2013 Minnesota Canola Production Center (CPC)

Cooperative Project with the Minnesota Canola Council and the University of Minnesota

2013 Research Summary Report

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Minnesota Canola Production Center

The Minnesota Canola Production Center is a public-private partnership between the Minnesota Canola Council and the University of Minnesota.

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A special thank you goes to Rice Farms Incorporated for land and field preparation for the small plot canola trials and Mr. Hugh Hunt for cooperation with the large on-farm canola trials.

SITE INFORMATION – 2013 MN Canola Production Center (CPC)

Location: Approximately, 6 miles NW of Roseau, MN

Cooperator: Rice Farms Incorporated

Previous Crop: Wheat

Soil Test Results:

Macronutrient Level:	
Nitrogen – 0-6 inch	7 #/acre
Nitrogen – 6-24 inch	24 #/acre
Phosphorous -	14 ppm
Potassium -	274 ppm
Sulfur -	32 #/acre

Target Yield:	2000 #/acre
Fertilizer Applied (#/acre):	N – 140; P – 35; K – 35; S – 30
%Organic Matter:	3.2
Soil pH:	8.2

Tillage Operations: The entire field was tilled prior to a broadcast fertilizer application. The entire field, except the fertility trial was harrowed and rolled after canola seeding. The fertility trial had the broadcast fertilizer and nitrogen treatments incorporated with an S-tine cultivator with a rolling basket.

Seeding Method: All small plot trials were seeded with a small plot-seeder and the direct harvest trial seeded with an air seeder.

Herbicides Applied: A) Clearfield hybrids – Beyond @ 4 fl. oz/ac + NIS 0.25% v/v + AMS @ 15 lbs/100 gal

B) Liberty Link hybrids – Ignite @ 22 fl. oz/ac + AMS @ 3.0 lbs/ac

C) Roundup Ready hybrids – Roundup PowerMax @ 16 fl. oz/ac + AMS @ 17 lbs/100 gal

Comments: The beginning of the 2013 growing season was in stark contrast to 2012. The 2012 season will be remembered for being early and warm, while the 2013 season was cool and late. In fact, daily temperatures for March, April and May were -6, -12 and -2 degrees below normal, respectively (Source: NDAWN – Greenbush site). After the soils dried out in May, precipitation for the remainder of the growing season was below normal.

In 2013, the crop planting window was mid-May into June, with a significant number of prevent planting (PP) acres in the region. Crop planting, in the spring of 2013 proceeded at a rapid pace, in the fields that dried out enough for field operations. Once planted, canola stands, for the most part, showed uniform emergence and good early season vigor. Once the canola emerged and was out of the ground, flea beetle populations in many canola fields were above threshold, which required a post emergence insecticide treatment. With flea beetles controlled, subsequent canola growth and development was good to excellent going into summer.

The summer of 2013 was below average in precipitation with average temperatures. These environmental conditions are favorable for canola growth, development and yield. The 2013 season didn't disappoint as many canola producers reported better than average canola yields in most of the canola growing region.

A cool late spring, flea beetles and hail damage were canola production challenges in the 2013 growing season. Two hail events were documented at the small plot location. The first occurred on 6/26 and the second on 9/3. Hail adjusters estimated canola yield losses of 10% from the early and 25% from the late date. On the positive side, white mold infestations were very low in most of the canola production region as most of the canola had completed the bloom period before white mold spores were released into the environment.

The Minnesota Canola Production Center (CPC) in 2013 had two locations, one in Roseau and the other in Kittson County, MN. The small plot replicated canola research trials were conducted with cooperation with Rice Farms Inc., on land adjacent to the U of MN Magnusson Research Farm. The U of MN Magnusson Research Farm is located approximately 6 miles northwest of Roseau, MN. The large on-farm replicated strip trials were located approximately 8 miles northeast of Hallock, MN. All field operations at this on-farm site were performed with commercial farming equipment with the cooperation of Mr. Hugh Hunt.

The public canola trials conducted at the 2013 CPC included:

- Small plot canola variety trial
- Small plot fertility nitrogen source, rate and timing trial
- Small plot canola fungicide trial
- Large on-farm strip trial to compare swathed vs. direct harvest canola
- Large on-farm strip fungicide trial

Small Plot Variety and Systems Trial

Objective:
To evaluate agronomic characteristics of the various canola production systems (Roundup Ready, Liberty Link and Clearfield) when grown under the climatic conditions of northern Minnesota.

