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.

The Canola Council of Canada is the co-ordinating body of the Canola Production Centre (CPC) program across Canada, and provides expertise and supervisory support for the CPC in Minnesota. Funding for the Minnesota CPC program was appropriated by the Minnesota State Legislature in co-operation with the Minnesota Canola Council and the University of Minnesota.

Each year sponsors (both locally and nationally) help support the Canola Production Centre program. With their generous contributions, the Program has become an effective tool in technology transfer to all interested parties.

II SITE DESCRIPTION

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

MINNESOTA

Location: Roseau, MN - 85 acres

Seed and Seed Treatment:
Agri-Tel Grain - LG 3260 (2 bags)
Croplan Genetics - CL 2070
Gustafson - Gaucho
Interstate Seed - Hyola 401, Q2, Quantum
Kaystar Seed - KC-701 (2 bags)
Wilber - Ellis

Fertilizer:
Cenex Land-O-Lakes Agronomy Co. and Allied Signal - granular fertilizer (85 acres)

Herbicides and Fungicides:
AgrEvo USA - Liberty (4 acres)
American Cyanamid - Raptor (4 acres)
Dow AgroSciences - Stinger (73 acres)
DuPont Agricultural Products- Assure II (73 acres)
FMC - Capture (105 acres)
Monsanto - Roundup Ultra (12 acres)
UAP Northern Plains, Ostlund - Herbimax (80 acres)
Zeneca Ag Products - Quadris (85 acres)

Equipment and Labor:
Cenex West Plant - soil testing, fertilizer spreading, equipment storage
Habstritt Farms - grain truck, use of truck scale
Pioneer Hi-Bred and Cenex West Plant - weigh wagon
Magnusson Farms - drying, storage and transport of crop, harrow, water truck
Rob and Tim Rynning - generator
Roseau Farm Service - tractor for planting, swath roller assembly
Salol Elevator - transport of crop to elevator
Slater Spraying Service - fungicide and insecticide application (97 acres)
Steve Dahl - straight header for combine
Wayne Bicker - use of drier

Photocopying & Faxing:
Roseau County Extension Office, Roseau
Polk County Extension Office, Crookston

Tours:

Border State Bank
Curt Nyegaard, Karen Andol and Bob Schaller
Roseau Dairy
Roseau Eagles Aerie 3882 (Orris Rasmusson & Duane Comstock)
Roseau Co. Fair Board and Geroy's Building Center
Wally's Supermarket
Wannaska 4H Club

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 allows 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.

In 1999, the field day tour was held on July 16 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 includes 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.

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	6.90	2.95	9.85	4.93
2.1 - 3.0	6.65	2.95	9.60	4.80
3.1 - 4.0	6.40	2.95	9.35	4.68
4.1 - 5.0	6.15	2.95	9.10	4.55
5.1 - 6.0	5.90	2.95	8.85	4.43
6.1 - 7.0	5.65	2.95	8.60	4.30
7.1 - 8.0	5.40	2.95	8.35	4.18
8.1 - 9.0	5.15	2.95	8.10	4.05
9.1 - 10.0	4.90	2.95	7.85	3.93

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 spring 1999.

Equipment costs were obtained from the Border State Bank of Badger, MN and are estimated equipment variable costs for northwestern 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**
45A51	4.10	Pioneer Hi-Bred	KC-701	4.70	Kaystar Seed
45A71	3.50	Pioneer Hi-Bred	LG3260	3.50	Agri-Tel Grain
46A65	3.40	Pioneer Hi-Bred	LG3275	4.50	Agri-Tel Grain
46A76	3.90	Pioneer Hi-Bred	LG3345	3.44	Cargill Seeds
Cavalier	2.70	Cargill Hybrid Seeds	Minot	3.95	Croplan Genetics
CL2070	4.70	Croplan Genetics	Phoenix	3.40	AgrEvo USA
CL2078	4.20	Croplan Genetics	Q2	3.15	Interstate Seed.
Eagle	2.80	Wilber-Ellis	Quantum	3.15	Interstate Seed.
Ebony	3.63	Agri-Tel Grain	Quest	3.90	Interstate Seed
Golden Ready RR	4.20	Seeds 2000	Roseau	2.70	Cargill Hybrid Seeds
Hyola 401	4.85	Interstate Seed	SW Rider	4.20	Interstate Seed
InVigor 2373	4.96	AgrEvo USA			

Note: Seed cost may vary from location to location. Prices reflect the Minnesota average for Spring 1999 and include the cost of seed treatments (Benlate and Gaucho). Gaucho is the U.S. product for flea beetle control.

PRODUCT INFORMATION			
Product	**Active Ingredient**	**Manufacturer/ Distributor**	**$/Unit Cost**
Assure II	quizalofop-p-ethyl	DuPont Agriculture Products	121.7/gal
Ammonium Sulphate	ammonium Sulphate	Imperial	0.33/lb
Capture	bifenthrin	FMC Corporation	398.81/gal
Herbicide 273	endothall	Elf Atochem North America	44.62/gal
Quadris	azoxystrobin	Zeneca Ag Products	287.50/gal
Liberty	glufosinate ammonium	AgrEvo USA	99.11/gal
Herbimax	crop oil concentrate - 17%	Loveland Chemical	5.25/gal
Preference	non-ionic surfactant - 90%	Cenex Land - O - Lakes	17.80/gal
Raptor	imazamox	American Cyanamid	679.20/gal
Roundup Ultra *	glyphosate	Monsanto	40.60/gal
Stinger	clopyralid	Dow AgroSciences	485.13/gal

Note: $15/ac TUA includes first pint of Roundup Ultra.

