nearly five times greater than at Ouyen with an average of 1.55 t/ha and 0.33 t/ha respectively across all treatments. However, despite the vast yield differences, similar treatment effects were observed at both sites.

Early time of sowing of improved yields at both sites (Figure 1) although this was only significant at Minnipa. A two-week delay in sowing at Minnipa resulted in a yield reduction of 0.27 t/ha or 16%. At both sites, variety choice made little difference to grain yield (Figure 2) even through the hybrid variety had produced significantly more biomass by mid flowering than the open pollinated variety. Early application of N produced higher grain yields at both sites (Figure 3). At Ouyen, applying N at seeding resulted increased yields by 18% relative to the other timings. There was no significant difference in grain yield between the other N timings. At Minnipa, seeding and post emergent N applications improved yields by 0.2 t/ha or 12% over the later timings.

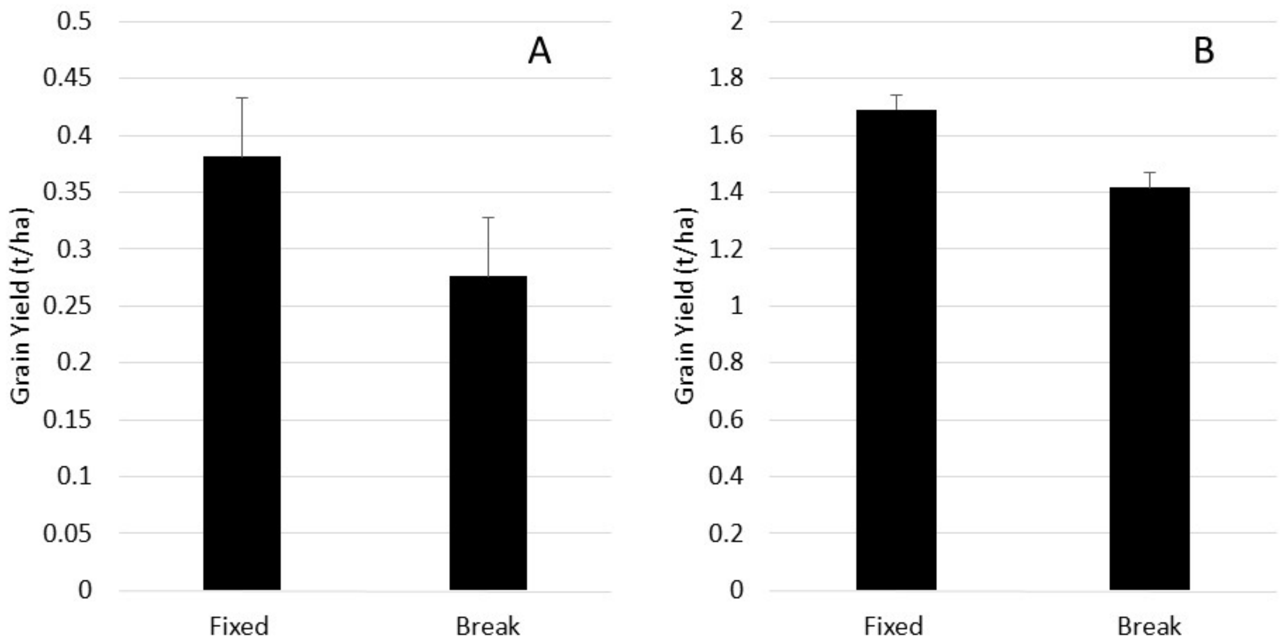


Figure 1. Canola grain yield for Ouyen (A) and Minnpa (B) for the fixed (early) and break (late) sowing dates. The bars represent the standard error off the mean with Ouyen (n.s.d) and Minnipa (P=0.037).