Background:
New and emerging technologies in canola varieties have given canola growers several choices in variety selection. Yield, lodging resistance, maturity, and crop quality are important variety traits for growers to consider when making variety selections. Canola seed companies were invited to submit current and pending varieties for entry in the trials to compare against similar varieties in a small plot replicated research trial.

Methods:
All varieties were seeded at 5 #/acre on May 25, 2013. The experimental design was a randomized complete block (RCB) with four replications. Individual plot size was 5 x 27 ft. and end-trimmed to a harvest area of 5 x 20 ft. Roundup Ready, Liberty Link, and Clearfield canola varieties were planted in separate blocks to minimize the influence of potential herbicide drift. Warrior at 1.5 oz/a was applied for flea beetle control on 6/12/13. Herbicides were applied on 6/21/13. Early canola varieties were swathed on 8/25/13 and harvested on 9/13/13. Late canola varieties were swathed on 8/28/13 and harvested on 9/13/13. Harvested canola was weighted and a sub-sample taken from each plot for test weight, percent oil content and other quality factors.

Results:
A total of 25 canola varieties were entered in the 2013 CPC (Table 1). A breakdown of the canola varieties: 21 Roundup Ready, 2 Liberty Link and 2 Clearfield canola entries. Canola yields ranged from 1590 to 2491 #/acre. The trial average yield was 2080 #/acre.

The top-yielding canola varieties were Monsanto G19275, HyClass 969, Monsanto DKL70-07, Monsanto G19719, DKL55-55, Star Specialty Seeds 514, Star Specialty Seeds 402, HyClass 930 and Monsanto G08695. Statistical analysis at the 5% level of confidence (251#/acre) suggests these 9 canola varieties did not differ from each other in yield. Average canola yield for these 9 varieties were 2,372 #/acre and at $20/cwt would be a gross dollar return of $474/acre.

All varieties exhibited good early season vigor. First flower date ranged from July 3rd to July 11th with the end of flowering ranging from July 21st to August 1st. Percent oil, protein, lodging plant height and other agronomic information is summarized in Table1.

Table 1: Relative seed yield, oil content, protein and growth characteristics of canola varieties at 2013 CPC, near Roseau, MN.