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 Sulphate	21-0-0-24	160.00	0.17 (of N)
Ammonium Sulphate	21-0-0-24	160.00	0.18 (of S)
Phosphate	18-46-0	245.00	0.20 (of P_2O_5)
Potash	0-0-60	149.00	0.12
Urea	46-0-0	160.00	0.17

Machinery Cost:

- Conventional tillage: $11.50/acre
- Broadcast & Harrow Seed add $3.65/acre
- Straight combining: subtract $1.00/acre

Additional Machinery Costs: (Custom Application)

- Aerial $4.25/acre
- Broadcasting Seed $5.25/acre

Note: Machinery costs were obtained from the Border State Bank of Badger, MN and are estimated operating costs (such as fuel, lubrication and repairs) for northwestern 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 1999, 10.5% per annum over six months was used.

C *Economic Results Report (example)*

Site: **Roseau, MN**

B. napus Variety Trial: **Hyola 401**

CALCULATION OF VALUE OF PRODUCTION				
Yield (bu/ac)	**X**	**Price ($/bu)**	**=**	**Value of Production**
38.5	X	4.30	=	165.55

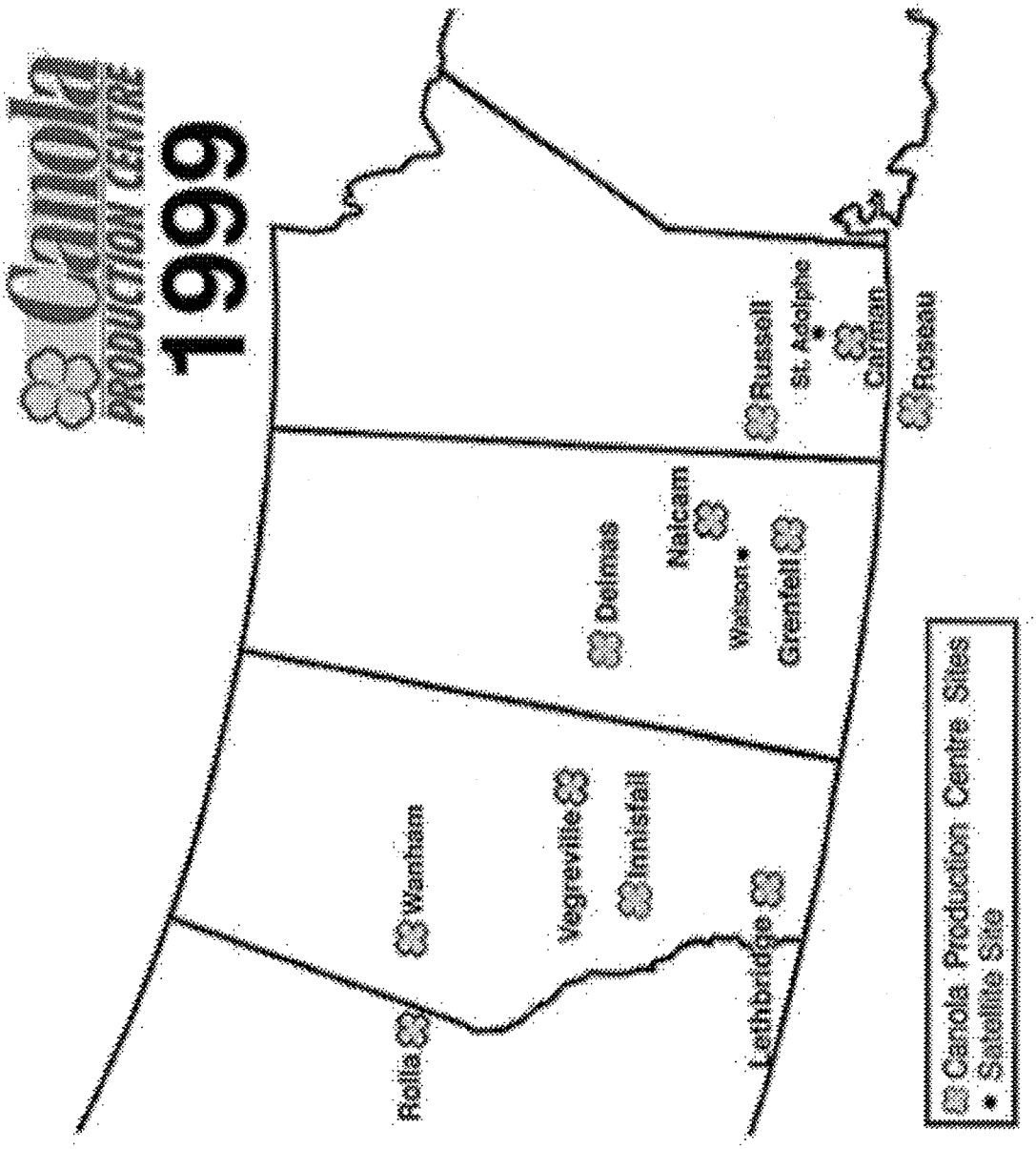
CALCULATION OF VARIABLE COSTS ($/ac)	
Seed	26.68
Fertilizer	35.88
Herbicides	25.33
Fungicides	22.46
Insecticides	7.79
Machinery	20.00
Insurance	0.00
Check-off	0.96
Interest/opportunity	6.20
Total Variable Costs	145.30

CALCULATION OF CONTRIBUTION MARGIN				
Value of Production ($/ac)	**-**	**Variable Costs ($/ac)**	**=**	**Contribution Margin ($/ac)**
165.55	-	145.30	=	20.25

Contribution Margin ($/ac)	/	Yield (bu/ac)	=	Contribution Margin ($/bu)
20.25	/	38.5	=	0.53

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:	**Roseau, MN**

Co-operator: Richard, John and Bob Magnusson

Previous crop: Wheat

Soil Test Results: (AgriSource Laboratories)

Organic matter content: 3.6 %

Macronutrient Levels:	0-6 inches; 0-24 inches (N and S)
Nitrogen -	19 lb/ac; 64 lb/ac
Phosphorus-	14 lb/ac
Potassium -	276 lb/ac
Sulphur -	74 lb/ac; 120 lb/ac

Micronutrient Levels:	0 - 6 inches
Calcium -	4400 ppm
Magnesium -	1230 ppm
Boron -	0.8 ppm
Zinc -	0.3 ppm
Manganese -	3.2 ppm
Copper -	0.5 ppm
Iron -	14.7 ppm

Target yield: 2200 lb/ac (44 bu/ac)

Fertilizer applied: N - 104 lb/ac P - 52 lb/ac K - 50 lb/ac S - 10 lb/ac

Soil Association/Zone: Wabanica - Fine Silty, Mixed Calcareous, Frigid Typic Endoaquolls

Soil Texture: Silt Loam (medium)

Soil pH: 8.2

Salinity: 0.3 mmho (slightly saline)

Tillage operations: The site was chisel-plowed and disked in the fall, and cultivated in the spring to incorporate broadcast fertilizer (100-40-50-10). After a three-week rain delay, it was cultivated again prior to seeding the second date. Twelve pounds of phosphate was seed-placed.

