



2013 ADOPT Project Report

Straight Combining Canola Small Plot Demonstration



Prepared by:

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1. Project Title: Straight Combining Canola in a Small Plot Demonstration

2. Project Number: 20120400

3. Producer Group Sponsoring the Project: Conservation Learning Centre Inc

4. Project Location: Conservation Learning Centre, Prince Albert, Sask.
Located on the SW 20-46-26 W2, RM 461

5. Project Start Date and End Date: May 1, 2013 to February 15, 2014

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7. Project Objectives: To demonstrate the risks and benefits of straight combining canola versus swathing and combining, using small plot equipment.

To develop an understanding of the issues surrounding adoption of this technology so as to develop a protocol to develop a field scale demonstration in 2014.

8. Project Rationale: Canola is arguably the most lucrative crop grown in Saskatchewan. The risks are high in terms of input costs and susceptibility at harvest time to winds when crops are swathed. The fall of 2012 was one of the worst years for such losses. Some fields being a virtual write off. The risks in leaving canola standing for straight combining can result in heavy shattering losses.

Canola cultivars with improved shatter resistance have been identified in recent years. Many producers are reluctant to leave these cultivars for straight combining as they lack good information as to the risk relative to the swathing option. This demonstration will begin to help producers evaluate how these newer cultivars may perform under a straight combining management plan.

9. Methodology: The demonstration was set up using Invigor 5440, which has improved shatter resistance, at two planting dates (early and late May) and two sampling dates at harvest time. As the crop from each seeding date nears maturity individual plots were be swathed at either the 20-30% seed color change stage and at the 50-60% seed color stage. The direct combining was done at two stages the 10-12% moisture stage and 1-2 weeks after reaching the 10-12% seed moisture stage (past what would be considered an optimal time for straight combining). The treatments were replicated 8 times.

The treatments were;

1. Seed early, swath at 20-30% seed color change
2. Seed early, swath at 50-60% seed color change
3. Seed early, straight cut at 10-12% seed moisture content
4. Seed early, straight cut 1 week after 10-12% seed moisture content
5. Seed early, straight cut 2 weeks after 10-12% seed moisture content
6. Seed late, swath at 20-30% seed color change
7. Seed late, swath at 50-60% seed color change
8. Seed late, straight cut at 10-12% seed moisture content
9. Seed late, straight cut 1 week after 10-12% seed moisture content
10. Seed late, straight cut 2 weeks after 10-12% seed moisture content

The project was seeded on Barley stubble. The project was sprayed with Advantage Plus at the rate of 1.5 L/ac on May 17, 2013. Fertilizer was deep banded on May 24, 2013 at a rate of 100 lbs/ac N, followed by a harrowing. The soil temperature was 11C that day with a 60-70 km wind.

The early seeded treatments were planted on May 27, 2013 at a seed rate of 6 lbs/ac. The fertilizer applied with the seed was 11 lbs/ac N and 52 lbs/ac P. The seed was planted at 1" deep. The soil temperature was 13C May 27, 2013. The canola had germinated on May 29 but emergence was poor as soil conditions were very dry. There was frost on the night of June 3, 2013. Crop started to bloom July

12, 2013 and was in full bloom July 17, 2013.

The density count on June 15, 2013 averaged 33 plants per meter on a row spacing of 7.5". The project was sprayed with Lance on July 17, 2013 at 142 g/ac. The project was sprayed with Liberty on June 24, 2013. A weed assessment on June 27, 2013 indicated a good weed kill.

The late seeded treatments were planted on June 6, 2013 at a rate of 6 lbs/ac and a depth of 3/4". The soil temperature that day was 17C. The late seeded treatments germinated on June 17, 2013. The germination was poor and soil conditions were wet. The late seeded treatments were sprayed with Liberty at a rate of 1.35 L/ac on June 24, 2013. The temperature was 24C with high humidity. It was noted on July 1, 2013 that there were a lot of dead plants, suspected to be caused by spray drift from a neighbouring field. In general the treatments recovered quite well from the suspected spray drift damage. The crop started to bloom on July 14, 2013 and was in full bloom on July 19, 2013.

