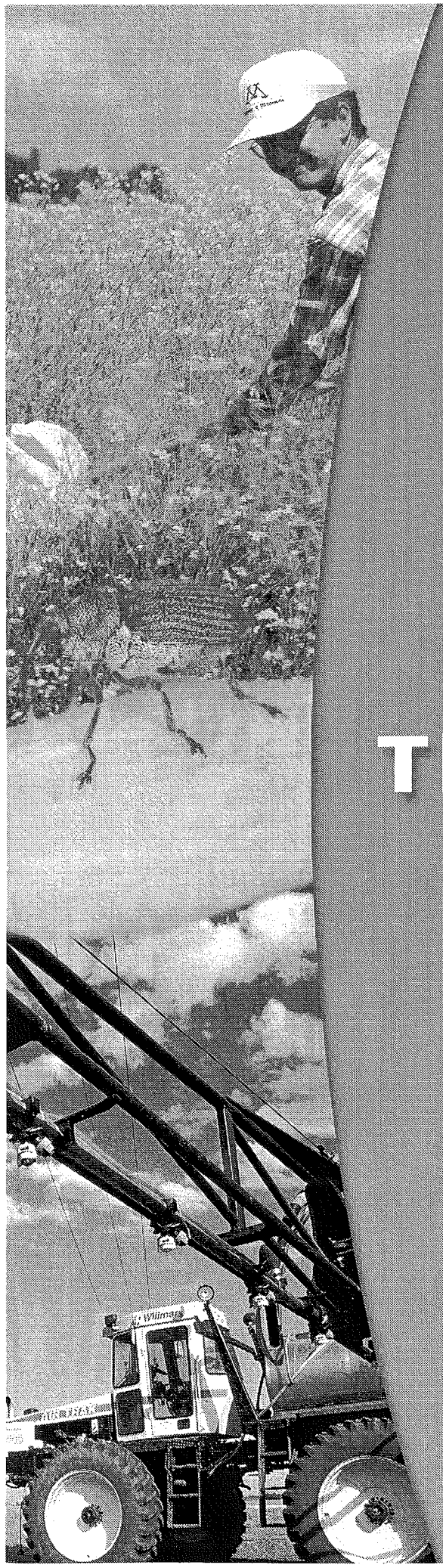

Canola
PRODUCTION CENTRE

Thief River Falls
MINNESOTA
REPORT

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MINNESOTA CANOLA PRODUCTION CENTRE RESULTS

I ACKNOWLEDGEMENTS

APPENDIX - Minnesota Canola Production Centre Results

The Minnesota Canola Production Centre is a public-private international partnership between the Minnesota Canola Council, the University of Minnesota and the Canola Council of Canada.

Many thanks to all of our local and regional sponsors for their donations of cash, products and services. Their continued support has made the Minnesota Canola Production Centre a reality.

Thank you all!

II SITE DESCRIPTION

The program was supported locally and regionally by the following organizations that have donated products and/or services to the Canola Production Centre:

MINNESOTA - Dave LeGare, Agronomist

Location: Thief River Falls - 95 acres

Land:

Ken and Connie Mehrkens (co-operators)

Gold Level Sponsors ($400 or more)

Northern State Bank

Bronze Level Sponsors (Less than $200)

Cenex Farmer's Union
First National Bank
Northern Motors
Westside Motors
Thune Insurance

Seed and Seed Treatment:

Agricore - Q2
Bayer CropScience - InVigor 2663 (3 bags), InVigor 2733
GrowTec - Extender seed coating
Interstate Seed - Hyola 401, Hyola 357 (2 bags)
Monsanto - DKL3455 (2 bags)
Syngenta - Helix Xtra seed treatment

Fertilizer:

Agriliance (95 acres)
UAP Northern Plains - Borosol (95 acres)

Pesticides:

BASF - Ronilan (80 acres), Poast (20 acres), Beyond (8 acres)
Bayer CropScience - Liberty (44 acres)
Dow AgroSciences - Stinger (40 acres)
DuPont Agricultural Products - Assure II (50 acres), Muster (30 acres)
Monsanto - Roundup Ultra Max (95 acres)

Equipment and Labor:

Anderson Power and Equipment - $500 donation toward combine rental
Dave Severson - cement mixer
Ken and Connie Mehrkens - 95 acres of spraying Borosol, John Deere 9600 combine, equipment storage, grain truck and shop use
Northwest Grain - fertilizer application, soil testing, soil analysis, seed storage and chemical storage
Pioneer Hi-Bred - weigh wagon

Photocopying & Faxing:

Pennington County Extension Office

Tours:

Agri-Tel Grain
Bayer CropScience
Berg Sales/Canterra Seeds
Dale Koop
Gustafson
Leonard Geske and Tom Koop
Monsanto
Northern State Bank
Pennington County Extension Office
Smiley 4-H Club
Syngenta
UAP Northern Plains
UMC Animal Industries Management Program
VanSeeds

Comments:

A special thanks to **Brent Arndt, Kristie Schill, Lisa Voth** and **Karen Andol** for all of their hard work and dedication throughout the growing season. Thanks to **Terry Sonju** for his assistance. Many thanks to the staff of the **Minnesota Canola Council** for their help with the field day and throughout the year. I would also like to thank **Derwyn Hammond** and the rest of the **Crop Production team** of the **Canola Council of Canada** for their ideas, assistance and guidance throughout the year. I would like to especially thank my wife **Sue** for her patience with me during a difficult season.

III INTRODUCTION

The Canola Council of Canada initiated Canola Production Centres to address the ongoing need for canola production technology transfer as identified during the Grow with Canola program (1985-1990). The Canola Production Centres are a joint effort between producer groups, industry representatives, and government and extension personnel. The continuing co-operation of these groups ensures the ongoing success of the Canola Production Centres. Field scale agronomic trials utilizing commercial farm equipment are conducted at the sites, and the information generated is utilized for extension activities throughout the year.

Following tours of the Canola Production Centre near Carman, MB in 1996 and 1997 the Minnesota Canola Council sought funding for a joint project between the Minnesota Canola Council, University of Minnesota and Canola Council of Canada. The purpose of the project was to establish a Canola Production Centre site in Minnesota, and the role of the Canola Council of Canada was to provide expertise and supervisory support. This would help ensure that activities at this site would be consistent with activities at the Canadian CPCs. This allowed the information from all sites to be easily shared. Funding for the project was approved in April 1998, and the Minnesota Canola Production Centre program was born.

During the first two years of the project, the Minnesota Canola Production Centre was located near Roseau, MN. In 2000, the site was moved to Thief River Falls, MN. In 2002, the field day tour was held on July 9 and included a barbeque lunch and tour of the site. All trials were signed and copies of site plans were available at the entrances to allow for self-guided tours at any time other than scheduled tour dates.

Information obtained from the Canola Production Centre included many agronomic factors such as yield and quality data, early season plant counts, lodging indices and harvestability ratings on varieties.

It should be noted that the material contained in this report is a collection of agronomic information from a specific location and only from one site year. Therefore, it should be observed and understood accordingly.

IV DEFINITIONS

Brassica napus varieties: Argentine varieties

Co-efficient of variation (CV): The standard deviation expressed as a percentage of the mean.

Contribution margin: The amount of total revenue less variable costs that directly relate to the business operation available to contribute to fixed costs and return on investment, labour and management.

Contribution margin per bushel: The extra revenue per unit of production, which is available to service fixed costs. This illustrates to the producer the importance of a well-planned marketing strategy.

Contribution margin per acre: The amount of revenue remaining per acre after variable costs have been serviced, allowing the producer to manage other financial commitments, such as fixed costs.

Days to maturity: Actual calendar days from the date of seeding to approximately 30% seed colour change on the main stem.

Fixed costs: Costs that remain relatively unchanged regardless of the volume of production (e.g. land taxes, mortgage interest and machinery depreciation).

Growing degree-days (GDD): Heat accumulated above canola's base temperature. The heat accumulated each day is determined by adding the maximum and minimum temperatures and dividing the total by two to obtain a daily average. The base temperature for canola of 5°C is subtracted from the average to arrive at the number of growing degree-days. The total growing degree-days required for Argentine canola on average is 1040 growing degree-days. Polish canola on average requires 850 growing degree-days.[1]

Least significant difference (LSD): The difference required for one treatment to be statistically different from another at the 90% confidence level, expressed in identical units. For example, if Variety A yielded 30 bu/ac and Variety B yielded 34 bu/ac and the LSD for that trial was 2.25, then Variety A is statistically different from Variety B because 34-30= 4, which is greater than 2.25. If the difference were less than 2.25, then the varieties would not be statistically different from each other.