Seeding method:

Seeded with a JD 9350 double disk press drill
Date: June 3, 19
Depth: 1/2 to 3/4 inch deep
Rate: 5.5 lb/ac *B. napus*

Herbicides applied:

First Seeding Date:
Seed treatment trial and early seeded Hyola 401 -Assure II (10 oz/ac) & Crop Oil (1 pt/ac) at the cotyledon to one leaf stage; Herbicide 273 (1.5 pts/ac) at the 2 to 6 leaf stage; Stinger (1/4 pt/ac) at 4 leaf to bolting

Second Seeding Date:
A) Conventional varieties and management trials - Assure II (10 oz/ac), Herbimax (1 pt/ac), Stinger (1/4 pt/ac) at 4 leaf stage
B) Liberty Link varieties - Liberty (34 oz/ac.), Ammonium Sulphate (3.0 lb/ac) at 4 leaf stage
C) Roundup Ready varieties - Roundup Ultra (1 pt/ac), Ammonium Sulphate (1.0 lb/ac) at 4 leaf stage
D) Raptor Tolerant varieties - Raptor (4 oz/ac), Non-ionic Surfactant (3.5 oz/ac), Ammonium Sulphate (2.5 lb/ac) at 4 leaf stage

Fungicides applied:

Quadris (10.0 oz/ac) at about 10-30 % bloom

Insecticides applied:

Capture (2.5 oz/ac) July 22 on first seeding date and August 25 on the entire site.

Swathing:

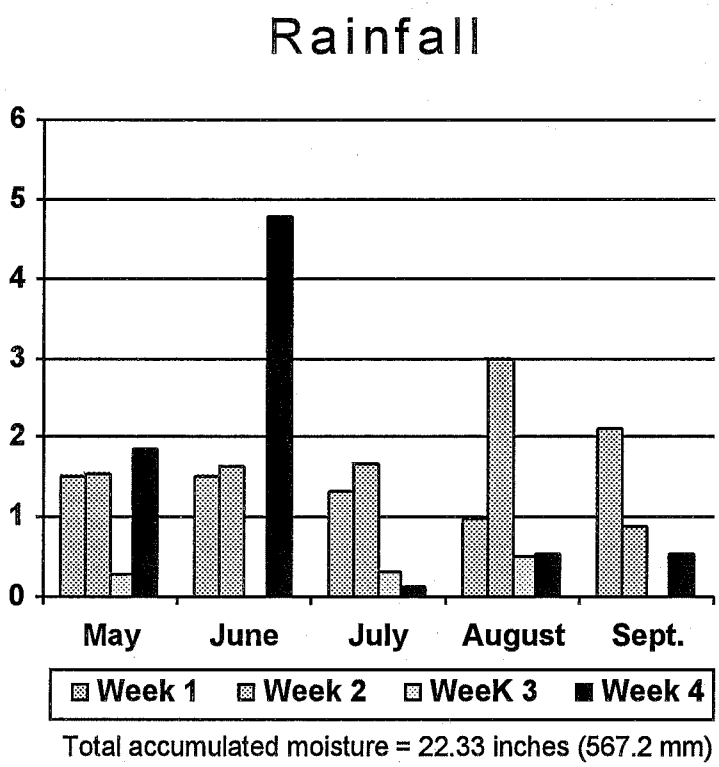
Started: August 31 Finished: September 28

Combining:

Started: October 11 Finished: October 23

Comments:

Due to the late spring, seeding was initiated under ideal to excessive moisture conditions. Heavy rains after seeding the Seed Treatment Trial and one treatment of the Variety Trial resulted in a 2 1/2 week delay in seeding. The excessive moisture resulted in uneven emergence in the earlier seeded trials. The rest of the site was seeded under ample moisture conditions and emergence was excellent. Very wet conditions throughout June and early July resulted in standing water on about one quarter of the site. Many areas of the field had standing water so long after planting that little or no canola was established in those areas. Many plots were shortened to eliminate drowned out and damaged areas. One replicate was discarded in three of the trials due to drowning. A moderately cool and dry July and August resulted in delayed maturity. Since most of the plots from the second planting date would not reach maturity until late September, all of the plots from the second planting date were swathed as soon as they reached 20% seed color change. The latest maturing varieties were cut on September 28, before reaching 20% seed color change, to allow curing time before it became too late to thresh in the fall.



Total accumulated moisture = 22.33 inches (567.2 mm)

VIII VARIETY TRIAL - B. NAPUS

Objective: To evaluate agronomic differences between newly registered and recommended conventional (non-herbicide tolerant) varieties in a given area as submitted by the seed trade.

Background: The increase in number of new varieties available over the past several years has made the task of choosing a variety for a specific farm challenging. Yield, crop quality and disease resistance are important variety traits to consider in the selection process. However, other agronomic factors such as lodging resistance and harvestability are also important factors. Varieties in the trial are selected and submitted by the seed trade.

Methodology: The variety trial was made up of four replicates in a randomized block design. Identical agronomic practices were used for all varieties. The trial was seeded on June 19 into adequate to excessive moisture conditions. Swathing commenced when seed color change (SCC) was 20% to 30% and harvest was completed when suitable conditions existed.

