

Impact of Sowing Depth on Early Sown Canola Establishment and Yield

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KEY MESSAGES

- Hunter was the top performing canola variety in this trial this season.
- There was no benefit to sowing in mid-March compared to early April, and whilst there was no penalty either, it does increase the risk of plant mortality with higher temperatures at this time.
- Shallow sowing improved plant numbers and final yields compared to deeper sowing.

AIM

To further investigate the risks and rewards of sowing canola very early, and how seeding depth can impact establishment, growth and yield.

BACKGROUND

Over the past three years, Liebe Group's early sown canola trials have consistently demonstrated that seeding earlier than the traditional early-May window can increase yields across various seasonal conditions. These trials have also highlighted the importance of a successful initial germination. Once established, the crop generally persists and delivers a profitable yield, whereas re-sowing a failed crop adds extra costs. This trial was designed to investigate whether adjusting sowing depth can improve early establishment, and lead to higher yields in early sowing scenarios, making the strategy more effective and reliable.

The field trial was conducted over the 2025 season in Pithara, WA. Canola was sown at two depths: shallow (1.5-2 cm) and deep (4.5-5 cm). The deeper sowing aimed to test the theory that the seed could have access to moisture for longer, as the topsoil dries quickly, and therefore will be able to establish more successfully. The trial had two sowing dates (18th March and 8th April), with three varieties of differing maturity: Emu (early), Hunter (early-mid) and PY525G (mid). April is conventional early seeding date for the region while March is to test very early seeding.

TRIAL DETAILS

Trial location	DW & GD McIlroy, Pithara
Plot size & replication	10 m x 2 m x 4 replications
Soil type	Sandy loam
Paddock rotation	2022 wheat, 2023 canola, 2024 wheat
Sowing date	TOS 1 -18/03/2025 TOS 2 - 08/04/2025
Sowing rate	Emu: 2.3 kg/ha Hunter: 3 kg/ha PY525G: 2.64 kg/ha Target plant density: 40 plants/m ²
Fertiliser	Seeding: 100 kg/ha MacroPro Extra (with Impact), 40 kg/ha SOA 17/06/2025: 20 L/ha UAN 17/07/2025: 150 L/ha UAN
Trial management	Pre-Sowing IBS (18/3 & 8/4): 1.5 L/ha Weedmaster DST, 2 L/ha Treflan, 1 L/ha Rustler, 800 mL/ha Chlorpyrifos 500, 150 mL/ha Bifenthrin 100EC 07/05/2025: 1.5 L/ha Weedmaster DST 17/06/2025: 1.5 L/ha Weedmaster DST
Growing season rainfall	298.4 mm
Harvest date	05/12/2025

TREATMENTS

Sowing Time	x	Depth	x	Varieties (maturity)
TOS 1: 18 th March		Shallow (1.5 - 2 cm)		Emu (3)
TOS 2: 8 th April		Deep (4.5 - 5 cm)		Hunter (4)
				PY525G (5)

SOIL COMPOSITION

Depth (cm)	pH (CaCl ₂)	Col P (mg/kg)	Col K (mg/kg)	S (mg/kg)	N (NO ₃) (mg/kg)	N (NH ₄) (mg/kg)	EC (ds/m)	OC (%)
0-10	4.9	33	33	8.7	16	2	0.041	0.86
10-20	5.1	9	25	25.2	7	1	0.055	0.36
20-30	4.2	16	27	27.9	9	2	0.052	0.33

