GOA trial site report

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

Grain Orana Alliance

Trial code:	GAMA00724-1
Season/year:	Winter 2024
Location:	Ballimore
Trial partner:	Nathan Simpson

Keywords

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

Take home messages

- Early sowing (mid-April) resulted in higher yields than later sowing (late May).
- Increasing target plant populations increased or maintained yield in 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.

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 (CL) lines 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 Ballimore (Table 1), and the in-crop rainfall was approximately 323.9 mm.

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

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2024	78	63	45	74	41	56	54	57	14	46	108	74	**710**
LTA	61	51	52	41	42	46	46	43	42	56	57	52	**589**

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 the varieties tested (Figure 1).
- The second time of sowing (TOS2) reflected a late sowing time for all the varieties tested (Figure 1).
- All varieties were sown at 3 target plant populations; 10, 30, and 60 plants/m^2.

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

- Sowing rates and varietal characteristics are summarized in Table 3.

Table 2: Key trial dates.

Treatment	Sowing	Harvest
TOS1	22/4/2024	23/11/2024
TOS2	21/5/2024	23/11/2024

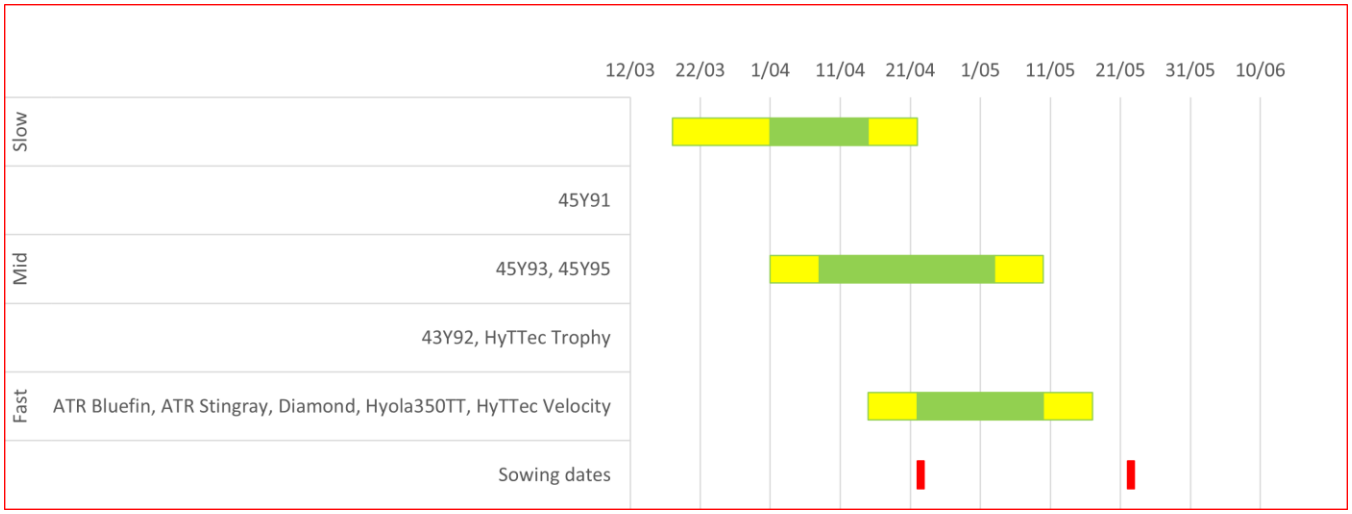

Figure 1: Phenology, optimal sowing windows, and actual sowing dates of the varieties tested. The first red bar denotes TOS1 and the second, TOS2.

Table 3: Key varietal characteristics and sowing rates for the varieties tested. Target plant populations were 10, 30, and 60 plants/$m^{2.}$ The values below 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 an 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.

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Plant populations

- Establishment was higher in TOS2 than TOS1, particularly at the higher sowing rates.
- In most instances, establishment was comparable to the targeted plant population (Figure 2).