Observations: Emergence was good. One replicate was discarded due to flooding. The late planting date and cool growing conditions caused the varieties to mature late in the season. Varieties were swathed starting mid-September after reaching 20% seed color change to reduce the risk of frost and allow more time to cure. The latest maturing varieties were swathed on September 28. Some of these varieties were cut prior to 20% SCC because the cool conditions at the end of September did not allow the seed to change color and the swaths needed time to cure before winter. Individual plots that were cut prior to 20% SCC include Roseau, Ebony, CL 2078 and Quantum.

Results:

B. NAPUS VARIETY TRIAL YIELD, ECONOMIC & QUALITY RESULTS Roseau, MN								
Treatment	**Yield (%)**	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Green Seed (%)**	**Oil (%)**	**Growing Degree Days**	**Days To Maturity**
Hyola 401	100	1925	38.5	20.25	6.1	43.9	1029	95
Ebony	82	1570	31.4	(14.48)	9.7	47.9	1050	102
46A65	80	1535	30.7	(4.70)	6.1	47.4	1029	95
Quantum	79	1520	30.4	(23.39)	11.6	45.1	1057	106
CL2078	77	1475	29.5	(36.59)	12.1	45.9	1050	102
Cavalier	74	1415	28.3	(3.83)	4.8	47.4	1021	94
Roseau	72	1395	27.9	(12.62)	6.3	48.1	1057	106
LSD CV%		1.96 8.7	3.92 8.7			1.45 2.1		

*Note: Hyola 401 was used as a check in this trial.
Note: Bracket in contribution margin reflects a negative value.

Discussion:

The check (Hyola 401) yielded significantly higher than the rest of the varieties. Hyola 401 had lower oil content than the other varieties except Quantum. Contribution margins reflect yield, green seed and seed costs. Hyola 401 had the highest contribution margin. The high green seed count of Ebony, Quantum and CL2078 contributed to the poor contribution margin. The days to maturity represent the calendar days from the date of seeding to 30% seed color change. Days to maturity were estimated for the late maturing varieties. The growing degree days, expressed in Celsius, represent the heat accumulation above canola's base temperature of 5°C (41°F). Cavalier exhibited the earliest maturity at this site, while CL2078, Roseau, Ebony and Quantum did not make it to maturity due to the late season and cool conditions at swathing.

IX HARVESTABILITY TRIAL

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

Background: A number of varieties have very similar yield and quality traits. In choosing a variety a grower should also consider such characteristics as lodging, and harvestability. Harvestability is the measurement of swathing and combining ease. Currently, there is no standardized scientific measurement for harvestability. Therefore, a qualitative assessment is used.

Methodology: Harvestability was evaluated as swathing and combining were completed. Each variety was swathed and evaluated on a scale of 1 to 5, compared to the Check (Hyola 401) which was rated a 3. The following criteria were considered: lodging, height, straw stiffness, straw strength, uniformity of stand, swath fluffiness, tendency to clump, flowability, speed of operation and feeding.

Ratings:
1 = much better than Check
2 = better than Check
3 = Check
4 = Worse than Check
5 = Much worse than Check

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

Observation: Lodging was variable among the varieties. Swathing was most difficult in the varieties with the uneven lodging. Combining ease was related more closely to the amount of clumping of the swath. The plots were swathed with an 18' Versatile 400 swather equipped with a pick-up reel, and harvested with a Massey Ferguson 760 combine.

Results:

HARVESTABILITY TRIAL *B. Napus* Roseau, MN			
Variety	**Lodging Ratio**	**Swathing Rating**	**Combinability Rating**
45A51	.85	4	3
45A71	.61	4	3
46A65	.69	3	3
46A76	.86	4	4
Cavalier	.84	3	2
CL2078	.96	3	3
Ebony	.94	4	4
Golden Ready	.68	4	3
Hyola 401	.85	3	3
InVigor 2373	.88	3	3
LG3275	.83	4	3
LG3345	.67	4	3
Minot	.76	3	3
Phoenix	.83	3	3
Quantum	.81	3	3
Quest	.65	5	4
Roseau	.96	3	3
SW RideR	.89	4	3

Discussion: The varieties varied in harvestability with 46A65 and Cavalier easier to swath and combine than the check (Hyola 401). Cavalier flowed smoothly into the combine. LG3345 and Quest were difficult to swath due to uneven lodging. Ebony and 46A76 were difficult to combine due to clumps in the swath.

XI RE-SEEDING TRIAL

Objective: To assess the impact of re-seeding on yield, quality and economic returns when initial plant densities are below recommended thresholds.

Background: Canola is a very flexible crop in that wide variations in plant populations have very little effect on the final yield, although these variations can affect maturity. Research has shown (*Canola Growers Manual - Crop Establishment section*) that as plant populations decline below 5.6 plants/ft^2 (60 plants/m^2) yields tend to decline. The recommended threshold for re-seeding is 3.7 plants/ft^2 (40 plants/m^2). The effect of plant density on maturity is more pronounced under cool summer conditions than warm conditions.

Methodology: This trial was seeded on June 3 with Hyola 401 and was originally intended to be a harvesting method trial. Heavy rains resulted in saturated conditions and soil crusting. This reduced emergence to 3.8 plants per square foot, which is the minimum recommended threshold for plant stands. Therefore, a re-seeding trial was established. One treatment was cultivated and re-seeded on June 19, while the other was left. The treatments were placed in a randomized block design.

