

GOA trial site report

Manipulating the canola sowing rate across a range of maturities/varieties with a delayed seasonal break.

Trial code: GOMA007
Season/year: Winter 2022
Property name: Berrilea
Location: Fifield
Collaborators: Clint Ward

Keywords

GOMA007, canola, late sowing, variety, population, triazine tolerant, Clearfield, conventional, Fifield

Key findings

- Sowing canola in the recommended window is best for optimizing canola yields.
- Later sowings, with higher populations and vigorous varieties, had better yields than less vigorous varieties sown on time.
- Increasing target populations from 10 to 30 plants/m² increased yields, regardless of variety or time of sowing.
- There were considerable yield differences between varieties.

Later sown canola may not yield as well as canola sown in the ideal window, however this trial yields suggest it remains a strong economic choice when compared with other crops not suited to late sowing

If considering sowing canola late, choose a quick maturing variety with a strong yield potential. Target a plant population of 30 or more plants/m².

Background

Early sowing of canola (before the 25 April) has been shown through recent Grains Research and Development Corporation (GRDC) funded trials to positively affect crop performance. However, there are many times when canola sowing is later due to delayed seasonal breaks (after the 10 May), or paddocks being too wet such as in 2022. In response growers either reduce canola areas or remove the crop from the rotation due to concerns over low profitability and possible crop failure.

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The removal of canola from the rotation has many flow-on issues including loss of disease and weed breaks and increased income risk through loss of commodity diversification. There are advantages to maintaining rotations with later autumn breaks but are there agronomic levers that can be manipulated to optimise late sown canola performance?

Trial work by Grain Orana Alliance (GOA) in the 2018 drought showed that hybrid Clearfield lines substantially out yielded similar maturity open pollinated TT lines when sown late. It is thought that the enhanced early growth rates and vigour of the hybrid lines enabled sufficient biomass accumulation on minimal rainfall, whereas the TT lines could not. This work also demonstrated that hybrid canola was as good as or in many cases a better economic option for late sowing than pulses or cereals.

This work showed that further investigation of varietal choice, both maturity and crop type (hybrid vs open pollinated), could give growers more confidence to keep canola in the rotations. Having robust plant populations is also likely to become more important with later sowing times, as there is less time for compensatory growth.

Aims

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

Methodology

Trial Design		
Type	Small plot (~12m x 2 m)	
Design	Randomized complete block	
Replications	4	
Analysis	ASREML	
Confidence interval	95%	

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

Table 1: Key dates

Treatment	Sowing	Harvest
TOS1	26/4/2022	24/11/2022
TOS2	14/6/2022	30/11/2022

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Treatments

Table 2: Varieties, target plant populations and sowing rates

							Target plant population (plant/m ²)		
							10	30	60
Breeder	Variety	Seeds/kg	Type	Phenology	Maturity	Plant height	Sowing rate (kg/ha)		
Pioneer	43Y92	174,800	Hybrid CL	Mid-fast	Early	Medium	1.0	3.0	6.0
Pioneer	45Y93	179,100	Hybrid CL	Mid	Mid	Med-tall	1.0	2.9	5.8
Nuseed	ATR Stingray	320,000	OP	Fast	Early	Short	0.5	1.6	3.2
Nuseed	Diamond	205,000	Hybrid OP	Fast	Early	Medium	0.8	2.5	5.0
Nuseed	NCH19T588	208,000	Hybrid TT	-	-	Medium	0.9	2.6	5.3
Nuseed	Trophy	230,000	Hybrid TT	Mid-fast	Early - Early Mid	Med-tall	0.7	2.2	4.4

The sowing date is represented by the red bars on Figure 1 show that time of sowing (TOS) 1 is towards the start-mid of the ideal window for most varieties.

The TOS 2 is over a month later than the optimal sowing window for most varieties¹ and for central west NSW.

