GOA trial site report

The impact of manipulating seeding rate across a range of canola maturities/varieties with delayed seasonal breaks.

Grain Orana Alliance

Trial code:	GAMA00723-2
Season/year:	Winter 2023
Location:	Woodview, Trundle
Trial partners:	Chris Berry
Trial establishment date:	19.4.2023

Keywords

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

Take home messages

- Earlier sowing (mid-April) resulted in higher yields than later sowing (early-June).
- Increasing target plant populations from 10 to 30 plants/m² improved yields across all varieties and sowing times.
- Significant yield differences were observed between varieties, highlighting the importance of varietal selection.
- While late-sown canola typically yields 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

Early sowing of canola (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 2023. 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, however, 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 rotations despite later autumn breaks, it is worth exploring whether agronomic levers can be adjusted to optimise performance in late-sown canola.

Trial work by Grain Orana Alliance (GOA) during the 2018 drought showed that hybrid Clearfield lines substantially out-yielded open-pollinated TT lines of similar maturity when sown late. It was hypothesised that the enhanced early growth and vigour of the hybrid lines enabled sufficient biomass accumulation under minimal rainfall, whereas the TT lines could not. 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 vs open-pollinated)—could give 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. This aspect warrants further exploration.

Aims

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

Site characteristics

Sites were selected in the more western areas of the GOA region where the adoption of heavier sowing rates as a weed control tool are less in use. Trials were placed in paddocks with a good rotational history to minimise disease risk.

Rainfall: 2023 was a below average season in Trundle (Table 1), and the in-crop rainfall was approximately 122.8mm.

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
2023	83	34	78	28	4	25	22	15	5	19	136	80	**529**
LTA	48	47	44	37	39	38	36	37	34	47	50	46	**503**

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).

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

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

Table 2: Key trial dates.

Treatment	Sowing	Harvest
TOS1	19/4/2023	30/10/2023
TOS2	2/6/2023	21/11/2023

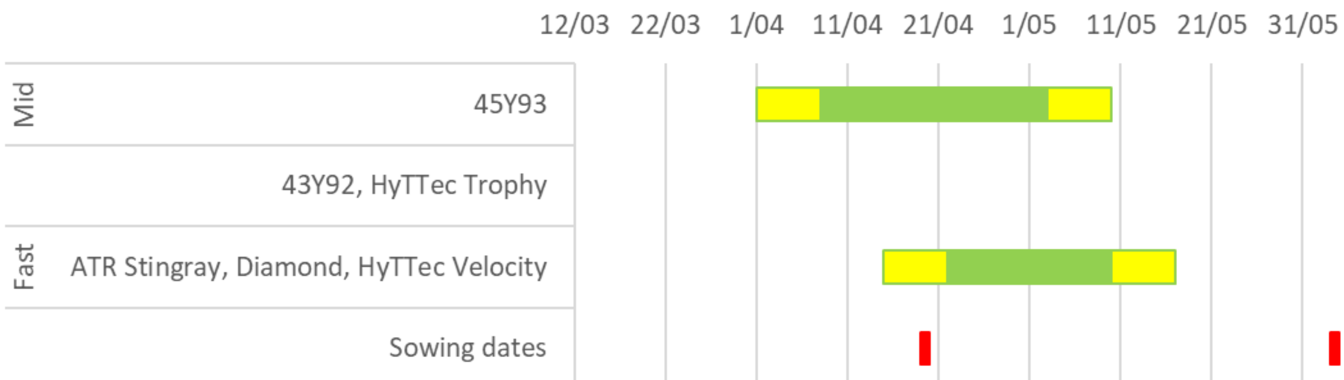

Figure 1: Phenology, optimal sowing windows, and actual sowing dates of the varieties tested. The first red bar denotes TOS1 and the second, TOS2.

Table 3: Key varietal characteristics and sowing rates for the varieties tested. Target plant populations were 10, 30, and 60 plants/m^2, and the values below these represent kg/ha sowing rates.