Observations: The tremendous amount of rain received after June 3 resulted in water standing in all low spots and in the wheel tracks. These areas were so water logged that most of the seed did not germinate for a few days, resulting in two distinct flushes. The dry conditions that followed the rain created a crusting problem for the second flush, which slowed emergence. The June 3 seeding date was heavily infested with aster yellows (30% of plants showed signs of infection), whereas the June 19 seeding date was only lightly infected (13% of plants showed signs of infection). Aster yellows is caused by a mycoplasma-like organism, which results in bladdering of pods, stunted pods and reduced seed set. Aster yellows is transmitted by the six-spotted leafhopper (aster leafhopper), which is blown up from the southern U.S. with southern weather fronts. These weather fronts continued into late-July this year, which is later than usual. The June 3 seeding was sprayed with Capture (2.5 oz/ac) to control lygus bugs (average 12 lygus/10 sweeps at early flower) on July 22, before the June 19 seeding reached flowering. The June 3 seeding exhibited high levels of premature seed germination in healthy looking pods which were on plants infected with aster yellows. These seeds appeared to germinate when the seed and the pod were still green and weeks away from seed color change. At swathing these germinated seeds had dried down and shrivelled up to resemble flakes of pepper in healthy looking pods.

Results:

RE-SEEDING TRIAL Roseau, MN				
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Oil (%)**
Seeded June 3	910	18.2	(70.80)	40.9
Re-seeded June 19	1925	38.5	(10.54)	43.9
LSD	386	7.72		1.75
CV%	11.4	11.4		1.7

Note: Bracket in contribution margin reflects a negative value.

Discussion:

The large yield difference between the June 3 and June 19 planting dates is likely due to a number of factors. The poor growing conditions caused by water logged soils reduced yield potential of the canola seeded on June 3. As well, the high infestation of aster yellows on the canola seeded June 3 reduced yield. Contribution margins reflect yield, green seed and the cost of reseeding (canola seed and tillage). Normally an earlier seeding date is better than later. However, in this trial the insect pressure, disease pressure and excessive moisture conditions of this season favored the later (June 19) seeding date.

XII SEED PLACEMENT TRIAL

Objective: To determine the effects of various seed placements on stand establishment, yield, quality and contribution margin of *B. napus* canola.

Background: The small seed size of canola results in much lower seeding rates than many other crops. For growers utilizing seeding equipment such as double disc press drills, this can lead to difficulty in setting seeding rates low enough. Some growers have attempted to overcome this by blocking alternating drill runs and doubling their seed rate setting. However, this also doubles the row spacing (12 inch vs. 6 inch), which can delay canopy closure and maturity. Time to canopy closure may also be affected by the variety. Other growers have turned to alternative seeding methods such as broadcasting the seed and harrowing it in, but this can result in uneven emergence in dry conditions.

Methodology: Each treatment was replicated four times in a randomized block design. The canola varieties used were Q2 (open pollinated) and CL2070 (hybrid). The 6 and 12 inch row spacing treatments were seeded with a John Deere 9350 double disc press drill. The broadcast treatments were spread with a 15 foot Gandy granular applicator and harrowed once with a spike tooth drag. Starter fertilizer was also applied with the Gandy prior to harrowing.

The treatments were:
A) Q2 - 6 inch spacing
B) Q2 - 12 inch spacing
C) Q2 - Broadcast and harrowed
D) CL2070 - 6 inch spacing
E) CL2070 - 12 inch spacing
F) CL2070 - Broadcast and harrowed

Observation: Moist conditions at seeding provided good emergence for all the treatments. Continued rain resulted in flooding and loss of the fourth replicate. All the treatments had two emergence dates. The middle 1 to 3 feet of each broadcast and harrow treatment was double seeded due to overlap of the granular applicator. This created a dense stand in the middle of the plots, which resulted in thinner stems and increased lodging in the middle of those treatments. Most weeds were controlled with Assure II (10 oz/ac) and Stinger (1/4 pt/ac). The majority of this trial was swathed on September 28 to allow as much time as possible for curing. Seed color change ranged from 1 to 10% due to the late season and late maturing varieties. The Q2 - broadcast and harrowed treatment matured a few days sooner than the other treatments.

Results:

SEED PLACEMENT TRIAL Roseau, MN						
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Green Seed (%)**	**Oil (%)**	**Plant Counts (Pl/ft^2)**
Q2						
6 inch spacing	1585	31.7	(2.79)	7.7	42.3	8.7
12 inch spacing	1520	30.4	(30.99)	13.3	41.2	7.6
Broadcast & Harrowed	1570	31.4	(11.77)	8.7	41.3	8.8
CL2070						
6 inch spacing	1440	28.8	(38.20)	11.7	41.1	7.2
12 inch spacing	1405	28.1	(44.42)	13.0	41.5	7.8
Broadcast & Harrowed	1410	28.2	(58.15)	16.7	40.6	8.5
LSD	101.5	2.03			0.90	2.07
CV%	4.6	4.6			1.5	14.0

Note: Brackets in contribution margin reflect a negative value.

Discussion: There were no significant yield or stand differences among seed placement treatments within a variety. Contribution margins reflect differences in yield, green seed, seed cost and costs of seeding (JD 9350 press drill vs. custom broadcasting and harrowing). The increased cost of custom broadcasting and harrowing was not offset with increased yield. However, the broadcast treatment of Q2 had a better contribution margin than the 12 inch spacing due to lower green seed and slightly higher yield. The 12 inch spacing reached canopy closer 3 - 5 days later than the 6 inch spacing and broadcast treatments for both varieties, however it did not affect yield. The late season and late maturing varieties did not allow an accurate comparison of maturity differences between the 6 inch and 12 inch spacings because most of the plots were swathed before reaching maturity.

XIII SCLEROTINIA STEM ROT (WHITE MOLD) CONTROL TRIAL

Objective: To evaluate sclerotinia control using a fungicide on yield, quality and economic return on canola.

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 crop density and weather conditions or irrigation, heavy infections can develop almost anywhere. In some cases half the potential yield of a crop may be lost to sclerotinia.

Methodology: The trial was seeded with the variety LG3260. Spraying was done using twin-jet nozzles at 75 psi. The treatments included:

A) Check - no treatment
B) Quadris - 9.6 oz./ac in 20 gal spray solution applied at 10 to 20% bloom
C) Quadris - 9.6 oz./ac in 20 gal spray solution applied at 40 to 50% bloom
D) Quadris - 9.6 oz./ac in 10 gal spray solution applied at 10 to 20% bloom

Infection readings were taken by sampling 100 nonswathed plants in three random areas of each plot along the edge of the swathed area.