The crop height on July 31, 2013 was 130 cm on the early seeded crop and 120 cm on the late seeded crop. On August 1, 2013 the disease rating was 0 but by August 6, 2013 Aster Yellow was showing up in a few of the canola plants. By August 16, 2013 both the early and late seeded crops were almost finished flowering. The late seeded treatments were 5-7 cm taller than the early seeded on August 16, 2013. There was a good stand of plants in all treatments.

Two shatter boxes of a size of 5" x 30" x 4" were placed in each of the treatments which were to be straight combined (numbers 3, 4, 5, 8, 9,10). These were placed to catch any seed or pods which shattered.

The early seeded (treatment 1) and late seeded (treatment 6) swathing date at the 20-30% seed color change stage was September 4, 2013. On this date the early and late seeded treatments were at virtually the same stage of maturity. On this same date there were 50 pods handpicked from each of the treatments. These samples were then air dried and weighed. The swathing treatments were not combined until October 16, 2013 as the stalks remained too green, due to a lack of frost, to harvest with the plot combine.

The early seeded (treatment 2) and late seeded (treatment 7) swathing date at the 50-60% seed color change stage was September 9, 2013. On this date the early seeded and late seeded treatments were at virtually the same stage of maturity. On this date there were 50 pods handpicked from each of the treatments. These sample pods were then air dried and weighed. The swathing treatments were not combined until October 16, 2013 as the stalks remained too green, due to a lack of frost, to harvest with the plot combine.

The early seeded, straight cut at the 10-12% seed moisture content (treatment 3) was combined on October 15, 2013. The late seeded, straight cut at the 10-12% seed moisture content (treatment 8) was also combined the same day.

The early seeded straight cut 1 week after the 10-12% seed moisture content (treatment 4) was combined on October 21, 2013. The late seeded, straight cut 1 week after the 10-12% seed moisture content (treatment 9) was also combined the same day.

The early seeded, straight cut 2 weeks after the 10-12% seed moisture content (treatment 5) was combined on October 28, 2013. The late seeded, straight cut 2 weeks after the 10-12% seed moisture content (treatment 10) was also combined the same day.

The data to be collected was yield, maturity, % green seed and seed size. Pictures were taken of the contents of the shatter boxes.

10. Results: While there were 8 replicates in the project, due to an error at sampling time 4 of the replicates were deemed to be questionable in terms of accuracy and were not included in the results.

Plot 1, Seed early, swath at 20-30% seed color change. Swathed and Pods Collected September 4, 2013. Combining was done on October 16, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
9.5	1	4.84	22.06	7.32	72.21
9.5	0	5.45	23.51	7.57	74.12
9.6	0	4.89	27.41	7.74	68.12
9.9	0	5.26	30.23	7.79	69.22
Average	0.25	5.11	25.80	7.60	70.91

Plot 2, Seed early, swath at 50-60% seed color change. Swathed and Pods Collected September 9, 2013. Combining was done on October 16, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
9.7	0	5.63	16.41	7.96	56.14
9.2	0	3.37	14.23	7.33	69.20
9.0	0	5.49	14.34	7.77	69.20
9.1	0	3.37	17.29	8.53	70.03
Average	0	4.46	15.57	7.90	66.14

Plot 3, Seed early, straight cut at 10-12% seed moisture content. Combining was done on October 15, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
8.9	0	5.86	N/A	N/A	71.40
9.0	0	3.80	N/A	N/A	69.76
9.2	0	4.36	N/A	N/A	70.30
8.9	0	5.16	N/A	N/A	68.67
Average	0	4.79	N/A	N/A	70.03

Plot 4, Seed early, straight cut 1 week after 10-12% seed moisture content. Combining was done October 21, 2013

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
10.7	0	4.00	N/A	N/A	62.95
9.5	2	3.29	N/A	N/A	57.23
9.6	2	4.11	N/A	N/A	59.13
10.0	3	3.28	N/A	N/A	74.12
Average	1.75	3.67	N/A	N/A	63.35

