2005

Canola Research

University of Minnesota

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MINNESOTA CANOLA PRODUCTION CENTRE RESULTS

ADDITIONAL UNIVERSITY OF MINNESOTA CANOLA RESULTS

I ACKNOWLEDGEMENTS AND FUNDING

Minnesota Canola Production Centre

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

This year's Canola Production Centre was funded by a grant from the North Central Regional Canola Research Program.

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

Thank you all!

II LOCAL AND REGIONAL SPONSORS

Dave LeGare, Scientist - Agronomy Dept. - University of Minnesota
Dr. Paul Porter, Assoc. Prof. - Agronomy Dept. - Univ. of Minnesota

Location: Grygla - West = 61 acres; East = 9 acres

Land: Arnold, Todd and Brian Stanley

Seed: Bayer CropScience - InVigor 4870 (2 bags)
Interstate Seed - Hyola 401, Hyola 357 Magnum (2 bags)
Croplan Genetics - HyCLASS 905

Fertilizer: Agriliance (73 acres) West field
Wilbur Ellis (14 acres) anhydrous East field

Pesticides: BASF - Ronilan (73 acres), Beyond (3 acres)
Bayer CropScience - Liberty (30 acres)
DuPont - Assure II (13 acres)
Monsanto - Roundup Ultra Max II (50 acres)

Equipment and Labor: Dave Severson - cement mixer
Brian Stanley - combine and semi grain truck
Trever Irlbeck - gravity wagons
Farmer's Union Oil Co., Grygla - fertilizer application, soil testing, soil analysis
Farmer's Union Oil Co., West Plant, Roseau - weigh wagon

Field Day: Eldon Neuschwander - hay racks, John Smeby - bales
Howard Hoven - Pork and catering,
American State Bank of Grygla - Coffee and rolls
Gary Grondahl of Wally's Supermarket - desert

Meal and Golf events:

ADM	Dow AgroSciences	Pioneer Hi-Bred Int'l Inc.
BASF	DuPont Crop Protection	Proseed, Inc.
Bayer CropScience	Farm Credit Services	Prosper
Border State Bank – Ros.	Farmers Union Oil – Ros.	Roseau Farm Service
Bunge Canada	Gustafson, LLC	Syngenta Seed Trtmt.
CerexAgri	Interstate Seed Company	UAP Northern Plains
Cheminova	Monsanto	
Citizens State Bank – Ros.	Northwest Grain	

Comments: We would like to thank **Martin Tubby, Nichole Olson, Britney Thronson, James (Reid) Dusheck** and **Karen Andol** for all of their hard work and dedication through-out the growing season. Thanks to **Bob Thompson** and the crew at **Farmer's Union Oil - Grygla** for their assistance. Thanks to the staff of the **Minnesota Canola Council** for organizing the field day. And a special thank you to Dave's family (**Sue, Laura** and **Katie**) for their patience with him during the growing 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 were a joint effort between producer groups, industry representatives, and government and extension personnel. Field scale agronomic trials utilizing commercial farm equipment were conducted at the sites, and the information generated was 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 also allowed the information from all sites to be easily shared. Funding for the project was approved in April 1998.

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 where it stayed through 2002. In 2003 and 2004, the CPC returned to the Roseau area. This year the CPC moved to the Grygla area. The field day site tour was held on June 28 in the morning with a noon lunch at Roseau and a golf tournament after the lunch. 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 date.

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.

Canada has not had Production Centres since 2002. In the fall of 2002 the Canola Council of Canada (CCC) initiated some strategic planning, and the Canadian canola industry identified a goal of achieving a sustained production and market demand base of seven million tonnes of canola by 2007. For the crop production area of CCC this has meant a shift from the Canola Production Centre program of field scale agronomy trials to a new extension focused program called Canola Advantage. This program focuses on providing producers with production information targeted at improving profitability, in order to make canola one of their best cropping options. Activities within the new program fall into one of five key areas including just-in-time information, skill development, optimizing production practices, production solutions, and research. Growers that would like to receive the "Canola Watch" report (via e-mail) can sign up by e-mailing the Canola Council of Canada at admin@canola-council.org and ask for it.

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, labor and management.

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.

DAP: Days after planting

Days to maturity: Actual calendar days from the date of seeding to approximately 30% seed color 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).

Height: The average plant height in inches at swathing time.

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 (Celcius) and dividing the total by two to obtain a daily average. The base temperature for canola of 0°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 1432 to 1557 growing degree-days.

Least significant difference (LSD): The difference required for one treatment to be statistically different from another at the **95%** confidence level, expressed in identical units. For example, if Variety A yielded 1900 lb/ac and Variety B yielded 2050 bu/ac and the LSD for that trial was 112.5, then Variety A is statistically different from Variety B because 2050 - 1900 = 150, which is greater than 112.5. If the difference were less than 112.5, then the varieties would not be statistically different from each other.

Lodging rating: A measure of the lodging resistance of a particular variety where 1 = erect and 9 = flat on the ground.

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).

V ECONOMIC ANALYSIS

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

Green Seed (%)	$/100 lb At Elevator	Plus $0.68 Loan Deficiency Payment (LDP)	$/bu
0 - 2.0	9.00	9.68	4.84
2.1-3.0	8.55	9.23	4.62
3.1-4.0	8.32	9.00	4.50

Note 1: *The green seed was determined by using a 300 seed crush strip test done on each sample from every plot within a particular project trial.*

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 the local dealer for summer 2005.

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 VARIETY SEED COSTS

B. napus	$/lb	Distributor	*B. napus*	$/lb	Distributor
45H21	5.56	Pioneer Hi-Bred	InVigor 4870	5.42	Bayer CropScience
45H72	5.26	Pioneer Hi-Bred	InVigor 5630	5.42	Bayer CropScience
DKL 38-25	5.30	DeKalb/Monsanto	IS 7145 RR	4.96	Interstate Seed
HyCLASS 905	5.18	Croplan Genetics	Roughrider Plus	3.66	Proseed
Hyola 357 Magnum	5.16	Interstate Seed	SW Titan RR	4.96	Interstate Seed
Hyola 401	4.36	Interstate Seed			

Note: Seed costs may vary. Prices reflect the Minnesota suggested retail for spring of 2005 with Helix Xtra or Prosper 400 seed treatment.

PRODUCT INFORMATION			
Product	**Active Ingredient**	**Manufacturer/ Distributor**	**$/Unit Cost**
Assure II	quizalofop-p-ethyl	DuPont Agri. Prod.	125.00/gal
Ammonium Sulfate	ammonium sulfate	Agriliance	0.35/lb
Beyond	imazamox	BASF	504.00/gal
Blend Master	non-ionic surfactant + ammonium sulfate	United Agri Products	16.00/gal
Helix XTra	fludioxonil + mefenoxam + difenoconazole + thiamethoxam	Syngenta	1.26/lb seed
Gramoxone Inteon	paraquat dichloride	Syngenta	29.50/gal
Liberty	glufosinate ammonium	Bayer CropScience	62.50/gal
Preference	non-ionic surfactant	Agriliance	19.75/gal
Prime Oil	crop oil concentrate	Agriliance	6.75/gal
Prosper 400	carboxin + thiram + metalaxyl + clothianidin	Gustafson	1.16/lb seed
Ronilan	vinclozolin	BASF	19.75/lb
Roundup Ultra Max II*	glyphosate	Monsanto	57.00/gal
Spodnam	polymer of cyclohexane	Miller Chemical	85.00/gal
Stinger	clopyralid	Dow AgroSciences	479.00/gal
Tactic	sticker/spreader	Loveland Ind.	64.00/gal
Trust	triflurilan		18.75/gal

*Note: $18/ac CUA (Canola Use Agreement) includes two applications of Roundup Ultra Max II (11oz/ac).

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	250.00	0.37 (of N)
Ammonium Sulfate	21-0-0-24	250.00	0.20 (of S)
Phosphate	18-46-0	295.00	0.18
Phosphate	11-52-0	298.00	0.21
Potassium	0-0-60	232.00	0.19
Urea	46-0-0	340.00	0.37
Ammonium Nitrate	34-0-0	540.00	0.79

Machinery Cost: (higher fall fuel costs taken into consideration)

Fuel, Lube and Repair costs: $ 39.92/ac
Extra spray pass: add $ 0.76/ac
Straight combine: subtract $ 1.86/ac
BISO header rental: $ 6.00/ac

Additional Machinery Costs: (Custom Application)

Aerial $ 5.00/ac
Fertilizer application $ 4.00/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 in spring 2005. Costs were adjusted for the higher fuel costs at harvest time.

Minnesota State Check-off:

$0.06 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 2005, 7.0% per annum over six months was used.

C. *Economic Results Report (example)*

Site: Grygla, MN

Variety and System Comparison Trial: Hyola 401

CALCULATION OF VALUE OF PRODUCTION				
Yield (lb/ac)	**X**	**Price ($/cwt)**	**=**	**Value of Production**
1348		9.68		130.49

CALCULATION OF VARIABLE COSTS ($/ac)	
Seed	21.80
Fertilizer	42.60
Herbicides	17.84
Fungicides	20.20
Insecticides	0.00
Machinery	39.92
Drying costs	0.00
Green seed discount	0.00
Check-off	0.81
Interest/opportunity	4.95
Total Variable Costs	148.12

CALCULATION OF CONTRIBUTION MARGIN				
Value of Production ($/ac)	**-**	**Variable Costs ($/ac)**	**=**	**Contribution Margin ($/ac)**
130.49		148.12		(17.63)

Note: Brackets indicate a negative contribution margin.

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

VI SITE INFORMATION

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

West site trials: Systems, Straight combining, and Top-dress trials.

