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Response of fifteen canola varieties to three planting times at Tamworth in 2012

Matthew Gardner and Rod Bambach NSW DPI, Tamworth

Key findings

The highest yields were achieved at Tamworth in 2012 when the end of flowering occurred during the last 10 days of September.

Hyola® 50 and AV Garnet$^{\phi}$ were the most consistent yielding varieties across all three planting times, whereas, the two quicker maturing varieties Pioneer® 43C80 and ATR Stingray$^{\phi}$ were the poorest performing varieties.

Earlier planting (TOS 1) resulted in lower yield penalties (–8%) compared to delaying planting (TOS 3, –20% yield) compared to the main season planting window (TOS 2).

Introduction

Planting time is a compromise between planting too early, which increases the risk of frost damage and lodging, and planting too late that increases the risk of hot and dry conditions occurring during seed development. These hot and dry conditions reduce the yield potential and oil content of canola seed. As a general rule planting earlier in the planting window has a range of benefits including;

- generally have higher seed and oil yields as the crop finishes under cooler, moister, conditions
- temperatures at planting are usually warmer, which may allow for better establishment and quicker early growth and ground cover
- ensures that canola is harvested before cereals at the end of season

Canola is most susceptible to frost during late flowering/early pod fill as a heavy frost can destroy immature seeds. Canola usually tolerates frosts better than cereals. In western and northern zones of NSW, quick maturing varieties should not be sown early as September frosts may coincide with the pod-fill stage of crop development.

The optimum planting time depends on a range of factors. Mid and mid-late maturing varieties should be sown early in the recommended sowing window for a particular region, and early maturing varieties should be sown later. A trial at Tamworth was established in 2012 to further refine the planting window in the northern region for current commercially available canola varieties.

Site details

Tamworth Agricultural Institute

Sowing date:	**20th April, 16th May and 12th June 2012**
Fertiliser:	**75 kg N/ha as Urea** **200 kg/ha Superphosphate**
Staring N:	**121 kg N/ha (0–120 cm)**
Starting Water:	**285 mm (PAWC 0–180 cm)**

Treatments

There were 15 commercially available varieties with varying maturities and agronomic traits used in the TOS trial in 2012. The trial included 5 conventional, 5 triazine tolerant and 5 clearfield® varieties, with each group having a mix of open pollinated and hybrid varieties (Table 1). All varieties were sown on three separate occasions being the 20th April, 16th May and 12th June. Throughout the season development stages were recorded. For this paper the start and end of flowering are presented, which refers to there being 5% of the plot having flowers at the start or at the end of flowering.

Results

The relationship between yield and flowering time is presented in Figures 1a and 1b. The optimum time for flowering to begin in 2012 was difficult to predict as varieties started flowering between the 1st and 13th of August. Although, based on the flowering times available it is predicted that optimum yields were obtained when flowering started between the 27th July and the 30th August in 2012 at Tamworth, which is a wide window. There was only a narrow spread in the time taken for varieties

to start flowering from each planting time, particularly with the second and third sowing dates. If the Juncea variety Xceed™ Oasis CL(ϕ) is removed, the spread in the start of flowering dates was 14, 9 and 7 days for TOS 1, 2 and 3, respectively (Table 1).

The correlation between the end of flowering and yield gave a better indication of important dates by which flowering must cease. In 2012 at Tamworth the optimum yields were obtained when flowering finished between the 19th September and the 1st October (Figure 1b). Interestingly, these dates coincided with the optimum anthesis window for cereal crops at Tamworth in 2012 which was between the 20th September and 5th October. The end of flowering was more critical than the start of flowering as at this stage (5% flowers remaining) there are a large number of pods in the early stages of filling with immature seeds.