Lodging ratio/rating: A measure of the lodging resistance of a particular variety.

Opportunity costs: The opportunity cost of a resource is the return the resource can earn when put to its best alternative.

Variable costs: Costs that vary directly with the volume of production or activity (e.g. seed, fertilizer, fuel and repairs).

1 Source: Canola Growers Manual

V ECONOMIC ANALYSIS

A. *Canola Pricing System (Based on average prices at harvest, in U.S. dollars)*

Green Seed (%)	$/100 lb At Elevator	Plus $/100 lb LDP*	Final $/100 lb	Final $/bu
0 - 2.0	10.84	0.00	10.84	5.42

Note 1: *The green seed was determined by using one 500 seed crush strip test done on each sample from every treatment within a particular project trial.*

Note 2: ** LDP = Loan Deficiency Program*

B. *Cost Calculations & Assumptions*

The following costs were used in calculating economic returns for the various trials and treatments, and are expressed in **U.S. dollars**. Fertilizer and crop protection product prices were obtained from various dealers throughout the region. Prices reflect a northwestern Minnesota average for summer 2002.

Equipment costs were obtained from the University of Minnesota Extension Service and are estimated equipment variable costs for Minnesota. There has been no value allocated for capital and fixed costs.

CANOLA ARGENTINE VARIETY SEED COSTS

B. napus	$/lb	Distributor	*B. napus*	$/lb	Distributor
45H21	5.24	Pioneer Hi-Bred	Gladiator	4.45	Interstate Seed
46A76	4.06	Pioneer Hi-Bred	Hyola 357 Magnum	5.43*	Interstate Seed
46H02	4.24	Pioneer Hi-Bred	Hyola 357	5.43	Interstate Seed
Canterra 1670	4.75*	Canterra Seeds	Hyola 401	4.25	Interstate Seed
Canterra 1812	5.50	Canterra Seeds	InVigor 2663	5.45	Bayer CropScience
Dakota	3.57	Interstate Seed	InVigor 2733	5.55	Bayer CropScience
DKL223	5.43	DeKalb/Monsanto	LiBred 499RR	5.26	Brett Young Seeds
DKL3345	3.83	DeKalb/Monsanto	Q2	2.84*	Agricore
DKL3525	4.35	LimaGrain	RR Hyb 2013	5.46	Proseed
DKL3585	3.83	DeKalb/Monsanto	SW Peak	4.15	DeKalb/Monsanto
DS Roughrider	3.86	Proseed			

Note: Seed cost may vary. Prices reflect the Minnesota suggested retail for Spring 2002 with Helix Xtra seed treatment.
* These varieties were not sold in the USA in 2002 and have estimated prices supplied by the seed dealer.

PRODUCT INFORMATION

Product	Active Ingredient	Manufacturer/ Distributor	$/Unit Cost
Aphoil	crop oil concentrate	AGSCO	5.99/gal
Assure II	quizalofop-p-ethyl	DuPont Agriculture Prod.	129.40/gal
Ammonium Sulfate	ammonium sulfate	Agriliance	0.28/lb
Beyond	imazamox	BASF	464.00/gal
Borosol	boric acid	UAP Northern Plains	11.75/gal
Capture	bifenthrin	FMC Corporation	411.20/gal
Endura *	boscalid	BASF	Not available
G7030-02 *	Not available	Gustafson	Not available
G7030-02 + L0263-A1*	Not available	Gustafson	Not available
Gaucho CS	carboxin + thiram + metalaxyl + imidacloprid	Gustafson	0.85/lb seed
Helix XTra	fludioxonil + mefenoxam + difenoconazole + thiamethoxam	Syngenta	1.35/lb seed
Molybor	ethanolamine + phosphoric acid + boric acid + sodium molybdate	PHOSYN	19.84/gal
Muster	ethametsulfuron	DuPont Agriculture Prod.	29.30/oz
Liberty	glufosinate ammonium	Bayer CropScience	89.40/gal
Poast	sethoxydim	BASF	55.00/gal
Preference	non-ionic surfactant	Agriliance	18.00/gal
Ronilan	vinclozolin	BASF	21.60/lb
Roundup Ultra Max **	glyphosate	Monsanto	51.30/gal
Rovral flo	iprodione	Bayer CropScience	135.00/gal
Select	clethodim	Valent	186.30/gal
Stinger	clopyralid	Dow AgroSciences	478.90/gal
Topsin M	thiophanate-methyl	Elf Atochem	16.60/lb
Canola Fungicide Pack.	thiram + metalaxyl	Gustafson	0.12/lb seed

*Note: Endura, G7030-02 and L0263-A1 are non-registered products and prices are not available.
**Note: $18/ac CUA (Canola Use Agreement) includes first 13 oz/ac of Roundup Ultra Max.

Numerous references to pesticide applications will be found in this report. We advise everyone to consult with recommendations and product labels for complete instructions.

CANOLA FERTILIZER COSTS

Fertilizer	Analysis	$/Ton	$/lb of Nutrient
Ammonium Sulfate	21-0-0-24	165.00	0.17 (of N)
Ammonium Sulfate	21-0-0-24	165.00	0.19 (of S)
Phosphate	18-46-0	210.00	0.16
Urea	46-0-0	160.00	0.17

Machinery Cost:

- Conventional tillage: $ 22.50/ac
- Extra spray pass: add $ 0.32/ac
- Straight combining: subtract $ 0.42/ac

Additional Machinery Costs: (Custom Application)

- Aerial $ 4.51/ac
- Ground (fungicide) $ 4.25/ac
- Fertilizer application $ 3.75/ac

Note: Machinery costs were obtained from the University of Minnesota Extension Service and are estimated operating costs (such as fuel, lubrication and repairs) for Minnesota.

Minnesota State Check-off:

$0.05 per 100 pounds of canola.

Interest/Opportunity Cost:

This cost calculation demonstrates the cost of money borrowed and charged on crop inputs and machinery-operating costs. In 2002, 7.5% per annum over six months was used.

C. *Economic Results Report (example)*

Site: Thief River Falls, MN

Variety and System Comparison Trial: Hyola 401

CALCULATION OF VALUE OF PRODUCTION				
Yield (lb/ac)	**X**	**Price ($/bu)**	**=**	**Value of Production**
28.1		5.42		152.30

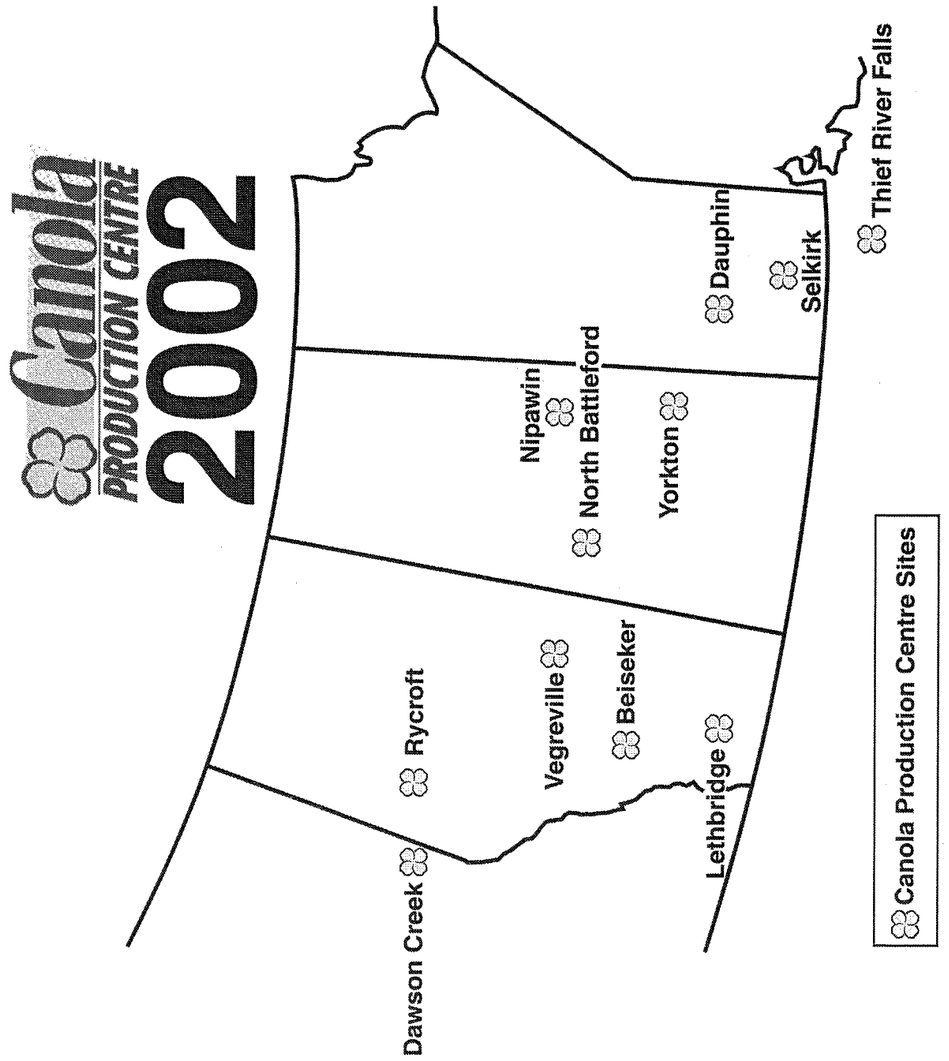
CALCULATION OF VARIABLE COSTS ($/ac)	
Seed	21.25
Fertilizer	33.65
Herbicides	39.52
Fungicides	26.11
Insecticides	0.00
Machinery	22.50
Insurance	0.00
Check-off	0.70
Interest/opportunity	5.36
Total Variable Costs	149.09