RESULTS

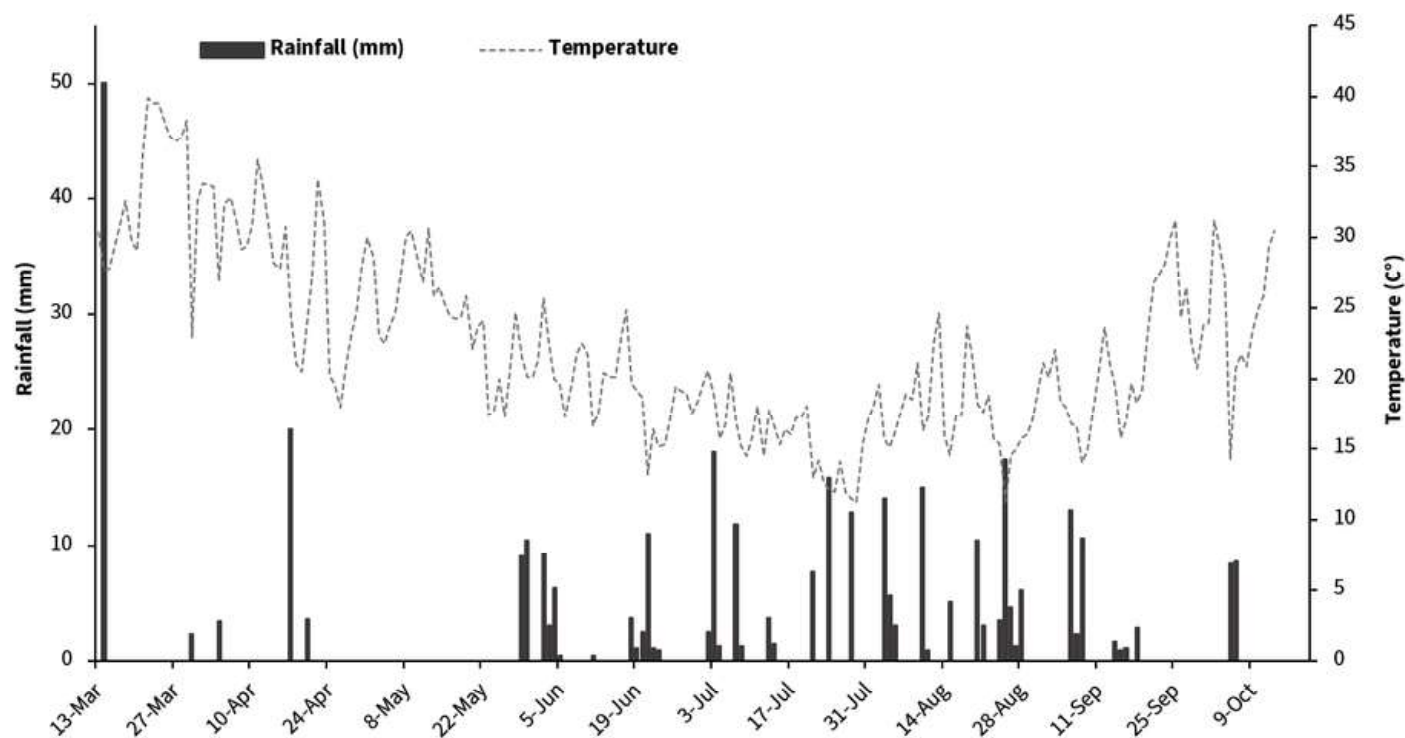


Figure 1. Rainfall (mm) data (black columns) from the farmers rain gauge and daily maximum temperature data (grey dotted line) from BOM Dalwallinu (station #8297).