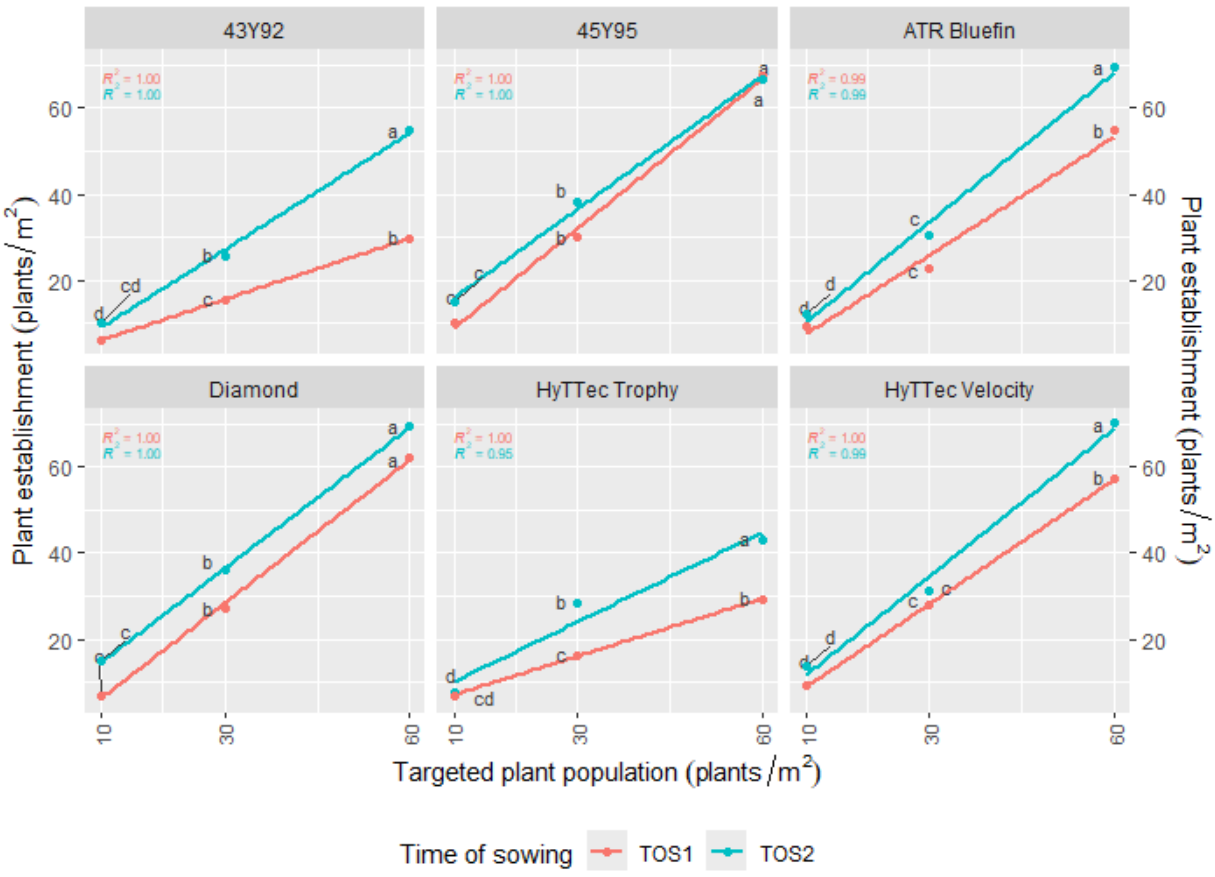

Figure 2: Plant establishment by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Yield

- The average site yield was 1.76 t/ha.
- For 45Y95CL and HyTTec® Trophy, there was no yield difference at each target population between TOS.
- For 43Y92CL and Diamond, the was no yield difference between TOS at 30 and 60 plants/m^2.
- For ATR Bluefin and HyTTec® Velocity, TOS1 had higher yields than TOS2 at each plant population; however, TOS2 yield was comparable to TOS1 yield when plant population was increased.

