Canola variety by time of sowing in the Northern Region

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Key messages

- Early sowing is the key to maximising canola yield in the Northern Agricultural Region (NAR)
- All varieties yielded less when sown on April 29 compared to April 14.
- Yield loss was on average 43 kg/ha per day between April 14 and April 29 sowing.
- Using the highest yielding variety rather than trying to match variety maturity to sowing date was the best option.

Aims

1) To see if matching canola variety maturity to sowing time would increase yields the NAR
2) To compare the response of common RoundupReady (RR) and triazine tolerant (TT) varieties to different times of sowing

Background

In 2013 and 14 dry winter conditions resulted in early sown canola crops becoming drought stressed. Some farmers and agronomists in the northern region reported better yields from later sowing dates. The question was asked, are we matching our canola varieties to sowing time as well as we can do?

Method

A small plot trial (plots 18 m by 1.54 m) was conducted at the Northern Agri Group Trial site north east of Binnu. Treatments included 10 varieties (5 TT and 5 RR) and two sowing times (TOS) (April 14 and 29).

The varieties included a range of season lengths: CB Telfer (v. early), Stingray (Early), Bonito (early/mid), Hyola 450TT (Mid), Hyola 559 (Mid/late), Pioneer 43Y23 (Early), Hyola 404 (Early/mid), GT41(Early/mid) GT50 (Mid), Hyola 525 (Mid)

The trial was designed such that TT and RR plots were blocked. Within these blocks varieties were randomised. There were 4 replicates of each treatment.
Measurements included plant density, plant biomass in late winter and also at plant maturity, seed yield and seed quality.

Results

Seasonal conditions

Rainfall at the site exceeded the long term average for Binnu of 340 mm (Table 1). 160.2 mm of rain was received from January to April 11, prior to sowing. The first time of sowing treatments were sown on soil moisture from over 40 mm received from April 7 to April 11. The temperature at sowing was close to 30° C causing the soil to dry rapidly. Time of sowing two was sown on April 29 on marginal moisture. Long periods without rain occurred throughout winter: April 12 to May 17 (1.2 mm), May 19 to June 16 (3.6 mm) and June 22 to July 20 (1.6 mm).

Table 1. 2015 monthly rainfall (mm) from BOM Binnu weather station (8010) and Ogilvie weather station (8104)

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Binnu	6.0	15.4	103.0	41.8	32.0	53.2	89.4	21.8	5.4	0.0	-	-	373.4

Establishment

Plant density was much lower than the targeted 20 plants/m². This occurred because the conditions at seeding and following seeding were hot and dry. Averaged over all treatments there were 8 plants/m². While establishment varied from 5 to 11 plants/m² there was no statistically significant difference between plant density at TOS 1 and 2 or between varieties.

Table 1. Plant density (plants/m²)

	Variety									
TOS	43Y23	Bonito	CB Telfer	GT41	GT50	Hyola 404RR	Hyola 450TT	Hyola 525 RT	Hyola 559TT	Stingray
1	9.0	7.7	7.2	7.0	7.4	7.9	8.1	8.4	7.2	5.0
2	8.7	9.4	9.5	5.5	6.7	7.5	10.9	9.5	10.1	8.4

Plant growth

When measured on August 18 dry matter production was significantly greater ($P < 0.05$) from the first time of sowing. Averaged over all varieties TOS 1 produced 145% of the biomass of TOS 2. The RR herbicide types produced on average 128% the biomass of the Triazine herbicide tolerant varieties at this time. There was also a significant interaction between the herbicide tolerance type and the time of sowing. The RR plants responded more to the early sowing date than the TT types. This resulted in RR biomass production being significantly greater than TT at TOS 1 but not at TOS 2.

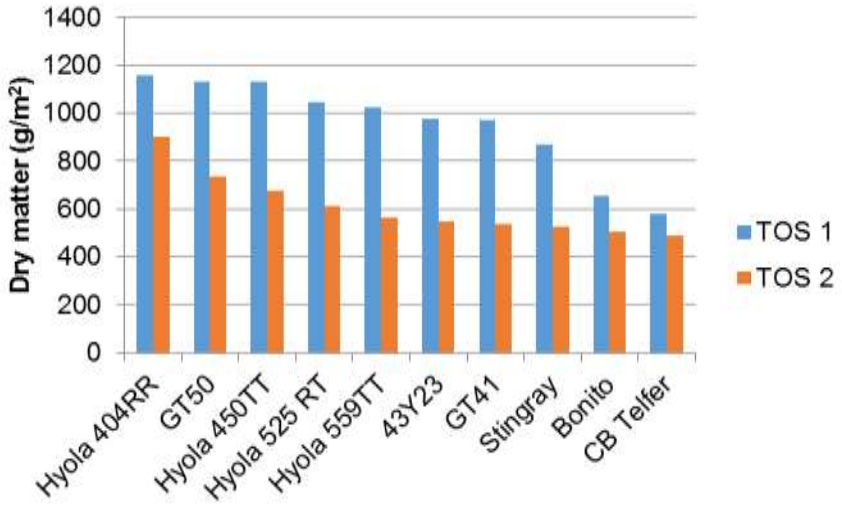

Figure 1. Plant biomass as of August 18

Plants of almost all varieties were larger from TOS 1 compared to TOS 2; the exception was the very short season variety Telfer. This resulted in TOS 1 plants on average being significantly larger than TOS 2 plants, in fact the average plant weight of TOS 1 was double TOS 2 at 70 grams compared to 36 grams. The RR herbicide type plants were heavier than the TT plants, on average 62 grams compared to 44 grams, not statistically significant.