Co-operators: Arnold and Todd Stanley

Previous crop: Wheat - Tile drained field

Soil test results: (AGVISE Laboratories)

Organic matter content: 2.4 %

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

Nitrogen -	10, 62 lb/ac
Phosphorus -	126 lb/ac
Potassium -	246 lb/ac
Sulfur -	24, 480+ lb/ac

Micronutrient Levels: (0-6")

Boron -	0.8 lb/ac
Copper -	0.9 lb/ac
Iron -	72.0 lb/ac
Zinc -	3.0 lb/ac
Manganese -	4.0 lb/ac

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

Target Yield (lb/ac)	Probability of Precip. (%)	Precip. Required (inches)	Nitrogen	Phosphate	Potash	Sulphur
2000	N/A	N/A	92	0	0	25

Target yield: 2000 lb/ac

Fertilizer applied:
Syst & Str C:N - 90 lb/ac P - 0 lb/ac K - 0 lb/ac S - 10 lb/ac
Top-dress: N - 10 lb/ac P - 0 lb/ac K - 0 lb/ac S - 12 lb/ac
Seed placed:N - 3 lb/ac P - 12 lb/ac K - 0 lb/ac S - 0 lb/ac

Soil association/zone:
Systems: Strandquist Loam and Kratka Fine Sandy Loam
Straight combining: Strandquist Loam, Kratka Fine Sandy Loam, and Smiley Loam
Topdress : Strandquist Loam and Smiley Loam

Soil texture: Loam to sandy loam

Soil pH: 7.9

Salinity: 0.26, 0.44 mmho (0-6", 0-24") (slightly saline)

Tillage operations: The field was chisel plowed in the fall of 2004. Broadcast fertilizer rates as well as the PPI fertilizer treatments for the Top dressing trial were applied the morning of April 23 prior to incorporation with an S-tine harrow that afternoon. Trust was applied to the conventional treatment of the systems trial and incorporated that evening after flagging. Five days later the Trust was incorporated again prior to seeding.

East site trial: MicroEssentials S15 Trial

Co-operators: Arnold and Brian Stanley

Previous crop: Soybeans - Not tile drained

Soil test results: (AGVISE Laboratories)

Organic matter content: 2.1 %

Macronutrient Levels: (0-6", 0-18")		*Micronutrient Levels: (0-6")*	
Nitrogen -	11, 26 lb/ac	Boron -	0.4 lb/ac
Phosphorus -	12 lb/ac	Copper -	0.6 lb/ac
Potassium -	40 lb/ac	Iron -	62.4 lb/ac
Sulfur -	66, 276 lb/ac	Zinc -	1.1 lb/ac
		Manganese -	5.8 lb/ac

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

Target Yield (lb/ac)	Probability of Precip. (%)	Precip. Required (inches)	Nitrogen	Phosphate	Potash	Sulphur
2000	N/A	N/A	114	38	62	12

Target yield: 2000 lb/ac

Fertilizer applied: MicroEss.: N - 90 lb/ac P - 0 lb/ac K - 60 lb/ac S - 0 lb/ac

Soil association/zone: Eckvoll loamy fine sand

Soil texture: Loamy fine sand

Soil pH: 7.8

Salinity: 0.22, 0.23 mmho (0-6", 0-18") (slightly saline)

Tillage operations: The field was chisel plowed in the fall of 2004. Anhydrous ammonia was applied (90 lb/ac N) on April 28. On April 30 the field was cultivated with an S-tine harrow to get rid of the ridges from the spring application of anhydrous ammonia. The potassium fertilizer (100 lb/ac of 0-0-60) was banded perpendicular to the direction of the plots with the 9350 JD double disk press drill just prior to seeding.

Combined site summary:

Seeding method: Both sites were seeded with a John Deere 9350 double disc press drill.
Dates: April 28 to May 4, 2005
Depth: 1/2 to 1 inch deep
Rate: 5.0 lb/ac with the following exceptions:
4.0 lb/ac - InVigor 4870 and InVigor 5630

Herbicides applied:
A) Conventional variety - Trust (2 pt/ac) PPI, Assure II (12 oz/ac), crop oil concentrate (13 oz/ac)
B) Liberty Link varieties in systems and straight combining - Liberty (34 oz/ac), ammonium sulfate (3.0 lb/ac)
C) Clearfield variety - Beyond (4 oz/ac), non-ionic surfactant (3.5 oz/ac), ammonium sulfate (2.5 lb/ac)
D) Roundup Ready varieties in the systems, MicroEssentials, and top-dress trials - Roundup Ultra Max II (16 oz/ac), ammonium sulfate (1.0 lb/ac)

Fungicide applied: Ronilan (12 oz/ac) + Tactic (3.2 oz/ac) on June 25 at 15 to 50% bloom

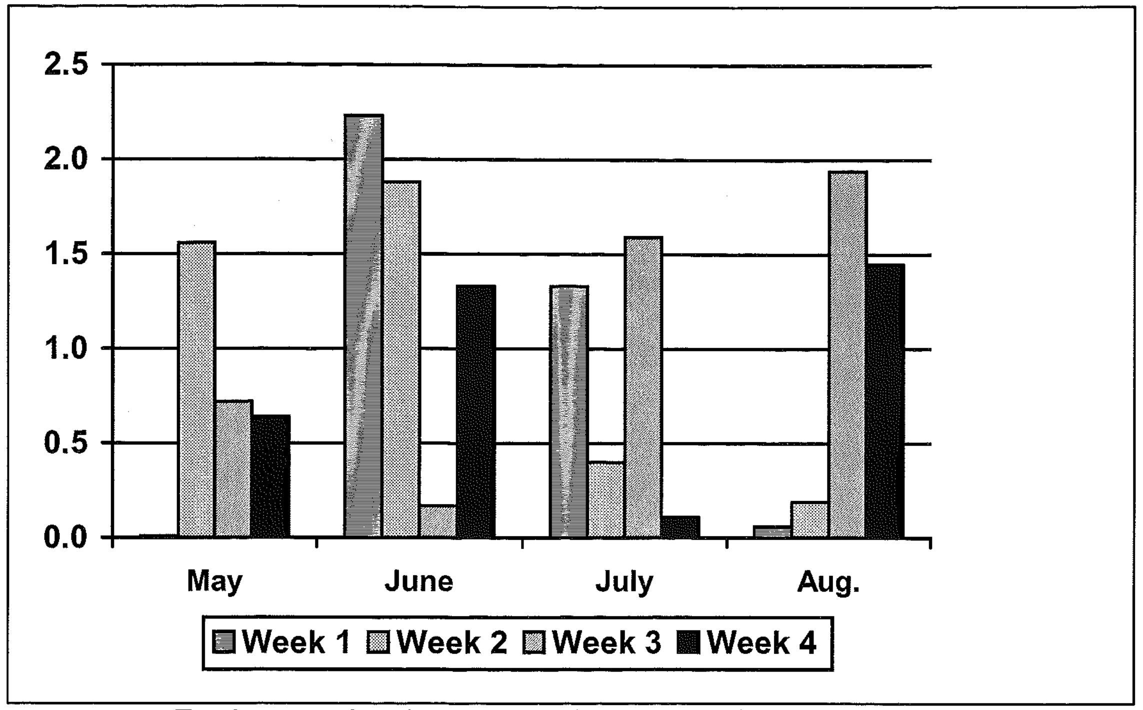
Insecticide applied: None

Swathing: Started: July 28 Finished: August 10

Combining: Started: August 16 Finished: September 3

Comments: The West site was tile drained and was able to be worked April 23 while most of the fields around there were still very wet. After seeding, the crop got a slow start due to cold temperatures the first half of May. Soil moisture was adequate to a little less than adequate until an inch of rain fell on May 9. The monsoon season began on May 21 and it rained nearly every day for three weeks. Parts of the West site were under standing water for days, even though the field was tile drained. The East site was not tiled and that site had extensive areas that were under water for long periods of time resulting in total crop loss in those areas. Large portions of the MicroEssentials trial were not useable for data and the forth replicate was discarded due to too much crop loss. The Systems trial was on the west third of the west site and appeared to suffer more from the excessive rains. Herbicides were finally applied on June 9 and 10 when the crop was starting to bolt, which is later than optimal. The later part of June and July were more normal and provided favorable conditions for flowering. Damage from diamondback moths appeared during the early flowering period but numbers were not high enough to warrant chemical control. A hail storm with 40 to 50 mph winds on July 19 resulted in many bruised pods with damaged seeds, especially in the area of the field where the Systems trial was. Yields this year were expectedly lower than ideal due to the hail damage and the likelihood of nitrogen loss from the long wet period early in the season.

Rainfall



Total accumulated moisture = 15.61inches (396.5 mm)

VII 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 5.0 lb/ac with the exception of the InVigor varieties, which were seeded at 4.0 lb/ac. The trial was laid out as a modified RCB design with four replicates. Roundup Ready varieties were grouped together to facilitate timely herbicide spraying and reduce drift damage to non-Roundup Ready plots, which were also grouped together. All varieties were treated with either Helix Xtra or Prosper 400 seed treatment and had the same tillage, fertilizer and post-emergent fungicide treatments. The check variety for this trial was Hyola 401, treated with conventional herbicides. All the herbicide tolerant varieties were sprayed with their respective herbicides (see *Site Information – Herbicides applied*). Swathing commenced when seed color change was about 30 to 40% on the main stem, and harvest was completed when suitable conditions existed.