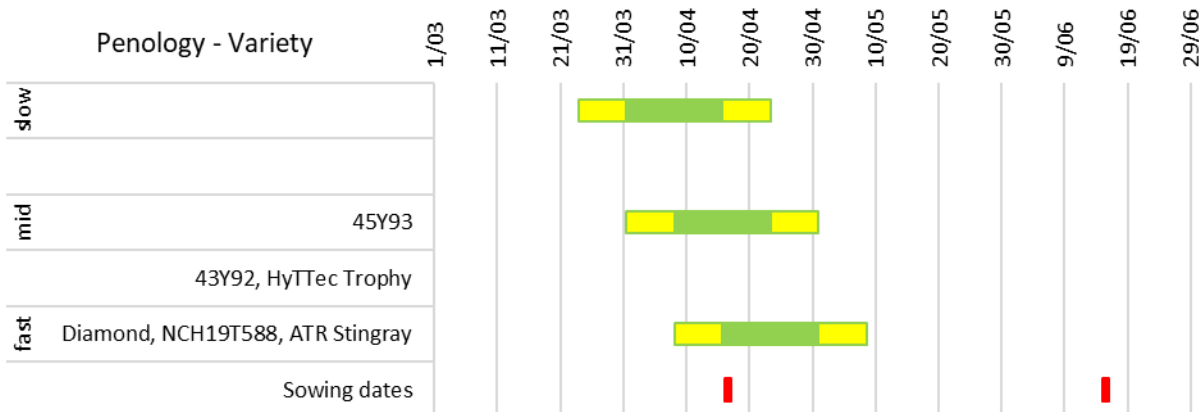


Figure 1: ideal sowing windows and actual TOSs.

¹ 2 Adapted from “Winter Crop Variety Sowing Guide 2022”, NSW DPI

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Table 2: Fifield rainfall for 2022 and the long-term average (LTA).

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2022	121	17	31	110	106	7	51	85	116	161	150	20	975
LTA	50	46	44	36	39	41	37	36	34	44	45	43	495

Results

Plant populations:

Establishment tended to be slightly lower than the target population at TOS1 (Figure 2) and higher than the target for TOS2, particularly at the higher sowing rates. Within a variety and timing, the resultant populations were significantly different.

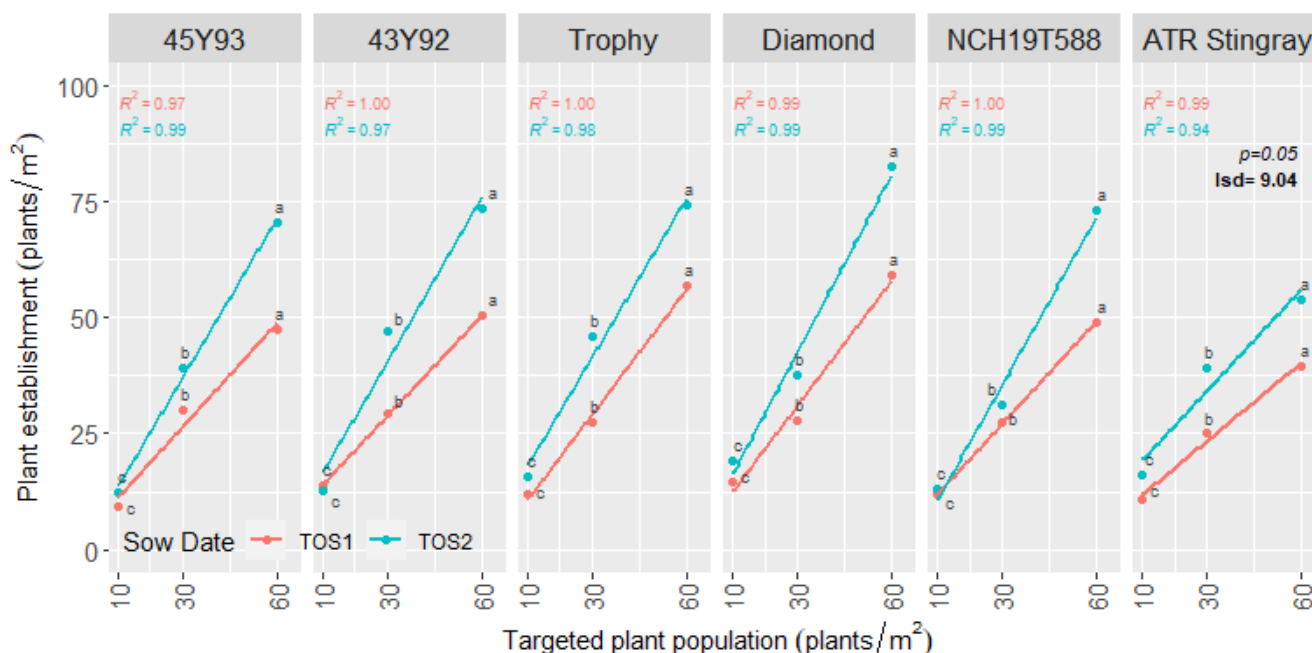


Figure 2: Plant establishment by variety and target plant population. Treatments with the same letter within a variety and TOS are not significantly different.

