

High yielding canola agronomy – optimum sowing date and variety type for the South West Slopes region of NSW

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Key findings

- There is wide phenological diversity in Australian canola varieties. From a 28 March sowing date the fastest variety, Nuseed® Diamond, started flowering on 22 June and the slowest variety, Hyola® 970CL (winter type), started flowering on 28 September, a difference of 98 days from sowing to start of flowering.
- The highest yield of 4.7 t/ha came from sowing fast (e.g. Nuseed® Diamond) and mid (e.g. Pioneer® 45Y25 (RR)) spring phenology types in mid-April to early May. Sowing the fast variety early (Nuseed® Diamond) resulted in significant frost damage, reducing yield and quality, as it started flowering in June.
- The winter varieties and the slow spring varieties had stable yield across sowing dates, but generally yielded closer to 4 t/ha.
- Open-pollinated (OP), triazine tolerant (TT) varieties yielded within 5% of hybrid non-TT varieties (with similar phenology).

Introduction

There has been recent interest in sowing slow spring and winter canola varieties in late March to early April. Crop models generally show higher yield potential from sowing long season varieties early, but there are secondary benefits from early sowing such as avoiding some establishment pests in no-till systems and capitalising on seedbed moisture from summer rain. There has, however, been little research comparing early sowing (late March to early April) long season canola varieties with later sowing (mid–late April) faster canola varieties in high yielding environments. Research started in 2017 through the project ‘High yielding canola for southern NSW’, which includes a site at Wallendbeen in the South West Slopes. Results from the first year are reported in this paper.

Site details

Location	Wallendbeen (530 m ASL), 15 km north-east of Cootamundra
Soil type	Red ferrosol
Previous crop	Wheat
Rainfall	Fallow rainfall (November 2016–March 2017) 228 mm In-crop rainfall (April 2017–October 2017) 279 mm (long-term average = 450 mm)
Soil characteristics	pH _{Ca} (0–10 cm, 13 April) 5.4 Soil nitrogen (0–120 cm, 13 April) 187 kg/ha Soil phosphorus (Colwell, 0–10 cm) 37 mg/kg
Nitrogen	Urea (46% nitrogen (N)) @ 190 kg/ha and ammonium sulfate (20% N, 24% sulfur (S)) @ 150 kg/ha, applied 27 March (broadcast and incorporated by a plot seeder). Urea @ 100 kg/ha, applied 4 July (broadcast).
Starter fertiliser	MAP (mono-ammonium phosphate) (11% N, 22.7% phosphorus (P), 2% S) @ 100 kg/ha, treated with 2.8 L/tonne flutriafol (500 g/L)

Treatments

Varieties

Nuseed® Diamond	Fast spring, conventional herbicide hybrid
Pioneer® 44Y90 (CL)	Mid-fast spring, Clearfield® (CL) hybrid
ATR Bonito [®]	Mid-fast spring, TT, OP
Pioneer® 45Y25 (RR)	Mid spring, Roundup Ready® (RR) hybrid
ATR Wahoo [®]	Slow spring, TT, OP
Victory® V7001CL	Slow spring, CL hybrid
SF Edimax CL	Winter, CL hybrid
Hyola® 970CL	Winter, CL hybrid

Sowing date (SD)

SD1: 28 March
SD2: 13 April
SD3: 1 May

Results

Phenology

Nuseed® Diamond was the fastest variety to flower from all three sowing dates and flowered close to the optimum start of flowering date (OSF) from the latest sowing date, 1 May (Figure 1). Pioneer® 44Y90 (CL), ATR Bonito[®] and Pioneer® 45Y25 (RR) all flowered close to the OSF date from the 13 April sowing, while the slow spring varieties ATR Wahoo[®] and Victory® V7001CL flowered close to the OSF date from the 28 March sowing date. The winter varieties Hyola® 970CL and SF Edimax CL flowered at least a month after the OSF date from all three sowing dates.