Observations: The trial was fertilized and S-tine harrowed once on April 23. Trust was applied to the conventional treatment and incorporated that evening after flagging. Five days later it was incorporated again prior to seeding. The trial was seeded on April 29 into good moisture. Cool weather provided slow emergence and delayed development. A very wet period began in late May and lasted until mid-June, preventing timely spraying of the trial. The crop was at the 3 to 4 leaf stage on June 1, but the field was way too muddy to spray. The trial was finally sprayed on June 9 when the crop was about 5 to 6 leaf. It was still muddy and some ruts were made in the lower areas. Weed pressure consisted of heavy levels of common lambs quarter, and mostly light levels of wild mustard, volunteer wheat, quackgrass, wild buckwheat and night flowering catchfly. Weed control was good with all the systems. The excess moisture in late May and early June resulted in standing water in lower spots for a few days despite the field being tile drained. After the ditches went down, the field drained very nicely. A large portion of the first two reps of the trial was under excess water stress that was very visible at swathing time. A hail storm with 40 to 50 mph winds on July 19 resulted in many bruised pods with damaged seeds. A rough estimate of yield loss from the hail storm was about 200 to 300 lb/ac. No sclerotinia was observed in the trial at swathing time.

Results:

VARIETY AND SYSTEMS COMPARISON TRIAL Grygla, MN							
System / Variety	**Yield (%)**	**Yield (lb/ac)**	**Contrib. Margin ($/ac)**	**Oil (%)**	**Days To Bloom**	**GDD**	**Days To Mature**
Conventional (Check)							
Hyola 401	100	1348	(17.63)	42.7	51	1381	93
Liberty Link							
InVigor 5630	106	1423	(10.17)	44.1	50	1381	93
InVigor 4870	105	1410	(11.38)	43.4	53	1403	94
Clearfield							
Pioneer 45H72	100	1343	(21.75)	43.1	52	1381	93
Roundup Ready							
Hyola 357 Magnum	110	1478	(9.86)	42.3	50	1403	94
DKL 38-25	108	1455	(12.74)	44.0	52	1381	93
Pioneer 45H21	102	1376	(21.75)	42.9	52	1403	94
IS 7145 RR	99	1338	(22.28)	44.4	51	1343	91
SW Titan RR	93	1255	(30.24)	42.9	52	1381	93
Roughrider Plus	89	1193	(29.43)	43.4	54	1448	96
LSD (0.05)		100.5		0.93	0.8		1.1
CV%		5.6		1.5	1.0		0.8

Note: Brackets indicate a negative contribution margin.
GDD = Growing Degree Days (see *Definitions*).

Discussion: Hyola 357 Magnum had the highest yield and the highest contribution margin. This trial was in an area of the field that yielded rather poorly compared with the rest of the Production Centre. InVigor 4870 was used in the straight combining trial right next to the systems trial and averaged 470 lb/ac more yield in the other trial. The low yields of the systems trial resulted in disappointing economic returns. Contribution margins reflect differences in seed costs, herbicide costs, and yield. This year, the herbicide cost of the conventional system ($17.84/ac) was similar to the Roundup ($18.35), Liberty ($17.65) and Clearfield ($16.84) systems. The Roundup Technology fee of $18/ac was used even though only 16 of the allotted 22 oz/ac were used for weed control. The split application was not possible due to the wet weather. IS 7145 RR was the quickest to reach maturity and Roughrider Plus the slowest. The seed lot of Roughrider Plus that was used this year showed signs of low vigor early in the season and was delayed throughout the season. Hyola 401 and Roughrider Plus had green seed levels of 2.0 % while all the other varieties were below 1% green seed. IS 7145 RR, InVigor 5630 and DKL 38-25 had the highest oil content while Hyola 357 Magnum had the lowest.

VIII 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: The entries in the variety and systems comparison trial were all scored for lodging and harvestability. The **lodging score** was a visual score in which 1 = erect and 9 = flat. **Harvestability** was evaluated as swathing and combining were completed. Swathing and combining were each evaluated on a scale of one to five. 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. Crop conditions, weather and time of day can affect the harvestability of a variety.

Ratings:
- 1 = much better than average
- 2 = better than average
- 3 = equal to average
- 4 = worse than average
- 5 = much worse than average

Observations: The lodging that was observed this year was likely from the driving wind and hail that hit the trial about two weeks before swathing. Prior to the hail storm, there was no lodging. The plots were swathed with an 18 foot Versatile 400 swather equipped with a pick-up reel and side cutter bar. Most of the plots were swathed in the morning when they were wet with dew. They were harvested with an 8820 John Deere combine.

Results:

HARVESTABILITY TRIAL Variety and Systems Comparison Trial Grygla, MN				
Treatment	**Height (inches)**	**Lodging score**	**Swathing Rating**	**Combining Rating**
DEKALB DKL38-25	32	3.3	2.5	3
Hyola 357 Magnum	29	3.0	2.3	3
Hyola 401	28	3.0	3.0	3
InVigor 4870	36	3.5	2.5	3
InVigor 5630	33	3.5	2.5	3
IS 7145 RR	31	3.8	2.8	3
Pioneer 45H21	33	3.8	2.8	3
Pioneer 45H72	36	4.0	2.8	3
Roughrider Plus	32	3.8	2.8	3
SW Titan RR	33	3.3	2.0	3
LSD (0.05)	2.7	0.77	0.67	
CV%	5.7	15.3	17.8	

Discussion: Hyola 401 was the shortest and was a little more difficult to swath than normal because of that. There was very little difference among the varieties for swathing ease. No differences were observed during combining because the swaths were so light.

IX MICROESSENTIALS TRIAL

Objective: To evaluate the effects of seed-placed MicroEssentials S15 (13-33-0-15) on stand establishment, maturity and yield, as compared to MAP (11-52-0) alone and MAP plus AMS (21-0-0-24).

Background: Growers that have high levels of residual nitrogen but are lacking sulfur could use another option to apply that sulfur with the seed at seeding time. Using a mixture of ammonium sulfate (21-0-0-24) and MAP (11-52-0) can result in hot spots and skips in the field, if blending is not uniform or segregation occurs in the applicator. MicroEssentials S15 is a product that has an analysis of 13-33-0-15 (N-P-K-S) for each prill. This eliminates uneven distribution during seeding and should allow for greater safety to emerging seedlings. Half of the sulfur in MicroEssentials S15 is in the sulfate form for immediate use and half is in the elemental form for possible use later in the season. Microbial action is required to break down elemental sulfur into the sulfate form for the plant to use it. This process can take 24 to 48 months, particularly from applications in bands. Farmers also report ease of handling MicroEssentials S15 because it seems to clump less.

Methodology: A spring soil test of the field indicated 11 and 26 lb/ac of nitrogen at 0-6" and 0-18" depths, respectively. Phosphorous (6 ppm) and potassium (20 ppm) levels were low to very low at 0-6 inches deep. Sulfur tests indicated 66 and 276 lb/ac at 0-6" and 0-18" depths, respectively. The canola variety HyCLASS 905 was seeded at a rate of 5.0 lb/ac. The trial was laid out in a randomized complete block (RCB) design with four replicates. All fertilizer treatments were applied through the fertilizer tubes of the double disk drill openers on the John Deere 9350. The trial consisted of the following treatments:

Trtmt	Product lb/ac	Fertilizer Source	Target Analysis applied lb/ac (N-P-K-S)
1.	0	(Check) no Seed Placed Fertilizer	NA
2.	64	Monoammonium Phosphate (MAP)	(7-33-0-0)
3.	64	Monoammonium Phosphate (MAP)	(7-33-0-0)
	62	Ammonium Sulfate (AMS)	(13-0-0-15)
4.	100	MicroEssentials S15	(13-33-0-15)
5.	150	MicroEssentials S15	(20-50-0-23)

Stand counts were taken in three 2 foot X 2 foot areas in each plot and marked with a flag. Counts were taken at the exact same locations in the plots on four dates (13, 20, 27 days after planting and at harvest).

Observations: This trial was NOT in a tiled field. The trial was seeded on May 4 into marginal moisture. Cold dry weather resulted in slow emergence of the crop. Heavy persistent rains in late May and early June delayed the Roundup herbicide application until June 10. There were extensive areas of the trial that were still under water during spraying. Begin bloom date was estimated at 48 days after seeding for all the treatments because of the tremendous variability within each plot. Over half of the plots in the first three reps had 50 to 140 feet from each plot that was not used for yield data due to drowned out. The fourth rep was so heavily damaged from standing water that it was dropped from the study at harvest time. Fertilizer costs for the treatments were as follows: MAP only ($9.54/ac), MAP + AMS ($16.83/ac), 100 lb/ac MicroEssentials ($16.50/ac), and 150 lb/ac MicroEssentials ($25.91/ac). There were no differences in lodging. Green seed levels ranged from 0.3 to 1.0 percent. Statistics for the harvest stand counts are not provided because there were too many areas that were not usable due to drowned out.

