

Is it worth switching to a longer season canola variety when you sow in March? - very early sown canola variety trial, Wongan Hills

Martin Harries & Mark Seymour, DAFWA

Key messages

- Early sowing is the key to maximising canola yield in the northern region;
- Delaying sowing by 15 days after March 31 led to 195kg/ha less yield – a loss of 13kg/ha/day
- When sowing in March at Wongan Hills the mid and mid/late maturity varieties performed best
- When sowing in mid-April early and early/mid maturity varieties performed best

Aims

- 1) To obtain data on late March and early April sowing of canola varieties.
- 2) To determine if changing variety to better match season length improves yield.

Background

Sowing canola in mid-April has become standard practice in the far north of the WA cropping zone. The benefits of early sowing were highlighted in a variety by time of sowing trial conducted at Binu in 2015. In that trial TOS 1 (April 14) yielded 1647kg/ha compared to 997kg/ha for TOS 2 (April 29). Hence delaying sowing by 15 days led to 650kg/ha less yield – 43kg/ha/day. While there was some variation between the varieties in the amount of yield loss from the later sowing time this was not significantly different. The results indicated that using the best variety for the area rather than switching varieties based on season length was the best approach. This trial design was repeated in 2016 because growers were asking if further yield improvements could be obtained by sowing even earlier than mid-April.

Method

The trial was conducted at DAFWA's Wongan Hills Research Station using a plot seeder, plots were 18m long by 1.54m wide. Treatments included 6 varieties and two times of sowing (TOS) (March 31 and April 15). The varieties were all Round-up Ready hybrid plant types and included a range of season lengths: Pioneer 43Y23 (Early), Hyola 404RR (Early/Mid), GT50 (Mid), Hyola 525RT (Mid/late), Hyola 600RR (Late), Hyola 725RT (V.Late). Varieties were blocked within times of sowing and there were 4 replicates. Measurements included: plant density, Normalised Difference Vegetation Index (NDVI), flowering dates, plant biomass near maturity, seed yield, seed oil content and seed weight. The seed rate used for each variety was calculated for a target density of 40 plants/m² at a field establishment rate of 65%. This is at the high end of recommended densities and was used due to the early sowing into warm conditions. Due to differences in seed weight the range of seed rates used varied from 2.2 to 3.9kg/ha (Table 3).

Results

Seasonal conditions

Rainfall at the site exceeded the long term average for Wongan Hills of 388mm (Table 1). 215.4mm of rain was received from January to March 31, prior to sowing. The first time of sowing treatments were sown after 70mm of rain from March 26 to March 28. Air temperature at sowing was 30.7°C however, the soil profile was full and despite hot conditions the top soil did not dry. Time of sowing two was sown on April 15 into good moisture following 19.8mm of rain received from April 9 to 13. Regular rain was received throughout the growing period and conditions were mild over the seed maturation period.

Table 1. 2016 monthly rainfall (mm) from DAFWA Wongan Hills weather station.

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Wongan Hills	66.2	0.0	149.2	77.6	46.0	57.0	80.8	63.6	34.8	17.0	-	-	592.2

Establishment and growth

Plant density achieved at both times of sowing and all varieties were around the recommended 20-40 plants/m². Plant density was lower from TOS 1 (27 plants/m²) compared to TOS 2 (37 plants/m²). Hyola 404RR established more plants than other varieties (40 compared to a site average of 32 plants/m²).

Plant growth

NDVI was measured at three dates during early plant growth. At all three dates of measurement there were differences between the sowing times and the varieties ($P < 0.001$) data not presented. NDVI readings were higher for TOS 1, as expected given the longer growing period, and for the shorter season varieties - indicating that these varieties produce green leaf at a faster rate than some of the longer season varieties.

When measured on September 7 dry matter production was significantly greater ($P < 0.05$) from the first time of sowing (Figure 1). The variation between varieties was almost significant ($P < 0.06$). GT50 had the greatest biomass and Hyola 525RT the least (Figure 1).