Plot 5, Seed early, straight cut 2 weeks after 10-12% seed moisture content. Combining was done on October 28, 2013

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
10.1	1.0	3.53	N/A	N/A	57.17
10.4	3.0	2.69	N/A	N/A	49.00
10.3	3.0	3.09	N/A	N/A	45.73
10.1	2.0	3.59	N/A	N/A	57.50
Average	2.25	3.22	N/A	N/A	52.35

Plot 6, Seed late, swath at 20-30% seed color change. The swathing and pod collection was done on September 4, 2013. Combining was done on October 16, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
10.0	1	5.08	20.57	5.67	49.05
10.1	3	5.02	22.64	6.54	42.51
9.7	5	5.03	27.11	7.18	47.96
9.6	4	4.96	26.41	7.11	44.96
Average	3.25	5.02	24.18	6.62	46.12

Plot 7, Seed late, swath at 50-60 seed color change. The swathing and pod collection was done on September 9, 2013. Combining was done on October 16, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
9.4	1	3.93	14.79	9.11	48.51
9.7	2	5.16	17.56	9.16	51.78
9.9	3	5.07	19.05	9.05	49.95
9.1	4	3.69	17.60	8.34	50.41
Average	2.50	4.46	17.25	8.91	50.16

Plot 8, Seed late, straight cut at 10-12% seed moisture content. Combining was done on October 15, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
10.0	2	3.35	N/A	N/A	63.77
9.4	2	5.34	N/A	N/A	67.04
9.4	1	3.49	N/A	N/A	63.22
9.7	1	5.21	N/A	N/A	63.50
Average	1.5	4.35	N/A	N/A	64.38

Plot 9, Seed late, straight cut 1 week after 10-12% seed moisture content. Combining was done on October 21, 2013.

Moisture %	% Green Seed	1000 Kernel Weight gms	50 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
10.1	1	4.38	N/A	N/A	59.95
10.3	2	3.99	N/A	N/A	53.68
10.1	3	4.94	N/A	N/A	51.23
10.3	3	4.95	N/A	N/A	54.50
Average	2.25	4.56	N/A	N/A	54.84

Plot 10, Seed late, straight cut 2 weeks after 10-12% seed moisture content. Combining was done on October 28, 2013

Moisture %	% Green Seed	1000 Kernel Weight gms	59 Green Pod Weight gms	50 Dry Pod Weight gms	Seed Yield Bus/ac
10.1	0	3.46	N/A	N/A	49.55
10.3	2	5.16	N/A	N/A	52.82
10.9	3	3.76	N/A	N/A	46.01
10.6	6	2.87	N/A	N/A	46.00
Average	2.75	3.81	N/A	N/A	48.59

The shatter boxes were removed as the treatments were combined. APPENDIX A has some pictures of what typically was in each treatment shatter box. There was not a lot of difference in the amount of seed in the shatter boxes of the different treatments. A visual assessment was made of the treatments prior to combining and the difference in shattering between the straight combined at 10-12% seed moisture content, the straight combined 1 week after the 10-12% seed moisture content and the straight cut 2 weeks after the 10-12% seed moisture content, were not visually evident.

The temperature at the CLC was warmer and dryer (25% of normal) than normal in May, June was near normal for temperature but approximately 3 times normal for precipitation. July and August were near normal for temperatures and precipitation.

There were no wind gusts in excess of 50 kms/hr in August, September or October of 2013.

In 2012 there were wind gusts of over 50 kms/.hr as follows;

August 29---64kms

September 10, 11, 12 and 18---62.0, 81.1, 65.8 and 61.1 respectively

October---no days over 50 kms

In 2013 at the CLC, straight cutting at 14 days after the crop reached 12% SMC resulted in a dramatic reduction in yield compared with other treatments where the crop was sown early. Swathing at 20-30% SCC or straight cutting when the crop reached 12% SMC provided the highest yields.