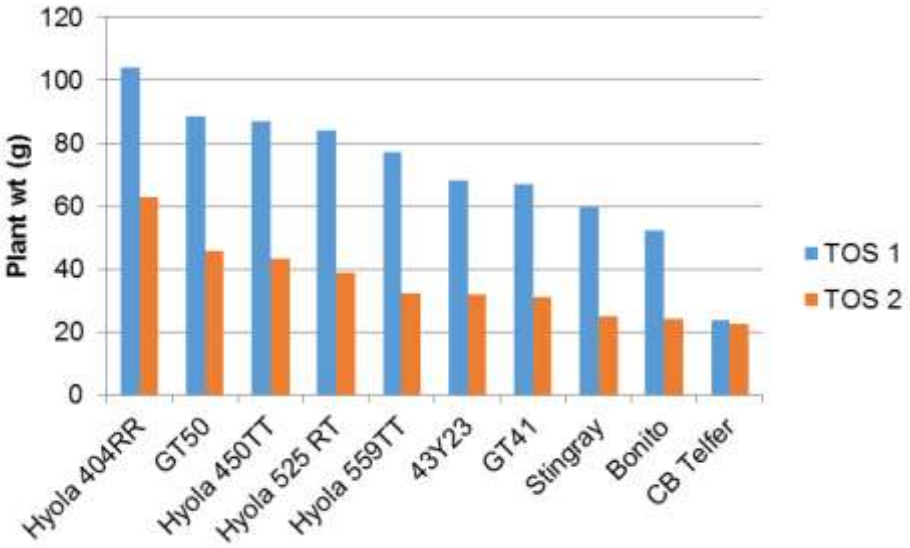

Figure 2. Single plant weight as of Aug 18.

Yield

The overall yield of the trial was 1322 kg/ha. Averaged across all varieties TOS 1 yielded 1647 kg/ha compared to 997 kg/ha for TOS 2. Hence delaying sowing by 15 days led to 650 kg/ha less yield – equivalent to a loss of 43 kg/ha/day. There was a variety response with the more recently released hybrids among the highest yielding varieties (Figure 3). There was no significant difference between herbicide type, with RR types yielding on average 1362 and TT types 1282. All varieties responded in a similar way to the time of sowing treatment with large decreases in yield as a result of sowing on April 29 compared to April 14. On average, across all varieties yield declined by 40% from TOS1 to TOS2. The trial was blocked for RR and TT to enable herbicide application hence statistical analysis of varietal response to sowing time was grouped by herbicide type. For both RR and TT herbicide types there were differences in varietal response to sowing time but the trial design constrained the analysis. There was an indication of these differences *P=0.112*.

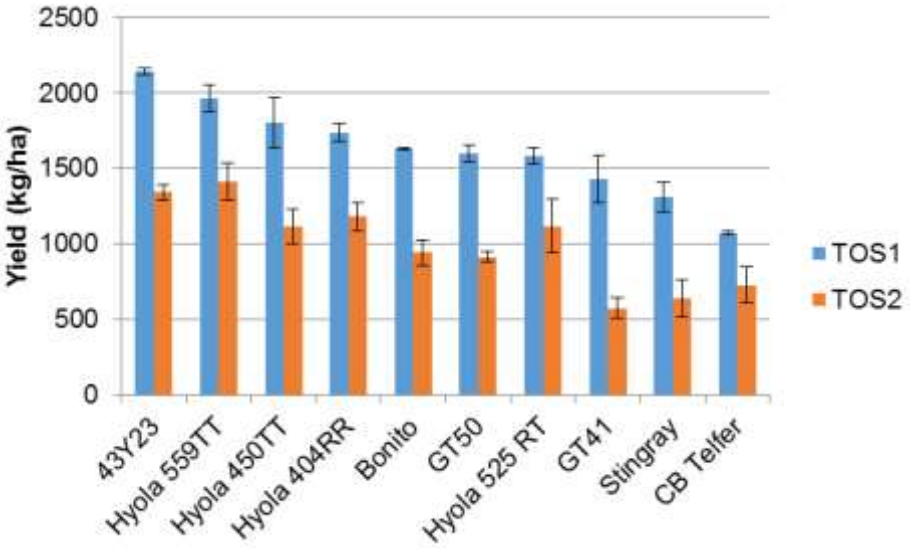

Figure 3. Yield of variety when sown on April 14 (TOS1) and April 29 (TOS2)

Seed quality

Most varieties produced less oil in the seed from the April 29 sowing compared to the April 14 sowing but overall there was not a statistically significant sowing time effect (Figure 3). The varieties did differ in oil content. Hyola 404RR had a high oil content compared to many of the other varieties, which is consistent with previous observations. RR varieties had on average 0.4% more oil in the seed than TT canola, however this was not statistically significant.