Yield:

- Yields were high, with several treatments yielding >2.5 t/ha. Half the varieties yield increased with increasing population at TOS1, while 5 out of 6 varieties yield increased for TOS2 with higher plant populations.
- 45Y93 had the highest yield at TOS1 of 3.3 t/ha.

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- ATR Stingray^A had the lowest yields regardless of timing, though it did have higher yields when plant populations were increased (Figure 3).

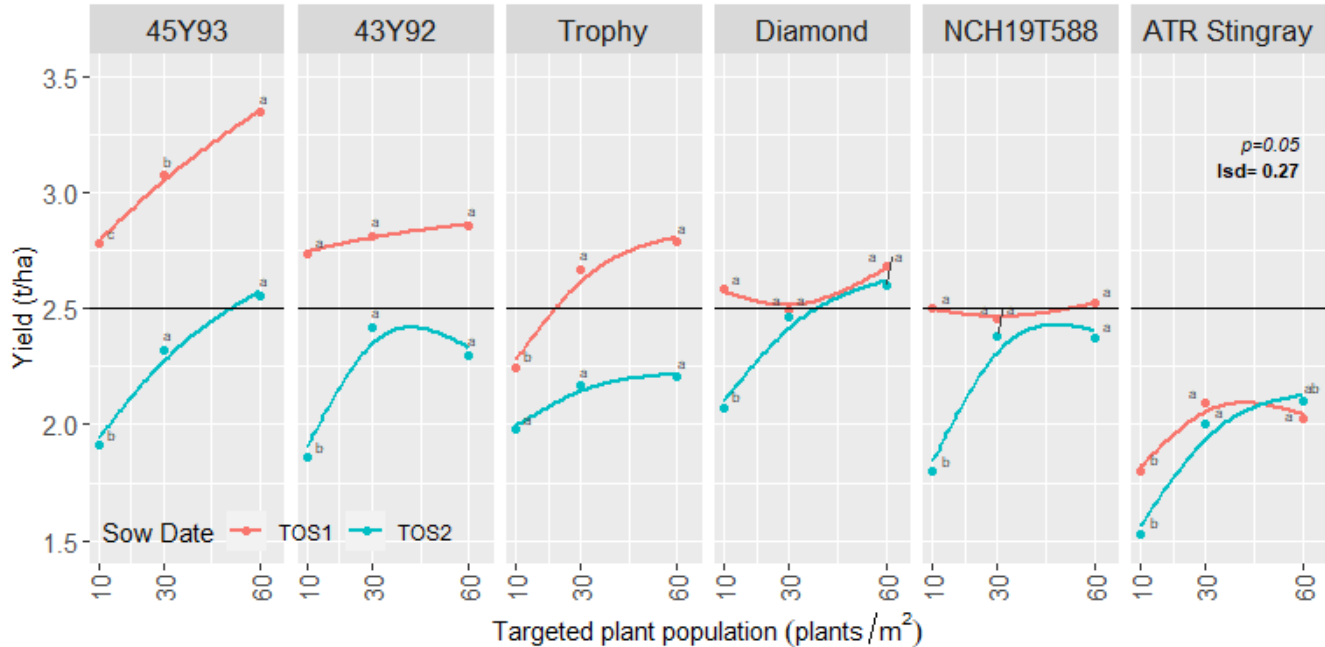


Figure 3: Canola yield by variety and targeted plant population (plants/m²). Treatments with the same letter within a variety are not significantly different.

Oil:

Oil content was not different for 435Y93, ATR Stingray or NCH19T588 at either timing or sowing rate. 43Y92 had lower oil at TOS2. Trophy and Diamond also had lower oil at the second timing but it was not consistent. (Figure 4).