- Increasing plant population increased or maintained yield in every instance.
- HyTTec® Velocity had the highest average yields, regardless of timing.
- ATR Bluefin had the lowest yields on average, regardless of timing, though yield increased with sowing rate (Figure 3).

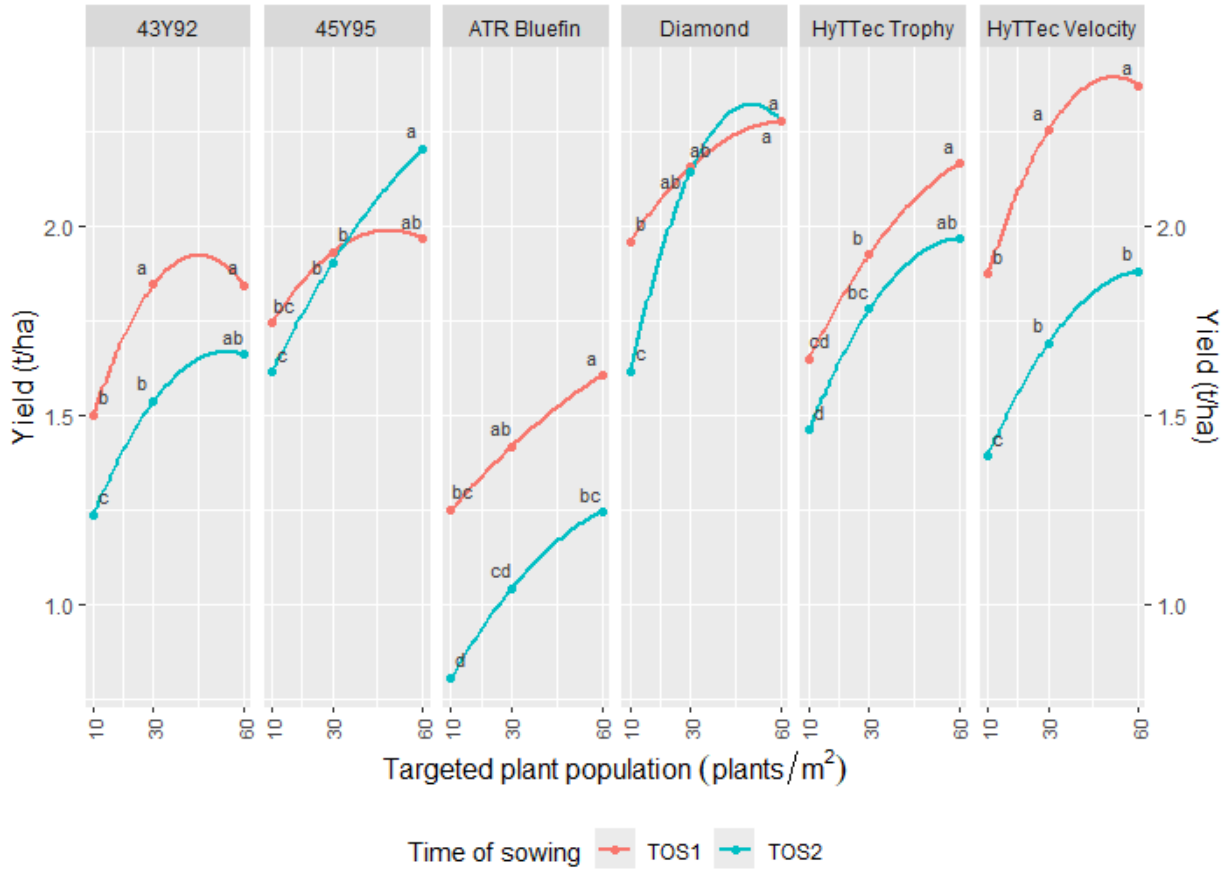

Figure 3: yield by variety, targeted plant population and TOS. Treatments within the same variety with the same letter are not significantly different.