CALCULATION OF CONTRIBUTION MARGIN				
Value of Production ($/ac)	**-**	**Variable Costs ($/ac)**	**=**	**Contribution Margin ($/ac)**
152.30		149.09		3.21

Contribution Margin ($/ac)	**/**	**Yield (bu/ac)**	**=**	**Contribution Margin ($/bu)**
3.21		28.1		0.11

This example was developed and prepared with assistance from Royal Bank of Canada agrologists.

VI SITE LOCATION MAP



VII SITE INFORMATION

THIS IS GENERAL SITE INFORMATION THAT MAY CHANGE FOR SPECIFIC TRIALS.

Location: **Thief River Falls, MN**

Co-operator: Ken and Connie Mehrkens

Previous crop: Wheat

Soil test results: (AGVISE Laboratories)

Organic matter content: *3.4* %

Macronutrient Levels: (0-6", 6-24")

Nitrogen -	14, 21 lb/ac
Phosphorus -	32 lb/ac
Potassium -	436 lb/ac
Sulphur -	20, 360 lb/ac

Micronutrient Levels: (0-6")

Boron -	1.2 lb/ac
Copper -	1.3 lb/ac
Iron -	41.2 lb/ac
Zinc -	1.7 lb/ac
Chlorine -	100 lb/ac (0-24")
Manganese -	2890 lb/ac

Recommended Fertilizer Applications - (lb/ac of actual nutrient):

Target Yield (lb/ac)	Probability of Precip. (%)	Precip. Required (inches)	Nitrogen	Phosphate	Potash	Sulphur
2200	N/A	N/A	90	0	0	0

Target yield: 2200 lb/ac

Fertilizer applied: Spring: N - 100 lb/ac P - 30 lb/ac K - 0 lb/ac S - 10 lb/ac
Bolting: Boron - 0.15 lb/ac

Soil association/zone: Clearwater clay
Reiner Variant sandy clay loam

Soil texture: Clay loam

Soil pH: 7.6

Salinity: 0.39, 0.59 mmho (0-6", 6-24") (slightly saline)

Tillage operations: The field was chisel plowed twice in the fall of 2001 with the exception of the fall dormant seeding trial, which was fertilized and lightly disked once in the fall of 2001. The remainder of the field was cultivated once with coil packing after a spring application of fertilizer. The spring-seeded treatment in the fall dormant seeding trial was cultivated once prior to seeding.

Seeding method: The field was seeded with a John Deere 9350 double disc press drill

Dates: October 18 and November 6, 2001
May 18 - 21 and May 29, 2002

Depth: ½ to 1 inch deep

Rate: 5.0 lb/ac with the following exceptions:
4.0 lb/ac - InVigor 2663 and InVigor 2733
5.5 lb/ac - DKL 34-55 in the Fungicide trial

Herbicides applied:

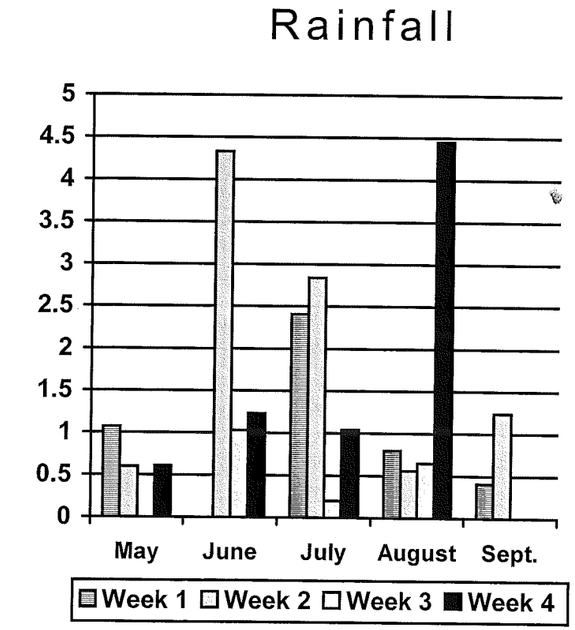
A) Conventional varieties in the systems trial - Assure II (10 oz/ac), non-ionic surfactant (32 oz/100 gal), Stinger (5 oz/ac), Muster (0.40 oz/ac)
B) Liberty Link varieties in the systems, pushing and canopy manipulation trials - Liberty (28 oz/ac), Poast (6 oz/ac), ammonium sulfate (1.5 lb/ac)
C) Clearfield varieties - Beyond (4 oz/ac), non-ionic surfactant (3.5 oz/ac), 28-0-0 (32 oz/ac), Stinger (4 oz/ac)
D) Roundup Ready varieties in the systems, fall dormant seeding, seed treatment, and fungicide trials - Roundup Ultra Max (13 oz/ac), ammonium sulfate (1.0 lb/ac)
E) Optimizing canola production trial - Liberty (28 oz/ac), Select (2 oz/ac), ammonium sulfate (1.5 lb/ac)

Fungicides applied: Ronilan (16 oz/ac) on July 8 at 15 to 55% bloom

Swathing: Started: August 6 Finished: August 29

Combining: Started: September 4 Finished: September 20

Comments: Most of the site was seeded into good moisture. The exceptions to this were the back two replicates of the seed treatment and pushing trials, which were slightly cloddy from working that area of the field when it was somewhat wet. Rain showers within ten days after seeding provided adequate moisture for germination in the cloddy areas. Flea beetles were observed at the site around June 4. Damage was mainly restricted to the areas that did not have insecticide seed treatment. The canola looked good until the first big rain on June 9. Most of the field drained adequately. However, frequent rains throughout June kept the ground saturated and restricted canola growth in all but a few of the highest areas of the site. Windy conditions delayed herbicide applications to trials where drift was a concern. Most trials were sprayed at the 2 to 5-leaf stage. The excess water stress on the crop and windy conditions caused herbicide applications on the systems trial to be delayed until most of the crop was in the 6-leaf to bolting growth stage. Continued heavy rains throughout the summer resulted in large areas of many plots being substantially affected. Areas of individual plots, which were not suitable for yield calculations, were not harvested with the sample swath. If the remaining plot was not at least 200 feet then the plot was excluded from the trial. Conditions during and after swathing were cool with numerous light showers providing ideal conditions for curing of the swath.



Total accumulated moisture = 22.75 inches (577.9 mm)

VIII VARIETY AND SYSTEMS COMPARISON TRIAL

Objective: To establish agronomic criteria for choosing among varieties and herbicide options.