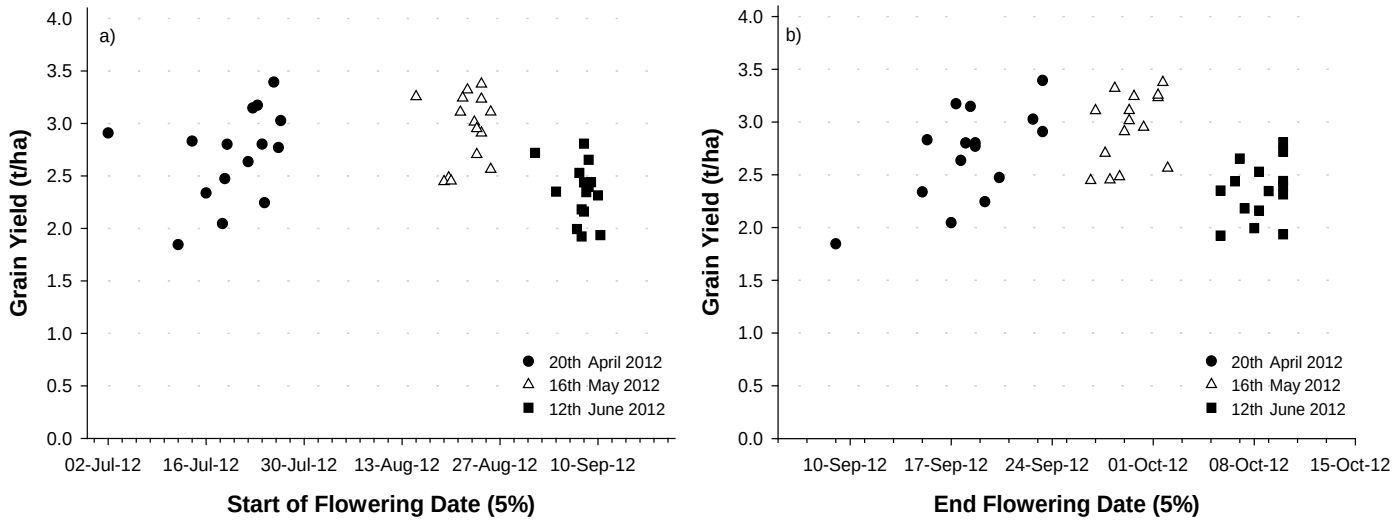

Figure 1: *Relationship between grain yield and (a) start of flowering (determined at 5% flowering) or (b) end of flowering (determined as 5% flowers remaining) date for three sowing dates at Tamworth in 2012*

The second TOS (16th May) had the highest grain yield with an average of 2.94 t/ha across all varieties. Planting on the 20th April (TOS 1) significantly reduce grain yields by 8% compared to TOS 2, whereas, delaying planting from the 16th May until the 12th June (TOS 3) significantly reduced grained by 20%. AV Garnet(ϕ), Hyola® 50 and CB Agamax, , which are all mid to long season varieties, were the best performing varieties for TOS 1 (Table 1). ATR Stingray(ϕ) had the lowest yield from TOS 1 but was similar to that of to Pioneer® lines 43C80, 44Y84 and 43Y85. All these varieties were significantly lower yielding than the other varieties. Despite the Juncea variety Xceed™ Oasis CL(ϕ) being almost 20 days quicker than the mid to long season canola varieties it was still one of the top five yielding varieties at TOS 1.

From the main season planting time (16th May) the top eight varieties yielded between 3.01 and 3.38 t/ha (Table 1). ATR Stingray(ϕ), Pioneer® 43C80 and CB Junee HT had the lowest yields (below 2.5 t/ha).

With the late planting (12th June) the top four yielding varieties (Hyola® 50, Xceed™ Oasis CL(ϕ), CB Agamax and Pioneer® 45Y82) all yielded above 2.5 t/ha. ATR Stingray(ϕ), Pioneer® 43C80 and ATR Gem(ϕ) had similar grain yields that were more than 15% below the average yield of other varieties at TOS 3 (Table 1).

Xceed™ Oasis CL(ϕ),was the quickest variety at all planting times to flower however it ended flowering above the average of all varieties suggesting it flowered for up to 20 days longer than all other varieties. ATR Stingray(ϕ) was the quickest canola variety to end flowering with TOS 1 and was equally as quick as Pioneer® 43Y85 with TOS 2 and TOS 3. For the last two planting times the days taken to reach the end of flowering was remarkably close regardless of maturity with only 5 and 4 days separating varieties for TOS 2 and 3, respectively. This suggests that as planting moves later in the planting window the maturity length of varieties is compressed significantly.