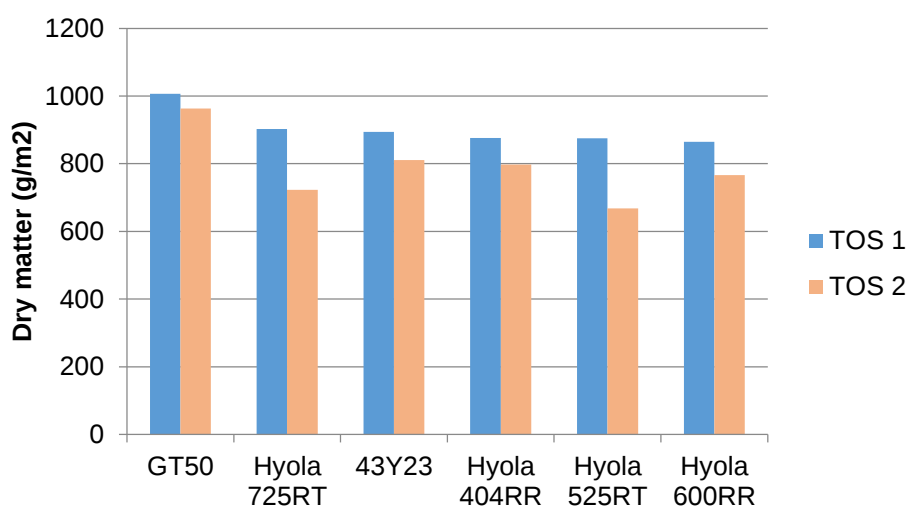


Figure 1. Plant biomass of six canola varieties (g/m²) as of September 7 at Wongan Hills in 2016.

Plants of all varieties were larger from TOS 1 compared to TOS 2. Average plant weight from TOS 1 was almost double TOS 2 and statistically significant ($P < 0.001$). The plant weight of varieties differed ($P < 0.05$) although this did not correlate to season length; the longer season varieties were not always the largest plants (Figure 2).

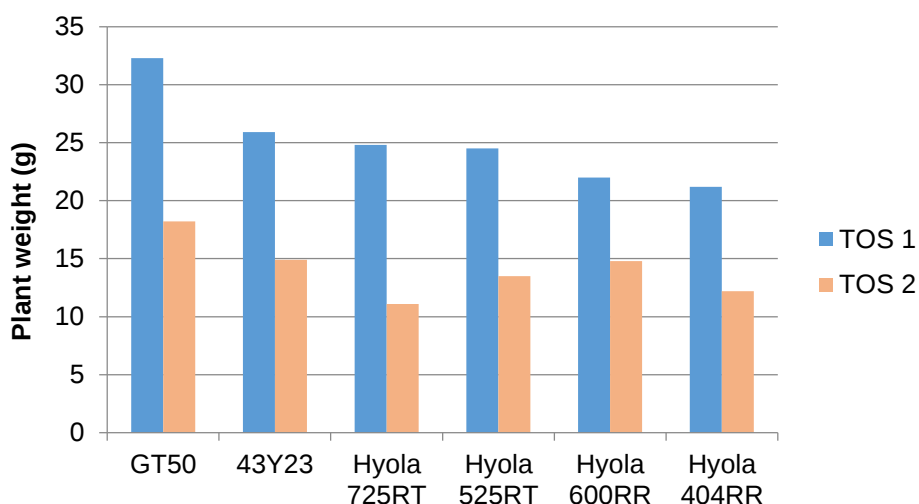


Figure 2. Single plant weight of six canola varieties (g/m²) as of September 7 at Wongan Hills in 2016.

Flowering time and duration

The flowering window of TOS 1 started on June 1 and went to September 5, depending on the variety and for TOS 2 June 10 to September 20 (Figure 4). The number of days from sowing to the start of flowering ranged from 56 to 88 and was affected by both variety and TOS, ($P < 0.001$) (Figure 4). The time to final 10% bloom was also affected by both variety and TOS, ($P < 0.001$) (Figure 4). There was a large variation between varieties, with a range from 127

days for Pioneer 43Y23 to 155 days for Hyola 725RT. Hence, the duration of the flowering period was affected by both variety and TOS. There was a large variation between varieties from 54 to 76 days. It was interesting to note that because longer season varieties took longer to flower they did not necessarily have a longer flowering period (Figure 4).