Results:

MICROESSENTIALS TRIAL
Grygla, MN

Treatment (4 replicates)	Stand counts - plants/ft^2				Height
	13 DAP	20 DAP	27 DAP	Harvest	(inches)
No Seed Placed Fertilizer	8.1	11.0	9.5	7.3	28
64 lb/ac MAP only (Check)	6.4	8.1	8.5	5.5	28
64 lb/ac MAP + 62 lb/ac AMS	3.5	5.5	5.4	4.4	29
100 lb/ac MicroEssentials S15	5.3	7.4	7.1	6.3	28
150 lb/ac MicroEssentials S15	3.1	5.7	5.4	6.2	27
LSD (0.05)	1.61	2.34	2.07		5.0
CV%	19.8	20.1	18.7		9.5

MICROESSENTIALS TRIAL
Grygla, MN

Treatment (3 replicates)	**Yield (%)**	**Yield (lb/ac)**	**Oil (%)**	**Contr. Margin ($/ac)**	**Days To Mature**
No Seed Placed Fertilizer	93	1784	45.0	12.98	93
64 lb/ac MAP only (Check)	100	1925	44.6	16.70	94
64 lb/ac MAP + 62 lb/ac AMS	88	1689	43.7	(13.63)	94
100 lb/ac MicroEssentials S15	88	1687	43.6	(13.46)	94
150 lb/ac MicroEssentials S15	87	1673	43.6	(24.55)	96
LSD (0.05)		367.3	0.50		1.8
CV%		11.1	1.4		1.0

Discussion: The No Fertilizer treatment had significantly higher stand counts than the other treatments up to 14 days after planting. The MAP+AMS and 150 lb rate of MicroEssentials had significantly lower stand counts up to 14 days after planting. The cold dry weather after seeding helped express potential emergence problems with the different treatments.

Yield data from this trial is unreliable due to the excess water damage and location effect of certain treatments. There were no significant yield differences among treatments. The first two plots of the trial (No Fertilizer and MAP only) were on a slightly raised area of the field that did not experience the excess water stress like the rest of the trial and these two plots each yielded over 2200 lb/ac. The next plot was the MAP+AMS treatment which yielded over 1900 lb/ac. Even though the No Fertilizer and MAP only treatments had higher yields than the rest of the treatments, they did only because of the location of the two plots in the first replicate. Contribution margins reflect differences in yield and fertilizer costs. The higher oil content of the No Fertilizer and MAP only treatments was observed across all reps. The 150 lb/ac MicroEssentials S15 treatment matured two days later than the other treatments.

X NITROGEN TOP-DRESS TRIAL

Objective: To evaluate the potential yield and economic benefit of top-dress nitrogen compared to pre-plant incorporation (PPI).

Background: A recent study indicated that nitrogen (N) accumulation in canola increases from about 20 lb/ac to 100 lb/ac in a 30 day period beginning twenty days after emergence, with the most N accumulation (about 110 lb/ac) occurring 55 days after emergence (Phil Thomas, 2000). Rainfall prior to and during this period of rapid nitrogen accumulation could result in N losses due to denitrification or leaching of soil N beyond the canola-rooting zone. A split application of N, with a portion applied pre-plant and the remainder applied at pre-bolt, may be more efficiently utilized by the plants. A split application of N could also provide growers an additional month to evaluate their canola crop prior to purchasing and applying the additional N.

A 2001 study conducted at two locations in North Dakota showed a yield increase of up to 30% when split applications of N were used (Bob Henson, personal communications). The trial was repeated in 2002 with an average yield increase of 9% across four site-years when all or part of the N was applied at the 3 to 5-leaf stage (Eric Eriksmoen, personal communications).

In 2003, an extensive nitrogen application trial, including 7 nitrogen levels PPI and 4 nitrogen levels top-dressed, was conducted at 7 locations in North Dakota. Results from this trial showed significant yield increases from top dressing at one location (John Lukach, personal communications), and significant yield reductions in some cases. In 2004 this trial was repeated with significant yield increases from top dressing occurring at two of the seven locations. The only locations that demonstrated increased yield from topdressing were in the higher rainfall areas. Of the three sites that have higher rainfall amounts (Langdon, Valley City and Carrington, ND), top dressing provided significantly higher yields three out of ten site years.

In 2003 and 2004, topdressing trials at the Roseau CPC showed no yield difference between PPI and topdressing nitrogen levels of 30, 60 or 90 lb/ac.

Methodology: A spring soil test in the area of the field where this trial was to be conducted indicated 10 and 62 lb N/ac at 0-6" and 0-24" depths, respectively. The trial was S-tine harrowed on April 23 to incorporate the **base fertilizer** (10-0-0-12, N-P-K-S) application and the 30, 60 and 90 lb N/ac PPI treatments. The base fertilizer was used to bring the trial area up to a fertility level of 72-126-246-480 (N-P-K-S, 0-24 inches). The ammonium nitrate treatment was used as a measure of nitrogen loss from possible volatilization if the weather remained dry after top dressing. Urea requires approximately 0.30 inches of rain within a few days after application to avoid losses from volatilization. High temperatures increase the danger of nitrogen loss. The trial was laid

out in a randomized complete block (RCB) design with four replicates. The trial consisted of the following treatments:

Trt	PPI	Top-dress at 6 leaf to bolting stage	N source
	Additional N lbs/ac		
1.	0	0	Base fertilizer only - No extra N
2.	30	0	Base + (46-0-0) Urea
3.	0	30	Base + (46-0-0) Urea
4.	60	0	Base + (46-0-0) Urea (Check)
5.	0	60	Base + (46-0-0) Urea
6.	0	60	Base + (34-0-0) Ammonium Nitrate
7.	90	0	Base + (46-0-0) Urea
8.	0	90	Base + (46-0-0) Urea

Note: all treatments received 23 lb/ac MAP (3-12-0-0) with the seed

All PPI fertilizer was applied with a 12 foot Gandy drop spreader. All top-dress treatments were applied with a Gandy Orbit-air test plot granular applicator mounted on a 1070 JD tractor.

Observations: The canola variety Hyola 357 Magnum was seeded on April 29 into good moisture at a rate of 5.0 lb/ac. All treatments received 23 lb/ac MAP (3-12-0-0) with the seed. Emergence was uniform. Roundup Ultra Max II (16 oz/ac) was applied on June 6. All top-dress treatments were applied the evening of June 10 at the 6-leaf to bolting stage of the canola. The top dress treatments were applied using the Orbit-air because it was too muddy to use the drop spreader. The Orbit-air applicator was driven along the edge of the plots with the boom reaching half way into the plots from each side. This prevented driving on the area of the plots used for yield analysis. A rain event totaling 1.20 inches occurred less than 20 hours after application with the temperature staying below 70° F the whole time. No leaf burning was observed after the top-dress treatments. The canopies of the 60 and 90 lb/ac N top dress treatments at pod filling time were noticeably darker green and thicker than the equivalent PPI treatments.

An application cost of $4.00/ac was included in the fertilizer costs of the 30, 60 and 90 lb/ac N treatments whether it was applied PPI or top dress. No additional application charges were calculated into the cost of the top dress treatments because the little bit of fertilizer that was applied across all treatments before seeding could have been applied with the drill at no cost.

Results:

NITROGEN TOP DRESSING TRIAL Grygla, MN									
Nitrogen Source / Timing	**Yield (%)**	**Yield (lb/ac)**	**Oil (%)**	**Green Seed (%)**	**Contr. Marg ($/ac)**	**Fert. Cost ($/ac)**	**Begin Bloom (DAP)**	**Ht (in)**	**Days To Matur**
No Added Nitrogen + Base*									
No Fertilizer	75	1227	41.3	1.8	0.08	9.68	50	25	94
30 lb/ac Nitrogen + Base*									
Urea PPI	86	1413	41.0	2.3	(3.94)	24.73	50	28	94
Urea Topdress	96	1582	41.6	1.9	18.69	24.73	51	27	94
60 lb/ac Nitrogen + Base*									
Urea PPI	100	1640	41.8	1.6	12.99	35.61	50	29	94
Urea Topdress	114	1870	42.7	2.1	26.71	35.61	52	28	95
AMN Topdress[#]	115	1887	42.4	2.4	1.80	61.20	52	27	95
90 lb/ac Nitrogen + Base*									
Urea PPI	106	1739	41.3	1.9	12.14	45.64	50	28	94
Urea Topdress	128	2094	41.9	3.3	32.07	45.64	52	28	96
LSD (0.05)		117.7	0.69	1.31			0.6	2.3	1.0
CV%		4.8	1.1	40.9			0.7	5.6	0.7

* All treatments received a base fertilizer (10-0-0-12, N-P-K-S) broadcast applied; plus 23 lb/ac seed placed MAP.
[#] AMN = Dry Ammonium Nitrate (34-0-0)

Discussion: Top dressed treatments provided 12, 14 and 20% higher yield than the PPI treatments for the 30, 60 and 90 lb/ac N application rates respectively. There was no difference between the 60 lb/ac N urea and ammonium nitrate top dress treatments because there was adequate rain soon after application to incorporate the urea into the soil before any volatilization occurred. There was no significant difference between the 60 and 90 lb/ac N PPI treatments. However, the 90 lb/ac N top dress treatment yielded significantly higher (224 lb/ac) than the 60 lb/ac N top dress treatments. Top dressing 30 lb/ac N provided a similar yield to 60 lb/ac N PPI. Top dressing 60 lb/ac N provided a better yield (131 lb/ac) than 90 lb/ac PPI. The heavy persistent rains in late May and early June appear to have caused nitrogen losses, possibly from leaching and/or denitrification. This year's weather was not typical, but it did provide the right environment to show what top dressed nitrogen fertilizer can do.

Green seed levels were generally higher with the top dress treatments compared to PPI. The high green count of the 90 lb/ac N top dress treatment hurt its contribution margin. However, the highest contribution margin came with the 90 lb N/ac top dress application. Contribution margins reflect differences in yield, green seed discounts and fertilizer costs. The 60 lb/ac N urea top dress was the only treatment with higher oil content than the PPI treatment. The top dress treatments of the 60 and 90 lb/ac N rates were later maturing than the PPI treatments.

XI STRAIGHT COMBINING TRIAL

Objective: To evaluate the potential benefits of straight combining canola with and without an anti-shattering agent and desiccants. To evaluate a combine header specifically designed for straight combining canola.