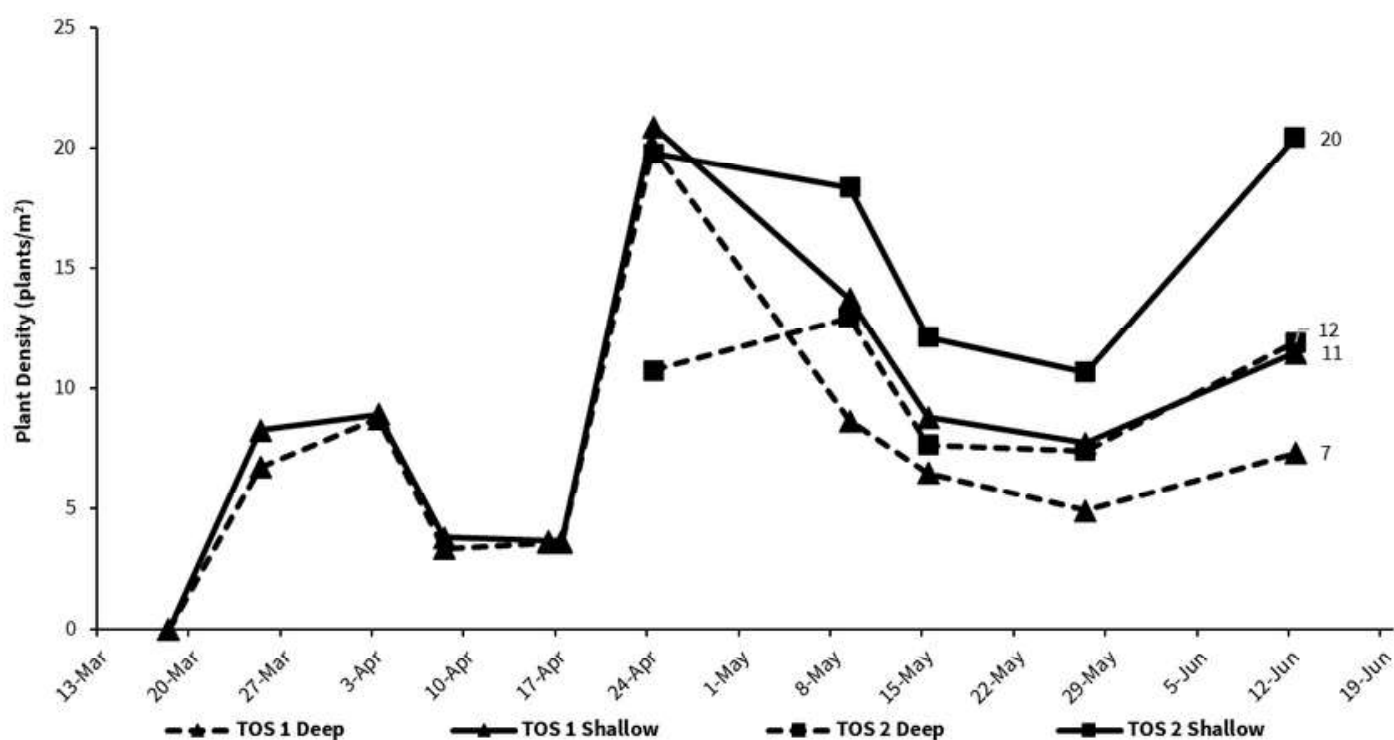


Figure 2. Plant density assessments (plants/m²) of the different depth and sowing timing treatments, with all varietal data combined. Target plant density for this trial was 40 plants/m².

For time of sowing 1 (TOS 1), the depth of sowing did not change the initial germination; however, deeper sown plots did decline over time. For time of sowing 2 (TOS 2), shallower sown plots initially had a higher germination and maintained higher plant counts throughout the data collection period compared with the deeper-sown treatments.