Breeder	Variety	seeds/kg	Type	Phenology	Maturity	Plant height	10	30	60
Pioneer	43Y92	213,600	Hybrid CL	Mid-fast	Early	Medium	0.7	2.2	4.5
Pioneer	45Y93	173,000	Hybrid CL	Mid	Mid	Med-tall	0.9	2.8	5.5
Nuseed	ATR Stingray	320,000	OP	Fast	Early	Short	0.5	1.6	3.1
Nuseed	Diamond	205,000	Hybrid OP	Fast	Early	Medium	0.8	2.4	4.7
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	3.9

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 comparable to the target populations.
- Within each variety, there was no difference in establishment between TOS at populations of 10 and 30 plants/m^2.
- For Diamond, HyTTec® Trophy, and Stingray®, establishment was higher in TOS1 than TOS2 at 60 plants/m^2 (Figure 2).

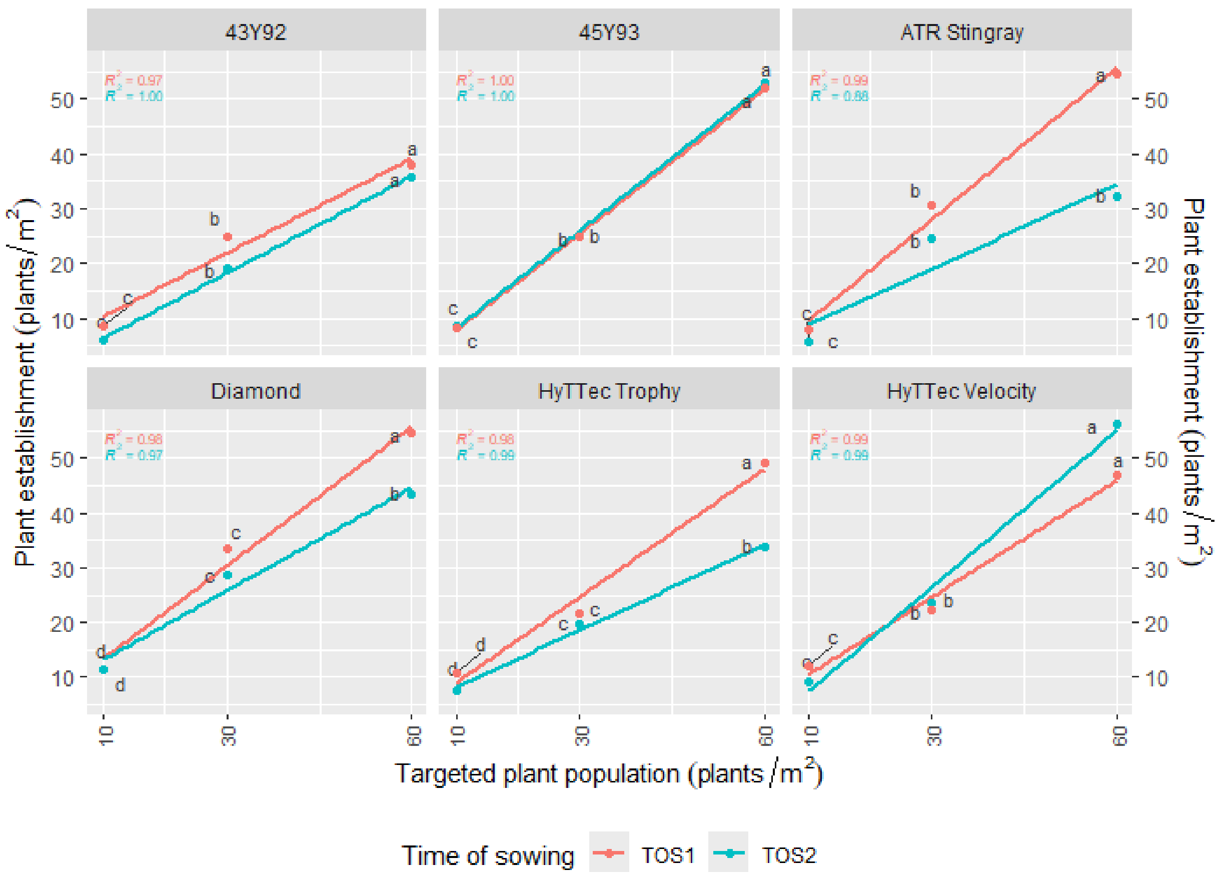

Figure 2: Plant establishment by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Yield:

- The average site yield was 0.86 t/ha.
- TOS2 resulted in significantly lower yields than TOS1 for all varieties and populations tested.