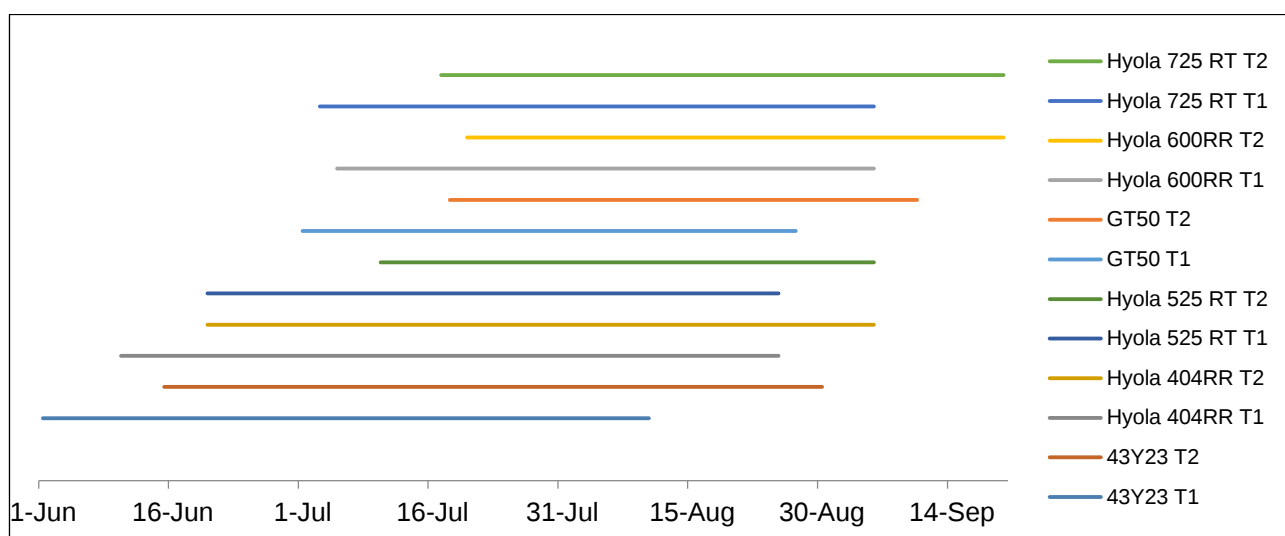


Figure 4. Flowering window (date of initial to final 10% bloom) of 6 canola varieties sown at two times of sowing (March 31 and April 15) at Wongan Hills in 2016.

Yield and seed quality

The average yield of the trial was 2755kg/ha. Averaged across all varieties canola sown on March 31 yielded 2853kg/ha compared to 2658kg/ha for canola sown on April 15. Hence delaying sowing by 15 days led to 195kg/ha less yield, which is equivalent to an average loss of 13kg/ha/day. There was a variety response; the longest season variety, Hyola 725RT was lower yielding than all other varieties while GT 50 was higher yielding than all other varieties. The effect of sowing time by variety was almost statistically significant ($P = 0.066$) and differences in the response to TOS were associated with variety maturity length (Figure 6). The early varieties Pioneer 43Y23 and Hyola 404RR did not have a yield improvement from sowing earlier than mid-April. Hyola 600RR and Hyola 725RT yields decreased by around 260kg/ha from delayed sowing (17kg/ha/day) or 9 and 10% respectively. GT50 and Hyola 525RT yields decreased by 360kg/ha (24kg/ha/day) or 11 and 12 % respectively.

For both seed weight and oil content there were differences between varieties ($P < 0.001$) with 43Y23 and GT50 producing lower oil and Hyola 404RR and Hyola 525RT producing larger seed than other varieties, however sowing date did not have a consistent effect (data not shown).

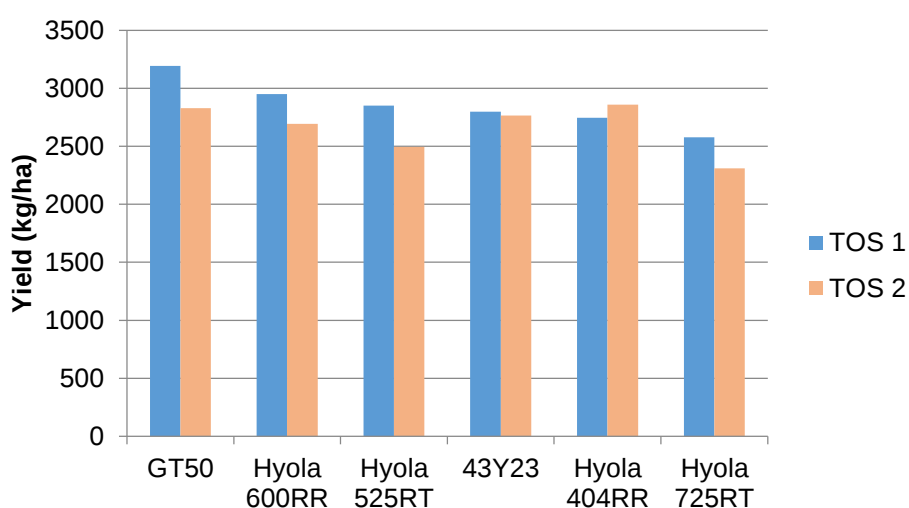


Figure 5. Seed yield of 6 canola varieties sown on March 31 (TOS1) and April 15 (TOS2) at Wongan Hills in 2016.