Maturity			Herb	Actual Clean seed yield adjusted to 8.5% Moisture					Harvest		6-18	6-18 % Ground	Begin	End	Swath
Group*	Entry	Company	Tolerance	#/ac	% of Mean	Rank	%oil	%Protein	Lodging[1]	Ht.(in.)	ESV[2]	Cover	bloom	bloom	Date
Late 1	InVigor L120	Bayer CropScience	LL	**1639**	**78.8**	24	39.6	21.2	7.5	47	9.0	95	7-6	7-23	8-28
2	InVigor L130	Bayer CropScience	LL	**2022**	**97.2**	16	40.2	20.3	9	49	8.8	95	7-6	7-23	8-28
3	Nexera 2012 CL	Mycogen	CL	**1841**	**88.5**	19	40.4	21.5	7	47	8.0	75	7-3	7-23	8-28
4	CL268726H	Mycogen	CL	**1590**	**76.4**	25	40.8	22.4	7.5	51	9.0	100	7-11	7-28	8-28
5	G1570046H	Mycogen	RR	**1782**	**85.7**	20	41	19.9	6	48	9.0	90	7-7	7-26	8-28
6	G1570048H	Mycogen	RR	**1731**	**83.2**	21	41.2	20.3	5.5	47	8.8	80	7-7	7-27	8-28
7	Nexera 1012 RR	Mycogen	RR	**1677**	**80.6**	23	40	21.4	5	51	8.3	80	7-10	8-1	8-28
8	Nexera 1016 RR	Mycogen	RR	**1888**	**90.8**	18	41.2	22	6	47	8.0	75	7-7	7-25	8-28
9	DKL70-07	Monsanto	RR	**2457**	**118.1**	3	44.9	18.2	6	44	8.8	95	7-4	7-23	8-28
10	DKL72-40	Monsanto	RR	**2199**	**105.7**	11	45.1	19.5	5.5	46	9.0	80	7-4	7-21	8-28
11	HyClass 955	Winfield Solutions	RR	**2115**	**101.7**	12	43.1	18.3	4	43	9.0	90	7-3	7-20	8-28
Early12	G08695	Monsanto	RR	**2244**	**107.9**	9	43.9	19.3	6.5	48	8.0	95	7-7	7-28	8-25
13	G29105	Monsanto	RR	**1722**	**82.9**	22	43.4	19.2	5.5	47	9.0	100	7-7	7-26	8-25
14	G19275	Monsanto	RR	**2491**	**119.8**	1	45.7	18.7	5.5	45	8.3	85	7-5	7-25	8-25
15	G29075	Monsanto	RR	**2089**	**100.4**	14	41.8	20.7	5.5	46	8.3	80	7-3	7-25	8-25
16	G19280	Monsanto	RR	**2047**	**98.4**	15	44.8	19.5	6	47	8.5	75	7-7	7-28	8-25
17	G19719	Monsanto	RR	**2448**	**117.7**	4	40.9	21.3	5.5	48	8.8	100	7-7	7-27	8-25
18	Integra 7150R	Wilbur Ellis	RR	**2090**	**100.5**	13	44.4	19	3.5	44	8.8	80	7-3	7-20	8-25
19	Star 402	Star Specialty Seed	RR	**2302**	**110.7**	7	46.2	18.2	5.5	44	8.0	80	7-6	7-23	8-25
20	Star 514	Star Specialty Seed	RR	**2317**	**111.4**	6	46.3	17.7	3.5	43	8.5	80	7-3	7-19	8-25
21	DKL55-55	Monsanto	RR	**2321**	**111.6**	5	44.7	18.6	4	43	8.5	80	7-3	7-20	8-25
22	HyClass 969	Winfield Solutions	RR	**2473**	**118.9**	2	44.6	19.1	3.5	44	9.0	100	7-5	7-24	8-25
23	DKL30-42	Monsanto	RR	**1984**	**95.4**	17	44	19.9	4	39	7.8	75	7-3	7-21	8-25
24	DKL38-48	Monsanto	RR	**2235**	**107.5**	10	43	19.8	4.5	42	8.3	90	7-4	7-22	8-25
25	HyClass 930	Winfield Solutions	RR	**2292**	**110.2**	8	45	19	3	42	8.5	80	7-3	7-20	8-25
	LSD @ 5% level			**251**	**12.1**		1.2	1.2	1.4	2	0.8	14	1	1	0
	LSD @ 10% level			**210**	**10.1**		1	1	1.2	2	0.7	12	1	1	0
	CV			8.6	8.6		2	4.3	19.1	3.7	6.7	11.8	19.9	3.7	0

Trial mean yield= 2080#/ac.

Seeding Rate= 5#/ac. 10-6" rows per plot

Plot size seeded = 5'x27'

Plot center=6'x27'

Fertilizer spring applied=140-35-35-30s

*Late grouping = medium to late relative maturity

Early grouping= early or unknown relative maturity

1 - Lodging 9=none;1=flat

2- ESV(Early Season Vigor)

Herbicide applications:

Roundup PowerMax @ 16oz./ac.

Liberty 280SL @ 22oz.+ 1 gal.N-Pak AMS/ac.

Beyond(Raptor) 1EC @ 4oz.+.25%NIS+2.5%AMS/ac.

Early varieties swathed 8/25/2013; combined 9/13

Late group varieties swathed 8/28; combined 9/15

Significant weather events-

Hail storm- 6/26/2013 --10% injury estimate(estimate from insurance adjuster in neighboring field)

Hail storm- 9/3/2013 --25% injury estimate(estimate from insurance adjuster in neighboring field)

Warrrior at 1.5 oz/acre applied 6/12-13

Herbicide application-6-21-13

Planted 5/25/2013

Nitrogen Fertility Trial

Objective:
To evaluate canola yield response from various rates of urea applied at PPI and post emergence (4-5 leaf canola), with and without the nitrogen stabilizer Agrotain. Urea was also applied PPI in combinations with a coated urea product ESN (environmentally smart nitrogen).

