

GOA trial site report

Impacts of seed rate manipulation across canola maturities/varieties with delayed seasonal breaks.

Grain Orana Alliance

Trial code:	GAMA00724-2
Season/year:	Winter 2024
Farm name and location:	"Coradgery" Goonumbla
Trial partner	Nathan Border

Keywords

GAMA007, canola, late sowing, variety, population, triazine tolerant, Clearfield, conventional, Parkes

Take home messages

- Earlier sowing (mid-April) resulted in higher yields than later sowing (late-May).
- Raising target plant populations increased or maintained yield for every treatment.
- Significant varietal yield differences were observed, highlighting the importance of varietal selection.
- In a good season, several late sown varieties had similar yields to when they were sown on time, particularly when the sowing rate was increased.
- While late-sown canola can yield less, trial results suggest it can remain a strong economic option, especially when compared with other late-sown crops and considering the agronomic costs of removing canola from the rotation.
- For late sowing, selecting a fast-maturing, high-yielding variety and targeting plant populations of 30 plants/m² or more is recommended.

Background

Sowing canola early (before 25 April) has been shown through recent Grains Research and Development Corporation (GRDC) funded trials to positively impact crop performance. However, sowing is often delayed due to late seasonal breaks (after 10 May) or excessively wet paddocks, as experienced in 2024. In response, growers may reduce canola plantings or remove the crop from their rotation altogether, driven by concerns over low profitability and potential crop failure.

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Removing canola from the rotation has several flow-on effects, including the loss of disease and weed breaks, and increased income risk due to reduced commodity diversification. Given the agronomic and economic benefits of maintaining canola in the rotation, it is worth exploring whether agronomic levers can be adjusted to optimise late-sown canola performance.

Trial work by Grain Orana Alliance (GOA) during the 2018 drought showed that hybrid Clearfield lines (CL) substantially out-yielded open-pollinated TT lines of similar maturity when late sown. It was hypothesised that the hybrid variety's early growth and vigour enabled sufficient biomass accumulation under minimal rainfall, which the TT lines could not achieve. This work also demonstrated that hybrid canola was in many cases, a more economically viable option for late sowing than pulses or cereals.

These findings suggest that further investigation into varietal choice, both in terms of maturity and crop type (hybrid versus open-pollinated), could improve growers' greater confidence to retain canola in their rotations. Robust plant populations are also likely to become increasingly important as sowing is delayed, given the reduced opportunity for compensatory growth, and it warrants further exploration.

Aims

Investigate the effect of changing variety (maturity and production systems) and plant population to improve the performance in late sown canola.

Site characteristics

Trials were placed in paddocks with a good rotational history to minimise disease risk.

Rainfall

2024 was an above average season in Parkes (Table 1). The in-crop rainfall was ~314.1 mm.

Table 1: Monthly rainfall¹ (mm) and long-term average (LTA) at trial site.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2024	106	41	20	63	70	72	44	58	16	44	75	108	717
LTA	53	50	46	41	42	45	41	42	36	46	53	48	543

Treatment descriptions

- The trial design was a small plot randomized complete block design with 4 replicates.
- All treatments were subject to 2 times of sowing (TOS) (Table 2).
- The first time of sowing (TOS1) reflected an optimal/near optimal sowing time for all varieties tested (Figure 1).

¹ Gridded data for the trial site from: Access Gridded Data | LongPaddock | Queensland Government

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- The second time of sowing (TOS2) reflected a late sowing time for all varieties tested (Figure 1).
- All varieties were sown at three target plant populations; 10, 30, and 60 plants/m².
- Sowing rates and varietal characteristics are summarized in Table 3.

Table 2: Key trial dates.

