Comparing Straight Harvest with an Anti-shattering Agent to Swathed Harvest of Canola and the Evaluation of Field Scale Straight Combining Compared to Swathed Canola

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Abstract

Swathed harvest of canola in the vast, open, rolling prairies of North Dakota can be problematic because of prevailing windy conditions that blow swaths in/off fields, resulting in high yield losses. The alternative straight harvest approach would eliminate swathing but would subject standing plants to potential seed shatter losses from hot, dry summer winds. Effective anti-shattering agents could change harvest from traditional swathing to straight harvest in certain situations. The objective of this study was to evaluate the anti-shattering agent Spodnam in North Dakota canola production. Field studies were conducted at the Carrington, Hettinger, and Minot North Central Research Extension Centers, and a field site near Prosper, North Dakota, during 2005. The study was a RCB with four replicates and 16 treatments. Treatments consisted of harvest method (straight or swathed), anti-shattering agent (application or non-application), and harvest date. Straight harvest treatments were sprayed with the anti-shattering agent Spodnam applied at two water volumes (20 and 50 gpa) at early pod yellowing. There were also non-sprayed straight harvest control treatments and a traditional swathed treatment. The first harvest date occurred at the optimum time with subsequent weekly harvests at 7, 14, and 21 days. Characters evaluated included yield, oil content, seed shatter, seed moisture, and green seed. Results indicated Spodnam was not effective in preventing or reducing seed shatter at the Minot and Prosper locations. At the Carrington location yield was stable as harvest was delayed for the Spodnam 50 gpa treatment; however, yield was not greater than the control treatment at the latest harvest date. Field scale studies indicated similar yield for Spodnam and control straight harvest treatments. Further research is recommended before commercial scale utilization of Spodnam as an anti-shattering agent in canola production.

Progress

Field studies were conducted at the Carrington, Hettinger, and Minot RECs and an off-station site, Prosper, associated with the North Dakota Agricultural Experiment Station at Fargo during the 2005 season. The study was lost at the Hettinger site due to hail. The study was completed at the other three sites and provided information on the effectiveness of the anti-shattering agent Spodnam.

Impact statement

Under certain conditions, when canola swaths are poorly anchored into stubble, high winds can cause blowing of swaths. In extreme situations swaths can be blown off the fields or greatly disrupted, making harvest difficult, if not impossible. Straight harvest keeps plants anchored to the ground by the stems, but if harvest is not timely and conditions are windy excessive shattering can also result in high yield losses. Effectiveness of anti-shattering agents for canola could change harvest management from the traditional swathed method to straight harvest. Protection against shattering, for

perhaps a week or two once the crop is at harvest moisture, would provide a harvest window sufficient to accommodate weather delays and harvest of larger acreages. Failure of anti-shattering agents to provide protection against shattering would greatly jeopardize yield potential and economic returns. Determination of the effectiveness of anti-shattering agents in plot studies and large scale field research studies is necessary before their introduction into commercial canola production.

Procedure

Field studies were conducted at the Carrington, Hettinger, and Minot North Central Research Extension Centers, and a field site near Prosper, North Dakota during 2005. The study was a RCB having four replicates and 16 treatments consisting of swathed, straight harvest, and a anti-shattering agent Spodnam applied at two water volumes.

Canola cultivar Invigor 4870 was sown at 600,000 pure live seed per acre in mid-May at all locations. Plots consisted of four or six row, 25 feet in length, spaced at 12 inches. For the straight harvest treatments Spodnam was applied by ground application with a CO_2 hand-held backpack sprayer (40 psi pressure) at water volumes of 20 or 50 gpa. Spodnam was applied at first sign of pod yellowing for the straight harvest treatments. The swathed treatments were not sprayed with Spodnam. Treatments were harvested at time 0 (optimum), 7, 14, and 21 days. Characters evaluated were yield, seed moisture, oil content, green seed, and seed shatter. Analysis of variance considered treatments a fixed effect. Treatment means separation will be performed by application of an *F*-protected LSD at $P <= 0.05$ level of significance for each evaluated characteristic.

Results and Discussion

Use of the anti-shattering agent Spodnam did not reduce or prevent seed shatter for the straight harvest treatments at the Minot North Central or Prosper field sites. Yield reduction associated with seed shatter was indicated at 14 and 21 d after application for the Spodnam 20 and Spodnam 50 treatments and the non-Spodnam control straight harvest treatment at these locations (Table 1). For these treatments seed shatter was the same for the Spodnam and control treatments. At the Carrington location, yield was maintained as harvest was delayed for the Spodnam 50 treatments. Yield was reduced at 14 and 21 d for the Spodnam 20 and control treatments, respectively, compared to their time 0 yields. However, yields were similar for both Spodnam treatments and the control at 0, 7, 14, and 21 d harvests.