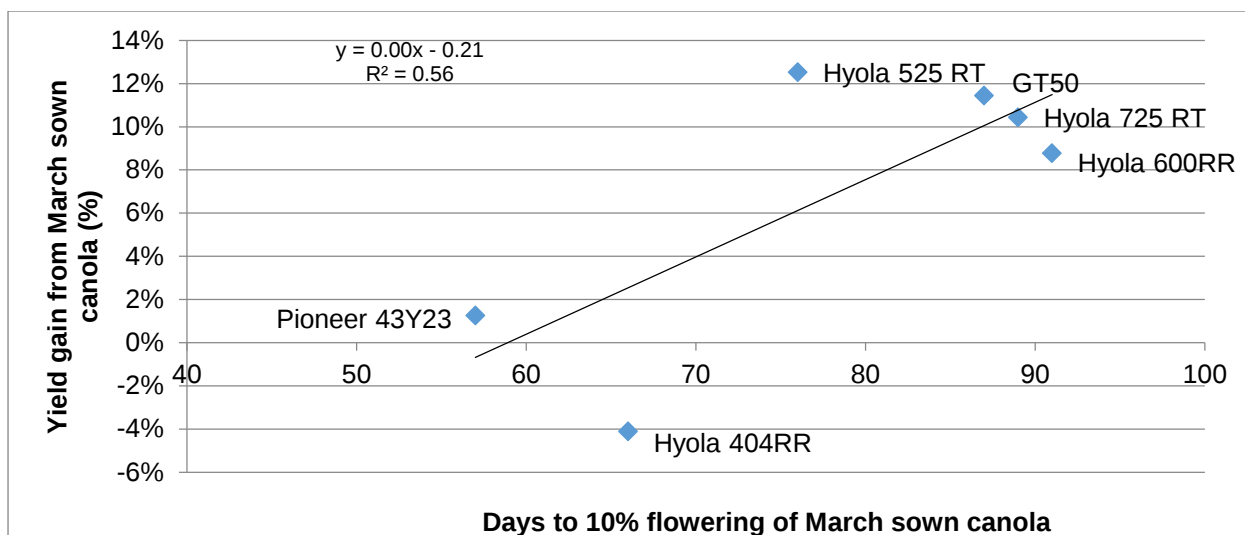


Figure 6. Yield gain of 6 canola varieties sown on March 31 (TOS1) and April 15 (TOS2) at Wongan Hills in 2016.

Gross margin

All treatments had positive gross margin, as expected given the yields but there was a large range from \$1306/ha to \$798/ha. The highest gross margins were obtained from sowing mid and mid/late maturity varieties at TOS 1. Total seed costs were calculated using cost per kilo and the seeding rate, which was adjusted for seed size and germination percentage, consequently seed costs varied significantly from \$54 to \$124/ha. Seed rates could have been reduced for TOS 2 as the plant density achieved was quite high, which would increase gross margins of TOS 2 treatments. Also for Hyola 404RR the large seed resulted in a better field establishment percentage and higher plant density so seed rates of this variety could have been reduced slightly.

Table 3. Seed cost (\$/kg), seed rate, total costs (\$/ha), income (%/ha) and gross margin (\$/ha) of 6 canola varieties sown at two times of sowing at Wongan Hills in 2016. (Income includes oil bonus and total costs include seed costs and input costs typical of a commercial crop such as fertiliser, herbicides etc.).

Variety	TOS	Seed cost/kg	Seed rate (kg/ha)	Total seed cost	Total cost	Income	GM
GT50	1	\$25	\$2	\$54	\$479	\$1,785	\$1,306
Hyola 600RR	1	\$32	\$3	\$86	\$507	\$1,722	\$1,215
GT50	2	\$25	\$2	\$54	\$470	\$1,594	\$1,124
Hyola 525RT	1	\$36	\$3	\$96	\$514	\$1,612	\$1,098
Hyola 404RR	2	\$32	\$4	\$124	\$545	\$1,638	\$1,092
Hyola 404RR	1	\$32	\$4	\$124	\$543	\$1,573	\$1,030
43Y23	2	\$32	\$3	\$82	\$498	\$1,518	\$1,020
43Y23	1	\$32	\$3	\$82	\$498	\$1,505	\$1,007
Hyola 725RT	1	\$36	\$3	\$94	\$505	\$1,452	\$946
Hyola 525RT	2	\$36	\$3	\$96	\$506	\$1,403	\$897
Hyola 600RR	2	\$32	\$3	\$86	\$492	\$1,328	\$837
Hyola 725RT	2	\$36	\$3	\$94	\$499	\$1,297	\$798

Conclusion

In general mid and mid/late season, 5 and 6 series, varieties responded best to March sowing while shorter season 3 and 4 series varieties produced similar yields from both times of sowing. The 7 series variety Hyola 725RT responded to March sowing, but its yields were still not competitive with other varieties. These results match well with NVT data which indicate that the longer season varieties yield better relative to shorter season varieties at high yield potential sites. These often correlate to longer season length sites.

Key words; Canola, Variety, time of sowing

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