Observation: The trial was originally seeded on June 3 with four replicates in a randomized block design. However, poor stands and crusted soil conditions required it to be cultivated and reseeded on June 19. Additional heavy rains in late June resulted in a thinner stand than desired. A petal test kit was conducted on July 28 at 10% bloom and showed 7% infection. Dry conditions before and during flowering resulted in low levels of infections. Green seed counts varied from 8 to 9%.

Results:

SCLEROTINIA STEM ROT CONTROL TRIAL Roseau, MN						
Treatment	**Yield (%)**	**Yield (lb/ac)**	**Yield (bu/ac)**	**Oil (%)**	**Plants Infected (%)**	**Contribution Margin ($/ac)**
Check (No fungicide)	100	1550	31.0	47.3	14.8	16.14
20 gal/10-20% bloom	101	1570	31.4	47.3	13.4	(10.14)
20 gal/40-50% bloom	95	1475	29.5	47.4	11.1	(17.78)
10 gal/10-20% bloom	99	1530	30.6	47.3	12.8	(9.38)
LSD CV%		143.5 7.2	2.87 7.2	0.65 1.1	5.74 27.0	

Note: Bracket in contribution margin reflects a negative value.

Discussion: None of the fungicide treatments significantly improved yield or reduced infection levels. The low disease pressure and dry conditions before and during flowering resulted in little development of sclerotinia. Contribution margins reflect the differences in yield and fungicide costs. The only treatment that resulted in a positive contribution margin was the untreated check.

XIV SEED TREATMENT TRIAL

Objective: To evaluate the impact of various seed treatments on yield, quality, protection from flea beetle and contribution margin of *B. napus* canola.

Background: The most widespread problem of canola production is poor stand establishment. A seedling disease complex including pathogens such as *Rhizoctonia solani*, along with *Fusarium* and *Pythium* species, can cause poor stand establishment. Seed treatment fungicides are used extensively in canola production as the first line of defence to control seedling disease. The application of an insecticidal seed treatment, in combination with the fungicidal seed treatment, may provide the added benefit of early season flea beetle control in areas where they are a problem. Benlate is a fungicide that has been available for canola in the U.S., primarily for control of seed borne blackleg. Gaucho is an insecticidal seed treatment primarily for control of flea beetles. Helix is a new seed treatment containing fungicides to control seedling diseases and an insecticide for flea beetle control.

Methodology: The seed treatment trial consisted of two varieties, Eagle (open pollinated) and KC-701 (hybrid) and three seed treatments in a randomized block system. The treatments were:

A) Eagle treated with Benlate only
B) Eagle treated with Benlate & Gaucho
C) Eagle treated with Helix
D) KC-701 treated with Benlate only
E) KC-701 treated with Benlate & Gaucho
F) KC-701 treated with Helix

Observation: The trial was seeded on June 3 with four replicates. One replicate was lost due to flooding. A tremendous amount of rain after seeding resulted in water standing in all low spots and in the wheel tracks. These areas were so water logged that most of the seed did not germinate for a few days, resulting in two distinct flushes. The first flush was uniform but thin. The second flush emerged approximately 12 days after the first. The dry conditions that followed the rain created a crusting problem for the second flush, which slowed emergence and reduced overall stand. Flea beetle damage assessments were taken at 14 and 21 days after seeding and showed little to no damage. Weed control required a three-step approach. Assure II (10 oz/ac) was applied at emerging to 1 leaf stage to control a heavy infestation of wild oats. Herbicide 273 (1.5 pts/ac) was applied at the 2 to 5 leaf stage of the crop to control a heavy infestation of smartweed. Stinger (1/4 pt/ac) was applied at the 4 leaf to rosette stage of the crop to control a heavy infestation of biennial wormwood that the Herbicide 273 did not control. The entire trial was heavily infested with aster yellows, 30-50% of plants showed signs of infection (see Re-Seeding Trial Observations, for further information, page 174). The KC-701 treatments flowered later than the Eagle and appeared to be more heavily infected with aster yellows than the Eagle treatments. The trial was

sprayed with Capture (2.5 oz/ac) to control lygus bugs (average 12 lygus/10 sweeps at early flower) on July 22.

Results:

SEED TREATMENT TRIAL
Roseau, MN

Treatment	Yield (lb/ac)	Yield (bu/ac)	Contribution Margin ($/ac)	Green Seed (%)	Oil (%)	Seed Cost ($/ac)*	Plant Stand (Pl/ft^2)
Eagle							
Benlate	715	14.3	(68.00)	3.3	45.4	9.02	6.7
Benlate & Gaucho	1005	20.1	(45.30)	2.3	45.8	15.40	6.2
Helix	965	19.3	(48.93)	2.0	45.4	17.60	5.6
KC-701							
Benlate	615	12.3	(88.08)	3.7	45.5	19.25	3.3
Benlate & Gaucho	910	18.2	(67.56)	4.0	45.5	25.85	4.0
Helix	870	17.4	(73.60)	4.0	45.3	28.05	4.2
LSD	141.5	2.83			0.86		1.93
CV%	11.3	11.3			1.3		26.1

Note: Bracket in contribution margin reflects a negative value.
Note: *These prices are based on consultation with Industry representatives.

Discussion: Gaucho and Helix (insecticide seed treatments) provided significant yield increases compared to the Benlate only seed treatment. This was not expected due to the lack of flea beetle pressure at the site. However, there was some lygus bug pressure as well as high levels of six spotted (aster) leafhoppers. Contribution margins reflect the differences in yield, green seed, seed treatment and seed costs. Overall values are very low due to low yields and the intensive weed management program required to protect the crop. Plant stands of Eagle were higher than KC-701. However, seed treatments within each variety had no effect on plant stands.