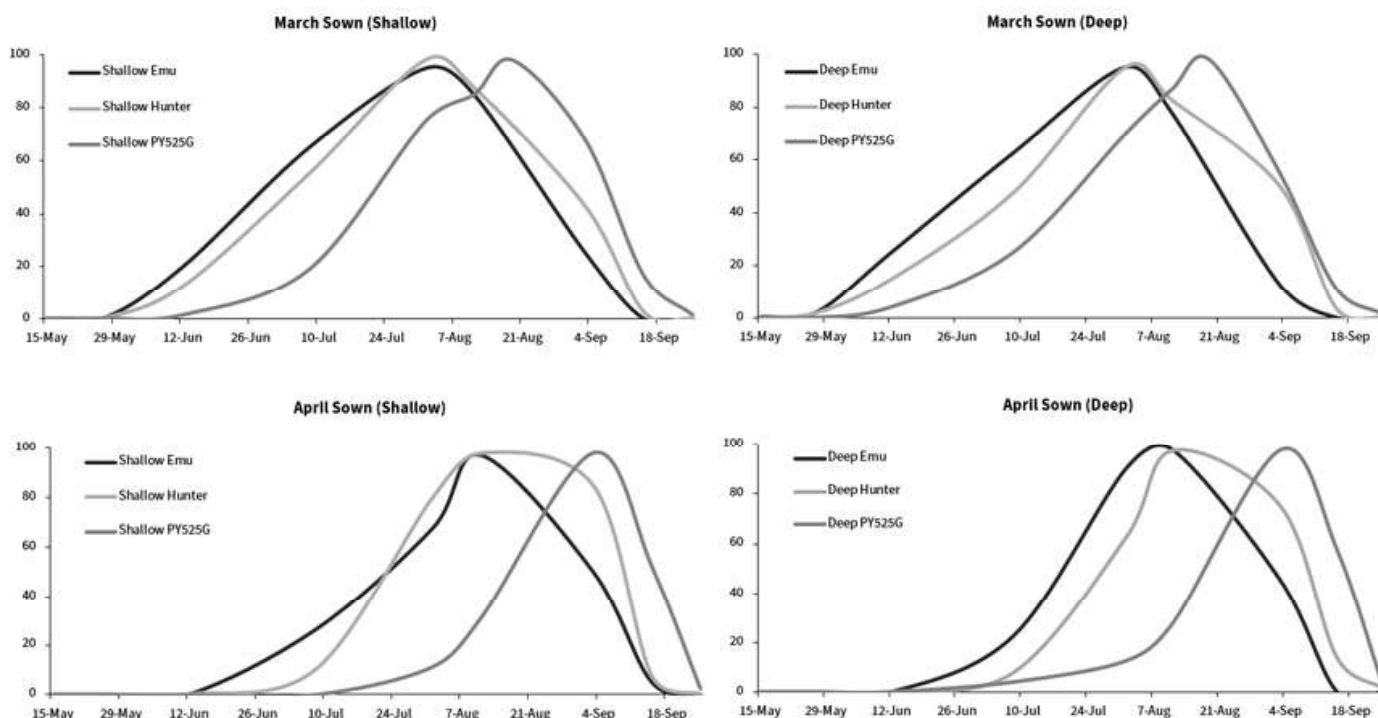


Figure 3. The percentage of flowering plants for all treatments. The top row is the March sown treatments (18th March), shallow-sown on the left and deep-sown on the right. The bottom row is the April sown treatments (8th April), shallow-sown on the left and deep-sown on the right.

The flowering data show no differences between shallow or deep-sown canola. There is a larger delay in peak flowering of PY525G, the mid-maturing variety, when sown in April.

Table 1. Yield and grain quality of canola sown at Pithara in 2025. TOS 1 was the 18th March and TOS 2 was 8th April. Different letters indicate significant differences. For yield; LSD Variety = 0.256, Depth = 0.181. For protein LSD Time of Sowing = 1.17, Variety = 1.66. For oil LSD Time of Sowing = 1.23.

	Yield		Oil		Protein	
	Deep	Shallow	Deep	Shallow	Deep	Shallow
Total Hunter	2.89a		48.55		19.28a	
TOS 1	2.83	3.00	48.87	49.65	19.12	17.85
TOS 2	2.65	3.09	46.85	48.90	21.25	18.80
Total PY525G	2.48b		46.61		20.21b	
TOS 1	2.45	2.73	47.22	48.20	19.25	18.20
TOS 2	2.28	2.46	45.35	45.70	21.95	21.45
Total Emu	2.26b		46.51		21.66b	
TOS 1	1.39	2.64	47.97	48.61	20.62	19.70
TOS 2	2.31	2.71	44.27	45.2	23.33	23.10
Grand Total	2.32a	2.77b	46.76	47.66	20.90	19.90