Background: The availability of canola with innovative traits (herbicide tolerance, specialty oils) has given producers many options for variety selection. Yield, crop quality, lodging resistance, harvestability and disease resistance are important variety traits to consider in the selection process. The greatest economic return will occur by choosing the most appropriate combination of suitable varieties and appropriate herbicides for each field. Factors to consider beyond the performance of the variety include specialty oil premiums, weed spectrum, tillage system and herbicide rotation.

Methodology: All varieties were seeded at 5 lb/ac with the exception of the InVigor varieties, which were seeded at 4 lb/ac. The trial was laid out as an RCB design with four replicates. All varieties were treated with Helix Xtra seed treatment and had the same tillage, fertilizer and post-emergent fungicide treatments. The check varieties for this trial were Hyola 401 and Q2, treated with conventional herbicides. All the herbicide tolerant varieties were sprayed with their respective herbicides (see *Site Information – Herbicides applied*). Swathing commenced when seed colour change was 30 to 40 % on the main stem, and harvest was completed when suitable conditions existed.

Observations: The trial was seeded on May 20 into fair to good soil moisture. Light rain showers the week after seeding allowed for reasonably uniform emergence. Weed pressure was high with primary weeds including green and yellow foxtail, Canada thistle, wild mustard, redroot pigweed, common lambsquarters, smartweed, and wild buckwheat. Heaviest weed pressure came from foxtail numbering over 200 per square foot and large patches of Canada thistle. The crop was growing nicely until approximately the 1-leaf stage when the weather turned wet. The crop suffered from excess moisture and did not grow very well for the first half of June. Herbicide application was delayed due to the stress on the crop and lack of calm conditions. All herbicides were finally applied on June 25 and 26 at the 6-leaf to bolting stage in very muddy conditions. To avoid tearing up the plots, the sprayer was driven on the border area of each plot. The Liberty Link varieties were sprayed prior to sunset. The Roundup Ready and Clearfield varieties were sprayed after dark and the Conventional varieties were sprayed the following morning.

Results:

VARIETY AND SYSTEMS COMPARISON TRIAL
Thief River Falls, MN

Treatment / System	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Contrib. Margin ($/ac)	Oil (%)	Growing Degree Days	Days To Mature
Liberty Link							
InVigor 2663	120	1684	33.7	50.33	43.2	1286	90
InVigor 2733	103	1450	29.0	24.64	42.8	1200	82
Clearfield							
46A76	99	1387	27.7	11.61	43.2	1286	90
Canterra 1670	93	1303	26.1	(4.92)	43.4	1309	92
Roundup Ready							
Hyola 357 Magnum	132	1846	36.9	66.85	42.7	1214	83
45H21	116	1631	32.6	44.59	42.8	1214	83
SW Peak	114	1598	32.0	46.71	43.6	1237	85
DKL 3455	113	1592	31.8	47.70	44.0	1214	83
DKL 223	111	1565	31.3	36.46	42.5	1200	82
Canterra 1812	108	1514	30.3	30.67	43.8	1279	89
Gladiator	105	1476	29.5	31.94	42.7	1226	84
RR Hyb 2013	103	1442	28.8	23.07	42.7	1237	85
DS Roughrider	101	1420	28.4	29.05	45.9	1286	90
LiBred 499RR	101	1414	28.3	21.05	43.5	1226	84
DKL 3585	97	1361	27.2	22.81	43.3	1271	88
Dakota	80	1126	22.5	(1.25)	42.4	1171	80
Conventional							
Q2	106	1495	29.9	20.22	42.8	1251	86
46H02	106	1486	29.7	11.99	43.4	1251	86
Hyola 401	100	1404	28.1	3.11	41.5	1237	85
LSD		201.5	4.03		0.88		1.8
CV%		11.5	11.5		1.7		1.7

Note: Brackets indicate a negative contribution margin.
Note: The contribution margins had an error in the Summary Report that was printed for distribution; the corrected values are in this table.

Discussion: Hyola 357 Magnum, InVigor 2663 and 45H21 yielded significantly higher than the check (Hyola 401). The late herbicide application on the conventional and Clearfield varieties was outside the recommended window of application as a result of poor weather conditions. Hyola 357 Magnum had the highest contribution margin. Contribution margins reflect differences in seed costs, yield and herbicide costs. The 12 day range in maturity may be attributed to the cool conditions prior to and during swathing. DS Roughrider had the highest oil content and Hyola 401 had the lowest.

IX HARVESTABILITY TRIAL

Objective: To compare the harvestability of varieties entered in the variety and systems comparison trial.

Background: A number of varieties have very similar yield and quality traits. In choosing a variety a grower needs to consider additional traits like lodging and harvestability. Harvestability is the measurement of swathing and combining ease. Currently, there is no meaningful scientific measurement for harvestability. Therefore, a standardized criterion for a subjective measurement was used.

Methodology: A **Lodging score** was a visual score in which 1 = erect and 9 = flat. Varieties that were standing well and had a 'high yield tip' were given a score of two or three. Varieties that had severe uneven lodging with patches standing upright and patches laying flat were given a seven or eight, depending on the severity. **Lodging ratios** were obtained by dividing the average height of the canopy by the average height of randomly selected plants. **Harvestability** was evaluated as swathing and combining were completed on the variety and systems comparison trial. Swathing and combining were each evaluated on a scale of one to five, compared to the check (Q2), which was given a three to match the rating at the Canola Production Centres in Canada. The following criteria were considered; lodging, height, straw stiffness, straw strength, stand uniformity, swath fluffiness (pod dispersion), tendency to clump, flowability, feeding and speed of operation.

The following ratings were subjective. The machine operator, crop conditions, weather and time of day can affect the harvestability of a variety.

Ratings:
1 = much better than the check
2 = better than the check
3 = equal to the check
4 = worse than the check
5 = much worse than check

Observations: Lodging was variable among varieties. The greatest challenge in swathing occurred in varieties where the pods fell through the canopy in areas of the field where the stand was thinner. The excess moisture resulted in weak, short, thin and spindly plants. The plots were swathed with an 18 ft Versatile swather equipped with a pick-up reel. They were harvested with a New Holland TR-98 combine.

Results:

HARVESTABILITY TRIAL
Variety and Systems Comparison Trial
Thief River Falls, MN

Treatment	Lodging ratio	Lodging score	Swathing Rating	Combining Rating
45H21	0.54	5.3	3.3	3
46A76	0.73	3.8	3.3	3
46H02	0.58	4.5	3.3	3
Canterra 1670	0.49	6.0	3.5	3
Canterra 1812	0.65	4.5	3.0	3
Dakota	0.55	5.0	3.5	3
DKL 223	0.67	4.5	4.0	3
DKL 3455	0.65	3.8	3.0	3
DKL 3585	0.52	6.0	3.8	3
DS Roughrider	0.37	6.0	3.8	3
Gladiator	0.67	4.0	3.0	3
Hyola 357 Magnum	0.74	3.5	3.0	3
Hyola 401	0.80	5.5	2.8	3
InVigor 2663	0.46	5.5	3.0	3
InVigor 2733	0.55	5.0	4.0	3
LiBred 499RR	0.71	4.3	3.5	3
Q2	0.43	4.5	3.0	3
RR Hyb 2013	0.58	5.5	3.3	3
SW Peak	0.61	4.5	3.3	3
LSD (0.10)	0.117	1.10	0.52	
C.V.	16.7	19.7	18.6	

Discussion: Canterra 1670, DKL 3585 and DS Roughrider had slightly more lodging than the other varieties. Swathing was similar for all the varieties with the most common problem coming from pods hanging down through the canopy to sickle height and catching on the sickle bar. There were no noticeable differences in combining ratings due to the large capacity of the combine and the relatively thin swaths.

X LIBERTY TANK MIX TRIAL

Objective: To demonstrate strategies to improve the efficacy of the contact herbicide Liberty on grassy weeds.

Background: Liberty is a non-selective contact herbicide that is used to control weeds in Liberty Link canola. Previous research has indicated Liberty to be less effective on controlling grasses than other non-selective herbicides. Reducing the rate of Liberty while adding a half rate of a grass herbicide should improve grass control while maintaining control of the broadleaf weeds.

