Risks and Rewards of Sowing Canola Early

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Key Messages

- All six canola varieties sown at the start of April (time of sowing 1, 3 April 2023) had significantly higher yields than all varieties sown at the start of May (time of sowing 2, 2 May 2023).
- The early maturing varieties, Emu and Battalion, performed the best overall.
- 2022 and 2023 trials demonstrate the significant effect time of sowing has on yield and the rewards associated with sowing canola early (if the opportunity arises).

Aim

To understand the risks and rewards of sowing canola early, in particular, the impact on yields and profitability.

Background

The past few seasons have provided early seeding opportunities, particularly in 2021 and 2022 off the back of tropical weather systems. In response, growers have sought to investigate the risks and rewards of sowing canola earlier in the season. Those who have taken these early opportunities have observed phenological variances with the earlier sowing conditions, as indicated by variety phenology work done by NSW DPI (NSW DPI, 2021).

Liebe growers have also identified a gap in experimental data, particularly on the consequences of sowing canola in the region before mid-April. While previous research conducted by the Department of Primary Industries and Regional Development in Mullewa and Wongan Hills in 2019 and 2020 showed no yield penalty for seeding in March, further investigation was required to understand the specific implications for the Liebe region.

To address this knowledge gap, Liebe Group's R&D Committee designed a trial wherein six varieties of Roundup Ready canola, with varying maturity lengths, were sown on two different dates: 3 April (time of sowing 1) and 2 May (time of sowing 2). The two early maturing varieties were Nuseeds' Emu and Pacific Seeds' Battalion, with maturity ratings of 3 and 3.5, respectively. The mid-maturing varieties, both with a rating of 4, were BASFs' Invigor 4022P and NuSeeds' Raptor. The longer maturing varieties were, BASFs' R4520P and NuSeeds' Eagle, with ratings of 4.5 and 5, respectively. This specific selection of varieties was chosen to assess the performance and adaptability of canola to early sowing conditions, aiming to provide valuable insights for Liebe members in optimising their sowing strategies.

Trial Details

Trial location	KL Carter & Co, Jibberding
Plot size & replication	10m x 1.5m x 3 replications
Soil type	Sandy loam
Paddock rotation	2022 wheat, 2021 canola, 2020 wheat
Sowing date	Time of sowing 1 - 03/04/2023 (sown wet, after ~36mm rain); Time of sowing 2 - 02/05/2023 (sown dry, no rain in month preceding);
Emergence date	Time of sowing 1 - ~08/04/2023 Time of sowing 2 - ~15/06/2023
Sowing rate	Battalion 4.4 kg/ha, Emu 2.3 kg/ha, Eagle 4.0 kg/ha, Invigor R4022P 2.9kg/ha, R4520P 2.9kg/ha, Raptor 1.8kg/ha. (Target of 40 plants/m2)
Fertiliser	60 kg/ha MacroPro Extra, 60 kg/ha Urea, 180 L/ha Flexi-N
Herbicides, Insecticides & Fungicides	2 L/ha glyphosate, 100 g/ha clopyralid, 1 L/ha propyzamide, 1.5 L/ha trifluralin, 1.8L/ha glyphosate, 300 ml/ha flutriafol, 600 ml/ha prothioconazole + bixafen, 1 L/ha chlorpyrifos, 100 ml/ha bifenthrin, 50 g/ha sulfoxaflor, 300 ml/ha emamectin.
Harvest date	10/11/2023

Results

Table 1. Average plants/m² for time of sowing 1 and 2, at four, six and ten weeks after seeding (approximately).

	4WAS Average		6WAS Average		10WAS Average	
Count date	**TOS1 2/5**	**TOS2 14/7**	**TOS1 18/5**	**TOS2 27/7**	**TOS1 15/6**	**TOS2 29/8**
Emu	13	63	11	56	30	62
Battalion	16	58	15	56	34	56
Eagle	10	54	8	54	30	56
Invigor 4022P	8	53	8	51	24	51
R4520P	12	51	10	44	28	48
Raptor	15	54	13	44	25	47
Average	12	56	11	51	29	53