Oil

- The average site oil content was 44.3%.
- Oil content was the same for 43Y92 and 45Y95 at both TOS and all target populations.
- All other varieties had lower oil content at TOS 2.
- HyTTec® Velocity had a lower oil content at the lowest population at TOS2 (Figure 4).

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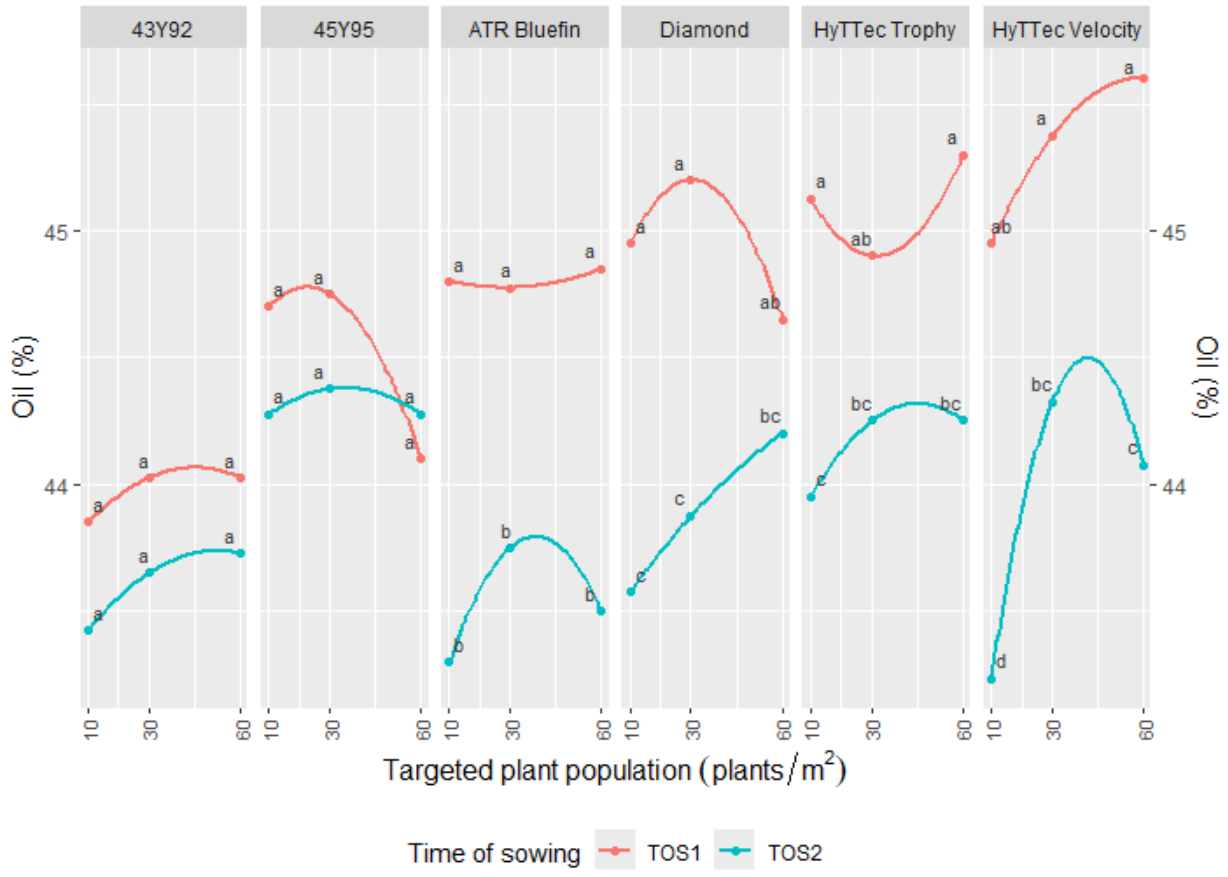

Figure 4: Oil content by variety, targeted plant population and TOS. Treatments within the same variety with the same letter are not significantly different.