Methodology: The Liberty tank mix trial consisted of the following treatments in a randomized complete block design:

1. Liberty - full rate (34 oz/ac) + ammonium sulfate (3 lb/ac)
2. Liberty (28 oz/ac) + Assure II (4 oz/ac) + ammonium sulfate (1.5 lb/ac)
3. Liberty (28 oz/ac) + Poast (6 oz/ac) + ammonium sulfate (1.5 lb/ac)
4. Liberty (28 oz/ac) + Select (2 oz/ac) + ammonium sulfate (1.5 lb/ac)

Observations: This trial was integrated into the variety and systems comparison trial. Weed pressure was high with primary weeds including green and yellow foxtail, Canada thistle, wild mustard, redroot pigweed, common lambsquarters, smartweed, and wild buckwheat. Heaviest weed pressure came from foxtail numbering over 200 per square foot and large patches of Canada thistle. Herbicide applications were delayed due to the excess moisture and lack of calm conditions. All treatments were applied prior to sunset on June 25 at the 6-leaf stage of the crop in very muddy conditions. To avoid wheel tracks in the plots, the sprayer was driven on the border area of each plot. Weed control was excellent for all the different tank mixes. No differences in maturity were noted among the treatments.

Results:

LIBERTY TANK MIX TRIAL
Thief River Falls, MN

Treatment	Yield (lb/ac)	Yield (bu/ac)	Contrib. Margin ($/ac)	Oil (%)
Liberty – full rate	1401	28.0	17.31	42.9
Liberty + Assure II	1393	27.9	17.03	42.8
Liberty + Poast	1450	29.0	24.64	42.8
Liberty + Select	1341	26.8	12.59	42.4
LSD	182.5	3.65		0.50
CV%	10.1	10.1		0.9

Discussion: All treatments did an excellent job of controlling weeds. Tank mixing options did not affect yield or oil. Contribution margins reflect differences in yield and chemical costs.

XI ROUNDUP TIMING TRIAL

Objective: To evaluate the effects of a split application of Roundup for weed removal and how it may affect yield and quality of canola.

Background: Canada thistle is a weed that has become more difficult to control with a single application of Roundup. A split application (2 and 6-leaf stages) is recommended for good control of Canada thistle.

Methodology: The Roundup timing trial was integrated into the variety and systems comparison trial. It was conducted using a split plot design with varieties as main plots and application timings as sub-plots. All applications included Roundup Ultra Max (13 oz/ac) + ammonium sulfate (1 lb/ac). The trial consisted of the following treatments:

1. DKL 223 - single application (6-leaf stage) (check)
2. DKL 223 - split application (2 and 6-leaf stage)
3. DKL 3585 - single application (6-leaf stage) (check)
4. DKL 3585 - split application (2 and 6-leaf stage)

Observations: Weed pressure was high with primary weeds including green and yellow foxtail, Canada thistle, wild mustard, redroot pigweed, common lambsquarters, smartweed, and wild buckwheat. Heaviest weed pressure came from foxtail numbering over 200 per square foot and large patches of Canada thistle. The field had Curtail (1.75 pt/ac) applied in 2001 for thistle control. The early (2-leaf stage) application was done on June 8 at the 1 to 2-leaf stage because of forecasted heavy rains. It rained 3.73 inches on June 9. Weed control was excellent with the early application. However, weeds were starting to reappear at about the 4-leaf stage. The variety DKL 3585 showed some signs of injury about a week after the early application, especially in areas of the field that were saturated. The single application was originally planned for the 3 to 4-leaf stage; however it was delayed due to excess moisture and lack of calm conditions. All remaining treatments were applied the evening of June 25 at the 6-leaf stage in very muddy conditions. Weed control was excellent for all the treatments. Canada thistle control was excellent for both the single and split application. No maturity differences were noted between the single and split applications.

Results:

ROUNDUP TIMING TRIAL
Thief River Falls, MN

Treatment	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Contribution Margin ($/ac)	Oil (%)
DKL 223					
6-leaf (check)	100	1565	31.3	36.46	42.5
2 and 6-leaf	104	1620	32.4	36.72	42.3
DKL 3585					
6-leaf (check)	100	1361	27.2	22.81	43.3
2 and 6-leaf	100	1358	27.2	16.82	43.4
LSD spray timing within a variety		114.3	2.29		0.43
CV%		5.6	5.6		0.7

Note: The contribution margins had an error in the Summary Report that was printed for distribution; the corrected values are in this table.

Discussion: Herbicide application timing had no effect on yield or oil content. The lack of good growing conditions this season did not allow the crop to capitalize on the early weed removal as has been observed in previous studies. Previous production centre trials indicated early weed removal under heavy weed pressure, such as this year, provided significantly higher yields. Contribution margins reflect differences in yield, seed costs, herbicide costs and application costs.

XII SEED TREATMENT TRIAL

Objective: To evaluate the impact of new seed treatments on seedling diseases and insect control for canola as it relates to yield, quality and contribution margins.

Background: The most wide spread problem of canola production is stand establishment. Poor stand establishment may be caused by a seedling disease complex including pathogens such as *Rhizoctonia solani*, along with *Fusarium* and *Pythium* species. Seed treatment fungicides are used extensively in canola production as a first line of defense to control seedling diseases. In addition, some new products are being evaluated to look at extended flea beetle control.

Methodology: The seed treatment trial included the following treatments on the same seed lot of Hyola 357:

1. Canola Fungicide Package (Check) (Gustafson - fungicide only)
2. Canola Fungicide Package (CFP) + Capture (1.5 oz/ac foliar)
3. Gaucho CS
4. G7030-02 (Coded Gustafson product)
5. G7030-02 + L0263A1 (Coded Gustafson product)

All other agronomic practices remained the same. The Capture treatment was applied at 16 days after planting (DAP). Flea beetle ratings and stand counts were taken at the exact same locations in the plots on three dates (16, 29 and 36 DAP).

The following flea beetle damage guide was used to estimate the percentage of shot hole damage to leaf area using the following scale:
0 = No leaf damage
1 = Approximately 10 % leaf damage
2 = Approximately 20 % leaf damage
3 = Approximately 30 % leaf damage
(4, 5, 6, etc.)
9 = Approximately 90 to 100 % leaf damage

Observations: The trial was seeded on May 19 into good to dry moisture conditions. The trial received little rain until May 29 (0.41 inches) so seed that went into dry soil germinated about 10 days later than the first flush. A heavy infestation of flea beetles came into the field around June 1. On June 4 (16 DAP), many of the first flush of seedlings without insecticide treatment were dead in the plots that were nearest the ditch (the first two replicates) and the second flush of canola was emerging. Capture was applied on June 4 to the CFP + Capture treatment. At 29 DAP the CFP had reduced plant counts and higher flea beetle injury than the other treatments. Lygus counts were taken weekly during bloom. Average counts ranged from 3 to 8 lygus per 10 sweeps with little consistency among treatments. Maturity was affected by the treatments

with the CFP + Capture maturing five days later than the insecticide seed treatments and the CFP treatment maturing seven days later than the insecticide seed treatments.

Results:

SEED TREATMENT TRIAL
Thief River Falls, MN

Treatment	Yield (lb/ac)	Yield (bu/ac)	Contrib. Margin ($/ac)	Oil (%)	Seed Cost ($/ac)	Flea Beetle Rating 16 DAP	Plant Stand (Pl/ft^2) 16 DAP	Flea Beetle Rating 29 DAP
Canola Fung.	1494	29.9	38.80	42.1	20.40	6.3	1.5	4.0
Canola Fung. + Capture	1782	35.6	64.61	42.5	20.40	6.8	2.4	2.2
G7030-02	1689	33.8	N/A	42.7	N/A	3.2	4.6	2.8
G7030-02 + L0263-A1	1717	34.3	N/A	42.0	N/A	2.2	4.8	2.8
Gaucho CS	1748	35.0	62.49	42.7	24.05	3.6	4.8	3.0
LSD CV%	198.8 9.4	3.98 9.4		1.41 2.6		1.96 35.2	1.39 30.4	0.58 15.7

Note: G7030-02 and L0263-A1 are coded products of Gustafson that are in the testing phase and do not have prices established.

Discussion: All the insecticide seed treatments provided good protection from the flea beetles with significantly less injury and significantly higher stands. The Canola Fungicide Package (CFP) treatment yielded significantly less than any of the other treatments with the exception of G7030-02. The CFP + Capture treatment produced similar yield to the other insecticide seed treatments. The higher yields of the CFP + Capture and the Gaucho CS contributed to higher contribution margins than the CFP alone. Contribution margins reflect differences in yield, seed treatments and foliar insecticide costs. Thirteen days after the application of the Capture (29 DAP); the flea beetle injury ratings of the CFP + Capture were slightly better than the insecticide seed treatments, due to mortality of the heavily damaged plants. Oil content was not affected by seed treatment.