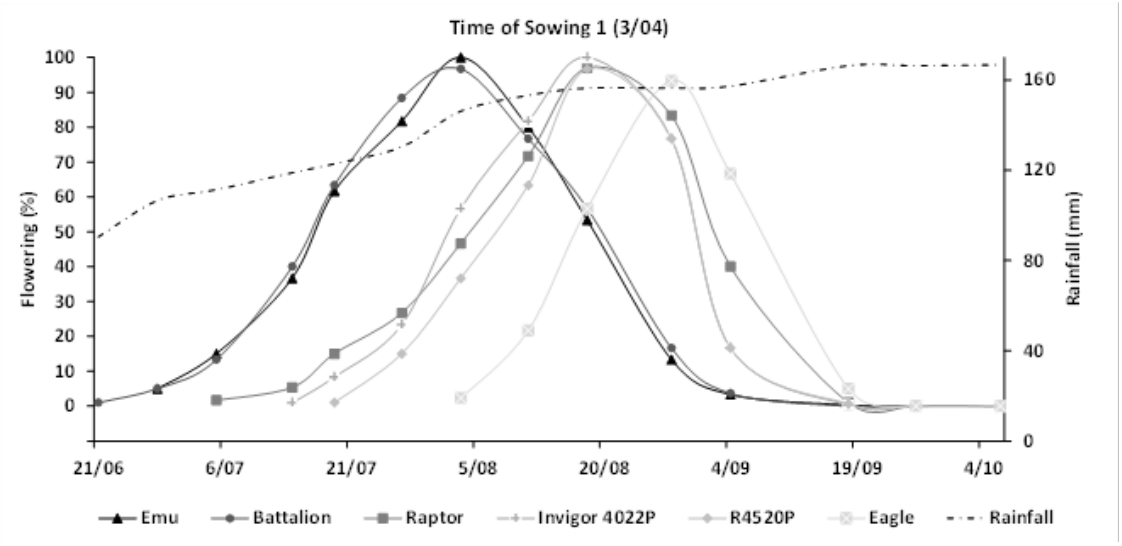

Figure 1. The number of flowering plants (%) for each variety over the flowering period for time of sowing 1. The secondary axis shows accumulated rainfall (mm) at the site for the year. Six varieties were used: Emu, Battalion, Raptor, Invigor 4022P, R4520P and Eagle, all were sown on 3 April.

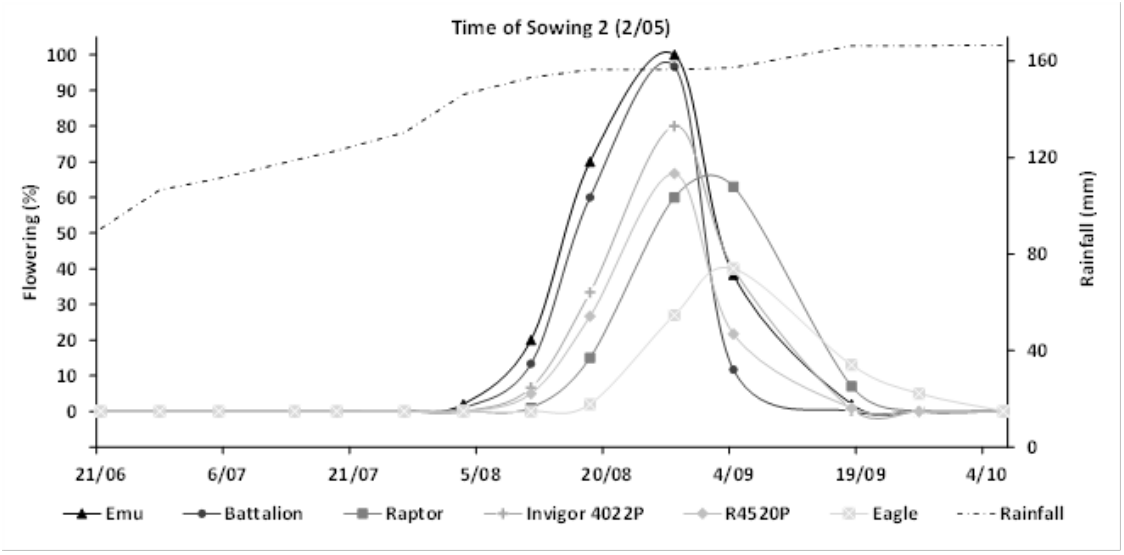

Figure 2. The number of flowering plants (%) for each variety over the flowering period for time of sowing 2. The secondary axis shows accumulated rainfall (mm) at the site for the year. Six varieties were used: Emu, Battalion, Raptor, Invigor 4022P, R4520P and Eagle, all were sown on 2 May.

Table 2. Harvest results for each variety in time of sowing 1 and time of sowing 2, including average yield (t/ha), protein, oil, moisture and admix (%).

	Average Yield t/ha		Protein		Oil		Moisture		Admix (%)	
Variety	TOS1	TOS2	TOS1	TOS2	TOS1	TOS2	TOS1	TOS2	TOS1	TOS2
Emu	0.62	0.30	20.87	23.7	46.77	44	3.9	5.7	0.80	1.38
Battalion	0.56	0.19	20.83	24.5	47.33	41.9	5.4	5.7	2.46	1.68
Eagle	0.34	0.08	23.2	23.7	44.2	44	5.4	5.7	3.14	1.38
Invigor 4022P	0.43	0.21	21.7	24.9	46.1	41.6	5.1	5.2	1.38	1.83
R4520P	0.43	0.19	22.5	23.9	42.6	40.8	5.5	5.8	1.78	1.85
Raptor	0.35	0.15	22.4	24.1	43	40.5	5.5	5.5	1.7	2.1