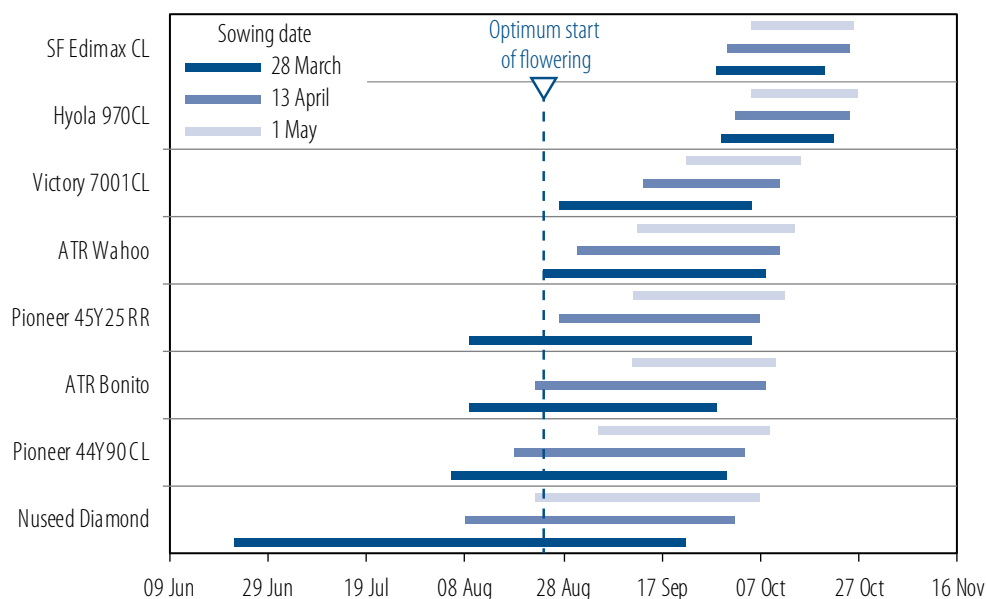


Figure 1. The effect of sowing date (three) on the flowering period of eight canola varieties at Wallendbeen in 2017.

Note: The date at the start of each line is the start of flowering (50% of plants with one open flower). The date at the end of each line is the end of flowering (95% of plants with no flowers). The vertical dashed line shows the Agricultural Production Systems Simulator (APSIM)-prediction for optimum start of flowering date for nearby Young (available at www.grdc.com.au/10TipsEarlySownCanola).

Grain yield

Phenology largely influenced the grain yields of the spring varieties. The fast and mid spring varieties Nuseed® Diamond, Pioneer® 44Y90 (CL), ATR Bonito[®] and Pioneer® 45Y25 (RR) all had a lower yield from early sowing than later sowing as their yield was limited by frost and potentially lack of radiation as a result of early flowering (Table 1). Nuseed® Diamond was the most affected by early sowing and yielded 1.1 t/ha less from the 28 March sowing than the 13 April sowing date. The yield from the slow spring varieties ATR Wahoo[®] and Victory® V7001CL was consistent across sowing dates, but yielded less than the faster spring varieties.

The OP TT varieties ATR Wahoo[®] and ATR Bonito[®] both grew approximately 15–20% less biomass than the hybrid varieties with similar phenology (Victory[®] 7001CL and Pioneer[®] 44Y90 (CL) respectively), but yielded within 5% of the hybrids as they had a higher harvest index (higher conversion of biomass to grain).

The winter varieties Hyola[®] 970CL and SF Edimax CL, although not as high yielding as the fast and mid spring varieties, yielded well considering their very late flowering. In seasons where growers miss early sowing opportunities for winter varieties for grain and grazing, this experiment shows that profitable yields can be achieved as a grain-only crop when sown into April. High yielding canola environments such as Wallendbeen generally have a wide optimum flowering window as spring is relatively cool with reliable rainfall.

Table 1. Grain yield (t/ha) of eight canola varieties sown on three dates at Wallendbeen in 2017.

Variety	Sowing date		
	28 March	13 April	1 May
Nuseed Diamond	3.7	4.7	4.8
Pioneer 44Y90 CL	4.1	4.3	4.4
ATR Bonito	4.1	4.4	3.9
Pioneer 45Y25 RR	4.2	4.7	4.7
ATR Wahoo	3.9	4.0	4.0
Victory V7001CL	3.8	4.0	3.6
SF Edimax CL	4.0	4.0	3.6
Hyola 970CL	4.1	4.1	3.8
l.s.d. ($P < 0.05$)		0.3	

Oil concentration

There were only minor differences between the oil concentration across the treatments (varieties and sowing dates) with an average of 47.5%. The main exception was the early sown Nuseed[®] Diamond which was frosted and had an oil concentration of 43.3%.

Conclusion

In 2017 at the Wallendbeen experiment site, the highest grain yield came from sowing fast and mid spring canola varieties in mid-April to early May. Sowing slow spring and winter varieties early resulted in lower grain yield. This experiment will be repeated in 2018 with four extra varieties; Phoenix CL (winter), Archer (slow spring), Pioneer[®] 45Y91 (CL) (mid spring) and an experimental slow spring variety. There will also be experiments examining responses to the rate and timing of nitrogen in a winter and a mid spring variety.

Reference

Lilley J, Kirkegaard J, Brill R & Ware A 2017, 'Ten tips to early-sown canola': www.grdc.com.au/10TipsEarlySownCanola, downloaded 20 June 2018.

Acknowledgements

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