XIII CANOPY MANIPULATION TRIAL

Objective: To compare the effects of various seeding dates and rates on yield, maturity, insects and disease on *B. napus* canola.

Background: European research (Scott et al, 1999) indicates that canola yields can be related to canopy structure after flowering. Thinner canopies allow more light to penetrate lower pods resulting in increased yield due to translocation of photosynthates from pod hulls. Also, excessive vegetative growth can deplete soil moisture and nutrients resulting in poor pod formation and filling. Seeding rate studies have been carried out throughout western Canada under various weed and disease pressures. The introduction of genetically enhanced canola varieties has improved weed control, which lessens the need for higher plant populations. Weather conditions often contribute to increased lodging and sclerotinia. Reducing plant stands may lessen the risk of these factors. However lower plant densities bring higher risks due to increased weed competition, later maturity, green seed and insects (i.e. root maggots).

Recent seeding date research indicated that early spring or fall dormant seeded canola often leads to increased yields over normal seeding dates.

Methodology: The canopy manipulation trial was conducted as an RCB design. The variety InVigor 2663 was used. Normal seeding was as early as possible. Late seeding was considered 7 to 14 days after normal seeding. The trial consisted of the following treatments:

1. Normal planting date @ 1.0 lb/ac swath @ 30 to 40% SCC on main stem (1 lb/ac early)
2. Normal planting date @ 1.0 lb/ac
3. Normal planting date @ 3.0 lbs/ac
4. Normal planting date @ 5.0 lbs/ac
5. Late planting date @ 1.0 lb/ac swath @ 30 to 40% SCC on main stem (1 lb/ac early)
6. Late planting date @ 1.0 lb/ac
7. Late planting date @ 3.0 lbs/ac
8. Late planting date @ 5.0 lbs/ac (check)

Weeds were removed at the recommended leaf stage with Liberty and Select. Corncob grit was used to bulk up the 1 lb/ac and 3 lb/ac seeding rates. This trial was not sprayed with any fungicide. Swathing in this trial commenced when the main stem was at 30 to 40% seed colour change (SCC) unless the seeds in the pods on the side branches were translucent and soft, in which case swathing was delayed until the seeds in the side branches were firm. The exceptions to this were treatments #1 and #5, which were swathed at 30 to 40% SCC on the main stem. If swathing was delayed, notes were taken as to the amount of SCC on the main stem and whole plant.

Observations: This trial was planted on May 18 and May 29 into good soil moisture. The plots of the later planting date were cultivated again prior to seeding. This helped control the first flush of weeds. Heavy rains during June delayed herbicide application for the normal planting date until it was at the 3 to 6-leaf growth stage and redroot pigweed were large. The canopy of pigweed and canola protected the second flush of newly emerging pigweed and resulted in poor control. This resulted in many large pigweeds at harvest in the normal seeding date. The 1 lb/ac rate had a thick stand of large pigweed due to lack of competition from the canola and this made swathing difficult. The 5 lb/ac rate had few large pigweeds at harvest. The late planting date was sprayed four days after the normal planting date when it was at the 3 to 4-leaf growth stage. Weed control was good on the late planting date. The normal planting treatments had more heat during the bloom period than late planting treatments. Despite the tremendous amount of moisture during the summer, sclerotinia infection was light. This was possibly due to the high temperatures during bloom, which inhibited the duration of viability of the ascospores. However, a petal test taken on July 11 showed 30% petal infection.

Results: (a) Plant stand measurements

CANOPY MANIPULATION Thief River Falls, MN							
Treat-ment	**Emerg. Counts Plants/ft²**	**Harvest Counts Plants/ft²**	**Plant Height (inches)**	**Canopy Closure (DAP)**	**Infected Plants (%)**	**# Primary Branches**	**# Secondary Branches**
Normal Seeding Date							
1 lb/ac	1.5	1.5	50	45	11	9.3	15.4
3 lb/ac	4.3	3.4	50	40	11	6.9	8.9
5 lb/ac	6.8	4.2	50	38	18	5.8	7.9
Late Seeding Date							
1 lb/ac	1.9	1.8	51	40	3	9.4	13.7
3 lb/ac	3.8	3.4	54	35	4	6.0	3.8
5 lb/ac	6.5	4.6	53	32	5	4.4	1.9
LSD CV%	0.82 19.3	1.04 31.5	4.3 6.9	2.3 4.9	9.1 73.7	1.22 14.1	3.14 29.5

Note: DAP equals Days After Planting

Results: (b) Yield and quality data

CANOPY MANIPULATION Thief River Falls, MN							
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Oil (%)**	**1000 Kernel Weight (g)**	**Growing Degree Days**	**Days To Swathing**
Normal Planting Date							
1 lb/ac early	1125	22.5	32.56	39.0	2.9	1264	89
1 lb/ac	1211	24.2	41.89	39.3	3.0	1312	94
3 lb/ac	1563	31.3	69.26	40.5	3.0	1288	91
5 lb/ac	1661	33.2	69.32	40.4	3.2	1264	89
Late Planting Date							
1 lb/ac early	1586	31.7	82.28	41.4	3.3	1312	89
1 lb/ac	1747	34.9	99.72	40.1	3.4	1390	94
3 lb/ac	1826	36.5	97.66	40.7	3.2	1297	88
5 lb/ac	1777	35.5	81.79	40.6	3.4	1297	88
LSD (0.10) CV%	148.3 7.8	2.97 7.8		1.12 2.3	0.16 4.3		1.6 1.5

Discussion:

The main stem in the 1 lb/ac treatments had about 70% seed color change (SCC) at swathing time, compared to the 1 lb/ac early treatment which was 30 to 40 % SCC on the main stem with translucent seeds in the side branches. Delaying the swathing of the 1 lb/ac seeding rate treatment by five days increased the yield slightly for both planting dates. Planting date had a greater impact on yield than seeding rate with the later planting date yielding higher than the normal date. This was especially true with the 1 lb/ac seeding rate which yielded 500 lb/ac more with the later planting date.

Seeding rate and planting date had little effect on height, oil content, harvestability, or sclerotinia disease levels. Seeding rates had a large impact on branching with the lower seeding rates having more main and secondary branches. Planting date had little impact on main branch counts. However, there were more secondary branches on the normal date at the 3 and 5 lb/ac seeding rates than on the late planting date. Contribution margins were greatly influenced by seeding rate and planting date with the highest contribution margin at the 1 lb/ac seeding rate on the late planting date. This can likely be attributed to the fact that yield potential of the 3 and 5 lb/ac treatments was limited by excess moisture (flooding and de-nitrification). Contribution margins reflect differences in yield, grit and seeding rates. The 1 lb/ac early treatments had higher oil content at the late planting date than the normal planting date.

XIV PUSHING TRIAL

Objective: To evaluate the potential of the "Yield Shield" canola pusher for improving the success of straight combining of *B. napus* canola.

Background: Past research at Canola Production Centres has indicated that shattering losses from straight combining *B. napus* canola generally outweigh any benefits as compared to swathing. However, results have varied from losses as large as 50% to small increases in yield. The trials where straight combining has been most successful indicate that lodged crops make the best candidates for straight combining. Ag Shield, a manufacturing company in Benito, Manitoba, Canada has designed a header, which can be used to simulate lodging by pushing the crop over.

Methodology: Treatments included the following:

A) Swath at 30 to 40% seed colour change
B) Straight combine without pushing
C) Pushed (approximately 10% seed colour change) then straight combine

Observations: The trial was seeded to InVigor 2733 on May 19 into adequate soil moisture. Heavy rains resulted in standing water over half of the trial. Nine plots were salvageable so the trial was reduced to three treatments with three replicates. The water stress created a wide range in maturity in the plots as well as a thinner stand than desired. The plots were about 15% SCC when they were pushed. Two reps were pushed toward the west and one toward the east. During the four weeks between pushing and harvest, there were 13 days on which the wind was blowing out of the west at 20 mph or greater and 4 days that it blew over 30 mph from the west. This resulted in approximately a third of the plants standing back up in the plots that were pushed toward the west. The plot pushed toward the east did not stand up as much. The wind also caused some shattering in the straight combine and pushed plots. Pushing was done with a 30 foot wide Yield Shield. Straight combining was done with a New Holland TR-98 combine equipped with a 20-foot straight header with a pick-up reel. The pushed plots were more difficult to combine than the swathed or straight combined plots. Ground speed was reduced by about a third in the pushed plots because of the close proximity to the ground with the straight header and the fear of picking up rocks.