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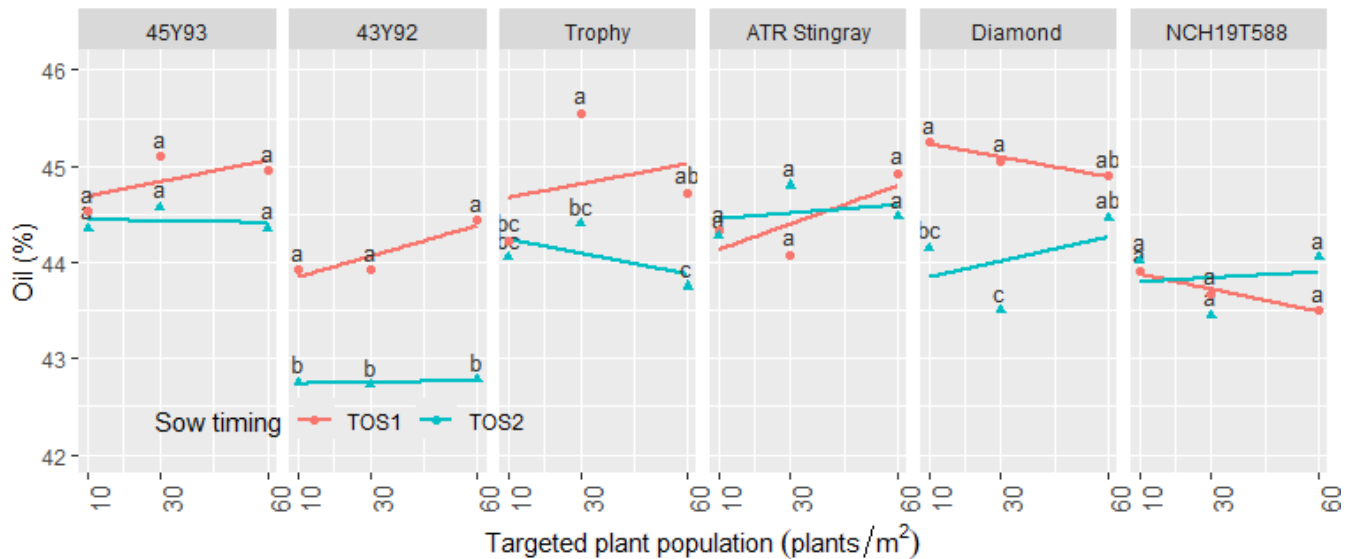


Figure 4: Canola oil by variety and targeted plant population. Treatments with the same letter within a variety and TOS are not significantly different.

Discussion

2022 was a very wet year with in-crop rainfall of 754.8 mm, resulting in high yielding crops. The average yield was 2.4 t/ha (Figure 3) and the average oil was 44% (Figure 4).

TOS 1 was sown in mid-April, the optimal time for varieties classified as mid and mid-fast. This was also close to the start of the fast-maturing window for varieties such as ATR Stingray^A. The TOS2 treatment was sown on the 14/6/22 and is well outside the optimal sowing window by more than a month, regardless of variety. Despite the 6 weeks difference in sowing dates, harvest was less than a week apart, indicating that TOS2 sped up all its maturity and likely had a shorter flowering window.

TOS2 had lower yields than TOS1. In the case of 45Y93 the difference was 1.5 t/ha. 45Y93 was the variety sown closest to its ideal window at TOS1 and the furthest outside its window at TOS2. Despite this, the variety had close to the best yields for TOS2 as well, suggesting its adaptability.

For plant populations, both 45Y93 and Trophy^A had higher yields at the higher plant populations for TOS1. Other varieties did not have a yield response to increasing populations. When the same varieties were sown more than a month later in TOS2, 5 out of 6 varieties had positive yield responses to increasing populations. The variety 45Y93 had over 1.5 t/ha yield advantage when comparing the highest and lowest plant populations. Except for 45Y93, all varieties had an optimal yield at a target population of 30 plants/m².

There was a big difference in the performance of varieties, with varietal differences being larger for TOS1 than TOS2. The hybrid varieties yielded better than the open pollinated variety. At TOS 2, Diamond sown at 30 plants/m² had close to 0.4 t/ha higher yield than the higher populations of ATR Stingray^A sown at the same time. When sown at TOS2 at 30 plants/m² or more all varieties, including ATR Stingray, yielded above 2.0 t/ha. This needs to be considered against the yields (and economics) of alternative late sown crops including the 'cost' of disruption to rotations.