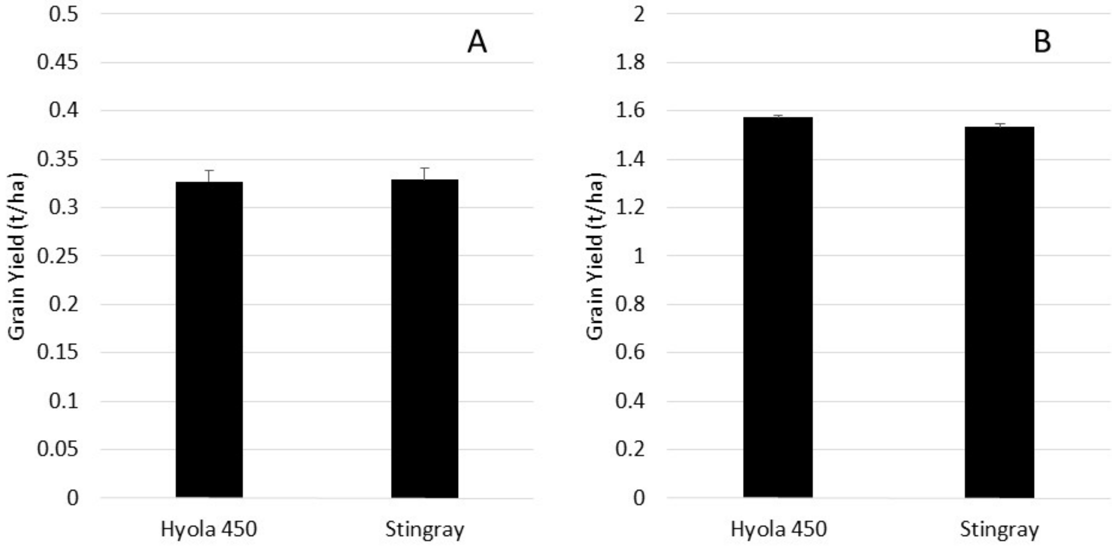
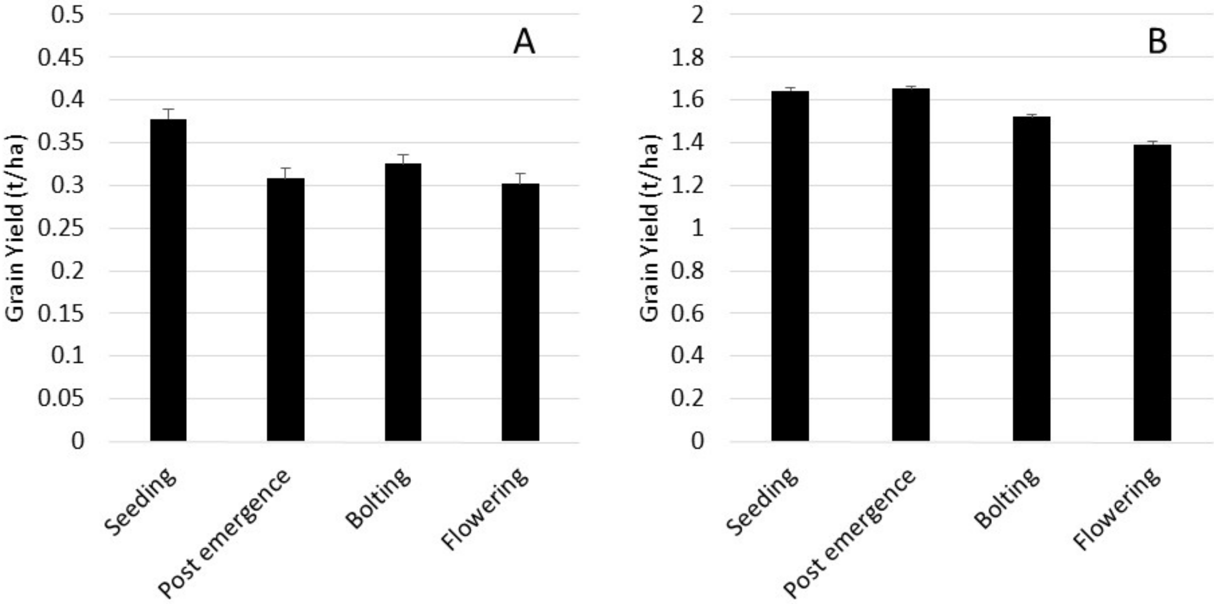


Figure 2. Canola grain yield for Ouyen (A) and Minnipa (B) for Hyola 450 (hybrid) and Stingray (open pollinated)



varieties. The bars represent the standard error of the mean with Ouyen (n.s.d) and Minnipa (P=0.017).

Figure 3. Canola grain yield for Ouyen (A) and Minnipa (B) for the seeding, post emergent, bolting and flowering nitrogen applications. The bars represent the standard error of the mean with Ouyen (P=0.01) and Minnipa (P<0.001)

Implications for commercial practice

The aim of these trials was to test if the risk of growing canola can be reduced in the low rainfall zone. Sowing at the earliest opportunity and applying N at seeding or early in the crops development produced the highest grain yields at both Ouyen and Minnipa despite vastly different yields at the two sites. This limits the ability to reduce risk by waiting for yield potential in response to seasonal conditions to be better understood as yield is compromised by delaying management decisions and inputs. However, using a hybrid variety provided very little benefit at these sites in 2015, suggesting that hybrid canola does not provide large enough production benefits to justify the significant cost of seed in the low rainfall zone.

This paper summarises the yield outcomes from these trials, however an important consideration is the impact on profitability. Similar experiments are continuing at these sites in 2016 with the trial program also expanding into the South Australian Mallee at Karoonda. The combined dataset from 2015 and 2016 will form the basis for an economic analysis to determine the profit-risk trade-offs of management decisions when growing canola in the low rainfall zone.

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Further Information

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