Results:

PUSHING TRIAL
Thief River Falls, MN

Treatment	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Oil (%)	Seed size (gms/1000)	Contribution Margin ($/ac)
Swath (check)	100	1357	27.2	41.9	2.7	14.69
Straight Combine	93	1267	25.3	43.2	3.5	5.41
Pushed	92	1252	25.1	43.5	3.1	3.40
LSD		176.8	3.54	0.60	0.58	
CV%		7.9	7.9	0.8	10.7	

Discussion: Pushing and straight combining both yielded slightly lower than the swathed check. Contribution margins were also lower than the check. Contribution margins reflect differences in yield and equipment costs. The fuel, lube and repair cost of pushing was calculated at $0.42/ac, which is the same cost as swathing. Oil content was higher in the straight combined and pushed treatments. This was expected because the oil is the last component produced in the seed.

XV FUNGICIDE TRIAL

Objective: To evaluate the effectiveness of different fungicides at controlling sclerotinia in canola and how they influence yield, quality and economic return.

Background: Sclerotinia stem rot is caused by the fungus *Sclerotinia sclerotiorum* that occurs in most canola growing areas. The disease is usually most severe in wetter areas of the growing region. Severity of stem rot varies from year to year, and even from field to field within a region. With the right combination of thick crop density and wet weather conditions before and during flowering, heavy infections can develop almost anywhere. In some cases half the potential yield of a crop may be lost to sclerotinia. Quadris, Ronilan EG and Topsin 70WP are currently labeled for sclerotinia control on canola in the United States.

Methodology: The trial was seeded with the variety DKL 34-55 at a seeding rate of 5.5 lb/ac to facilitate a microclimate in the canopy to enhance sclerotinia development. Spraying was done using a ground sprayer equipped with twinjet nozzles at 75 psi and 20 gal/ac spray solution. Fungicides were applied at rates and timings suggested by the label or industry representative. Treatments included:

1. Check - no fungicide applied
2. Endura 70WG - 5.7 oz/ac applied at 30 to 40% bloom
3. Ronilan EG - 12 oz/ac applied at 30 to 40% bloom
4. Rovral flo - 14.4 oz/ac + 1% v/v Aphoil applied at 30 to 40% bloom
5. Topsin 70WP - 16 oz/ac applied at 30 to 40% bloom (1 lb)
6. Topsin 70WP - 24 oz/ac applied at 30 to 40% bloom (1.5 lb)
7. Topsin 70WP - 16 oz/ac + 0.25% v/v non-ionic surfactant applied at 30 to 40% bloom (1 lb + NIS)

Infection readings were taken by recording disease level of 50 unswathed plants at three random locations within each plot along the edge of the swathed area. Disease levels for each plant were assessed on a scale of 1 to 5 (1 = small branch infected, 5 = the whole plant is dead with substantial yield loss).

Observations: This trial was seeded on May 20 into good moisture. The wet weather throughout the summer created a shorter and thinner stand than expected. Despite the tremendous amount of moisture during the summer, sclerotinia infection was only light in the trial. This was possibly due to the high temperatures during bloom, which may have inhibited the duration of viability of the ascospores. However, a petal test taken on July 11 showed 30 % petal infection.

Results:

FUNGICIDE EVALUATION TRIAL
Thief River Falls, MN

Treatment	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Oil (%)	Plants Infected (%)	Infect. Rating (1-5)	Contribution Margin ($/ac)
Check (No Fung.)	100	1675	33.5	44.7	5	4.2	84.79
Endura	103	1733	34.7	44.1	3	4.4	68.66
Ronilan	98	1637	32.7	44.5	5	4.2	59.13
Rovral Flo	102	1715	34.3	44.7	5	4.5	67.47
Topsin 1.5 lb	104	1735	34.7	44.2	5	4.2	60.73
Topsin 1 lb	97	1632	32.6	44.3	5	4.3	58.15
Topsin 1 lb + NIS	98	1635	32.7	44.6	4	4.6	57.64
LSD (0.10)		198.1	3.96	0.75	1.9	0.48	
CV%		9.6	9.6	1.4	35.4	9.0	

Discussion: There were no differences in yield, oil content or infection rating among the treatments. Infection levels were very low. However, infection frequency was lower with Endura than the other treatments. With the low infection levels and lack of differences in yield, the check had the greatest contribution margin due to the lack of fungicide cost. Contribution margins reflect differences in yield and fungicide application costs.

XVI OPTIMIZING CANOLA PRODUCTION TRIAL

Objective: To measure the individual and combined effects of varying levels of fertilization and crop protection on canola yield, quality and profitability.

Background: Research in the past has generally focused on a single component of canola production, be that a product or a management decision. While this allows the researcher to isolate the benefit of that single component, it is clear that benefits determined in this way cannot simply be added together to determine the overall benefit in a cropping system. Several small plot research trials are being conducted by a team of researchers, headed by Dr. Don Flaten at the University of Manitoba. The purpose of these experiments is to focus on the combined effects of varying levels of fertilization, crop protection and genetics, in order to determine how the choice of a certain level of one (e.g. genetics) affects the profitability of different levels of the others (e.g. fertility, crop protection levels).

While University of Manitoba experiments focused on three general "packages" of inputs including fertilization, crop protection and genetic yield potential, the trial at the Canola Production Centre focused only on the interaction between fertilization and crop protection levels. This allowed the trial to be conducted in the larger field scale format commonly used at the CPC site.

Methodology: The optimizing canola production trial consisted of six treatments in an RCB design. InVigor 2663 was used with the following treatments:

1. Medium level of crop protection, low level of fertilization
2. Medium level of crop protection, medium level of fertilization
3. Medium level of crop protection, high level of fertilization
4. High level of crop protection, low level of fertilization
5. High level of crop protection, medium level of fertilization
6. High level of crop protection, high level of fertilization

Each level of crop protection and fertilizer was conducted as follows:

Low level of fertilization = no fertilizer applied

Medium level of fertilization = fertilizer applied to 1750 lb/ac target yield
- Micronutrients foliar applied (Boron 0.15 lb/ac)
- Macronutrients soil applied (70 - 20 - 0 - 10; N - P - K - S)

High level of fertilization = fertilizer applied to 2500 lb/ac target yield
- Micronutrients foliar applied (Boron 0.15 lb/ac)
- Macronutrients soil applied (116 - 33 - 0 - 17; N - P - K - S)

Macronutrients were spread with two passes of a 12-foot drop spreader down the middle of the plot and then incorporated with a cultivator and harrow. The boron was foliar applied at the bolting stage.

Medium level of crop protection = Tribune (Syngenta fungicide) seed treatment, one application of Liberty (28 oz/ac) + Select (2 oz/ac) at the 3 to 4-leaf stage. No foliar fungicide applied. Foliar insecticide (Capture @ 1.5 oz/ac) applied at the 1-leaf stage for flea beetle control.

High level of crop protection = Helix Xtra seed treatment, two applications of Liberty (28 oz/ac @ 3 to 4-leaf stage and 6-leaf stage). Select (2 oz/ac) was applied along with the first application of Liberty. Fungicide was applied for sclerotinia control (Ronilan EG @ 12 oz/ac) at 30 to 50% bloom. Foliar insecticide was not applied to control flea beetles because damage was well below threshold levels.

Observations: The trial was seeded on May 21 into good moisture. The fungicide seed treatment plots were at action threshold levels (25 % leaf area damage) for flea beetle damage on June 4 and were sprayed with Capture (1.5 oz/ac). Plots with Helix Xtra had little flea beetle damage and were not sprayed. The low fertility treatments showed reduced height and delayed maturity throughout the season until swathing time. The excess moisture stress damaged many areas in the plots and created variability in height and maturity within each plot. At swathing time, maturity ranged from 20 to 50 % seed color change across the whole trial with few discernable differences among treatments. The whole trial was swathed 90 days after planting with an accumulated 1286 growing degree-days.

