

Comparison of canola varieties; including new genetically modified (GM) options

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Key findings

- The total average trial yield achieved for canola varieties was 1 t/ha at Hart in 2021.
- Most conventional and Clearfield® varieties were high yielding, leading to higher \$/ha returns in the 2021 season.
- A number of genetically modified varieties yielded well, with yields ranging from 1.09 – 1.28 t/ha, demonstrating that GM options can provide yield benefits equal to or beyond traditional herbicide tolerance traits (Clearfield®, Triazine Tolerant).
- Canola oil content (%) was generally high, with most varieties achieving > 42% leading to oilseed premiums.

Why do the trial?

To compare the performance of new canola varieties, including genetically modified (GM) options now available to South Australian mainland growers, alongside current commercial standards including conventional, triazine tolerant and Clearfield® varieties.

How was it done?

Plot size	2.0 m x 10.0 m	Fertiliser	Seeding: DAP (18:20) Zn 1% + Impact @ 80 kg/ha
Seeding date	May 3, 2021		June 12: Easy N (42.5:0) @ 70 L/ha
Location	Hart, SA		
Harvest date	November 9, 2021	Soil available N	88.5 kg N/ha

At Hart in 2021, 27 canola varieties were trialed. Canola varieties were blocked by technology as a randomised design with three replicates and was managed with the appropriate application of pesticides to ensure a weed, insect and disease-free canopy. All plots were assessed for crop establishment (plants/m²), flowering date (50% flower), crop yield (t/ha) and oil content (%). Canola gross margins were also calculated for the 2021 season (Table 3).

Results and discussion

Crop establishment

Crop establishment was assessed for all canola varieties due to the late and staggered emergence of plants. This was a result of dry conditions with below average rainfall in May. No correlation was observed between establishment and crop yield (t/ha), meaning that establishment was variable across the site and did not directly influence yield results for each variety (data not shown). Target crop density was 45 plants/m², however an average of only 20 plants/m² was achieved across the trial site, equating to 44% of that target.

Oilseed yield

The total average trial yield achieved for canola varieties was 1 t/ha at Hart in 2021.

Conventional varieties Nuseed Diamond and Nuseed Quartz were high yielding, achieving 1.26 and 1.2 t/ha respectively (Table 1).

Yields for Triazine Tolerant varieties ranged from 0.66 – 1.13 t/ha, with InVigor T 4510 and HyTTec Trident (an alternative to ATR Bonito) achieving the highest yields of 1.13 and 1.10 t/ha respectively. Both of these early-maturing varieties are well adapted to environments within the low – medium rainfall zones, reaching 50% flower by September 1 (Table 2).

Saintly CL (1.32 t/ha) and Pioneer 44Y94 CL (1.35t/ha) were high yielding Clearfield® varieties at Hart providing a good \$/ha return in 2021 (Table 3). Banker CL, Pioneer 43Y92 CL and Pioneer 45Y95 CL were lower yielding; however, still performed well at Hart, yielding between 1.04 – 1.23 t/ha.

At Hart in 2021, many genetically modified canola varieties performed well, averaging 1.1 t/ha. The highest yielding GM varieties were; Hyola Garrison XC, Nuseed Emu, InVigor R 4022P, Nuseed Raptor TF, Pioneer 44Y27 RR and Pioneer 45Y28 RR, with yields ranging from 1.09 – 1.28 t/ha.

Results from Hart in 2021 demonstrate that GM varieties can provide yield benefits equal to or beyond the traditional herbicide tolerance traits South Australian growers have had access too, with many providing yields similar to Clearfield® varieties.

Oil content

Most canola varieties trialed at Hart in 2021 achieved high oil content (> 42%) with some above that level leading to oilseed premiums (Table 1).

Although lower yielding, ATR Bluefin and SF Spark TT had the highest levels of oil content for TT varieties, ranging from 44 – 44.8%, providing a minimum increase of \$16.50/tonne as a result of oilseed premiums.

Roundup Ready® varieties Pioneer® 45Y28 RR and InVigor R 4022 P also performed well with high oil content (> 42%). TruFlex® varieties Hyola 530 XT (stacked tolerance) and Hyola 410 XX were lower yielding but achieved high oil content ranging from 44.3 – 43.8%. All other GM varieties had significantly lower oil content, but still performed well.

In addition to crop yield (t/ha), Saintly CL and Pioneer 44Y94 CL, achieved the highest levels of oil content for Clearfield® varieties, with 43.4% and 42.5% respectively.



Table 1. Summary of oilseed yield (t/ha) and oil content (%) for canola varieties trialed at Hart in 2021. Shaded values in each column show the highest performing varieties within each technology.