Background:
Canola requires high levels of nitrogen and usually shows increased yields with increasing levels of nitrogen fertilizer. However, high spring application rates of nitrogen can be subject to environmental losses. One strategy to reduce nitrogen losses into the environment is to delay nitrogen availability until just before peak uptake demand by the canola plant. This delay in nitrogen availability can be accomplished by; 1) a coated urea product like ESN, which is a polymer-coated urea that releases nitrogen based on temperature and moisture, and 2) an early post emergence application of urea with and without the nitrogen stabilizer Agrotain. This study was initiated to evaluate the canola yield response to various rates, timings and combinations of urea with ESN and urea applied with and without the nitrogen stabilizer, Agrotain Ultra.

Methods:
The canola variety Star Specialty Seeds '514' was seeded at 5 #/acre on 5/24/13. Harvested plot size was 5 x 20 ft. The experimental design was a RCB with four replicates. The entire plot area had a background nitrogen level of 31 #/acre. A broadcast application of 29-30-40-25 was applied to the entire plot area. Nitrogen treatments included PPI urea (46-0-0) applied at 0, 45, 90, 135 and 180 #/acre. A 50/50 blend of urea and ESN (44-0-0) applied at 0, 45, 90, 135 and 180 #/acre. Post emergence urea alone and with Agrotain Ultra applied at 45, 90 and 135 #/acre with and without a base urea treatment of 45 #N/acre applied PPI. All plots were swathed on 8-2-12 and harvested on 8-20-12. Harvested canola was weighted and a sub-sample taken from each plot for test weight and percent oil content.

Results:
This trial was seeded approximately 1 inch deep on May 24, 2013. Topsoil was slightly dry with good sub-soil moisture. Canola yields for the untreated plots averaged 1,767 #/acre compared to over 2,500 #/acre for the high rates of nitrogen (Table 2). The 50/50 blend of urea and ESN gave similar canola yields, as the nitrogen rate increased to 180# nitrogen/acre. The highest canola yield (2,816 #/acre) in the trial was from 180# nitrogen applied as 50/50 blend of urea and ESN. Canola yields from urea applied post emergence averaged 2368#/acre compared to 2,502 #/acre from urea +Agrotain Ultra. In this trial, canola yields tended to be higher from post emergence urea applied with the nitrogen stabilizer Agrotain Ultra, than urea alone especially when nitrogen was applied at 90 and 135 # of nitrogen. Percent oil and protein were

inversely related with nitrogen rate. Percent oil decreased and protein increased as the rate of nitrogen increased, regardless of the method of nitrogen application, with and without nitrogen stabilizers.

A chlorophyll meter, FIELDSCOUT, CM 1000, from Spectrum Technologies, Inc., was used in this trial to determine if a light meter could be used to detect nitrogen levels in canola. Light meter readings were taken under full sun conditions at approximately noon, on July 2 and 15. Results indicate that as the applied nitrogen level increased, the chlorophyll meter readings increased at both dates. Further, higher light meter readings were recorded at the first date (July 2). Results from this trial suggest that light meters may have potential to detect nitrogen concentration levels in canola. Additional research will be conducted in the future with light meters to collect additional data, at various growth stages in canola. The goal would be to correlate light meter readings with nitrogen status in the plant. This information could be used to predict nitrogen deficiencies in canola and develop a predictive model of how much nitrogen should be applied at a given canola growth stage to maximize canola yield and minimize environmental concerns.

The canola yield response to this early post emergence application of nitrogen with the nitrogen stabilizer, Agrotain Ultra, may warrant investigation to further investigate how to improve the nitrogen use efficiency in canola. Further, the coated urea product, ESN, appeared to enhance nitrogen efficiency, especially at the total nitrogen rate of 135 and 180#/acre.

Table 2: Canola seed yield in #/acre and % of mean, oil content, test weight, early season vigor and growth characteristics of Star 514 in a fertility conducted near Roseau in 2013.