Seed weight was more responsive to the treatments imposed (Figure 4). Time of sowing 1 seed was 114% the weight of time of sowing 2. There was significant variation among the varieties and the TT plant type had heavier seed that RR varieties.

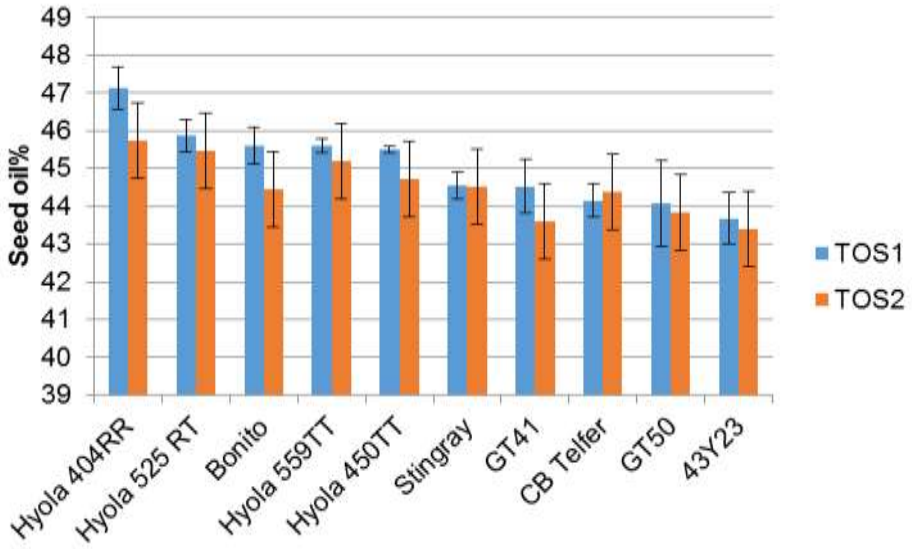

Figure 4. Seed oil% of variety when sown on April 14 (TOS1) and April 29 (TOS2)

Gross margin

Total seed costs were calculated using cost per kilo and the seeding rate, which was adjusted for seed size and germination percentage. The lowest cost seed was Telfer at $3/ha, it was assumed that seed of this older variety had been retained on farm. Seed cost of all the hybrid varieties was around $80/ha to 100$/ha. There was a large range in gross margin from 630$/ha to -156$/ha. The newer hybrid varieties had the highest gross margin. It should be noted that the prices used in this analysis were 5 year averages; non-GM $523/tonne and GM $516/tonne. There was a much larger difference in prices at harvest in 2015 with non-GM varieties attracting a premium of up to $65/tonne. This would make the hybrid TT lines very competitive with the top RR varieties. It should also be noted that for all varieties except Telfer we assumed that new seed was brought. Retaining seed of open pollinated varieties; ATR Bonito, ATRStingray and Telfer would increase the gross margin of these compared to the hybrid varieties.

Table2. Seed cost ($/kg), total costs ($/ha), income (4/ha) and gross margin ($/ha).

Variety	TOS	Seed $/kg	Total seed cost $/ha	Total costs $/ha	Income $/ha	Gross Margin $/ha
Pioneer 43Y23	1	$32	$94	$482	$1,113	$630
Hyola404	1	$32	$83	$463	$954	$491
Hyola559TT	1	$24	$78	$475	$964	$489
Hyola450TT	1	$24	$86	$480	$884	$405
Nuseed GT50	1	$25	$81	$456	$843	$387
Hyola525RT	1	$34	$93	$482	$861	$379
ATRBonito	1	$13	$47	$435	$812	$377

Nuseed GT41	1	$32	$103	$477	$785	$308
Pioneer 43Y23	2	$32	$94	$464	$701	$236
Hyola559TT	2	$24	$78	$461	$686	$224
ATRStingray	1	$12	$37	$417	$638	$221
Hyola404	2	$32	$83	$450	$638	$189
Telfer	1	$1	$3	$376	$524	$147
Hyola525RT	2	$34	$93	$470	$600	$130
Hyola450TT	2	$24	$86	$463	$537	$74
Nuseed GT50	2	$25	$81	$440	$479	$39
ATRBonito	2	$13	$47	$419	$458	$39
Telfer	2	$1	$4	$368	$349	-$19
ATRStingray	2	$12	$37	$401	$308	-$94
NuseedGT41	2	$32	$103	$456	$300	-$156

Conclusion

This trial provides more evidence that early sowing is critical to maximise canola yield in the Northern Agricultural Region. There was little difference between herbicide type and the response of varieties was similar to TOS. This indicates that using the highest yielding variety rather than trying to match variety season length to sowing date was the best option in this trial.

Key words

Canola, Variety, Time of sowing

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