GOA Site Report

Yield impact of harvest delays in direct headed canola- Wellington 2013

Season;	Winter 2013
Location;	Spicer's Creek, Wellington
Collaborators;	Mason Family
Project Code;	GOHM01013-1

Background

Recent trial work by GOA has shown that direct heading of canola crops to be a viable alternative to windrowing. However, a common concern for growers when considering direct heading of canola rather than windrowing is that yield loss through pod shattering prior to harvest can be significant particularly if harvest is delayed. This trial is an attempt to quantify the rate at which canola losses yield though shattering prior to harvesting

Aim

To assess the rate at which canola yield declines when direct heading is delayed.

Methods

The trial used a small plot randomised complete block design with four replicates and plots 3m wide by 15 m long.

The trial was established in a commercially grown crop of canola where an even area of crop was left un-windrowed (standing) whilst the rest of the paddock was windrowed. The trial was established in this area with plots running perpendicular to the direction the crop was sown.

The trial consisted of 10 harvest timings with the final harvest timing plot used to monitor the crop throughout the duration of the trial for shattering losses from the standing crop. Shattering was assessed by leaving catch trays in the crop between each harvest timing. Grain and pods were collected from these at each harvest timing so that between harvest timing shattering losses could be calculated.

Yield was assessed by harvesting with a plot header between 2-3 pm at each harvest timing. The plots were wider than the header front to ensure earlier harvest timings did not interfere with adjacent un-harvested plots.

Wind speed, humidity and temperatures were recorded with data loggers placed inside the trial area and rainfall was recorded manually (Table 4).

Results were analysed by ANOVA and results compared by using a LSD method with a 95% confidence interval. Any references to differences between treatments should be assumed to be statistically different unless otherwise stated.

Table 1. Harvest delay intervals and dates

Days delay from 1st harvest date	Date
0	15-Nov-13
3	18-Nov-13
6	21-Nov-13
9	24-Nov-13
12	27-Nov-13
16	01-Dec-13
22	07-Dec-13
28	13-Dec-13
35	20-Dec-13
61	15-Jan-14

Results

Delays in the direct heading resulted in yields as detailed in Table 2 below. With the exception of the Day 3 timing the first six harvests from Day 0 until Day 16 were not different to each other. Yields at Day 3 were the highest of all harvest timings and different to all other timings. Harvested yields at Day 22 & 28 were lower than the earlier timings but not different to each other. Yields at Day 35 & 61 were lower again, and no different to one another but the prior was also no different to Day 22.

Table 2. **Effect on harvested yields by delays in direct heading**

Harvest Day	Harvested Yield t/ha	
Day 0	1.63	B
Day 3	1.99	A
Day 6	1.58	B
Day 9	1.43	B
Day 13	1.49	B
Day 16	1.48	B
Day 22	0.94	CD
Day 28	1.05	C
Day 35	0.72	DE
Day 61	0.67	E
lsd	0.25	
CV	13	

Estimated shattering losses from the standing crop over the period of the trial are detailed in Table 3 below. No statistics are presented on this data as the sampling area and method of collection were less than optimal and as such this data should be considered indicative only. As can be seen losses were relatively low and consistent. There were a number of higher measurements at Day 9, 22, 54, 59 and 61 indicating increased losses in the periods leading up to those sampling dates.

Table 3. Estimated standing crop losses through shattering due to harvest delays

Harvest delay	Sampling Date	Estimated yield loss kg/ha
0	15-Nov-13	0
3	18-Nov-13	1
6	21-Nov-13	0
9	24-Nov-13	11
12	27-Nov-13	3
16	01-Dec-13	5
18	03-Dec-13	1
22	07-Dec-13	54
28	13-Dec-13	5
32	17-Dec-13	9
35	20-Dec-13	0
54	08-Jan-14	59
59	13-Jan-14	20
61	15-Jan-14	19

Discussion

Firstly, the methods used to assess crop losses between harvest timing should be discussed. In each replicate a monitoring plot was left unharvested until Day 61. Within these plots were placed a two catch trays; constructed from 2 meters long, 150 mm diameter PVC pipes cut in half, longitudinally, with each end blocked to prevent seed rolling out. These were left in position between sampling dates, at when seeds/pods were collected, weighed and losses calculated. The combined area of both catch trays was 0.6 m^2 and as such only measuring approximately 1.5% of the plot area. Secondly it was later found that there was a high possibility that a proportion of the seed falling into these trays from canopy height was in fact bouncing out. Therefore, the quantity of grain captured was likely to be a true reflection of the actual amount lost. However, the relative amount captured at each sample timing may give an indication of periods of increased losses.

With the exception of Day 3, harvested yields remained constant at around 1.5 t/ha until Day 16 indicating there was minimal losses from pod shattering (Figure 1). Yields for harvest timings Day 22 & 28 averaged around 1 t/ha, a reduction of around 0.5 t/ha. This outcome is reinforced by the measurement from the catch trays which indicated increased losses prior to sampling at Day 22 but then with lower levels recorded at sampling on Day 28.

Harvested yields at Day 35 & 61 were an average of 300 kg/ha lower than the previous two harvest timings. The catch trays indicated increased losses at Day 32 but losses measured by the catch tray was disproportionate to the decline in harvested yields, but further losses measured at Day 54, 59 and 61 indicated further losses not reflected in harvested yields.

These inconsistencies tends to highlight the limitations of the catch trays used in this trial.