Treatment	Sowing	Harvest
TOS1	23/4/2024	11/11/2024
TOS2	22/5/2024	11/11/2024

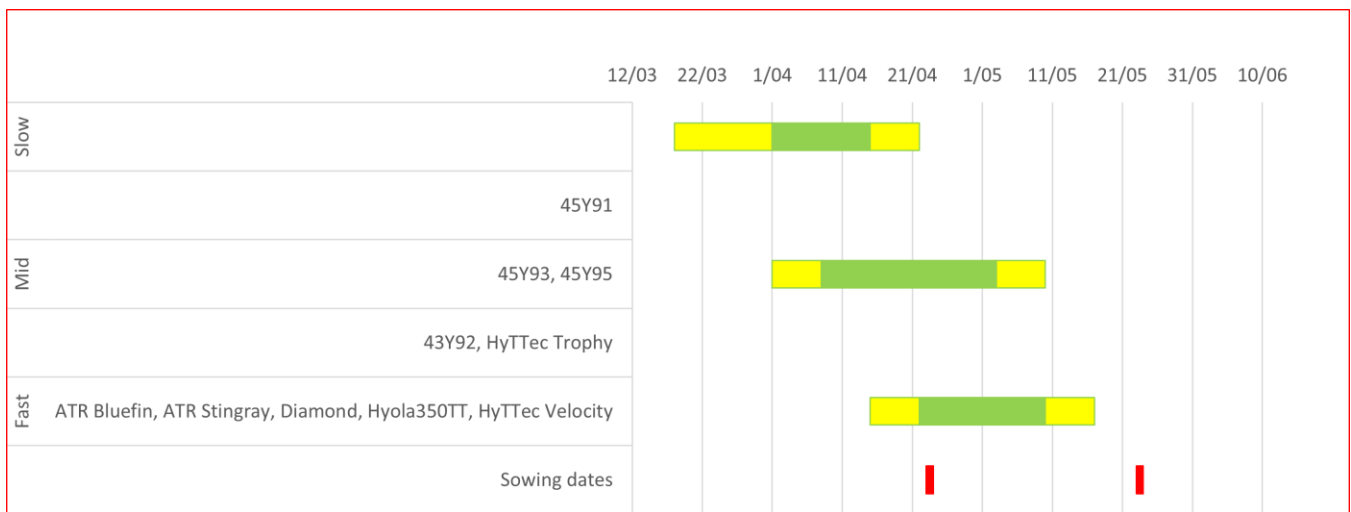


Figure 1: Phenology, optimal sowing windows, and actual sowing dates of the varieties tested. The first red bar denotes TOS1 and the second, TOS2.

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Table 3: Key varietal characteristics and sowing rates for the varieties tested. Target plant populations were 10, 30, and 60 plants/m², and the values below these represent kg/ha sowing rates.

Breeder	Variety	seeds/kg	Type	Phenology	Maturity	Plant height	10	30	60
Pioneer	43Y92	168,600	Hybrid CL	Mid-fast	Early	Medium	1.0	2.9	5.7
Pioneer	45Y95	182,100	Hybrid CL	Mid	Mid	Med-tall	0.9	2.7	5.4
Nuseed	ATR Bluefin	325,000	OP	Fast	Early	Short	0.5	1.5	3.0
Nuseed	Diamond	205,000	Hybrid OP	Fast	Early	Medium	0.8	2.3	4.6
Nuseed	HyTTec Velocity	200,000	Hybrid TT	Fast	Early	Medium	0.8	2.4	4.7
Nuseed	HyTTec Trophy	250,000	Hybrid TT	Mid-fast	Early - early Mid	Med-tall	0.6	1.9	3.7

Results

Results were analysed by ANOVA and results compared by using a LSD method with a 95% confidence interval. Any references to differences between treatments should be assumed to be statistically different unless otherwise stated. The full list of results is provided in the Appendix.

Plant populations

- Establishment was lower than targeted plant population in TOS1, and close to target populations in TOS2.
- TOS2 establishment was significantly higher than TOS1 within each plant population (Figure 2).