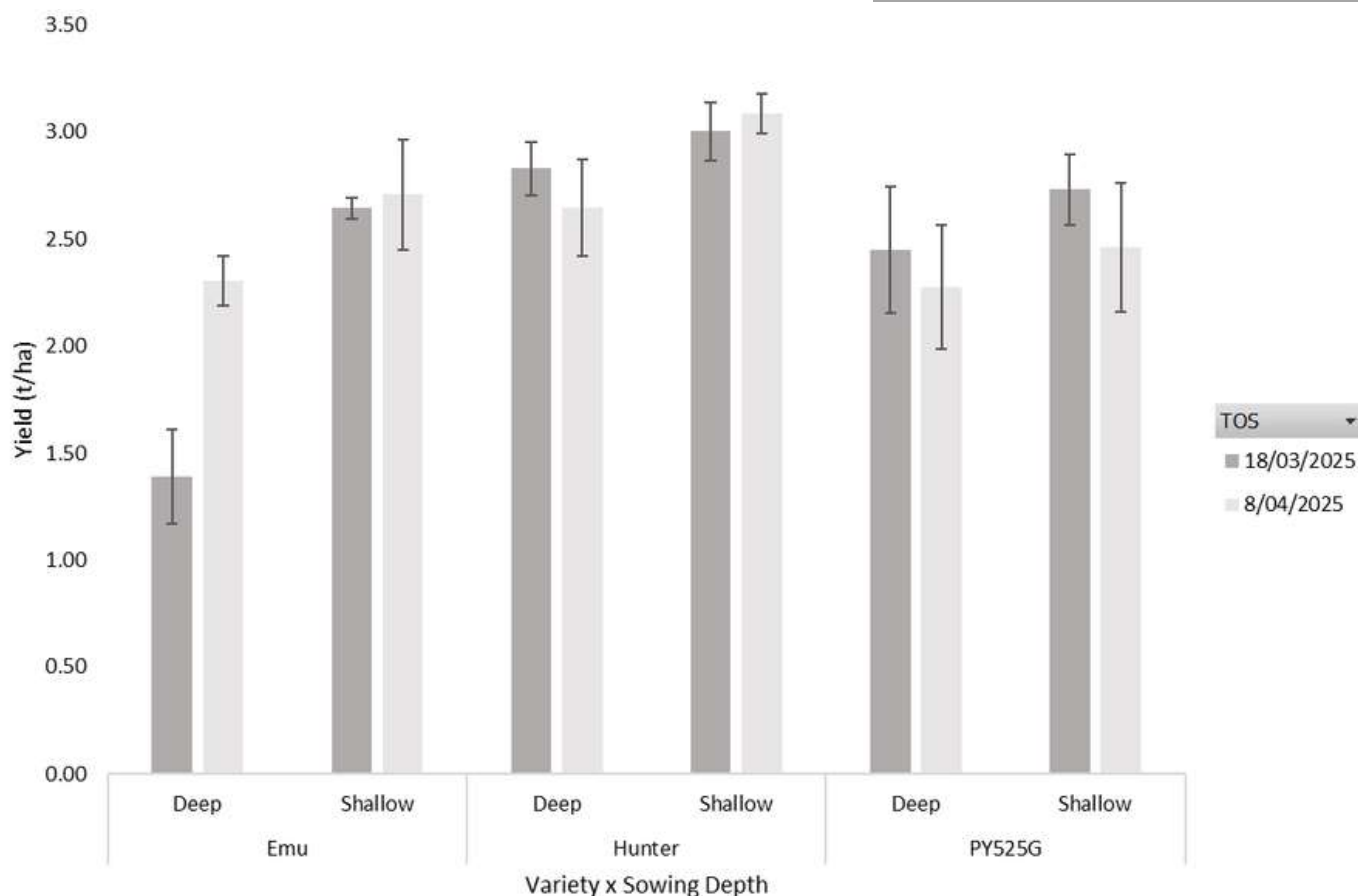


Figure 4. Grain yield (t/ha) of canola varieties sown deep and shallow at 2 times of sowing.

There were significant yield differences between varieties ($p < 0.001$) and between the depths of sowing ($p < 0.001$). There was no statistically significant difference between time of sowing. The interaction between time of sowing and variety was marginally significant ($p = 0.047$) and all other interactions were not significant.

Time of sowing had a significant effect on both protein and oil content ($p < 0.001$). Hunter had significantly lower protein than the other varieties ($p < 0.05$). There was no depth interaction detected for grain quality.

COMMENTS

Establishment

The March-sown treatment (TOS 1) was sown five days after a 50 mm rainfall event on 13th March in Pithara (Figure 1). Both the shallow and deep sown treatments were sown into moisture; however, the soil profile was drying rapidly with average maximum temperature exceeding 35°C (Figure 1). Some seed did germinate, however, well below the target density of 40 plants/m² (Figure 2). Initially, there were no differences in plant counts between the deep and shallow sown treatments. However, through the growing season, both depth treatments experienced mortality and further germination events. By June, the shallow-sown canola had a higher plant density than the deeper-sown treatments ($p < 0.01$).