Discussion

2024 was a wetter than average year and the in-crop rainfall at this site was approximately 323.9 mm. The average site yield was 1.76 t/ha and the average site oil content was 44.3%.

Sowing mid-April (TOS1) was optimal time for varieties classified 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 sown on 21/5/2024 was outside the optimal window by more than a month, regardless of variety. Despite this 4-week difference in sowing dates harvest occurred on the same day, suggesting that the TOS2 canola accelerated its development and likely experienced a shortened flowering window.

Several varieties sown at TOS2 had comparable yields to TOS1, indicating that late sown canola is a strong economic option for growers who have not been able 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 sowing times, 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, HyTTec® Velocity achieved the highest yield at 2.4 t/ha (High population), followed closely by Diamond at 2.3 t/ha. Even at TOS2, Diamond maintained its high yield at 2.3 t/ha (High population), while ATR Bluefin achieved only 1.2 t/ha—a 1.1 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

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC. The authors would like to thank them for their continued support. Special thanks go out to Nathan Simpson who hosted this trial.

DISCLAIMER — TECHNICAL

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Appendix

Time of sowing	Variety	Target population	Plant establishment		Yield		Oil	
			(plants/m2)		(t/ha)		(%)	
TOS1	45Y95	Low	10.2	hij	1.7	efghij	44.7	bcdefghi
		Medium	30.0	def	1.9	def	44.8	bcdefgh
		High	67.5	a	2.0	bcde	44.1	ghijklm
	43Y92	Low	6.2	j	1.5	klmn	43.8	jklmn
		Medium	15.5	ghi	1.8	efgh	44.0	ijklm
		High	29.8	def	1.8	efgh	44.0	ijklm
	HyTTec Trophy	Low	7.0	ij	1.7	ghijkl	45.1	abc
		Medium	16.2	gh	1.9	def	44.9	bcde
		High	29.3	ef	2.2	abc	45.3	abc
	Diamond	Low	7.0	ij	2.0	bcde	45.0	abcd
		Medium	27.3	ef	2.2	abcd	45.2	abc
		High	62.0	ab	2.3	a	44.7	cdefghi
	HyTTec Velocity	Low	9.2	hij	1.9	efg	44.9	abcd
		Medium	27.8	ef	2.3	a	45.4	ab
		High	57.2	b	2.4	a	45.6	a
	ATR Bluefin	Low	9.5	hij	1.3	nop	44.8	bcdefgh
		Medium	22.7	fg	1.4	lmno	44.8	bcdefg
		High	54.7	b	1.6	ijklm	44.8	bcdef
TOS2	45Y95	Low	15.0	ghi	1.6	hijklm	44.3	defghijk
		Medium	38.2	cd	1.9	ef	44.4	defghij
		High	66.8	a	2.2	ab	44.3	defghijk
	43Y92	Low	10.0	hij	1.2	op	43.4	mn
		Medium	25.8	f	1.5	jklm	43.6	klmn
		High	54.7	b	1.7	ghijkl	43.7	jklmn
	HyTTec Trophy	Low	7.5	hij	1.5	klmno	43.9	jklmn
		Medium	28.5	ef	1.8	efghi	44.3	efghijkl
		High	43.0	c	2.0	cde	44.2	efghijkl
	Diamond	Low	15.0	ghi	1.6	hijklm	43.6	lmn
		Medium	36.0	cde	2.1	abcd	43.9	jklmn
		High	69.3	a	2.3	a	44.2	fghijkl
	HyTTec Velocity	Low	13.7	hij	1.4	mno	43.2	n
		Medium	31.2	def	1.7	fghijk	44.3	defghijk
		High	70.3	a	1.9	efg	44.1	hijklm
	ATR Bluefin	Low	12.2	hij	0.8	q	43.3	n
		Medium	30.5	def	1.0	pq	43.7	jklmn
		High	69.5	a	1.2	op	43.5	mn
lsd	lsd	lsd	8.9	na	0.2	na	0.7	na

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