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Conclusions

Late sown canola may not yield as well as canola sown in the recommended window, however the yields achieved in this trial would suggest it may remain a strong economic choice when compared with other crops that also suit late sowing.

If sowing canola late, choose a variety that is fast maturing and with good yield potential. Targeting a plant population of 30 or more plants/m² is recommended.

Acknowledgements

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Appendix

Table 1: Trial results 2022

Time of sowing	Variety	Target population	Plant establishment (plants/m ²)	Vegetation index (ndvi)	Yield (t/ha)	Oil (%)
1	45Y93	Low	9.2 o	0.6 i	2.8 cdef	44.5 bcdefghij
		Medium	30.0 ijk	0.8 ef	3.1 b	45.1 abc
		High	47.5 ef	0.9 bc	3.3 a	45.0 abcd
	43Y92	Low	13.8 no	0.7 fg	2.7 cdef	43.9 ghijkl
		Medium	29.3 jk	0.9 bc	2.8 bcd	43.9 ghijkl
		High	50.3 de	0.9 a	2.9 bc	44.4 bcdefghijk
	Trophy	Low	11.8 no	0.6 h	2.2 klmno	44.2 cdefghijkl
		Medium	27.5 kl	0.8 ef	2.7 cdefg	45.5 a
		High	56.8 cd	0.8 cd	2.8 cde	44.7 abcdefgh
	Diamond	Low	14.5 no	0.7 g	2.6 defghi	45.2 ab
		Medium	27.7 kl	0.8 de	2.5 fghijk	45.0 abc
		High	59.3 c	0.9 ab	2.7 cdefg	44.9 abcdef
	NCH19T588	Low	11.8 no	0.7 h	2.5 fghijk	43.9 hijkl
		Medium	27.3 kl	0.8 de	2.5 ghijkl	43.7 jkl
		High	49.2 de	0.9 ab	2.5 efg hij	43.5 klm
	ATR Stingray	Low	10.8 no	0.4 j	1.8 s	44.3 cdefghijkl
		Medium	25.0 klm	0.6 h	2.1 nopqr	44.1 defghijkl
		High	39.7 fgh	0.8 fg	2.0 opqrs	44.9 abcde
	45Y93	Low	12.3 no	0.2 nop	1.9 qrs	44.4 cdefghijk
		Medium	39.3 fghi	0.2 mnop	2.3 ijklmn	44.6 bcdefghi
		High	70.7 b	0.3 kl	2.6 defghij	44.3 cdefghijk
	43Y92	Low	12.8 no	0.2 nop	1.9 rs	42.7 m
		Medium	47.0 ef	0.2 klmn	2.4 ghijklm	42.7 m
		High	73.5 ab	0.3 k	2.3 jklmn	42.8 m
Trophy	Low	15.7 mno	0.2 nop	2.0 pqrs	44.1 efg hijkl	
	Medium	45.8 efg	0.2 mnop	2.2 mnopq	44.4 bcdefghij	
	High	74.2 b	0.2 lmnop	2.2 lmnop	43.7 ijkl	
Diamond	Low	19.2 lmn	0.2 nop	2.1 nopqr	44.2 defghijkl	
	Medium	37.8 ghij	0.2 lmno	2.5 ghijkl	43.5 klm	
	High	82.7 a	0.3 k	2.6 cdefgh	44.5 bcdefghij	
NCH19T588	Low	13.2 no	0.2 op	1.8 s	44.0 fghijkl	
	Medium	31.3 hijk	0.2 mnop	2.4 hijklm	43.5 lm	
	High	73.3 b	0.2 klm	2.4 hijklm	44.0 efg hijkl	
ATR Stingray	Low	16.2 mno	0.2 p	1.5 t	44.3 cdefghijkl	
	Medium	39.3 fghi	0.2 nop	2.0 opqrs	44.8 abcdefg	
	High	54.1 cde	0.2 mnop	2.1 nopqr	44.5 bcdefghij	
lsd	lsd	lsd	9.0 na	0.0 na	0.3 na	0.9 na