Conclusion

Preliminary results indicate the anti-shattering agent Spodnam does not consistently prevent or reduce canola seed shattering. Further replication of the study next year is recommended before final conclusions.

Table 1. Mean canola yield (lb/acre) for delayed harvest of swathed and straight harvest treatments at three North Dakota locations during 2005.

Treatment	Day	Location		
		Carrington	Minot	Prosper
Swath	0	2519	2435	1455
Swath	7	2164	2618	1254
Swath	14	2337	2358	1021
Swath	21	2030	2192	1120
Straight	0	2350	2781	1531
Straight	7	2137	3182	1455
Straight	14	1839	2284	346
Straight	21	1428	935	218
Spodnam 20†	0	2185	2933	1632
Spodnam 20	7	1865	3107	1271
Spodnam 20	14	1642	2248	455
Spodnam 20	21	1796	1274	330
Spodnam 50†	0	2263	3150	1640
Spodnam 50	7	1942	3030	1202
Spodnam 50	14	2012	2193	391
Spodnam 50	21	1812	993	395
LSD (0.05)		455	489	255

† Spodnam was applied with 20 and 50 gallon per acre water volumes.
Spodnam treatments were straight harvested with a plot combine.
Harvest delays were 7, 14, and 21 d from the optimum harvest at 0 d.

Evaluation of field scale straight combining of canola compared to swathed canola

Trial 1 Kip Johnson Farm, Rugby, ND:
Hyola 357 Magnum RR was seeded in late April. The trial was a randomized complete block with three replicates. Plots were 45 feet wide by 800 feet long. Spodnam was applied at 1 pt/A with 20 gpa on August 1. The swath treatment was swathed August 5. Shatter cards were placed under the canopy in each plot to collect any seed or pod shatter prior to harvest. All plots were harvested on September 7; which was about 12 days later than the optimum (August 25). All plots were combined with a Case 2188 combine. The straight combine plots were harvested with a 30 foot flex head. Harvest moisture was below 8% for all harvest treatments.

Trial 2 Steve Kakala Farm, Langdon, ND:
Invigor 4870 was seeded in late May. The trial was a randomized complete block design with three replicates. Plots were 45 feet wide by 500 feet long. Spodnam was applied at 1 pt/A with 20 gpa on August 21. The swath treatment was swathed September 2. All plots

were harvested on October 3 with a John Deere 9600 combine. The straight combine plots were harvested with a 30 foot rigid head. Harvest moisture was below 8% for all harvest treatments.

Results

Rugby, ND: On August 31, sustained winds of 49 mph resulted in severe pod shattering of the standing canola. The swath treatments in the trial were in an east/west direction and did not blow. Swaths in the field that were in a south/north direction had severe yield loss due to blowing. There was a significant loss in yield with the straight combined treatments compared to the swath due to the extensive pod shatter loss. There was significantly higher green count with the swath treatment compared to the straight combine treatments

Langdon, ND: The straight combining yields were significantly higher at the 10% level compared to the swath treatments. There was no difference in yield with the straight combining treatments with and without Spodnam. There was significantly higher green count with the swath treatment compared the straight combine treatments. In field scale canola harvest trials, Rugby 2004 and Langdon 2005, results indicate that straight combining canola can be successful with equal to higher yield than traditional harvest methods of swathing and combining when harvested at the optimum time.

2005 Field Scale Canola (Hyola 357 Magnum RR) Harvest Trial Results, Rugby, ND

Treatment	Yield	Oil	Green Count	Seed Shatter at Harvest
	lb/A	%	%	lb/A
Swath	2266	45.6	5.5	330
Straight	1356	45.3	0.6	831
Straight w/Spodnum	1391	45.4	0.4	735
LSD 5%	148	NS	0.9	318

2005 Field Scale Canola (Invigor 4870) Harvest Trial Results, Langdon, ND

Treatment	Yield	Oil	Green Count	Seeds/lb
	lb/A	%	%	
Swath	2792	49.5	2.9	114,766
Straight	3062	49.4	0.3	106,468
Straight w/Spodnam	3030	49.6	0.6	103,444
LSD 5%	NS	NS	1.1	NS
LSD 10%	207	NS	0.9	NS