- Increasing plant population from 10 to 30 plants/m^2 increased yield in every instance, and a further increase from 30 to 60 plants/m^2 increased or had no effect on yield.
- Diamond had the highest average yields, regardless of timing.
- ATR Stingray® had the lowest yields on average, regardless of timing, though yield increased with sowing rate (Figure 3).

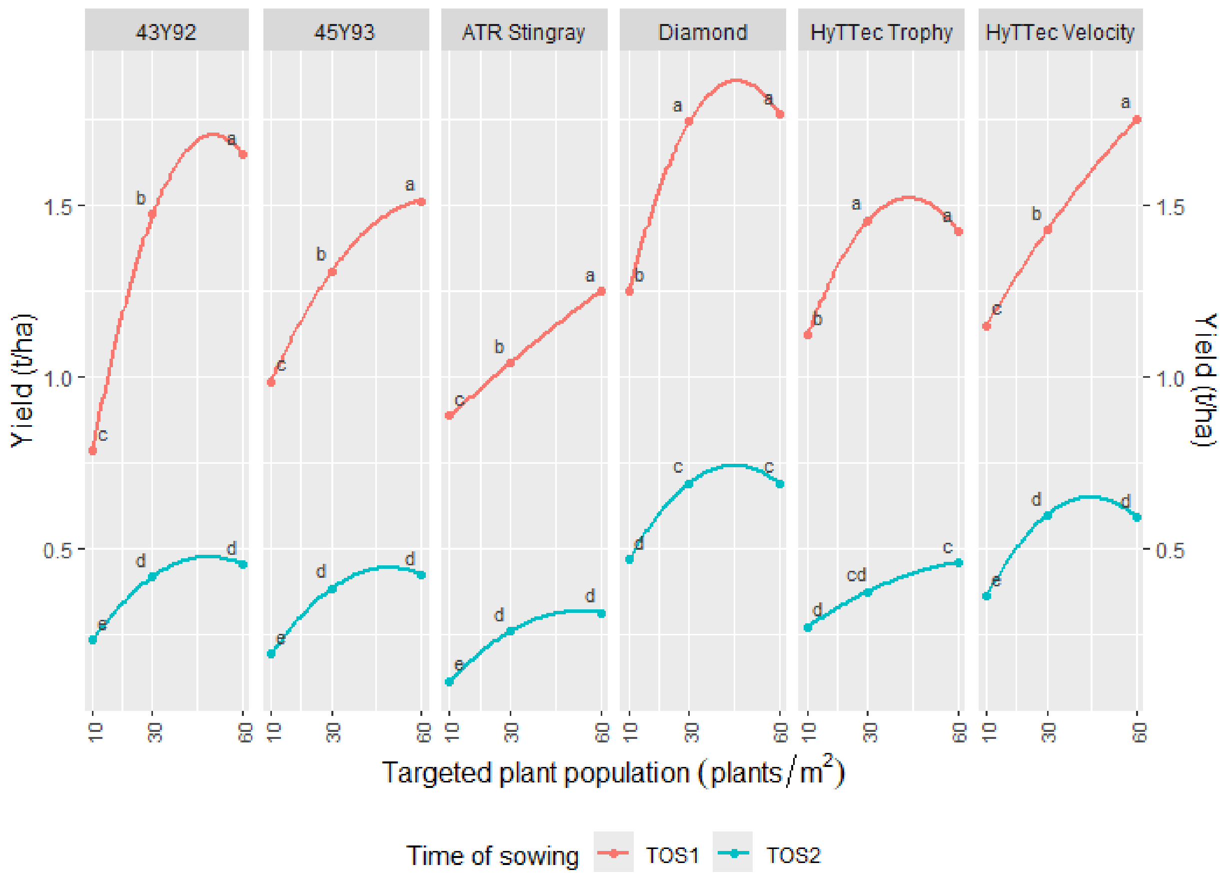

Figure 3: yield by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Oil:

- Oil content was not practically affected by varietal choice or population within each TOS.