Background: Previous work done at the 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. In 1998, straight combining provided better yields in 3 of the 6 varieties tested at the Roseau CPC. In 1999, high winds prior to harvest resulted in 40 to 50 % losses compared to swathing at the Roseau CPC. In 2000, straight combining resulted in 10 to 20% losses compared to swathing at 30 to 40 % seed color change at the Thief River Falls CPC. In 2001 and 2002, a 10% yield loss was observed with straight combining. The use of a polymer coating like Spodnam to seal up the pods as they ripen may help to reduce losses from shattering. Desiccants applied before straight combining can reduce the problems encountered from uneven maturity in the field and weeds that are still green at harvest. Some of the loses observed from straight combining come at the header from the reel hitting the pods and causing shattering before the grain gets into the header. The BISO header has the cutting bar and table extended out beyond the reel so that any shattering that occurs from the reel is caught on the table and not lost on the ground. The BISO header also has vertical cutting bars on each side of the header.

Methodology: The trial consisted of the following treatments:

1. Swath at 30 to 40 % seed color change (SCC)
2. Straight combine with a conventional header
3. Straight combine with a BISO header
4. BISO and Spodnam (1.5 pts/ac) applied at the first sign of seed color change
5. BISO and Spodnam plus Roundup Ultra Max II (22 oz/ac) applied when the crop is 60 to 70% SCC on the main stem
6. BISO and Spodnam plus Gramoxone Inteon (40 oz/ac) applied when the crop is 60 to 70% SCC on the main stem

InVigor 4870 (4 lb/ac) was used for this trial because Roundup could be used as a desiccant on the Liberty Link variety. InVigor 4870 is also a variety that tends to lean during pod filling so that the pods are better intertwined together to prevent them from hitting each other and shattering in the wind.

Five foot long shatter catch trays were built from 4 inch PVC pipe that was cut in half the long way and attached to furring strips to keep them from tipping. Aluminum window screen material was screwed to each end to allow rain water to escape but keep shattered seed in the tray. Three trays were placed into each plot in areas that would be under the header when straight combining or under the swath.

Since the straight headers that were lined up for this study were 30 feet wide, two 18 foot swaths were taken from each of the swathed treatment plots to have a better yield comparison (2 x 18 ft = 36 ft). Two thirds of one wheel track was included in the harvested area of each plot of the treatments that had Spodnam applied to represent the potential yield losses from wheel tracks left by a Rogator with a 90 foot boom.

Observations: This trial was seeded on April 28 into good moisture. The crop had uniform emergence. Spodnam was applied on July 29. The swathed plots were cut on August 1 at 35% seed color change (94 days after planting). Gramoxone Inteon and Roundup Ultra Max II were applied the evening of August 5 at 60 to 70% seed color change. A miscalculation was made and the Gramoxone was applied at only half rate. The mistake was caught after applying the treatments, but the wind picked up before the balance of the chemical could be applied that night. The remaining Gramoxone (20 oz/ac) was applied 4 days later on August 9. The company rep said that a split application could be done in this situation. The Gramoxone plots that had the half rate applied on the 5th looked pretty brown on the 9th. This was possibly due to ideal weather conditions during and after the first Gramoxone treatment. Even though the crop looked pretty dead before the second application, use of a half rate of Gramoxone is not recommended. The surfactant used with the Gromoxone on August 5th was 'Blend Master' which is a mix of non-ionic surfactant and ammonium sulfate. An application cost of $0.75 for each application of polymer or desiccant was included in the chemical costs listed in the table except for the second application of Gramoxone, which normally would not have occurred.

Correctly judging the height of the BISO header during harvest was rather difficult, especially going across ditches. The conventional header seemed to be easier. The crop was about 37 to 38 inches tall and the pods were relatively high on the plant. Because the BISO header is a specialized header, all plots harvested with the BISO header were charged a rental fee of $6.00/ac. The savings for conventional straight combining compared to swathing was $1.86 /ac.

Due to equipment complications at harvest time, 25 foot headers (both BISO and conventional) were used for the straight combining treatments. The conventional header was not available until very late the day of harvesting, so the BISO header was used for the Spodnam, Roundup and Gramoxone treatments. The conventional header treatment was harvested after dark; however there was a 5 to 10 mph wind and no dew until about an hour after harvest completion. The wind speed from August 5 (60% SCC) to August 23 (harvest) never exceeded 25 mph and there was very little to no seed in the shattering trays of the standing or swathed plots prior to harvest.

One replicate of this trial was discarded due to yield variability caused by a ditch that severely reduced yield in two treatments. Dockage of the swathed treatment (2.8 %) was significantly higher that the straight combined treatments (1.9 to 2.0%).

The "PreHarvest shatter" values were taken from the trays that were outside of the harvested area and the "Harvest shatter" values were taken from trays that were inside or along the edge of the harvested area. The "Harvest shatter" values are the estimated losses during harvest and where calculated by taking total losses captured in each tray and subtracting the average "PreHarvest shatter" for each treatment. The values presented here are the average of the trays that were in each respective location. There are not statistics associated with the shattering numbers because of the lack of consistent sample numbers associated with each category. Care was taken in placing these trays in the correct location. However, changes in header size prior to harvest resulted in them not being in the ideal locations. Some trays were also flipped or smashed during the course of harvesting.

Results:

STRAIGHT COMBINING TRIAL
Grygla, MN

Treatment	Yield (%)	Yield (lb/ac)	Harv. moist. (%)	Oil (%)	Contrib. Margin ($/ac)	Chem Cost * ($/ac)	PreHarv. shatter (lb/ac)	Harvest shatter (lb/ac)
Swath	100	1887	8.4	44.7	34.46	0.00	0	39#
Conv. Hdr	111	2096	9.6	44.8	56.51	0.00	23	126
BISO Hdr	106	1998	9.1	45.1	40.90	0.00	24	90
All treatments listed below were harvested with the BISO header and had Spodnam applied.								
Spodnam	102	1930	10.9	45.1	17.12	16.69	23	67
Roundup	111	2099	8.8	45.1	22.03	27.58	48	100
Gramoxone	107	2022	8.2	45.7	13.11	29.04	22	62
LSD (0.05)		190.0	2.32	0.44				
CV%		5.2	13.9	0.6				

* An application cost of $0.75 for each application of polymer or desiccant was included in the chemical costs
# This value represents losses from the pickup header and from the back of the combine.

Discussion: The conventional header and Roundup treatments were the only treatments that yielded higher than the swathed treatment. The lack of high winds prior to straight combining prevented the shattering losses observed in previous studies. The lack of shattering also did not allow an accurate assessment of how well the Spodnam worked. There was no yield difference between the conventional header and the BISO header. Only the Spodnam treatment had higher harvest moisture than the swath treatment. The Gramoxone treatment had significantly higher oil content than the other treatments. The conventional header produced the highest economic return. Contribution margins reflect differences in yield and chemical, application and harvesting costs. The added chemical and application costs and losses from wheel tracks of the pre-harvest chemical applications caused lower contribution margins for those treatments. The BISO header had similar harvest shattering compared to the conventional header. Shattering losses were least with the swathed plot and greatest with the conventional header.

XII CPC SUMMARY

The eighth year of the Minnesota Canola Production Centre (CPC) program was again successful. The early summer weather was a challenge as usual, but that's farming. The trials at the Grygla site were chosen to demonstrate basic canola production principles as well as investigate new equipment and techniques. All of the results will provide good focal points for discussions at extension meetings throughout the winter. Since the grant we received for this year was only for one year, a new proposal has been written to seek funding to support a smaller size CPC in 2006 near the Grygla, MN area. If you have any questions, ideas or comments about the Minnesota CPC program please feel free to contact Paul Porter who is listed in the Staff Information section at the end of this report.

XIII VARIETAL TOLERANCE TO SCLEROTINIA

Funding:
This trial was funded by a grant from the Sclerotinia Initiative and from fees paid by companies for testing their varieties.

Procedures:
This study was conducted at the Red Lake Falls, MN misting site. The trial consisted of 28 varieties and test lines. There were 9 check varieties in this trial of which 6 have been included in the variety screening since the trial started in 2001. They include: 44A89 (super susceptible), 46A76, Hylite 201 (apetalous), DKL34-55, Hyola 357 Magnum, and Hyola 401. HyCLASS 905, InVigor 5630 and InVigor 4870, were added to the list in 2005.

The trial was fertilized and seeded to wheat in early May. The grower allowed us to use the site on short notice because the site that was suppose to be used in 2005 turned out to not have enough water for misting. Trust (1.5 pt/ac) was applied for weed control and the field cultivated 2 times with a small plot cultivator prior to seeding on May 20. A rain shower occurred immediately after seeding. Assure II (10 oz/ac) was applied on June 6 to control the wheat that was not killed by the cultivation. Quadris (18 oz/ac) was applied on June 16 to control blackleg in the plots. Capture (2.5 oz/ac) was applied on June 17 to control flea beetles. Endura (8 oz/ac) was applied on July 12 to the two fungicide treatments listed in the table below. These plots were at 60% bloom at the time of application. Ascospores were applied July 6, 11 and 18. A petal test on July 7 showed 50% petal infection. Misting began July 2 and ended August 4. Disease notes were recorded August 5.

Disease and severity notes were taken on 50 plants per plot from 2 middle rows of each plot using the following severity scale:

Severity:
- 1 = superficial lesions or small branch infected
- 2 = large branch dead
- 3 = main stem 50% girdled
- 4 = main stem girdled but plant produced good seed
- 5 = main stem girdled with much yield loss

Incidence (percent infection) was calculated by multiplying number of infected plants by 2.

Excess moisture during late May and early June created problems with nitrogen loss and weak plants that didn't create a favorable environment for sclerotinia development.