Seeding at a later date in 2013, saw the highest yields with straight cutting at 12% SMC followed by straight cutting 7 days later. Yields were lower where the crop was straight cut at 14 days after 12% SMC or where swathing was done at 50-60% SCC. Lowest yield was where swathing was done at 20-30% SCC.

In respect to shatter losses, they appeared to increase as combining was delayed beyond the point where the crop had dried to 12% SMC. This likely reflected the very long period of time that elapsed between harvest dates, which was the result of a long fall without a killing frost, meaning the crop did not

dry down to allow cutting with the plot combine. With the late seeding, yields were reduced due to incomplete seed filling where swathing was done, while delayed straight cutting past 12% SMC increased shatter losses.

Green seed was quite variable between treatments with little evidence of any real trends. In all cases the percent of green seed was below the 5% threshold where downgrading would occur. Seed weight was highest on the treatments that were swathed at the 20-30% SCC and lowest on the straight cutting at the 12% SMC + 14 days. The other treatments saw no significant difference in seed weights.

11. Conclusions and Recommendations: This project was carried out at 5 locations in the province in 2013. The composite report for the project was completed by Stu Brandt of NARF and resulted in the following conclusions and recommendations;

'During the harvest period from late August through October of 2013, conditions were much drier and wind events were not nearly as severe as during 2012. Under these conditions yield was highest where swathing at 50-60% seed color change stage or straight cutting when seed had first dried to 12% seed moisture was done. In five of seven cases, swathing earlier at 20-30% seed color change resulted in reduced yield compared with swathing at 50-60% seed color change. Delaying straight cutting for 2 or more weeks after the crop first dried to 12% seed moisture resulted in increased yield at three sites and decreased yield at the other two sites. Overall cutting too early risks reduced yield due to incomplete seed filling, while delayed swathing beyond the 12% seed moisture stage risks increased seed shatter losses'.

12. Acknowledgements: The Conservation Learning Centre would like to acknowledge the funding received for this project from the ADOPT Program of the Ministry of Agriculture. The project would not have been completed without the dedicated work of the CLC staff.

The CLC would also like to acknowledge the assistance provided by Stu Brandt of NARF in providing his leadership and expertise to delivering the project and reviewing the final report.

13. Appendices: APPENDIX A, Pictures of shatter boxes (TBD)

14. Abstract/Summary: This project was carried out at 5 sites in Saskatchewan in 2013. The following is the composite abstract for all 5 sites, prepared by Stu Brandt of NARF;

'Canola is arguably the most lucrative crop grown in Saskatchewan, but can also be quite risky. Along with risks associated with crop establishment is the risk to the crop at harvest time. Canola swaths are subject to be blown about by winds resulting in yield losses that usually exceed 50% in the blown swaths. The fall of 2012 was one of the worst for such losses in recent memory. Canola can be left standing and straight combined, but here the risk is that the pods will shatter or whole pods will fall of the plant and be lost. Canola cultivars with improved shatter resistance have been identified in recent years. Many growers are reluctant to straight combine these cultivars in part because they lack good information about risk relative to swathing and practise they might employ to limit such risk. An improved understanding of relative risk of the two combining options will allow growers to make better informed decisions about when and where to utilize each harvesting option. To demonstrate risks associated with various harvest options plots were harvested by swathing at either the 20-30% seed color stage or the 50-60% seed color stage, or straight cut the crop at the point where seed moisture had declined to 12%, or further delayed straight cutting by one or two weeks. During the harvest period from late August through October of 2013, conditions were much drier and wind events were not nearly as severe as during 2012. Under these conditions yield was highest where swathing at the 50-60% seed color change stage or straight cutting when seed had first dried to 12% seed moisture was done. In five of seven cases, swathing earlier at 20-30% seed color change resulted in reduced yield compared with swathing at 50-60% seed color change. Delaying straight cutting for 2 or more weeks after the crop first dried to 12% seed moisture resulted in increased yield at 3 sites and decreased yield at another 2 sites. Overall cutting too early risks reduced yield due to incomplete seed filling, while delaying swathing beyond the 12% seed moisture stage risks increased seed shatter losses.

15. Expenditure Statement: Attached