XVI STRAIGHT COMBINING VS SWATHING *B. NAPUS* TRIAL

Objective: To determine the effects of swathing and straight combining of selected *B. napus* varieties on yield, quality and contribution margin. A secondary objective will determine what conditions mitigate harvest losses due to straight combining.

Background: Work at Canola Production Centres has shown that straight combining is generally not a viable option compared to swathing *B. napus* varieties. However, success of straight combining will be affected by environmental and crop factors.

Methodology: Two plots of selected varieties were seeded side by side within each replicate of the variety trial. One was swathed at 20-30% seed color change and the other was straight combined.

Observation: A Massey Ferguson 760 was used for harvesting this trial. Straight combining was done with a 20-foot header and pick-up reel. The straight combined and swathed Cavalier and the swathed Hyola 401 plots were harvested on October 11. The rest of the swathed plots were harvested on October 22 and the straight combined plots on October 23. Seed moisture varied among the varieties. The Cavalier straight combined plots averaged 2% more moisture than the swathed plots. The Ebony and Quantum straight combined plots averaged 4% less moisture than the swathed plots. The Cavalier straight combined plots were harvested before high winds came through the area. These showed little sign of shattering and fed nicely into the header. The rest of the straight combined plots were harvested after high winds (30-40 mph). This resulted in severe uneven lodging, which made harvesting difficult due to the crop bunching up on the header. These plots also showed evidence of shattering.

Results:

STRAIGHT COMBINING VS SWATHING *B. NAPUS* TRIAL Roseau, MN						
Treatment	**Yield (%)**	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Green Seed (%)**	**Oil (%)**
Cavalier						
Straight Combined	106	1495	29.9	(18.46)	10.5	48.7
Swathed	100	1415	28.3	(3.83)	4.8	47.4
Ebony						
Straight Combined	59	920	18.4	(81.06)	16.3	48.2
Swathed	100	1570	31.4	(14.48)	9.7	47.9
Hyola 401						
Straight Combined	54	1035	20.7	(60.46)	8.5	45.3
Swathed	100	1925	38.5	20.25	6.1	43.9
Quantum						
Straight Combined	53	810	16.2	(86.88)	17.7	45.6
Swathed	100	1520	30.4	(23.39)	11.6	45.1
LSD for method within variety		164.0	3.28			1.04
CV%		9.2	9.2			1.4

Note: Bracket in contribution margin relfects a negative value.

Discussions:

All yields were adjusted to 9% moisture. The straight combined Cavalier yielded more than the swathed plots. These increases are likely due to the ability of the later formed pods to finish filling after the swathing period (30% seed color change). The Cavalier straight combined plots were harvested before the rest of the varieties because they were the only plots ready and the weather forecast called for high winds. The straight combined Hyola 401, Quantum and Ebony resulted in yields which were significantly lower than the swathed plots. Contribution margins reflect differences in yield, seed costs and cost of swathing. Higher oil content in the straight combined plots is a common occurrence since oil is the last component produced in the seed. This trial resembles results observed in Canadian trials with *B. napus*. In the majority of trials, straight combining resulted in significant losses compared to the swathed plots.

Straight combining of *B. napus* varieties appears to work well when weather conditions are favorable (no damaging storms or high winds) and when the plots are lodged and well knitted.

XIII SYSTEMS COMPARISON TRIAL

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

Background: The introduction of canola with novel traits for herbicide tolerance has given producers many options for herbicide and variety selection. The greatest return will occur by choosing the most appropriate combination of variety and herbicide for each field. Factors to consider beyond the performance of the variety include weed population, weed spectrum, tillage system and herbicide rotation. Entries in the systems comparison trial were on a contract basis.

Methodology: Each treatment was replicated four times in a randomized block design. The canola varieties with novel traits for herbicide tolerance were compared to the conventional varieties Hyola 401 and Quantum and a conventional herbicide program. Weeds were controlled using the appropriate herbicides for each system.

Varieties used were:

- Roundup Ready - 45A51, Golden Ready RR, LG3345, LG3275, Minot, Quest and SW RideR
- Smart (Raptor Tolerant) - 45A71, 46A76
- Liberty Link - InVigor 2373 and Phoenix
- Conventional - Hyola 401, Quantum

Chemicals used to control weeds were:

- Roundup Ready - Roundup Ultra (1 pt/ac), ammonium sulphate (1.0 lb/ac)
- Smart – Raptor (4 oz/ac), non-ionic surfactant (3.5 oz/ac), Ammonium Sulphate (2.5 lb/ac)
- Liberty Link - Liberty (34 oz/ac.), ammonium sulphate (3.0 lb/ac)
- Conventional - Assure II (10 oz/ac), Herbimax (1 pt/ac), Stinger (1/4 pt/ac)

Observation: The trial was seeded on June 19 into adequate to excessive moisture conditions. Emergence was good. Herbicides were applied at the 4-leaf stage of the crop. High winds prevented spraying until two hours before dark. Weed pressure was light with the primary weeds being biennial wormwood, green foxtail, wild oats, wild buckwheat, smartweed, and curly dock. All systems controlled weeds well. Liberty appeared to cause rapid browning of six inch biennial wormwood. Five weeks after spraying, six inch biennial wormwood appeared stunted in the Roundup, Raptor and conventional plots but were not present in the Liberty plots. The late planting date and cool growing conditions caused the varieties to mature late in the season. Swathing started in mid-September when varieties reached 20% seed color change to allow more time to cure. Quantum was the only variety swathed on September 28 at a seed color change of 10%. This was done because the cool conditions at the end of September did not allow the seed to change color and the swaths needed time to cure before winter.