Observations:

Replicates 2, 3, and 4 had NO sclerotinia in them. MON03 was sprouted at seed cleaning time and had a lighter test weight, even though it was dried like the other samples. HyLite 201 is an apetalous variety (no petals).

Red Lake Falls, MN Results:

Variety/Trtmt	Yield	Test Wt.	Oil	Begin Bloom	Phyio. Maturity	Height	1=Erect 9=Flat Lodging	Sclero. Incid. Ave.	Severity 1 st rep
	lb/ac	lb/bu	% DM	DAP	DAP	Inches	(1-9)	(%)	(0-5)
44A89	814	49.8	44.7	41	75	24	3.5	0.3	5
46A65	968	49.1	43.5	42	81	27	3.3	0.0	
46A65 w/ fung.	923	48.8	43.1	41	80	26	4.5	1.0	5
46A76	861	49.5	45.7	42	81	29	1.8	0.0	
46A76 w/ fung.	857	49.9	43.3	42	81	29	2.3	0.0	
BN1	1033	48.7	40.9	41	81	29	4.0	0.0	
BN1-1	799	49.8	42.1	40	78	24	3.5	0.0	
BN3	821	49.9	39.9	42	83	24	2.8	0.0	
DKL34-55	974	48.5	44.0	42	80	27	3.0	2.5	5
EXP1	652	48.5	44.5	41	82	26	2.8	0.0	
EXP1-1	831	49.2	44.9	41	79	27	4.0	0.3	3
EXP2	1010	49.2	41.0	40	81	30	3.5	0.5	5
EXP2-1	1147	46.7	44.6	41	80	27	2.3	0.0	
EXP3	885	47.7	41.5	41	79	23	3.3	0.0	
EXP4	908	50.7	41.3	40	78	26	3.5	0.0	
EXP5	1167	50.3	43.0	42	81	34	3.3	0.5	3
HyCLASS 905	1301	48.9	46.8	42	80	31	2.0	0.3	
HyLite 201*	628	47.9	39.1	40	75	18	2.5	0.0	
Hyola 357 Mag.	1016	49.1	43.3	39	79	23	3.3	1.5	4
Hyola 401	1110	49.4	41.2	41	83	27	3.5	0.5	5
InVigor 4870	1205	49.9	45.8	42	80	29	2.3	0.0	
InVigor 5630	1064	49.3	45.0	41	77	29	3.5	6.8	5
IS 7145 RR	1117	51.0	47.7	40	77	27	4.0	0.0	
MON01	1203	49.7	43.6	43	85	33	4.5	0.3	4
MON02	489	49.2	39.7	42	85	28	2.3	1.0	4
MON03	613	42.7	40.3	43	85	27	3.3	0.0	
MON04	900	49.3	43.4	42	85	30	4.0	0.0	
PR9040	804	48.0	41.9	41	80	25	3.5	0.5	4
mean	932	49.0	43.1	41	80	27	3.2	0.6	
LSD (0.05)	350.6	1.22	3.06	1.2	2.7	5.2	1.02	3.80	
Pr > F	0.0008	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.5027	
C.V.	26.7	1.8	4.3	2.0	2.3	13.5	22.6	480.8	

* HyLite 201 is an apetalous variety (no petals).

Carrington,ND Data

The results from Carrington, ND are included in this report due to the lack of disease at the Red Lake Falls, MN site. The Carrington trial was seeded on May 23, 2005 into 5 ft x 25 ft. plots. Inoculation with ascospores occurred on July 11 and plots were misted from July 11 to August 13. Swathing occurred on August 26 and combining on August 30. Disease notes were taken using the same score used in Minnesota. At Carrington they evaluated 12 or 13 plants in each of 4 areas of a plot to give a total of 50 plants. Since the disease

can be spotty in plots, they felt that evaluating in 4 areas gave them a score that was more representative of the whole plot.

Since there was very little sign of infection near the end of the season, they increased the misting late in the season, which resulted in a lot of late apothecia development. This resulted in the infection coming on later than usual in the season, which may have affected the relative disease ratings. Also, the delay in reaching physiological maturity in some entries resulted in more lodging, which also may have influenced the results.

Carrington, ND Results:

Variety/Trtmt	Yield	Test Wt.	Oil	Begin Bloom	Phyio. Maturity	Height	1=Erect 9=Flat Lodging	Sclero. Incid.	Severity
	lb/ac	lb/bu	% DM	DAP	DAP	inch	(1-9)	(%)	(0-5)
44A89	1288	49.9	46.6	39	80	43	6.0	50	4.3
46A65	1999	50.5	47.6	38	83	45	5.8	48	4.2
46A65 w/ fung.	1817	50.7	47.7	38	84	42	6.3	25	4.2
46A76	2162	50.2	48.3	41	89	46	3.5	16	3.7
46A76 w/ fung.	1882	50.3	47.9	40	88	47	3.5	13	3.3
BN1	1246	51.4	42.7	38	82	38	7.8	28	4.1
BN1-1	946	51.4	44.7	38	84	39	7.8	24	4.4
BN3	2212	51.1	47.0	40	90	49	5.3	14	4.0
DKL3455	2077	50.5	48.8	40	86	46	3.8	30	4.0
EXP1	1907	50.9	46.0	38	87	46	6.3	20	3.7
EXP1-1	1742	51.2	45.0	39	82	43	7.0	36	4.0
EXP2	2207	51.4	45.2	38	86	50	4.0	20	4.2
EXP2-1	2259	50.6	47.7	40	87	46	3.3	12	3.4
EXP3	2074	50.7	44.9	38	83	46	6.3	21	4.0
EXP4	1845	51.4	45.2	37	81	46	5.0	12	2.9
EXP5	2625	51.8	45.5	39	87	50	2.8	8	2.9
HyCLASS 905	2168	50.1	49.5	40	83	50	3.3	35	4.2
HyLite 201*	1284	48.3	45.5	39	80	36	7.0	41	3.9
Hyola 357 Mag.	1724	50.5	45.1	36	83	41	6.5	56	3.9
Hyola 401	1896	50.6	45.5	37	87	40	6.3	55	3.7
InVigor 4870	2892	51.2	49.8	40	86	51	2.0	20	4.0
InVigor 5630	2334	48.5	47.9	39	84	43	3.8	45	4.2
IS 7145 RR	1194	51.0	48.3	39	81	42	7.8	69	4.8
MON01	2183	50.2	47.1	41	89	46	3.8	11	4.0
MON02	1364	50.5	47.2	42	93	48	3.0	5	3.2
MON03	1461	50.4	48.4	41	91	48	3.8	10	4.2
MON04	1858	50.2	49.7	41	90	46	3.8	15	4.0
PR9040	1743	47.9	47.2	38	87	49	3.5	25	4.2
Mean	1872	50.5	46.9	39	85	45	4.9	27.0	3.9
LSD (0.05)	448	1.2	1.84	0.8	3.1	4.3	1.2	13.5	NS
Pr >F value	<0.0001	<0.0000	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.2823
C.V. (%)	17.0	1.6	2.7	1.4	2.5	6.8	16.6	35.3	20.5

XIV CROP ROTATION AND SCLEROTINIA IN CANOLA

Funding:
This trial was funded by a grant from the Agricultural Utilization and Research Institute (AURI) and the National Sclerotinia Initiative.

Background:
Research began in 2003 near Thief River Falls, MN to better understand the effect of crop rotation and a rye cover crop on white mold development in canola. The primary objective was to evaluate sclerotinia incidence and severity in canola when grown in a number of cropping sequences with and without the presence of a fall-planted rye cover crop. A three-year field study was initiated in 2003 at one site (03CRye) and again in 2004 at a second site (04CRye) about a mile from the first site. Information presented here is for the second year of the 04CRye trial.

The 04CRye field study involved eight cropping-sequence treatments the first two years, after which the plots were divided allowing for sixteen cropping-sequence treatments the third year:

Treatments in 2004-05	2004	2005	2006	Treatments in 2006
	------------------ Crop year --------------			
1. W- C	W	C	-&+ rye[1] C	1. & 9.
2. W- W	W	W	-&+ rye C	2. & 10.
3. W-rC	W	rye + C	-&+ rye C	3. & 11.
4. W-rW	W	rye + W	-&+ rye C	4. & 12.
5. C- C	C	C	-&+ rye C	5. & 13.
6. C- W	C	W	-&+ rye C	6. & 14.
7. C-rC	C	rye + C	-&+ rye C	7. & 15.
8. C-rW	C	rye + W	-&+ rye C	8. & 16.

[1] The plots were split following harvest in 2005, with half planted to the rye cover.

Procedures:
Plots that did not have winter rye seeded were cultivated one time on April 28 to kill volunteer rye that had dribbled out of the seeder in the fall when seeding the rye on September 13, 2004. The rye was sprayed out on May 6 with Roundup Ultra Max II (40 oz/ac). The rye was killed very well. The canola and wheat were also seeded on May 6, 2005. The Liberty Link canola variety InVigor 2663 was seeded at rate of 5.9 lb/ac (14 viable seeds per square foot) and the wheat variety Hanna was seeded at 120 lb/ac. Both crops were seeded at a depth of 1 inch with a seed placed fertilizer mix of MAP and 0-0-60 (5-25-15-0, N-P-K-S). Rain the next day provided good emergence of both crops. Each plot was 20 feet wide by 50 feet long and consisted of 3 - 6 foot wide passes made by a Hege 1000 seeder. The middle pass was used for data collection and the outside passes were used as borders. The trial was top dress fertilized on May 17 with ammonium nitrate and ammonium sulfate (120-0-024, N-P-K-S).