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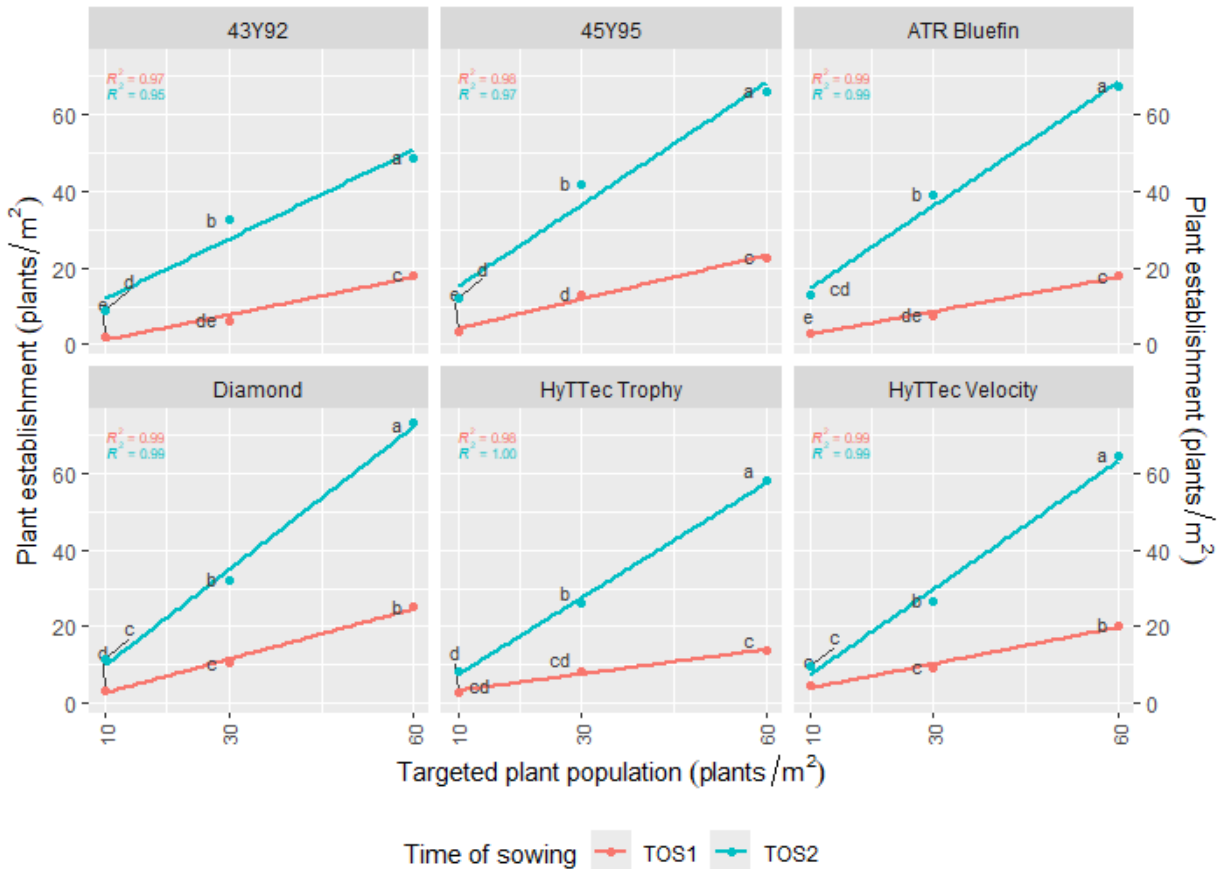


Figure 2: Plant establishment by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Yield

- The average site yield was 1.72 t/ha.
- In all but the highest population of Diamond and the 2 highest populations of HyTTec® Velocity, there was no difference in yield between TOS1 and TOS2 within each measured population.
- Increasing plant population increased or maintained yield in every instance.
- Hybrid varieties had the highest yields on average, regardless of timing.
- ATR Bluefin had the lowest yields on average, regardless of timing, though yield increased with sowing rate (Figure 3).