Technology	Variety	Oilseed yield (t/ha)	% of average	Oil content (%)	% of average
Conventional	Nuseed Diamond	1.26	102	42.6	101
	Nuseed Quartz	1.20	98	41.4	99
	Average	1.23	100	42.0	100
	LSD (P≤0.05)	NS		NS	
Triazine Tolerant and stacked	ATR Bluefin	0.66	72	44.8	105
	Hyola [Ⓟ] Blazer TT	0.99	108	41.3	97
	Hyola [Ⓟ] Enforcer TT	0.98	107	43.6	102
	ATR Bonito [Ⓟ]	0.72	78	43.4	102
	HyTTec [Ⓟ] Trifecta	0.91	99	42.0	99
	HyTTec [Ⓟ] Trophy	0.89	97	41.3	97
	InVigor [Ⓟ] T 4510	1.13	123	41.5	98
	SFR65-028TT	0.87	95	40.9	96
	SF Spark TT	0.89	97	44.0	103
	SF Dynatron TT™	0.96	105	43.0	101
	HyTTec [Ⓟ] Trident	1.10	120	42.3	99
	Average	0.92	100	42.6	100
	LSD (P≤0.05)	0.12			
Roundup Ready®, TruFlex® and stacked	Hyola [Ⓟ] Battalion XC	0.98	88	42.0	97
	Pioneer [Ⓟ] 44Y27 RR	1.26	114	43.0	99
	Pioneer [Ⓟ] 45Y28 RR	1.28	115	44.6	103
	Hyola [Ⓟ] 530 XT	0.79	71	43.8	101
	Hyola [Ⓟ] 410 XX	1.05	95	44.3	102
	Hyola [Ⓟ] Garrison XC	1.09	98	43.2	100
	Nuseed Emu	1.25	113	43.4	100
	InVigor [Ⓟ] R 4022 P	1.13	102	43.9	101
Nuseed Raptor TF	1.16	105	41.6	96	
	Average	1.11	100	43.3	100
	LSD (P≤0.05)	0.19		0.92	
Clearfield®	Banker CL	1.04	85	40.6	97
	Saintly CL	1.32	108	43.4	104
	Pioneer [Ⓟ] 43Y92 CL	1.23	100	42.0	100
	Pioneer [Ⓟ] 44Y94 CL	1.35	110	42.5	101
	Pioneer [Ⓟ] 45Y95 CL	1.18	96	41.1	98
	Average	1.22	100	41.9	100
	LSD (P≤0.05)	0.10		0.97	

Table 2. Flowering dates (50% flower) for canola varieties trialed at Hart in 2021.

Technology	Variety	Maturity	Days to 50% flower	Date of 50% flower
Conventional	Nuseed Diamond	Early	89	August 23
	Nuseed Quartz	Mid	103	September 6
Triazine Tolerant	ATR Bluefin	Early	88	August 27
	Hyola [®] Blazer TT	Mid-Early	91	August 30
	Hyola [®] Enforcer TT	Mid	98	September 6
	ATR Bonito	Early-Mid	93	September 6
	HyTTec [®] Trifecta	Mid	93	September 1
	HyTTec [®] Trophy	Early-Mid	93	September 1
	InVigor [®] T 4510	Early-Mid	93	September 1
	SFR65-028TT	Early-Mid	98	September 6
	SF Spark TT	Early	93	September 1
	SF Dynatron TT™	Mid	98	September 6
HyTTec [®] Trident	Early	87	August 26	
Roundup Ready [®] , TruFlex [®] and stacked	Hyola [®] Battalion XC	Early-Mid	91	August 30
	Pioneer [®] 44Y27 RR	Early-Mid	91	August 30
	Pioneer [®] 45Y28 RR	Mid	98	September 6
	Hyola [®] 530 XT	Early-Mid	98	September 6
	Hyola [®] 410 XX	Early-Mid	98	September 6
	Hyola [®] Garrison XC	Mid	98	September 6
	Nuseed Emu	Early	84	August 23
	InVigor [®] R 4022 P	Early-Mid	93	September 1
	Nuseed Raptor TF	Early-Mid	98	September 6
Clearfield [®]	Banker CL	Mid	98	September 9
	Saintly CL	Mid to Early-Mid	87	August 28
	Pioneer [®] 43Y92 CL	Early	98	September 6
	Pioneer [®] 44Y94 CL	Early-Mid	93	September 1
	Pioneer [®] 45Y95 CL	Mid	98	September 6

Table 3. Gross margins (excluding oilseed premiums) for trialed Roundup Ready®, TruFlex®, CL and TT canola technologies.

Technology	Variety	Hart yield (t/ha)	Gross margin \$/ha	
			Hart \$/ha	MRZ average \$/ha
Conventional	Nuseed Diamond	1.26	\$222.73	\$316.00
	Nuseed Quartz	1.2	\$190.49	
Triazine Tolerant	ATR Bluefin	0.66	-\$105.38	\$203.00
	Hyola [®] Blazer TT	0.99	\$77.63	
	Hyola [®] Enforcer TT	0.98	\$72.26	
	ATR Bonito	0.72	-\$67.47	
	HyTTec [®] Trifecta	0.91	\$34.64	
	HyTTec [®] Trophy	0.89	\$23.89	
	InVigor [®] T 4510	1.13	\$152.87	
	SFR65-028TT	0.87	\$13.14	
	SF Spark TT	0.89	\$23.89	
	SF Dynatron TT™	0.96	\$61.51	
HyTTec [®] Trident	1.10	\$136.75		
Roundup Ready, TruFlex and stacked	Hyola [®] Battalion XC	0.98	\$1.89	\$215.00
	Pioneer [®] 44Y27 RR	1.26	\$134.89	
	Pioneer [®] 45Y28 RR	1.28	\$144.66	
	Hyola [®] 530 XT	0.79	-\$94.71	
	Hyola [®] 410 XX	1.05	\$32.30	
	Hyola [®] Garrison XC	1.09	\$51.84	
	Nuseed Emu	1.25	\$130.00	
	InVigor [®] R 4022 P	1.13	\$71.38	
	Nuseed Raptor TF	1.16	\$86.04	
Clearfield	Banker CL	1.04	\$83.56	\$246.00
	Saintly CL	1.32	\$234.03	
	Pioneer [®] 43Y92 CL	1.23	\$185.67	
	Pioneer [®] 44Y94 CL	1.35	\$250.15	
	Pioneer [®] 45Y95 CL	1.18	\$158.80	

Values (input costs and sale price) sourced from the 2021 Farm Gross Margin and Enterprise Planning Guide.

Average canola yield used for the medium rainfall zone (MRZ) is 1.4 t/ha (TT = 1.3 t/ha, conventional = 1.5 t/ha).

This data should be used a guide and is based on 2021 forecasted values only.

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References

2021 Farm Gross Margin and Enterprise Planning Guide (2021).