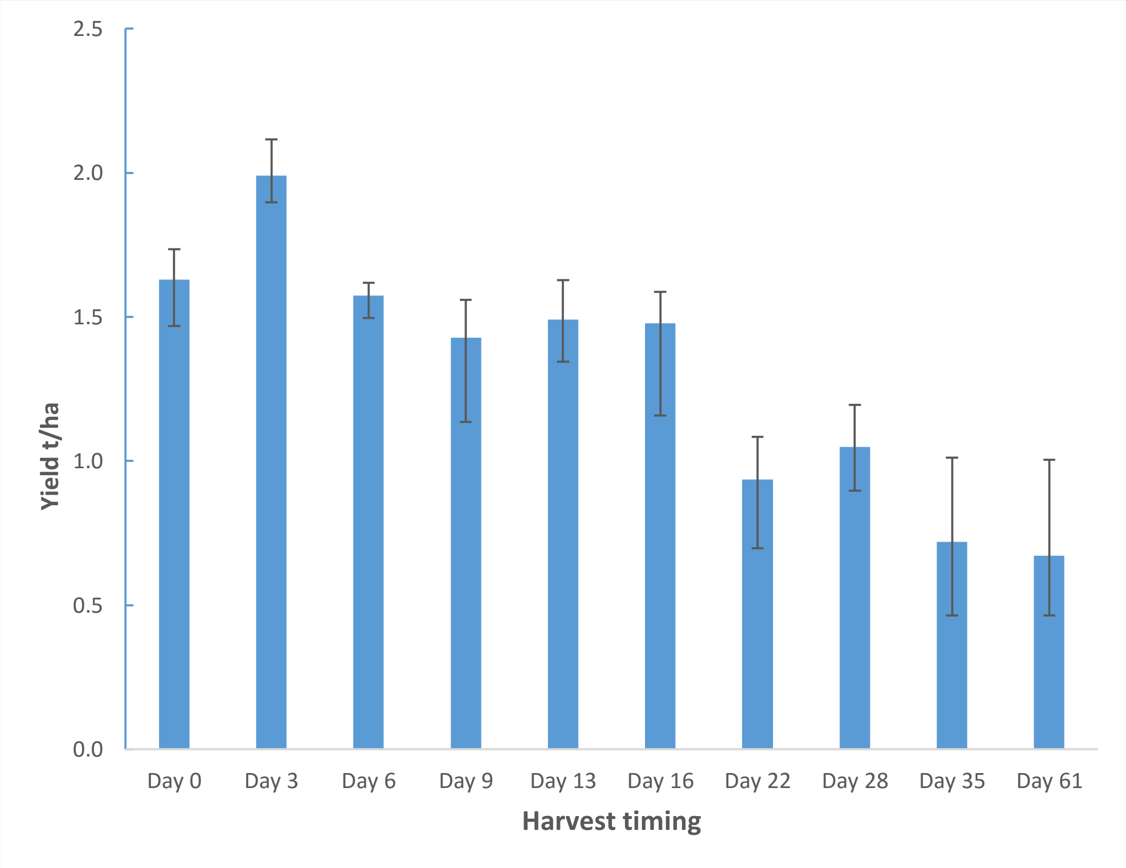

Figure 1. **Harvested yield in response to delayed harvest timings. Error bars represent the maximum and minimum values for each harvest date.**

What was also not assessed in this trial and not realised until later was the potential for differences in harvester losses as timing was delayed. The trial design stipulated that harvesting was to occur at a similar time of day at each harvest timing. This meant that environmental conditions could be different at each timing and could either increase or decrease the potential for harvester losses particularly off the harvester front.

A clear demonstration for this is the Day 3 harvest which clearly yielded above timings both before and after. Investigation of weather conditions during that period reveal a small rain event of 5 mm occurred early that morning which would have wet the crop canopy. Although harvesting did not take place until 2.30 pm, humidity levels measured in the canopy were much higher and temperature much lower than at any other harvest timing (see Table 4). Given these circumstances it is plausible that the pods may have been more resilient to shattering at that particular harvest timing resulting in much lower losses, an outcome that is reflected in the harvested yields.

In fact, it should be noted the very hot and dry conditions present at some harvest timings were quite extreme and would have significantly increased the likelihood and magnitude of harvest losses from the header front.

Table 4 Averages of temperature, humidity and wind speed for 30 minutes prior to and after each harvest timings.

Harvest Delay	Temperature °C	Humidity %	Windspeed km/h
Day 0	33	14	9
Day 3	25.7	33	10.5
Day 6	38	18	8.6
Day 9	31	18.7	8.6
Day 13	36.3	10.8	5
Day 17	34	18.5	5.5
Day 21	33.3	13.1	5.2
Day 25	37.9	8.9	7.6
Day 30	42.9	14.1	5.1
Day 61	40.9	22.9	4.9

Therefore, the results of this trial begs the question: is the decrease in harvested yields more attributed to increasing header losses that potentially worsened as conditions became even less suitable for harvest? If this is the case, then the catch trays did represent closely the incurred losses. Alternatively, were the header losses reasonably constant across all timings and the yield decline was purely a function of pod shattering in the standing crop? And if this is the case then the catch trays were largely inaccurate in any prediction of shattering losses (as discussed above).

Conclusion

This trial has demonstrated there was very little impact on yields from delaying harvest as long as 17 days from the first possible harvest date.

Yields did show sharp declines on two more occasions during the 61 days the trial ran for, the first after a little over two weeks and 26 days in the second. It was demonstrated that the rate of yield decline was not a constant linear change but more in steps. Yield losses are most likely a function of weather extremes which are infrequent and unpredictable in their nature.

However, there is also some doubt as to relative proportion of losses via loss in the standing crop pre harvesting or losses during the harvest operation?

Upon review it is obvious some shortcomings in the measurements of header losses and standing crop losses but by investigation of some of the measurements it could be speculated losses may be as high as 400 kg/ha. But it should also be remembered that many of these treatments were harvested in extreme conditions when many commercial growers would have long since stopped harvesting till the weather improved.

Acknowledgements

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