Results:

SYSTEMS COMPARISON TRIAL Roseau, MN								
System	Yield (%)	Yield (lb/ac)	Yield (bu/ac)	Contribution Margin ($/ac)	Green Seed (%)	Oil (%)	Growing Degree Days	Days To Maturity
Conventional								
Hyola 401	100	1760	35.2	23.74	3.0	44.5	1029	95
Quantum	88	1555	31.1	(17.10)	11.0	45.1	1050	103
Liberty Link								
InVigor 2373	99	1750	35.0	20.06	2.7	46.6	1029	95
Phoenix	83	1460	29.2	5.91	4.3	47.5	1029	95
Roundup Ready								
Minot	94	1650	33.0	20.98	5.0	46.5	1029	95
Quest	93	1630	32.6	23.70	3.5	46.1	1029	95
LG3345	90	1580	31.6	13.81	5.3	46.7	1021	94
45A51	88	1550	28.5	(0.25)	4.3	45.0	1013	93
LG3275	86	1510	30.2	1.51	5.3	45.8	1021	94
Golden Ready RR	84	1485	29.7	1.04	5.3	45.5	1033	96
SW RideR	80	1415	28.3	1.95	3.8	45.3	1033	96
Smart (Raptor Tolerant)								
46A76	98	1730	34.6	20.66	4.5	45.6	1037	97
45A71	81	1425	28.5	2.50	2.8	44.2	1033	96
LSD CV%		153.0 8.1	3.06 8.1			0.98 1.8		

Note: Bracket in contribution margin reflects a negative value.

Discussion: InVigor 2373, Minot, Quest and 46A76 all yielded similar to the check (Hyola 401). All the other varieties yielded similar to the other conventional variety (Quantum). Phoenix, LG3345, InVigor 2373, and Minot all had significantly higher oil content. Contribution margins reflect differences in seed cost, yield, green seed and chemical costs for weed control. InVigor 2373, Minot, Quest and 46A76 all provided similar contribution margins to the check (Hyola 401) and provided alternative methods of weed control.

XIV TIME OF WEED REMOVAL TRIAL

Objective: To compare the effect of time of weed removal on yield and quality of canola.

Background: Since canola is slow growing and slow to cover the ground in the early growth stages, it is not a strong weed competitor. Weed removal and the proper time to remove weeds has been a constant source of frustration to producers. Producers will often delay post-emergent herbicide applications in an attempt to avoid late flushes of weeds, which they feel will add to the bank of weed seeds in the soil or require additional herbicide applications and increased input costs. Work conducted by Harker, et al (Agriculture & Agri-Food Canada) along with previous work at the Canola Production Centres has indicated economic benefits of removing weeds early in the crop's development.

Methodology: The time of weed removal trial consisted of the following varieties and stages of herbicide application in a split plot design:

A) Conventional variety Quantum
- Assure II (10 oz/ac), Herbimax (1 pt/ac) & Stinger (1/4 pt/ac) applied at 1 to 3 leaf stage
- Assure II (10 oz/ac), Herbimax (1 pt/ac) & Stinger (1/4 pt/ac) applied at 4 to 6 leaf stage

B) Smart (Raptor tolerant) variety 45A71
- Raptor (4 oz/ac) non-ionic surfactant (3.5 oz/ac), ammonium sulphate (2.5 lb/ac) applied at 1 to 3 leaf stage
- Raptor (4 oz/ac) non-ionic surfactant (3.5 oz/ac), ammonium sulphate (2.5 lb/ac) applied at 4 to 6 leaf stage

C) Roundup Ready variety LG3345
- Roundup Ultra (1 pt/ac), ammonium sulphate (1.0 lb/ac) applied at 1 to 3 leaf stage
- Roundup Ultra (1 pt/ac), ammonium sulphate (1.0 lb/ac) applied at 4 to 6 leaf stage

The herbicides were applied at the above growth stages of the canola.

Observations: The trial was integrated with the Systems Trial (see previous section). Weed pressure was light with primary weeds being biennial wormwood, green foxtail, wild oats, wild buckwheat, smartweed, and curly dock.

Results:

TIME OF WEED REMOVAL TRIAL Roseau, MN					
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Green Seed (%)**	**Oil (%)**
45A71					
1 to 3 leaf	1425	28.5	(4.61)	4.5	44.7
4 to 6 leaf	1425	28.5	2.50	2.8	44.2
LG3345					
1 to 3 leaf	1530	30.6	5.43	6.5	46.0
4 to 6 leaf	1580	31.6	13.81	5.3	46.7
Quantum					
1 to 3 leaf	1465	29.3	(20.08)	9.8	45.2
4 to 6 leaf	1555	31.1	(17.10)	11.0	45.1
LSD	204.8	4.10			1.03
CV%	13.1	13.1			1.5

Note: Bracket in contribution margin reflects a negative value.

Discussion: Time of weed removal had no effect on yield or oil content. Due to the low level of weed pressure, early weed removal did not show the yield benefits observed in other trials conducted previously. Under heavy weed pressure, early weed removal is important to reduce weed competition to allow the crop to reach its full yield potential.

XVIII SUMMARY

The second year of the Minnesota Canola Production Centre program has been a success. The trials at the Roseau site were chosen to demonstrate basic canola production principles as well as look at new technologies. While many of the trends in the trials reflected past results from the Canadian CPC program, others turned out different than long term trends. Future work will help reveal if these unexpected trends are regionally specific, or if they were just a feature of this year's 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 and the site for next year will be near Thief River Falls, Minnesota. 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.

XIX FIELD STAFF INFORMATION

Derwyn Hammond Agronomist	1 Wexford Bay Brandon, Manitoba Canada R7B 3K4 Email: hammondd@canola-council.org	Tel: (204) 729-9011 Fax: (204) 729-9011
David LeGare Scientist	1102 Groveland Ave. Crookston, Minnesota 56716 Email: dlegare@mail.crk.umn.edu	Tel: (218) 281-4487 Fax: (218) 281-4487
For additional information:	The Minnesota Canola Council 1306 W. Co. F Suite 109 St. Paul, Minnesota 55112 Email: MNCANOLA@aol.com	Tel: (800) 499-0696 Fax: (651) 638-0756

- THE END-