Trt#	N' Rate PPI Urea[1]	Yield[3] #/acre	Yield as[4] % of mean	0-24" Residual N-NO3	% Oil	%Protein	Early[5] Season Vigor6/18	Early[5] Season Vigor7/2	RCI[6] 7/2	RCI[6] 7/15	Begin Bloom Date	End Bloom Date	Harvest Height (inches)	Lodging[7]
1	0	**1588**	**67.7**	27	46.1	18.1	5.7	4.3	251	299	7-2	7/19	39	6.3
2	45	**2273**	**97.0**	39	46.1	18.4	7.7	7	336	351	7-2	7/19	41	6.3
3	90	**2252**	**96.1**	30	45.9	18.2	8.7	8.3	389	339	7-3	7/20	43	5.0
4	135	**2482**	**105.9**	30	45.2	19.4	8.7	8	403	361	7-4	7/20	44	3.0
5	180	**2593**	**110.6**	30	45.6	19.4	9	9	439	383	7-2	7/19	43	1.7
	PPI Urea/ESN[1]													
6	0	**1800**	**76.8**	NA	47.2	17.0	6	5	224	313	7-2	7/19	40	5.7
7	45	**2259**	**96.4**	36	47.2	17.2	7.7	6.3	325	325	7-2	7/20	41	6.3
8	90	**2302**	**98.2**	38	45.7	18.8	8	7	370	332	7-3	7/20	45	4.3
9	135	**2564**	**109.4**	36	45.4	19.5	8.7	8.3	418	349	7-2	7/20	44	2.3
10	180	**2816**	**120.1**	54	44.4	20.6	9	8.3	447	434	7-3	7/20	44	3.7
	PPI/Post Urea[1]													
11	0	**1762**	**75.2**	NA	46.8	17.5	6	5.3	250	310	7-2	7/19	39	5.7
12	0/45	**2371**	**101.2**	30	46.2	18.2	8.3	7	363	327	7-3	7/20	41	3.7
13	0/90	**2106**	**89.8**	49	45.2	19.2	8.3	7.3	434	354	7-3	7/20	42	3.0
14	0/135	**2230**	**95.1**	43	44.9	19.5	8	7	375	372	7-3	7/20	43	3.0
15	45/45	**2612**	**111.4**	40	45.9	19.1	8.7	7.3	449	369	7-2	7/20	42	3.0
16	45/90	**2390**	**102.0**	44	44.9	19.9	9	8.3	470	367	7-4	7/20	46	3.7
17	45/135	**2499**	**106.6**	30	44.2	20.3	9	9	433	398	7-3	7/20	44	3.0
	PPI/Post Urea+Agrotain Ultra[2]													
18	0/45	**2209**	**94.2**	31	46.1	18.1	7.7	7.3	411	355	7-3	7/20	42	5.7
19	0/90	**2585**	**110.3**	51	45.5	18.8	8.7	7.3	392	370	7-2	7/19	41	3.7
20	0/135	**2647**	**112.9**	NA	45.3	19.4	9	7	382	393	7-3	7/20	41	3.7
21	45/45	**2248**	**95.9**	56	46.0	18.4	9	8	420	362	7-3	7/20	42	2.3
22	45/90	**2634**	**112.4**	54	45.2	19.7	9	8.3	443	365	7-3	7/20	45	2.3
23	45/135	**2689**	**114.7**	47	44.8	20.5	9	8.7	428	394	7-3	7/20	44	3.0
LSD @5% Level		**375**	**16.0**		1.6	1.6	1	1	50	57	1	1	3	1.7
LSD @10% Level														
CV(%)		9.7	9.7		2	5	11	8	8	10	24	4	5	27

Experimental design: RCB w/4 replications

[1]N rate- PPI treatments= all applied at planting time and incorporated with final seedbed prep. PPI Urea source nitrogen

PPI urea/ESN= 50%coated Urea(ESN)+ 50% Urea nitrogen source and shallow tilled into soil

PPI/Post= #N urea source applied pre-plant incorporate/#N source urea applied June 20

[2]Urea+Agrotain Ultra= #N urea source applied pre-plant incorporate/#N source urea+Agrotain applied June 20

[3]Harvested seed cleaned and corrected to 8.5% moisture

[4]Trial mean = 2344 #/acre

[5]Early Plant Vigor: 1 = poorest; 9 = best

[6]RCI: Relative Chlorophyll Index with higher number, more chlorophyll

[7]Lodging: 9= upright; 1=flat

Plots seeded 5/24/2013

1Pt. Roundup PowerMax+2.5%AMS - June 21

Proline 5 oz/acre applied first petal fall -July 11

Warrior at 1.5 oz/acre applied June 12

Fertilizer broadcast applied & incorporated to all plots: 29-30-40-25s

Post application urea application means

Urea only 2368#/acre

Urea+Agrotain 2502#/acre

Canola On-Farm Fungicide Management Trial

Objective:
To evaluate fungicides applied at two timings in canola and determine the influence on canola growth development and yield.