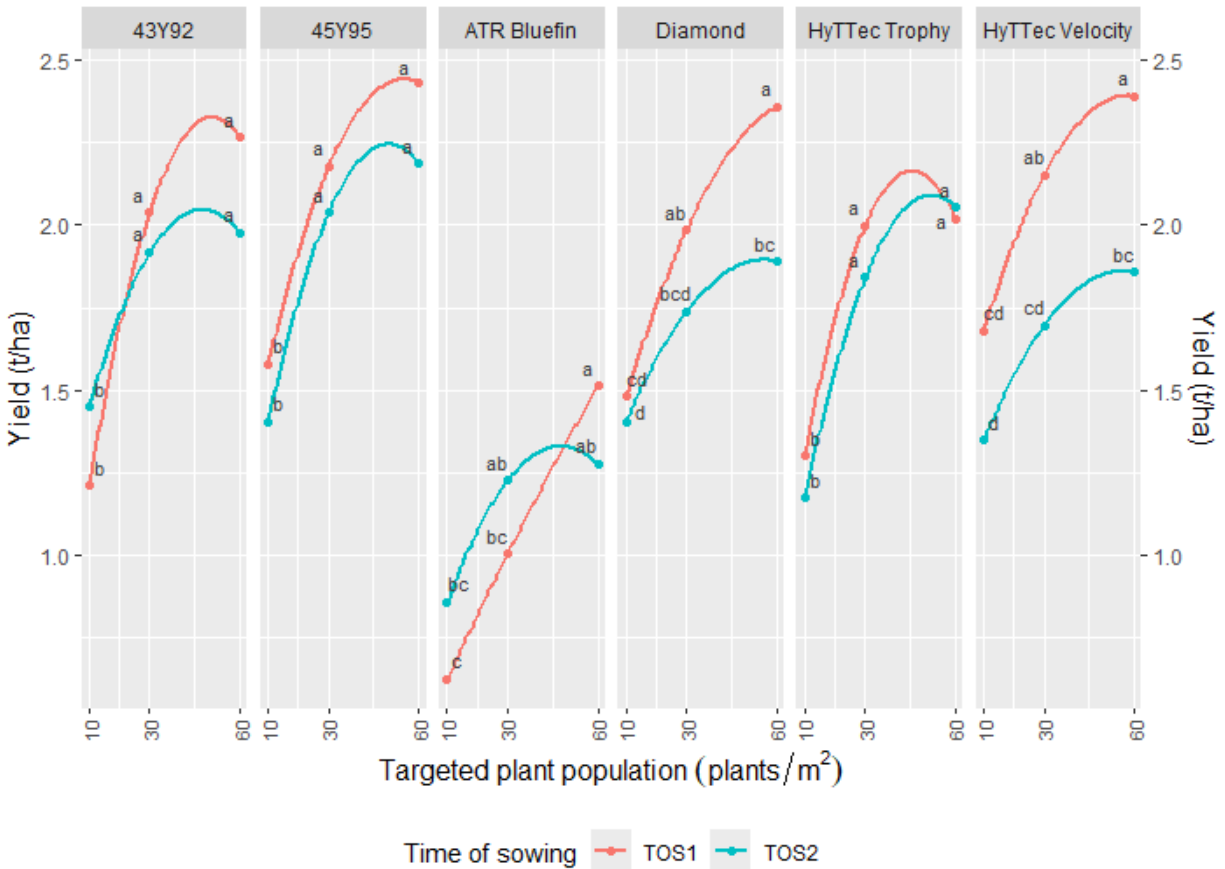


Figure 3: yield by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Oil

- The average site oil content was 42.6%
- Oil content was not affected by varietal choice or population within each TOS except for NuSeed Diamond which had a lower oil content at TOS2 and the highest sowing rate.
- Oil content tended to be lower in TOS2 than TOS1 for each variety tested (Figure 4).