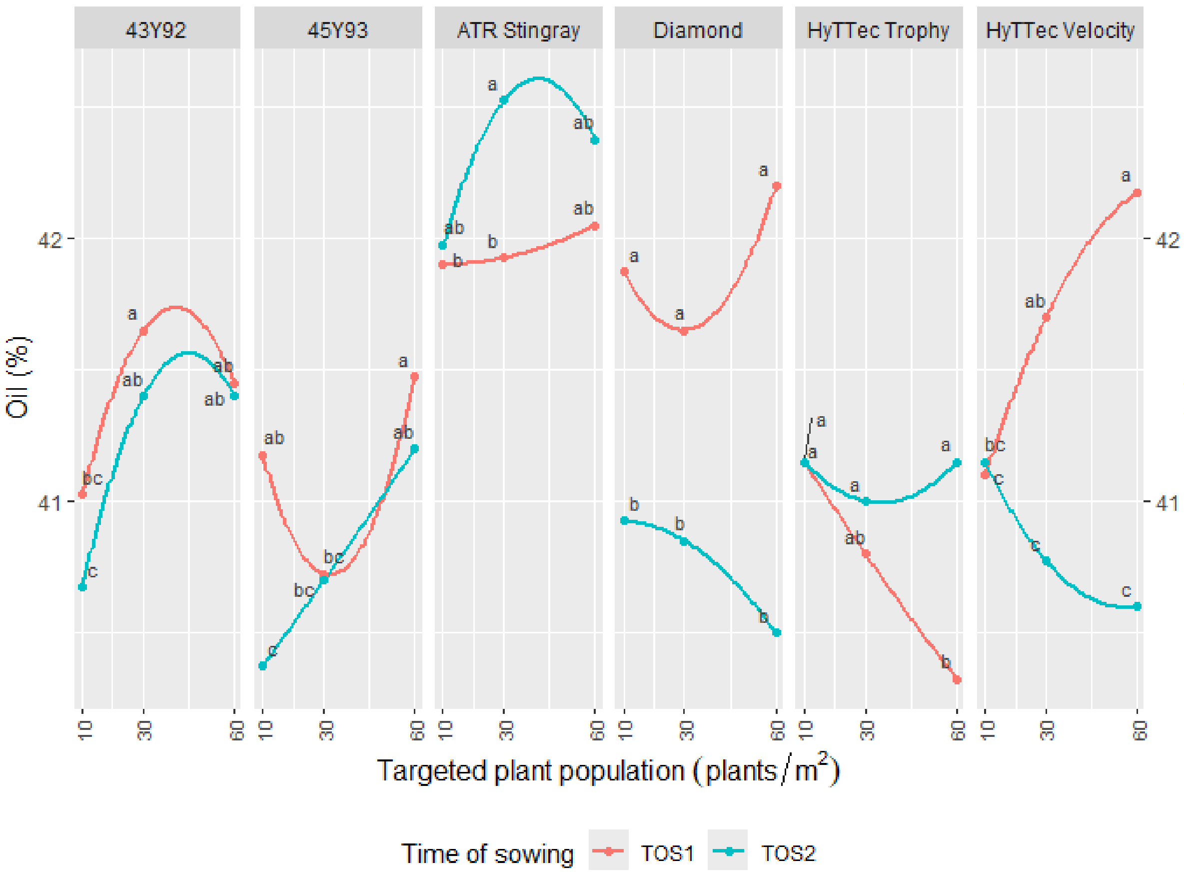

Figure 4: Oil content by variety, targeted plant population, and TOS. Treatments within the same variety with the same letter are not significantly different.