Results:

OPTIMIZING CANOLA PRODUCTION TRIAL Thief River Falls, MN						
Treatment	**Yield (%)**	**Yield (bu/ac)**	**Contrib. Margin ($/ac)**	**Oil (%)**	**Sclero. Infection (%)**	**Flea Beetle Rating***
Medium Level of Pest Control						
Low Fertility	1426	28.5	84.46	42.6	1.1	2.8
Medium Fertility	1528	30.6	72.23	42.3	3.2	2.8
High Fertility	1593	31.9	67.31	41.5	4.6	2.3
High Level of Pest Control						
Low Fertility	1334	26.7	31.28	42.9	0.9	0.8
Medium Fertility	1678	33.6	45.23	42.4	0.5	1.0
High Fertility	1590	31.8	23.81	41.5	1.2	1.0
LSD	119.6	2.39		0.76	2.15	0.73
CV%	6.3	6.3		1.5	89.6	33.5

*Note: Flea Beetle Rating on June 4; 0 = no injury, 9 = 90 to 100% leaf area damaged

Discussion: The highest yield came from the combination of medium fertility and high pest control. The highest contribution margin came from the combination of low fertility and medium pest control. This can likely be attributed to the fact that yield potential of the medium and high fertility treatments was limited by excess moisture (flooding and de-nitrification). Although sclerotinia infections were very low, there were significant differences between the low and high fertility levels in the medium pest control treatments. Higher fertility produced more sclerotinia. Fertility levels influenced oil content with the highest oil content at the lowest fertility levels within each level of pest control.

XVII FALL DORMANT SEEDING

Objective: To compare the effectiveness of seeding canola in the spring versus fall (with and without 'Extender' polymer seed coating).

Background: Fall dormant seeding has become another management tool that growers can use when planting canola to spread out the workload and hopefully capture higher yields. Research in Canada and in the United States has shown mixed results. With good spring stand establishment, fall-seeded canola generally flowers sooner and longer than spring–seeded canola and often produces a better yield by avoiding the hot weather during flowering. Thin and uneven stands can cause problems with weed control and harvest timing due to many late maturing branches. One of the difficulties of fall dormant seeding is judging when to plant it. The soil must be cool enough and/or dry enough to prevent germination in the fall. Early snow or rains late in the season can prevent a grower from seeding fall dormant canola. "Extender", a product from GrowTec Inc. out of Nisku, AB, Canada provides an extended period in the fall in which the grower can seed the canola up to two weeks before freeze-up. Without Extender, the grower needs to plant a day or two before winter freeze-up. The introduction of herbicide tolerant canola has provided a better means of weed control in fall-seeded canola, especially for the winter annual weeds.

Methodology: The fall dormant seeding trial was conducted on wheat stubble that had been disked lightly to allow the 9350 John Deere double disc drill to seed into the soil. Different seed treatments and seeding dates included:

1. October 18 - Extender treated + Helix Xtra
2. November 6 - Extender treated + Helix Xtra
3. November 6 - Helix Xtra
4. November 6 - Tribune (Syngenta fungicide only)
5. May 21 - Helix Xtra

Observations: The Roundup Ready variety DKL 3525 was used for this trial. The trial was lightly disked (not recommended on Extender label) to bury some of the residue from the previous heavy wheat crop and provide some exposed soil for seeding while still maintaining as much residue as possible for snow catch. The winter was mild with little or no snow cover. Fall soil temperatures at 2 inches below the surface stayed between 2 and 5 °C until November 19 before dropping below freezing. Soil temperatures rose above 2 °C on November 22-25 then stayed below freezing for the rest of the winter. Spring soil temperatures rose above 2 °C for two days after March 27 and fluctuated around 2 to 4 °C during mid-April. Stand counts were noticeably thin during spring planting (mid-May); however it looked like more plants were emerging. Stand counts were taken on June 4, after flea beetles had moved into the plots, and were thinner than necessary to obtain a decent crop. However, the trial was allowed to continue to see what would result from the thin stands. Maturity on June 4 varied from 1 to 3-leaf growth stage. The Roundup application was delayed until the largest plants were bolting due to the light weed pressure and lack of crop canopy. During the course of the summer, flooding destroyed the third and fourth reps. The Tribune treatment in the first two reps had an inadequate stand to take to harvest. The first two reps of spring seeded plots and the Extender treated plots were salvaged as a demonstration trial.

Results:

FALL DORMANT SEEDING - FALLOW
Thief River Falls, MN

Seeding Date	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Contrib. Margin ($/ac)	Spring Stand (plt/ft^2)	Flea Beetle Injury*	Height (in)	Days To Mature
Oct. 18 - Extender	19	203	4.1	(106.94)	0.5	4.0	27	100
Nov. 6 - Extender	19	198	4.0	(106.35)	0.9	4.0	25	100
Nov. 6 - Helix Xtra	NA	NA	NA	NA	0.2	3.8	NA	NA
Nov. 6 - Tribune	NA	NA	NA	NA	0.1	5.3	NA	NA
May 21 - Helix Xtra	100	1069	21.4	(8.46)	7.8	0.5	39	87
LSD		NA	NA		0.61	1.49		
CV%					33.8	25.0		

Note: Brackets indicate a negative contribution margin.

Discussion: Fall seed treatments yielded much less than the spring seeding treatment due to inadequate stand counts. The November 6 - Extender treatment had a higher spring stand than the November 6 treatments without Extender. The Extender likely helped reduce fall germination during the first 13 days after seeding while the soil temperature remained above freezing. Days to maturity for the fall-seeded treatments were calculated from April 27 when the average temperature stayed above freezing.

XVIII FOLIAR NUTRIENT APPLICATION TRIAL

Objective: To compare the use efficiency of foliar applied nutrients as it relates to yield and quality of *B. napus* canola.

Background: Boron is one of the micronutrients that have been shown to reduce yield in deficient soils. Companies have been developing foliar applied nutrient products, which may have a role in enhancing canola yields under deficient conditions.

Methodology: This trial was bulk seeded to SW Peak and laid out in small plots (6 feet x 40 feet) with six replications in an RCB design. The plots were harvested with a small plot swather and combine. The treatments included the following foliar applied boron products:

1. Check
2. Borosol - 1 pt/ac at bolting (onset of stem extension)
3. Borosol - 2 pt/ac at bolting
4. Borosol - 1 pt/ac at bolting + 1 pt/ac 6 days later
5. Molybor - 3 pt/ac at bolting

Observations: Fall soil tests indicated that the site had low levels of boron (0.6 ppm). The trial was set up using small plots due to lack of space and potential variability of boron levels in the field. The trial was seeded on May 21 on higher ground that would not be subjected to standing water. Tissue samples taken at the 4 to 5-leaf stage indicated low boron levels (14 ppm) in the plants. Molybdenum (an extra micronutrient in Molybor) was not tested for in soil or tissue samples.

Results:

FOLIAR NUTRIENT APPLICATION TRIAL
Thief River Falls, MN

System	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Contribution Margin ($/ac)	Oil (%)	Days To Maturity
Borosol 1 pt + 1 pt	95	1205	24.1	8.34	44.6	95
Borosol 1 pt	97	1232	24.6	13.10	44.2	95
Borosol 2 pt	101	1281	25.6	16.93	44.6	95
Check	100	1269	25.4	18.97	44.7	95
Molybor 3 pt	101	1282	25.6	12.31	44.0	95
LSD		82.2	1.64		0.68	
CV%		6.6	6.6		1.2	

Discussion: Foliar applied boron treatments had no effect on yield or days to maturity. Contribution margins reflect differences in yield, micronutrient treatments and application costs.

XIX SUMMARY

The fifth year of the Minnesota Canola Production Centre (CPC) program was another success. The trials at the Thief River Falls site were chosen to demonstrate basic canola production principles as well as investigate new technologies and techniques. While many of the trends in the trials reflected past results from the Canadian CPC program, other trial results differed. Future work will help reveal if these unexpected trends are regionally specific, or if they were just a feature of this year's less than favorable growing conditions. All of the results will provide good focal points for discussions at extension meetings throughout the winter. This joint project has provided a unique opportunity to share information between Canadian and American growers. Planning for next year's program has already begun with the site for 2003 being ½ mile south of Steve Dahl's farm south of Roseau, Minnesota on Highway 89. If you have any questions or comments about the Minnesota CPC program please feel free to contact any of the people listed in the following Field Staff Information section.

XX STAFF INFORMATION

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