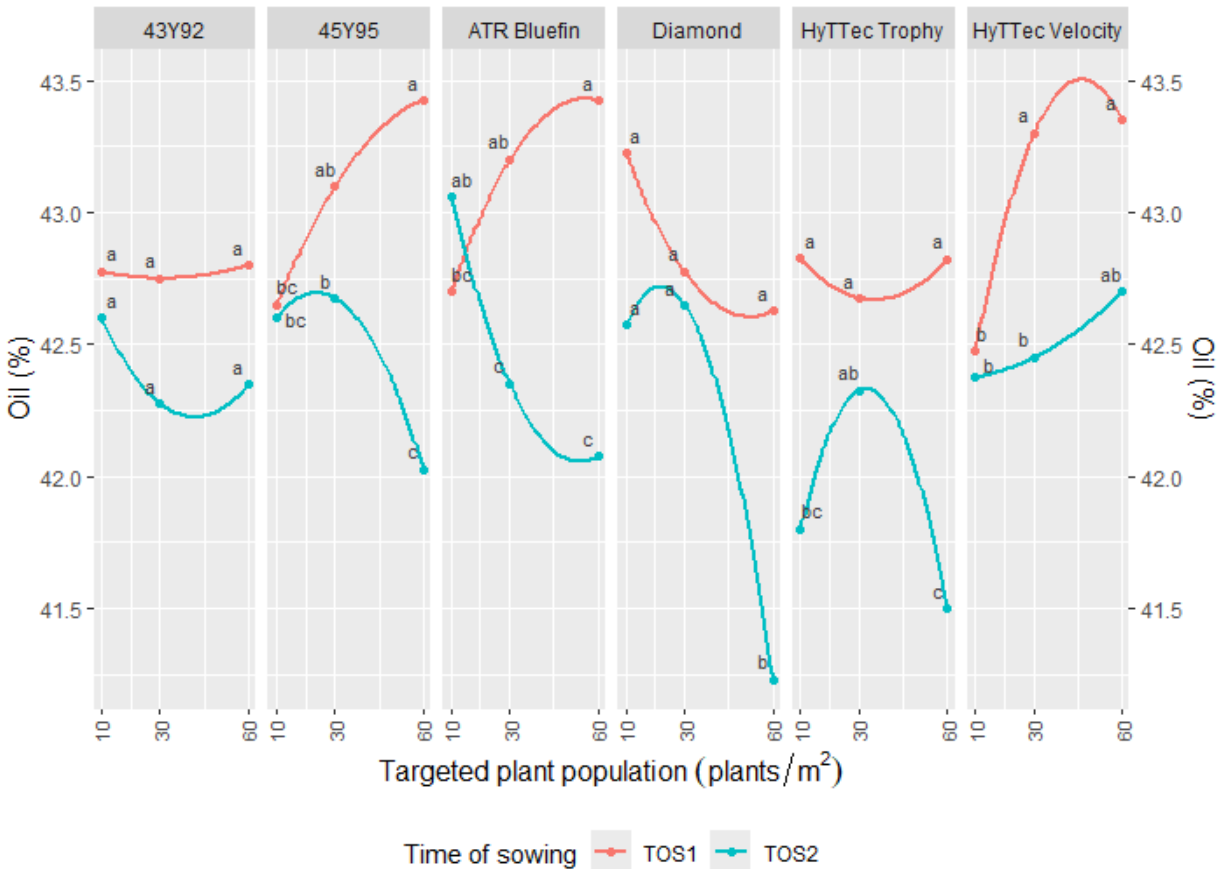


Figure 4: Oil content by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Discussion

The 2024 season was wetter than average and the in-crop rainfall at this site was ~314.1 mm. This resulted in an average site yield of 1.72 t/ha. The average oil content was 42.6%.

The TOS1, sown in mid-April, was optimal for varieties classified as mid and mid-fast, and aligned closely with the start of the sowing window for fast-maturing types such as ATR Bluefin. In contrast, TOS2 was well outside the optimal window, by a month, regardless of variety. Despite a 4-week difference in TOS's, harvest occurred on the same day, suggesting that canola at TOS2 accelerated its development and likely had a shortened flowering window.

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Establishment was markedly higher in higher in TOS2 compared to TOS1 for each population tested, which is likely explained by a change in sowing practices: TOS1 was sown with press wheel pressure, and TOS2 was sown with the press wheels removed.

Several varieties sown at TOS2 had comparable yields to those of TOS1, indicating that late sown canola can be a strong economic option for growers who have been unable to establish a crop in the optimal window, even when lower yielding. This result may be due to an excellent growing season, as previous GOA trials indicate late sown canola usually has a yield deficit.

Across all varieties and TOS's, increased plant populations consistently improved or stabilised yield. Additional benefits likely include enhanced weed competition and reduced reliance on herbicides.