Discussion

2023 was an average year and the in-crop rainfall at this site was approximately 122.8 mm. The average site yield was 0.86 t/ha, and the average site oil content was 41%.

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 Stingray®.

In contrast, TOS2 was well outside the optimal window—by more than a month—regardless of variety. Despite a 6-week difference in sowing dates, harvest occurred only 3 weeks apart, suggesting that crops at TOS2 accelerated their development and likely experienced a shortened flowering window.

Across all varieties and sowing times, increased plant populations consistently improved or stabilised yield. Additional benefits are likely to include enhanced weed competition and reduced reliance on herbicides.

Varietal performance differed markedly, with greater variation observed at TOS1 than TOS2. Hybrid varieties outperformed the sole open-pollinated line, Stingray®, particularly at higher plant populations. At TOS1, Diamond achieved the highest yield at 1.8 t/ha (High population), outperforming Stingray® by up to 0.9 t/ha at equivalent sowing rates. Even at TOS2, Diamond maintained a yield advantage of 0.4–0.6 t/ha over Stingray® across all population levels, highlighting 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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DISCLAIMER — TECHNICAL

Appendix

Time of sowing	Variety	Target population	Plant establishment (plants/m2)		Yield (t/ha)		Oil (%)	
TOS1	45Y93	Low	8.3	o	1.0	gh	41.2	fghijkl
		Medium	24.7	hijkl	1.3	cd	40.7	klmno
		High	52.0	ab	1.5	b	41.5	defgh
	43Y92	Low	8.5	o	0.8	ij	41.0	hijklm
		Medium	25.0	ghijkl	1.5	b	41.6	cdefg
		High	38.0	cde	1.6	a	41.5	efgh
	HyTTec Trophy	Low	10.8	no	1.1	f	41.1	fghijkl
		Medium	21.7	kl	1.5	b	40.8	jklmno
		High	49.2	ab	1.4	bc	40.3	o
	Diamond	Low	11.5	mno	1.2	de	41.9	bcde
		Medium	33.5	efgh	1.7	a	41.7	cdefg
		High	54.5	a	1.8	a	42.2	abc
	HyTTec Velocity	Low	12.0	mno	1.1	ef	41.1	ghijkl
		Medium	22.2	jkl	1.4	b	41.7	cdef
		High	46.9	abc	1.7	a	42.2	abc
	ATR Stingray	Low	8.0	o	0.9	hi	41.9	bcde
		Medium	30.7	efghij	1.0	fg	41.9	bcde
		High	54.8	a	1.2	de	42.1	abcd
TOS2	45Y93	Low	8.8	o	0.2	qr	40.4	no
		Medium	25.0	ghijkl	0.4	lmn	40.7	klmno
		High	53.0	a	0.4	lm	41.2	fghijk
	43Y92	Low	6.0	o	0.2	pq	40.7	klmno
		Medium	19.0	lmn	0.4	lm	41.4	efghij
		High	35.8	def	0.5	l	41.4	efghi
	HyTTec Trophy	Low	7.5	o	0.3	nopq	41.1	fghijkl
		Medium	19.7	lm	0.4	lmn	41.0	hijklm
		High	33.7	efg	0.5	l	41.2	fghijkl
	Diamond	Low	11.5	mno	0.5	l	40.9	hijklmn
		Medium	28.7	fghijk	0.7	jk	40.8	ijklmno
		High	43.5	bcd	0.7	jk	40.5	mno
	HyTTec Velocity	Low	9.3	o	0.4	lmno	41.1	fghijkl
		Medium	23.5	ijkl	0.6	k	40.8	jklmno
		High	56.2	a	0.6	k	40.6	lmno
	ATR Stingray	Low	5.8	o	0.1	r	42.0	abcde
		Medium	24.5	ijkl	0.3	opq	42.5	a
		High	32.2	efghi	0.3	mnop	42.4	ab
lsd	lsd	lsd	8.9	na	0.1	na	0.6	na