The winter Rye and residue from the fall emerged volunteer spring wheat was sampled for biomass on May 11 when the rye was about 4 to 6 inches tall. Two one-foot by one foot area samples were cut at ground level, placed in light duty paper bags and dried for 12 days at 130 F. Biomass of the wheat and canola were taken on June 16 when the crops were at jointing and bolting stages respectively.

Four Sclerotia strings were placed in the middle of each plot on May 19. The sclerotia strings were made by rolling 11 black undamaged, dime sized sunflower sclerotia in onion netting, using a produce bag sealer to close the rolls and keep the sclerotia separated. The sclerotia strings were checked for apothesia each day the Steadman test was conducted (June 6, 15, 20, 24, July 5, 8, 12, 15, 21, and August 1). A few of the sclerotia produce apothesia. A Steadman test is a method of calculating how many sclerotinia ascospores are in the canopy of the crop. The Petri plates are exposed over the noon hour for two hours to allow the spores to land on the purple Steadman media. The spores germinate and produce yellow spots after a few days, which can be counted to determine spore concentration.

The wheat plots were sprayed on June 21 with Stinger (5 oz/ac). Most of the weeds in the canola plots were removed by hand because wet weather prevented the application of herbicides until the crop was starting to flower. Capture (3 oz/ac) was applied with a backpack fogger on July 13 to control Lygus bugs that had reached numbers above the spraying thresh hold.

Canola was swathed on August 8 at about 30 to 40% seed color change. Sclerotinia levels were read the same day. Scab ratings on the wheat were taken on July 27. The canola was combined on August 15 . The wheat was harvested on August 24.

Results:
The following is a combined summary from the second year of the 03Crye and 04Crye.
Canola grown following a rye cover crop compared with no rye cover crop: In the second year for both studies, canola yields were reduced (15.5 in 03CRye and 10.7% in 04CRye) and seed protein content was increased (6.6 and 9.5%) but test weight was not influenced when rye was grown as a cover crop. Canola plant height at harvest was reduced by 6.7% when rye was grown in 03CRye, but was not influenced by the rye in 04CRye. Canola plant biomass was reduced when rye was grown in 03CRye, but not in 04CRye. In 03CRye, time to 30% flowering was delayed by about 1 day, whereas in 04CRye time to beginning flowering was not influenced when rye was grown. Canola seed oil content was not influenced by the rye in 03CRye, whereas in 04CRye the seed oil content was increased by 4.7%. For both studies, sclerotinia disease severity was not influenced when rye was grown, but in 03CRye sclerotinia disease incidence was greater where no rye was grown (but both incidence and severity were quite low).
Canola grown following wheat or canola: In the second year for both studies, canola test weight, plant height, seed protein content, and sclerotinia disease incidence and severity were not influenced by whether the previous year's crop was wheat or canola. Canola yield was reduced 9.0% in 04CRye when following canola compared to following wheat. Canola yield was not affected by previous crop in 03CRye. In both studies, canola grown after canola delayed time to 30% flowering by about a day compared with canola grown after wheat. Only in 04CRye was canola seed oil content influenced by previous crop, with canola grown after wheat slightly greater.
Wheat grown following a rye cover crop compared with no rye cover crop: In the second year for both studies, wheat yields were reduced (9.2 and 19.1%), wheat test weights were reduced (0.5 and 1.6%), mid-season wheat biomass were reduced (29.0 and 66.4%), and wheat plant heights at harvest were reduced (4.5 and 8.9%) when rye was grown as a cover crop compared with no rye. Heading date was not influenced by rye in 03CRye. Although wheat scab disease severity was not influenced for either study, in 04CRye wheat scab disease incidence was greater when rye was grown. In 04CRye, wheat protein content and 1000 kernel weight were decreased (8.1 and 10.5%, respectively) when rye was grown, but this did not occur in 03CRye.

Wheat grown following wheat or canola: In the second year, wheat yield was reduced by 9.2% when grown wheat on wheat compared with wheat on canola in 03CRye, but in 04CRye there was no statistical difference (in spite of a numerical 8.0% difference). In both studies, protein content was reduced (2.8 and 2.4%) when grown wheat on wheat. Wheat test weights were reduced slightly in 04CRye when grown wheat on wheat, but not in 03CRye. For both studies, wheat scab disease incidence and severity were not influenced with wheat on wheat compared with wheat on canola.

Canola yields and agronomic measurements from 04CRye - 2005.

	Yield lb/ac	Rye Biomass lb/ac	Crop stand Plt/sqft	Crop Biomass lb/ac	Oil DM	Sclero. Incid. %	Sclero. Sever. (0-5)	Height inches	Begin bloom DAP	Matur DAP
2004 Crop - Averaged across Rye										
Canola	1947	687	7.0	868	42.9	1.8	3.4	37	50	90
Wheat	2139	565	8.2	1164	43.6	2.3	3.1	38	49	89
Rye - across 2004 crop										
Norye	2159	0	7.8	1045	42.2	2.4	3.4	37	49	90
rye	1927	1252	7.4	987	44.2	1.7	3.1	37	50	89
2004 Crop - winter cover										
Canola Norye	2056	0	7.6	905	41.7	1.8	3.3	37	50	91
Canola rye	1838	1374	6.5	831	44.0	1.8	3.5	37	51	89
Wheat Norye	2261	0	8.0	1185	42.7	3.0	3.5	37	49	89
Wheat rye	2016	1129	8.3	1143	44.4	1.5	2.8	38	49	88
2004 Crop x winter cover										
mean	2043	625.9	7.6	1015	43.2	2.0	3.3	37.3	49.6	89.375
LSD (0.05)	133.8	142.5	2.2	262.3	0.8	2.0	2.1	2.5	0.7	1.1
CV%	5.3	18.5	23.9	21.0	1.4	81.4	51.3	5.4	1.2	1.0
Pr>F: from 2 x 2 factorial analysis										
Rep	0.0518	0.2251	0.3306	0.3009	0.0004	0.2279	0.2122	0.0078	0.3109	0.0280
2004 Crop	0.0006	0.0204	0.1444	0.0039	0.0146	0.5485	0.7183	0.2803	<0.0001	0.0043
Winter Cover	0.0001	<0.0001	0.5653	0.5173	<0.0001	0.2866	0.7183	0.7642	0.0578	0.0107
Crop x Cover	0.7723	0.0204	0.3427	0.8512	0.2350	0.2866	0.4735	0.4870	1.0000	0.5118

Wheat yields and agronomic measurements from 04CRye - 2005.

	Yield bu/ac	Test Weight lb/bu	Rye Biomass lb/ac	Crop Biomass lb/ac	1000 Kernal wt grams	Prot. DM	Scab Incidence %	Scab Severity %	Height inches
2004 Crop - Averaged across Rye									
Canola	30	63.2	474	1008	33.7	16.7	42	18	36
Wheat	28	62.6	520	833	32.8	16.3	39	21	35
Rye - across 2004 crop									
Norye	32	63.4	0	1378	35.1	17.2	49	20	37
rye	26	62.4	994	463	31.4	15.8	31	19	34
2004 Crop - winter cover									
Canola Norye	32	63.4	0	1503	35.5	17.4	48	18	37
Canola rye	28	63.0	948	513	31.9	16.0	36	18	34
Wheat Norye	32	63.4	0	1253	34.8	17.0	50	23	37
Wheat rye	23	61.8	1041	414	30.9	15.6	27	19	34
2004 Crop x winter cover									
mean	29	62.9	497	921	33.3	16.5	40	20	35
LSD (0.05)	4.2	0.83	342.2	149.5	1.58	0.29	22.1	11.4	2.9
CV%	11.9	1.1	55.9	13.2	3.9	1.4	44.8	47.4	6.7
Pr>F: from 2 x 2 factorial analysis									
Rep	0.1112	0.6716	0.5059	0.5251	0.4479	0.1810	0.1101	0.6813	0.6182
2004 Crop	0.1084	0.0494	0.6902	0.0031	0.1191	0.0008	0.6832	0.4667	0.8659
Winter Cover	0.0006	0.0026	<0.0001	<0.0001	<0.0001	<0.0001	0.0308	0.6678	0.0037
Crop x Cover	0.0874	0.0331	0.6902	0.1487	0.7175	0.8648	0.4834	0.6827	1.0000

Results from the third and final year of the 03CRye are not presented here but will be presented in conjunction with the third year results of the 04CRye.

XV CROP ROTATION AND WINTER RYE IN SOYBEAN

2005 Soybean Following Canola, Wheat and Soybean With and Without a Rye Cover Crop.

Funding:
This trial was funded by a grant from the Agricultural Utilization and Research Institute (AURI) and the National Sclerotinia Initiative.

Procedures:
In 2003, a two-year crop rotation study was initiated near Thief River Falls, MN with six treatments where canola, wheat and soybean were grown that year and followed after harvest either with or without a fall–planted rye cover crop. The data below is from the second location which was started in 2004. Soybeans were planted in 2005 to document the influence of the previous cropping system on soybean productivity. The soybeans (Croplan 0041) were no-till planted on May 19, 2005. Each plot was 20 feet wide by 50 feet long and consisted of 3 - 6 foot wide passes made with a Hege 1000 small plot cone seeder. The middle pass was used for data collection and the outside passes were used as borders. Roundup Ultra Max II (40 oz/ac) was applied on May 19 to kill the winter rye. Roundup Ultra Max II was applied on June 25 (34 oz/ac) and July 21 (16 oz/ac) to control weeds. Sclerotinia strings and Steadman plates were used the same as the previous trial.