Background:
White mold, caused by the fungal pathogen, *Sclerotinia sclerotiorum*, is the most serious disease in canola. White mold infects the canola plant during flowering. Fungicides are an effective tool management tool used by canola growers. Blackleg, *Leptosphaeria maculans* is another fungal disease that can damage canola. Blackleg is most damaging to canola when infection occurs from the cotyledon to the six-leaf stage. Genetic resistance is the most effective method of control for Blackleg in canola. However, recent disease surveys suggests that Blackleg is now a common disease in canola (Source: NDSU, Plant Disease Bulletin, PP-1367). If fungicides are to be effective in the control of these two canola diseases, two different timing windows will be required to optimize disease control. This multiply fungicide strategy has worked well in spring wheat. In fact, the U of MN has several years of field research which documents higher wheat yields from an intensive fungicide regime compared to the standard practice (Source: MN Varietal Trials, Jan 2013). This fungicide trial in canola will be designed to evaluate canola yield and growth parameters from a standard compared to sequential fungicide applications.

Methods:
This trial was a large on-farm trial with all field operations performed with commercial equipment. Each treatment was 60 feet wide by 500 feet long. The experimental design was a RCB with three replications. The canola variety selected was Star '514' and was seeded at 5.5 #/acre on 5/16/13. The three treatments included: 1) no treatment, 2) Quadris at 7 oz/acre applied to 4 leaf canola follow by Proline at 5 oz/acre applied at 30% bloom, and 3) Proline at 5 oz/acre applied at 30% bloom. All fungicides were applied by air. Each strip was harvested on 9/7/13 with individual weights quantified by a weigh wagon scale and a sub-sample taken from each strip for quality analysis.

Results:
Canola yields in this large on-farm fungicide trial ranged from 2,731 to 2,811 #/acre (Table 3). No statistical difference was observed (LSD 0.05%) for canola yield, oil production/acre or other quality factors. The 2013 growing season had a low incidence of disease pressure, (North Dakota Agriculture Network Sclerotinia risk maps). In addition, to low disease pressure, the majority of canola flowering was completed before the release of white mold spores into the environment. The untreated canola yield of 2,731#/acre is an indication of low disease pressure. This fungicide trial will be repeated in subsequent years in with different environmental conditions.

Table 3: Canola seed yield, % oil, oil yield/acre % moisture, test weight and % dockage of Star 514 influenced by fungicide treatment, Hallock, MN 2013

	Fungicide	Yield	Oil Yield			Test	
Trt#	timing	#/acre	%Oil	#/acre	%moisture	Weight	%Dockage
1	No fungicide	2731	50.8	1387	5.1	49.1	2.5
2	4 leaf+ flowering	2782	50.9	1416	5.2	49.2	1.9
3	Flowering	2811	50.9	1431	5.1	49.2	1.7
	LSD @ 5% level	NS	NS	NS	NS	NS	NS
	cv	2	0.9	1.8	4	0.3	32

Experimental Design= RCB with 3 reps

Planted: 5/16/13

Harvested: 9/7/13

Previous Crop: Soybeans

Fertilizer Applied: 130-30-0-15

Seeding Rate: 5.5lb/acre

Variety: Star 514

Quadrisat 7 oz/acre applied at 4 leaf stage

Proline at 5 oz/acre applied at 30% flowering

Note: Grizzly at 3.5 oz/acre applied at cotyledon stage for flea beetle control

Table 3A: Canola seed yield, % oil, % protein, Plant height and lodging of Star 402 as influenced by fungicide treatment near Roseau, in 2013.