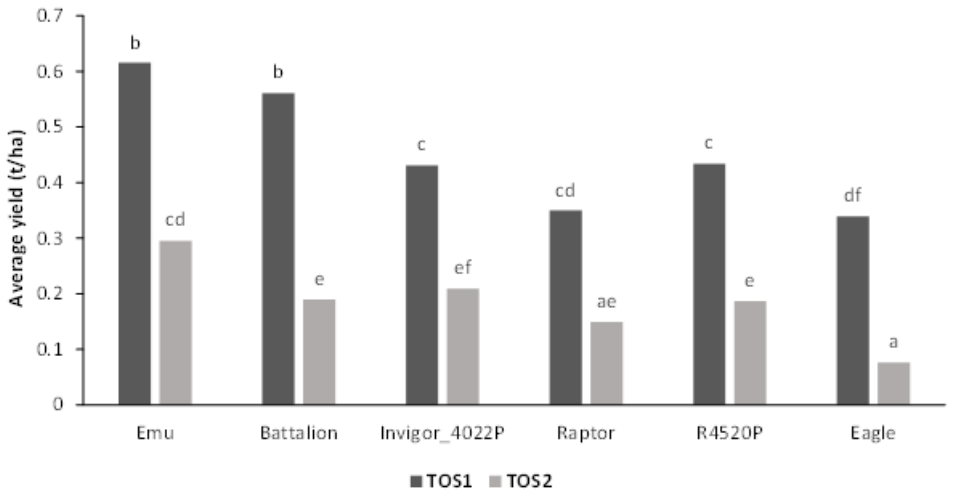

Figure 3. Average yield for each variety for time of sowing 1 and time of sowing 2. Bars annotated with the same letter have average yields that were not significantly different (P > 0.05) according to a LSD test.

Comments

Time of sowing 1 (TOS 1) canola was sown into wet soil conditions on 3 April after the site received ~36mm between 25 and 31 March, enough to achieve germination. Whereas time of sowing 2 (TOS 2) was sown on the 2 May and germinated approximately six weeks later, at the start of June, after a 12mm rainfall event.

In both time of sowing treatments, the early season varieties had the highest plant counts (Table 1). Battalion consistently had the highest plant counts in TOS 1, whereas in TOS 2, Emu had the highest. Additionally, TOS 2 had higher plant density at all stages indicating increased initial germinations and minimal plant mortality.

Time of sowing 1 started flowering approximately three months after germination, due to the cooler than average June which potentially delayed the varieties reaching their required number of degree days. The two early varieties, Emu and Battalion, were the first to flower in late June, and the longest variety, Eagle, started flowering 6 weeks later (3 August) (Figure 2). On average the varieties in TOS 1 were flowering for 9.5 weeks, with most reaching full flower around the six-week mark. TOS 1 had three distinct full-flower stages, which were dependent on the maturity length of the variety.

The seasonal conditions impacted the flowering opportunities for TOS 2 with cool and dry conditions in May delaying germination until 6 weeks post-seeding, in mid-June. Rainfall then decreased through July and August whilst temperatures rose, delaying varieties reaching the reproductive stage by not meeting their vernalisation requirements. All varieties in TOS 1 reached full flower, however, in TOS 2 only the early maturing varieties, Emu and Battalion, managed full flower, with the longer variety, Eagle, only having a maximum of 40% flowering for the season (Figure 3). On average, the TOS 2 treatments were flowering for five weeks, with the peak flowering stage at three weeks; a substantially shorter flowering period than the TOS 1.

Average yield was significantly higher in TOS 1 compared to TOS 2, with the early varieties performing the best overall (Table 2 and Figure 3). Early April seeding had significantly lower plant counts, with an average of 17 plants/m² compared to early May seeding's 53 plants/m². Despite the low plant density, TOS 1 yields were double the yield of TOS 2, demonstrating that the time of sowing significantly affects yield ($p < 0.05$). The extended growing period of TOS 1 allowed the treatments to reach full flower before the hot and dry spring resulting in increased pod production and enhanced overall performance.

In terms of grain quality, protein and moisture increased for all varieties in TOS 2 from TOS 1, whereas oil decreased. This pattern is expected as TOS 1 had a longer growing window, allowing it to utilise increased nitrogen from the system to produce higher yields and therefore higher oil content and lower protein (DPIRD 2019). Whereas TOS 2 had a shorter growing season, limiting nitrogen usage, which is reflected in the higher protein levels and lower oil content.

Due to the dry year resulting in low-yielding crops, treatments had to be combined in order to conduct grain quality testing. This is a limiting factor of the 2023 trial as a single measurement only provides a snapshot and does not capture potential variability within each variety or time of sowing treatment.

Although the 2022 and 2023 seasons were starkly different, a consistent theme emerged across both trials: all TOS 1 treatments outperformed their TOS 2 counterparts. These trials demonstrate that sowing canola before mid-April can result in significantly higher yields within the Liebe region, and given the right conditions, can be a reliable practice to optimise crop performance.

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References
DPIRD. (2019). *Tactical Break Crop Agronomy Project: Canola and Pulse Agronomy Trials and Information.* Department of Primary Industries and Regional Development.
NSW DPI. (2021). *Canola Phenology - targeting varieties to dlowering dates in different environments.* Grains Research and Development Corportaion.

Peer Review
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