Table 1: *Grain yield, yield rank and days to end of flowering (5% flowers remaining) for 15 canola varieties at three sowing times at Tamworth in 2012. Lsd for TOS x variety interaction is 0.43 t/ha (P<0.05).*

Variety	Yield (t/ha) and rank within sow time						Days from sowing to end of flowering		
	20th April		16th May		12th June		20th April	16th May	12th June
43C80 CL(ф)	2.05	*14*	2.48	*13*	1.99	*13*	148	134	116
43Y85 CL(ф)	2.34	*12*	3.11	*7*	2.35	*8*	146	132	114
44Y84 CL(ф)	2.24	*13*	3.32	*2*	2.44	*6*	150	133	115
45Y82 CL(ф)	2.80	*8*	3.24	*4*	2.53	*4*	149	135	116
ATR Gem(ф)	3.03	*4*	2.56	*12*	1.94	*14*	154	137	118
ATR Stingray(ф)	1.85	*15*	2.45	*15*	1.92	*15*	140	132	114
AV Garnet(ф)	3.39	*1*	3.23	*5*	2.44	*5*	154	136	118
CB Agamax	3.17	*2*	2.91	*10*	2.65	*3*	148	134	115
CB Junee HT	2.47	*11*	2.45	*14*	2.18	*11*	151	133	115
Xceed Oasis CL	2.91	*5*	3.26	*3*	2.72	*2*	154	136	118
Hyola 50	3.15	*3*	3.38	*1*	2.81	*1*	149	137	118
Hyola 555TT(ф)	2.64	*10*	3.01	*8*	2.35	*9*	149	134	117
Hyola 559TT	2.80	*7*	2.71	*11*	2.16	*12*	150	133	116
Hyola 575CL	2.83	*6*	2.95	*9*	2.40	*7*	146	135	118
Victory V3002	2.77	*9*	3.11	*6*	2.32	*10*	150	134	118
TOS Average	2.70		2.94		2.35		149 (16th Sep)	134 (27th Sep)	116 (6th Oct)

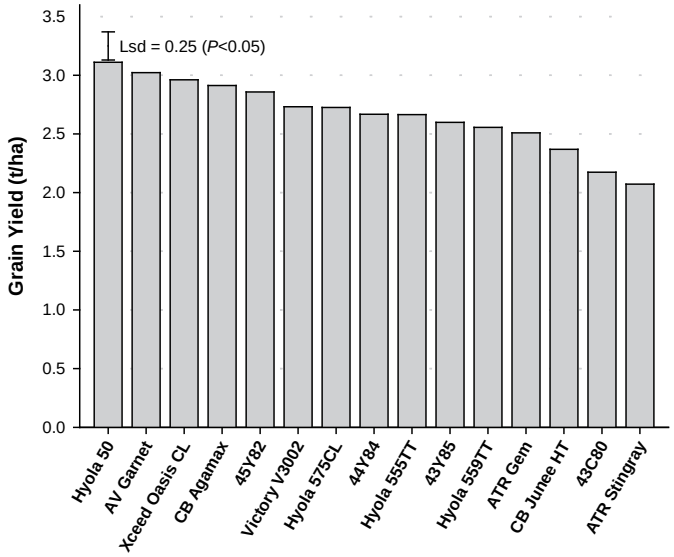

Figure 2: *Average grain yield of canola varieties for three planting times at Tamworth in 2012.*

Hyola® 50 and AV Garnet(ф) had a yield of 3.11 and 3.02 t/ha averaged across all planting times, respectively. This was significantly higher than varieties that had an average yield across sowing dates less than Pioneer® 45Y82 (Figure 2). ATR Stingray(ф) and Pioneer® 43C80 had average yields 33 and 33% lower than Hyola® 50 and were lower than all other varieties except for CB Junee HT.

Summary

When the end of flowering occurred during the last 10 days of September, the highest yields were achieved at Tamworth in 2012. This end of flowering window coincides with early pod fill and immature grains, which are the most sensitive to damage from either frost or hot and dry conditions. Hyola® 50 and AV Garnet(ф) were the most consistent yielding varieties across all three planting times, whereas, the two quicker maturing varieties Pioneer® 43C80 and ATR Stingray(ф) were the poorest performing varieties. Shifting planting time forward resulted in lower yield penalties (8%) compared to delaying planting from the main season window (20% penalty).

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