The April-sown treatments (TOS 2) were sown into marginal moisture conditions with 13 mm rainfall in the week before sowing. The TOS 2 depth treatments showed a clear trend from the start; the shallow-sown canola consistently had higher plant density than the deeper-sown treatments. Potentially, the shallow-sown canola was able to germinate and increase root mass quicker than the deeper sown canola (DPI NSW, 2011).

It was observed that the deeper sown canola, irrelevant of timing, had thinned stems. The deeper sowing reduces light, so the hypocotyl responds to this by elongating, which can reduce the chance of seedling emergence (DPI NSW, 2011). The elongated hypocotyl depletes the seed reserve and can make the plant more susceptible to damage. Additionally, it can result in poorly developed root systems, which can put them at an increased risk of heat stress. This could explain why, overall, deeper sown treatments had lower establishment compared to shallower sown canola.

There was high variability in canola establishment observed between plots, which potentially influenced the results. This trial was in a single location in single year so results must be interpreted with caution, however these results are consistent with other work completed on this topic (Fletcher et al. 2024).

Flowering

The Liebe Group's previous work (The Liebe Group, 2025) demonstrated that when canola is sown in early April, straight thermal varieties begin flowering sooner than those with vernalisation requirements. This is because they quickly accumulate the required degree days in warmer early Autumn conditions, consequently, varieties that require a certain number of cooler days to meet their vernalisation requirements are delayed. This was evident again this year, with PY525G, a mid-maturing variety, having delayed flowering compared to Emu and Hunter. Interestingly, this delay is slightly less pronounced in the March-sown treatments, however, the same trend is visible. There were no differences in peak flowering between shallow or deep-sown canola.

Yield

In terms of varieties, Hunter was the top performing variety and was significantly different from both Emu and PY525G, suggesting that it was best suited to the length of the 2025 growing season (Table 1). There was no significant difference between Emu and PY525G. This response likely reflects the flowering patterns in this season, with Hunter presenting slightly longer at full flowering (Figure 3) through what was a relatively mild spring. Whilst in this trial sowing time was not a major factor in the relative performance of the varieties, the varietal responses are largely consistent with the harvest maturities of the varieties. Emu being too early for this season and PY525G is more suited to med-high rainfall zones and longer seasons (DPIRD, 2026). Hunter has performed consistently well in the NVTs over the past five years across both low-medium and medium-high zones, demonstrating adaptability to different seasons as an indeterminate variety that continues flowering and podding when conditions are favourable. Emu has been more suited to shorter seasons performing well in Liebe trials and low rainfall med-low rainfall NVTs over the last 5 years (The Liebe Group, 2025). Please refer to the DPIRD crop sowing guide for more information (DPIRD, 2026).

Shallow sowing significantly outyielded deep sowing (Table 1), with a yield difference of 0.45 t/ha, this is consistent with the plant density numbers (Figure 2). There were no significant differences between sowing time (2.38 t/ha v 2.44 t/ha).

Grain Quality

Protein and oil content were both significantly influenced by time of sowing ($p < 0.001$). The April sown canola had lower oil and higher protein content compared with the March sown canola. Protein and oil content in canola are known to have an inverse relationship, whereby an increase in one is typically associated with a decrease in the other (Zhu et al., 2023). Cooler temperatures during grain-fill period, as well as a longer duration for grain filling, results in higher oil content, which explains why March-sowing had higher oil content than April-sown canola as it completed flowering earlier (Si & Walton, 2004).

Hunter had significantly lower protein levels compared with the other varieties, which is consistent with it being the highest-yielding variety in the trial, with more resources allocated to yield.

ACKNOWLEDGMENTS

Thank you to the McIlroys for hosting the site and Living Farm for seeding and managing the trial. This trial is a GRDC investment through the National Grower Network, Project Code LIE2505-001SAX. Thanks to Nuseed, Pioneer Seeds, Brendon McAlpine and Dylan Hirsch for supplying seed.

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