Varietal performance differed markedly. Hybrid varieties outperformed the sole open-pollinated line, ATR Bluefin, particularly at higher plant populations. At TOS1, 45Y95, HyTTec® Velocity and Diamond achieved the highest yield at 2.4 t/ha (all at the high population). ATR Bluefin, by contrast, yielded just 1.5 t/ha at the same population, a difference of 0.9 t/ha.

At TOS2, CL45Y95 still had the highest yield at 2.2 t/ha (High population), while ATR Bluefin reached only 1.3 t/ha, a 0.9 t/ha difference. This highlights the importance of varietal selection under delayed sowing conditions.

Conclusions

Although late-sown canola may not yield as well as timely sown crops, the results from this trial suggest it can still be a strong economic option, particularly when compared with other crops suited to late sowing. This is especially relevant when considering the agronomic costs associated with reducing or removing canola from the rotation.

For growers considering late sowing, selecting a variety with fast phenology and strong yield potential is recommended. Targeting plant populations of 30 plants/m² or more is also advised, to maximise establishment and support yield under a shortened growing window.

Acknowledgements

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Appendix

Time of sowing	Variety	Target population	Plant establishment	Yield	Oil
			(plants/m ²)	(t/ha)	(%)
TOS1	45Y95	Low	3.3 pqr	1.6 hijklmno	42.7 defghi
		Medium	13.2 klm	2.2 abcde	43.1 abcde
		High	22.7 hij	2.4 a	43.4 a
	43Y92	Low	2.2 r	1.2 opq	42.8 bcdefg
		Medium	6.0 nopqr	2.0 abcdefg	42.8 bcdefgh
		High	18.2 jk	2.3 abcd	42.8 bcdefg
	HyTTec Trophy	Low	2.8 qr	1.3 mnopq	42.8 abcdefg
		Medium	8.3 lmnopq	2.0 bcdefg	42.7 defghi
		High	13.7 kl	2.0 abcdefg	42.8 abcdefg
	Diamond	Low	3.3 pqr	1.5 jklmno	43.2 abcd
		Medium	10.5 lmn	2.0 cdefg	42.8 bcdefg
		High	25.0 gi	2.4 abc	42.6 defghi
	HyTTec Velocity	Low	4.5 opqr	1.7 ghijklmn	42.5 fghij
		Medium	9.3 lmno	2.2 abcdef	43.3 abc
		High	20.2 hij	2.4 ab	43.4 ab
	ATR Bluefin	Low	3.2 pqr	0.6 r	42.7 cdefghi
		Medium	7.7 mnopqr	1.0 pqr	43.2 abcd
		High	17.8 jk	1.5 ijklmno	43.4 a
TOS2	45Y95	Low	12.0 klmn	1.4 lmnop	42.6 defghi
		Medium	41.7 e	2.0 abcdefg	42.7 bcdefgh
		High	66.1 b	2.2 abcde	42.0 ijk
	43Y92	Low	9.0 lmnopq	1.5 klmno	42.6 defghi
		Medium	32.5 f	1.9 defghi	42.3 ghij
		High	48.7 d	2.0 bcdefgh	42.4 ghij
	HyTTec Trophy	Low	8.5 lmnopqr	1.2 opq	41.8 jkl
		Medium	26.0 hi	1.8 efghijk	42.3 ghij
		High	58.0 c	2.1 abcdefg	41.5 kl
	Diamond	Low	11.8 klmn	1.4 lmnop	42.6 defghi
		Medium	32.0 fg	1.7 fghijkl	42.7 cdefgh
		High	73.2 a	1.9 defghij	41.2 l
	HyTTec Velocity	Low	9.5 lmnop	1.3 lmnop	42.4 ghij
		Medium	26.7 fgh	1.7 ghijklm	42.5 eghi
		High	64.5 b	1.9 defghij	42.7 bcdefg
	ATR Bluefin	Low	13.0 klm	0.9 qr	43.1 abcdef
		Medium	39.0 e	1.2 opq	42.4 ghij
		High	67.4 ab	1.3 nopq	42.1 hijk
Isd	Isd	Isd	6.5 na	0.4 na	0.7 na

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