Trt.#	Fungicide Treatment/Timing		Product Rate/acre	Yield[5] #/acre	Yield[5] % of mean	% Oil	%Protein	Harvest Ht.(in.)	Lodging[7]
1	No treatment			**2241**	**90**	46	17.6	45	6.5
2	Proline	7/9	4.3oz. Fl	**2470**	**100**	47.1	16.7	45	6.5
3	Proline	7/9	5.7oz. Fl	**2513**	**101**	45.9	18.2	44	5.5
4	Endura	7/9	6oz wt.	**2527**	**102**	45.7	18.2	44	6.5
5	Quash	7/9	2oz.wt	**2551**	**103**	46.2	17.6	44	6.0
6	[1]Serenade Soil +trt.3	5/25+7/9	1 Qt(+5.7oz)	**2355**	**95**	46.2	17.7	44	5.5
7	[1]Serenade Soil +trt.3	5/25+7/9	2 Qt.(+5.7oz.)	**2244**	**91**	45.8	18.6	43	5.5
8	[2]Proline-7/9+ Priaxor- 7/21		5.7oz+5.7oz	**2585**	**104**	46.5	17.9	43	6.0
9	[3]Quadris -6/18+Proline- 7/9		7oz.+5.7oz.	**2598**	**105**	45.8	18.7	44	5.5
10	[4]Quadris 6/18+Proline 7/9+Priaxor 7/21		7oz+5.7oz+5.7oz.	**2665**	**108**	45.8	18.5	44	5.5
			LSD @5% level	**226**	**9**	0.9	1.2	NS	NS
			CV(%)	6.3	6	1	5	3	20

.25% NIS added to all treatments Mean Yield=2475#/acre

[1] Serenade Soil applied 5/25 cldy-60F 5 pm SW wind 10-15mph post plant - 5' backpack sprayer@17GPA--.1" rainfall overnight

Serenade Soil is a biological product generally applied in furrow or as a soil drench at planting.

[2]Proline 5.7oz 40% bloom+Priaxor 6 oz. 7/21 (10 days after first petal fall)

[3]Quadris 7oz. 4 leaf+Proline 5.7oz 40% bloom

[4]Quadris 7oz. 4 leaf+Proline 5.7oz 40% bloom+Priaxor 6 oz. 7/21(10 days after first petal fall)

[5] Harvested seed cleaned and corrected to 8.5% moisture. Trial mean= 2344 #/acre.

[6]Early Season Vigor 6/18 -1 = poorest;9 = best.

[7]Lodging-9= upright;1=flat

Variety- Star 402(Star specialty seeds)
Seeding Date=5/25/2013
Plot size- 6' x 27'

Application Timing:

7/9= (General applications/medium) timing date
Growth stage- 40% bloom
CO2 backpack sprayer- 18GPA @ 28psi wind NW 6-12 70F
6/18=Early Quadris treatments-(15-16)
Growth stage- 4 leaf stage
Co2 bicycle sprayer @ 12.5gpa

All plots swathed 8/23/2013
Significant weather events-
Hail storm- 6/26/2013 --10% yield loss injury estimate
Hail storm- 9/3/2013 --25% yield loss injury estimate

Trade name	common name	Active ingredient(AI)
Quash	Metconazole	50%WG
Proline 480SC	prothioconazole	4#/gal
Endura	Boscalid	70WG
Priaxor	fluxapyroxad+pyraclostrobin	1.4#+2.8#
Serenade Soil	basilus subtilis	1.34%
Quadris Flowable	azoxystrobin	2.08#/gal
Preference	Non-ionic surfactant	90%

Canola Fungicide Management Small Plot Trial

Objective:
To evaluate fungicides applied at three timings in canola and determine the influence on canola growth development and yield.

Background:
White mold, caused by the fungal pathogen, *Sclerotinia sclerotiorum*, is the most serious disease in canola. White mold infects the canola plant during flowering and fungicides are an effective management tool used by canola growers. Blackleg, *Leptosphaeria maculans* is another fungal disease that can damage canola. Blackleg is most damaging to canola when infection occurs from the cotyledon to the six-leaf stage. Genetic resistance is the most effective method of control for Blackleg in canola. However, recent disease surveys suggests that Blackleg is now a common disease in canola (Source: NDSU, Plant Disease Bulletin, PP-1367). If fungicides are to be effective in the control of these two canola diseases, two different timing windows will be required to optimize disease control. This multiply fungicide strategy has worked well in spring wheat. In fact, the U of MN has several years of field research which wheat yields were higher from an intensive fungicide regime compared to the standard (Source: MN Varietal Trials, Jan 2013). This fungicide trial in canola will be designed to evaluate canola yield and growth parameters from a standard fungicide program compared to a sequential fungicide application.

Methods:
This was a small plot trial conducted on land operated by Rice Farms Inc., and located adjacent to the U of MN Magnusson Research Farm. The experimental design was a RCB with four replications. The canola variety in this trial was Star '402' and was seeded at 5 #/acre on 5/25/13. Individual plot size was 5 wide by 27 feet long and end trimmed to 5 x 20. The treatments and application dates are listed in Table 3A. All post emergence fungicides were applied with hand boom sprayer delivering 17 gpa. Plots were swathed on 8/23/13 and harvested on 9/6&12/13 (equipment breakdown). Harvested canola was weighted and a sub-sample taken from each plot for test weight, percent oil content and other quality factors.

Results:
Canola yields in this small plot fungicide trial ranged from 2,241 to 2,665 #/acre (Table 3A). The untreated and the two Serenade treatments gave canola yields on the low-end of the range. Statistically at the 95% confidence level, there was no differences in canola yields with other fungicide treatments even though higher relative yields were measured from multiple fungicide applications (treatments 8, 9 &10). Additional research in canola is needed to determine if multiple fungicide applications are advisable.

Straight Harvest Trial

Objective:
To compare canola yields from the standard practice of swathing and harvesting compared to straight harvest alone with and without a desiccant.

Background:
Swathing is a common management practice in the production of canola. Swathing prior to harvest has the potential to reduce shattering loss, reduce moisture content, lower green count and may "even up" canola maturity. However, many growers are interested in ways to eliminate swathing in favor of to direct harvest of canola. This study was initiated to determine the effectiveness of straight harvest canola as compared to the standard practice of swathing prior to harvest.

Methods:
The experimental design was a RCB with three replications. The canola variety selected was Star '402' and was seeded to a rate of 5.5 #/ac. Treatments included swathing prior to harvest, direct harvest and direct harvest after an application of a desiccant. Canola was swathed on 8/15. The desiccant used in this trial was Reglone and was applied at 1 pint/acre. Reglone was applied at 70-75% seed color change on entire canola plant. Canola was harvested on 9/7/13.

Results:
Canola yields from this large on-farm, direct harvest and swathing trial ranged from 2,876 to 3,053 #/acre (Table 4). No statistical difference was observed for yield or oil production/acre between treatments at the 0.05% level of confidence. However, swathed canola tended to be dryer, lower in test weight and had more dockage than either the direct harvest alone of direct harvest with a desiccant. At harvest, no visual differences were observed in canola dry down with and without a desiccant. This canola field had a uniform stand with very few weeds. In addition, this canola crop had minimal lodging with a little bit of a lean (tabled), due to the heavy seed crop. The results of this trial suggest that direct harvest can be a successful management practice in canola.

Table 4: Canola seed yield, % oil, oil yield/acre, % moisture test weight and % green of Star 402 influenced by harvest method near Hallock, MN in 2013

		Yield		Oil Yield		Test	
		#/acre	%Oil	#/acre	%moisture	Weight	%Dockage
1	Direct Combine	2876	52.8	1519	6.9	49.4	0.7
2	Swath/Combine	3053	52.6	1606	6.1	48	1.9
3	Dessicate*/Direct Combine	2940	52.1	1531	7.4	49.4	0.6
	LSD @ 5% level	NS	0.5	NS	1.3	0.3	0.5
	cv	6	0.5	6	8	0.3	18

Experimental Design= RCB with 3 reps

Planted: 5/16/13

Harvested: 9/7/13

Previous Crop: Soybeans

Fertilizer Applied: 130-30-0-15

Seeding Rate: 5.5lb/acre

Note:

Grizzly 3.5 oz/acre applied for flea beetle

*Reglone applied at 1 pint/acre, 1 week after swathing