Results:
There were no differences in yield, test weight, oil or protein among treatments. The no rye treatments had only slightly higher yield and lower protein content than the rye treatments when following wheat and soybeans. Rye biomass was reduced after soybeans due to poorer stands and delayed emergence in the fall of 2004. The rye was seeded by scattering the seed over the soil into the standing soybean plots instead of drilling it, which was done following the canola and wheat crops. Soybean plant height was taller in the no rye treatments than in the rye treatments following canola and soybeans.

2005 soybean yield, test weight, oil content, protein content, height and days to maturity in the two-year rotation study involving soybean following canola, wheat and soybean with and without a rye cover crop.

2004 and 2005 crops	Yield	Test Weight	Rye Bio mass	Oil	Protein	Height	Matur
	lb/ac	lb/bu	lb/ac	% DM	% DM	inches	DAP
Canola - Soybean	43.5	57.4	0	17.6	35.8	26	128
Canola-rye-Soybean	43.9	56.6	2099	17.6	35.8	20	127
Wheat - Soybean	44.1	56.9	0	17.8	35.5	23	127
Wheat-rye-Soybean	42.1	56.4	2313	17.7	36.0	22	127
Soybean - Soybean	43.8	57.3	0	17.6	35.4	25	126
Soybean-rye-Soybean	41.5	57.1	1455	17.4	36.2	22	127
mean	43.2	57.0	978	17.6	35.8	23	127
LSD (0.05)	4.4	0.68	531.2	0.3	0.7	2.3	2.6
Pr>F	0.6003	0.5359	0.0690	0.7073	0.2073	0.0142	0.5871
CV%	6.8	0.8	36.0	1.3	1.3	6.8	1.4

XVI WINTER CANOLA

Funding:
This work was funded by a grant from the North Central Regional Canola Research Program (NCRP).

History:
Winter canola has the potential to provide exceptionally high yields compared to spring canola, especially in years when spring rains prevent early seeding of spring canola. Winter canola has been tested in northwestern Minnesota with limited success over the last 15 years. Newer varieties with better winter hardiness are coming out of some of the breeding programs such as at Kansas State University. These newer varieties were tested in 2001-02, 2002-03 and in 2003-04. The 2001-02 trial was completely winter killed, perhaps because the trial was seeded late into dry soil and plants didn't get enough growth in the fall to survive the harsh and open winter that year. In 2002-03, a seeding date X seeding rate trial was conducted near Morris, Waseca and Red Lake Falls, MN with very good winter survivability. There was more snow cover that winter at Red Lake Falls and temperatures were not extremely low. Yields that year were 2200 lb/ac for the cultivar Wichita. In 2003-04 the seeding date X seeding rate trial and the National Winter Canola Variety Trial were conducted south of Thief River Falls, MN. Two thirds of the plots were winter killed. Yields from surviving plots ran between 2000 and 3000 lb/ac with less than two plants per square foot.

Procedures and Observations:
The national winter canola variety trial was seeded east of Thief River Falls, MN into barley stubble on September 2, 2004. Two thirds of the trial was plowed and cultivated so that it was planted on bare soil, while one third was planted into 10 inch barley stubble. A light snow fall occurred in mid December that blew into the stubble and provided about 1 to 1.5 inches of cover compared to no cover on the plowed ground. On December 23rd and 24th the temperature dropped to -20 °F. The surface temperature of the plowed plots dropped between -3 °F to -15 °F. The surface temperature of the stubble plots dropped to around +4 °F under 1.5 inches of snow, accept one area that recorded -0.3°F for a few hours each night under ½ to ¾ inch of snow. The area that recorded the -0.3 °F was the only stubble area that had extensive winter kill. Canadian researchers have identified 0°F as the lowest temperature that winter canola can survive. The area that was killed was also the most northwestern corner of the stubble area. On Jan 17, the air temperature dropped to -40 °F but the soil surface temp on the plowed plots stayed between +5 °F and -4 °F under only 3 inches of snow. Stubble plots stayed at +23 °F under 9 inches of snow.

The crown of the canola stayed at or below the soil surface in the plowed ground, but raised about ½ to ¾ inch above the surface in the stubble plots. A higher crown is more likely to be exposed to low temperatures. Color coded pin flags were placed in 50 plots next to plants that showed different crown heights above the soil surface. When spring came, crown height did not appear to make a difference in survivability.

In the spring, both the plots on the plowed soil and in the stubble looked pretty good as the soil thawed out. But as the weeks of late March and early April went by, more and more of the plowed soil plots looked dead and more of the stubble plots started to green up and grow new leaves. By April 9, all of the plants on the plowed soil were visibly dead and the plants in the stubble had new leaves emerging from the crown.

The plots were fertilized with 80 lb/ac MAP (9-42-0) seed placed fertilizer and top dressed with another 20 lb/ac N as ammonium nitrate 20 days after seeding (September 22, 2004). Assure II (7 oz/ac) was applied 27 days after seeding to kill volunteer barley plants. Stinger (7 oz/ac) was applied on May 16, 2005 to control heavy pressure from Canada thistle. Some of the canola varieties had begun to bolt and showed some injury from the herbicide. The plots were top dress fertilized on May 17, 2005 with ammonium sulfate and ammonium nitrate (120-0-0-24; N-P-K-S). The fertilizer should have been applied earlier, prior to bolting, but the soil was too wet to prevent damaging the plots. Yields were not as high as expected. Possible causes of this are the excess rain in May and June leaching the fertilizer away from the crop, or the late application of spring applied fertilizer or the injury from the Stinger application, or a combination of all three.

Results:

Yields and agronomic data of plots that survived in barley stubble from National Winter Canola Variety Trial at Thief River Falls, MN – 2004-05.

Winter Variety	Yield	Test Wt.	Oil	Begin Blm	Matur.	Fall Stand	Fall Vigor	Winter Survival	Spring Stand	Height	Lodg -ing
	lb/ac	lb/bu	% DM	DA 4/1	DA 4/1	0-9	0-9	0-9	plnt/ft^2	inches	1-9
ARC92004	820	52.1	37.2	59	111	8.0	7.7	7.0	3.8	45	3.7
Casino	1051	52.7	37.9	60	113	6.7	5.0	6.3	2.4	44	3.3
KS2004	778	52.3	38.2	62	113	7.0	4.7	3.3	1.7	38	5.0
KS2064	1006	53.1	39.1	60	111	8.3	5.0	7.3	4.1	41	3.7
KS2098	1016	52.9	38.8	59	112	8.0	5.7	7.0	2.9	42	3.7
KS2169	1272	52.7	39.6	58	111	8.3	6.0	7.0	5.3	37	3.3
KS2185	1244	53.3	39.0	56	112	8.0	5.7	7.0	3.2	37	3.7
KS3018	717	51.3	36.2	57	108	7.0	5.7	6.7	2.1	36	5.7
KS7436	1076	52.8	40.0	58	111	6.0	5.3	7.0	1.8	40	3.7
KS9124	1017	52.7	38.6	59	110	7.7	5.3	6.0	3.1	42	4.0
KS9135	1069	53.2	38.8	60	111	8.3	6.3	8.0	4.5	40	3.0
KS9183	1019	52.6	38.6	58	111	8.3	6.0	7.0	4.9	40	3.7
Kronos	1134	53.3	37.7	56	111	9.0	8.0	7.7	3.6	41	3.0
Largo	448	51.6	36.9	54	96	8.7	5.0	8.0	3.0	32	3.3
Plainsman	555	52.2	37.5	63	114	7.3	5.3	4.7	1.1	46	4.0
Sumner	987	52.7	39.5	58	108	8.7	6.3	7.0	2.6	35	4.0
Witchita	1074	53.1	38.1	60	110	7.7	5.7	7.0	2.3	38	4.3
mean	958	52.6	38.3	59	110	7.8	5.8	6.7	3.1	11	3.8
LSD (0.05)	296.5	0.7	1.7	2.9	3.0	1.5	1.3	2.0	1.8	7.0	1.3
Pr>f	0.0001	0.0001	0.0063	0.0001	0.0001	0.0128	0.0004	0.0055	0.0014	0.0247	0.0164
C.V.	18.6	0.8	2.7	3.0	1.6	11.1	13.4	17.7	35.8	10.6	19.8

Note: A winter/spring canola cross was broadcast seeded over the soil on April 1, 2005. It yielded 1645 lb/ac and matured on August 3, 2005 (125 Days after 4/1).
DA 4/1 = Days after April 1 when the soil temperature stayed above freezing.
Stand and Vigor notes: 0 = none, 9 = excellent, Lodging notes: 1 = erect, 9 = flat

Current Work:

The National Winter Canola Variety Trial is being conducted south west of St. Hilaire, MN in a wheat stubble field on the Monte Casavan farm. The trial was direct seeded into wheat stubble on September 7, 2005 with 80 lb/ac MAP (9-42-0) seed placed fertilizer into very wet soil. Emergence was excellent and the canola was in a healthy 6-leaf stage going into the winter. Plots were 6 feet wide X 30 feet long and replicated 4 times. The trial was sprayed on September 15 with Assure II (8 oz/ac) to control volunteer wheat. Ammonium Nitrate was top dressed on September 16 at 100 lb/ac (34-0-0) when the canola was in the cotyledon to 1-leaf stage. Another trial at that site is looking at when winter kill of the canola is occurring.

XVII SEED TREATMENT TRIAL

Procedures:

This trial was located near Grygla, MN and was on the same field as the West site of the Canola Production Centre. The canola variety InVigor 4870 was seeded on May 3, 2005 at a rate of 10 viable seeds per square foot. The trial was laid out in a randomized complete block (RCB) design with six replicates. Plots were 6 ft x 60 ft with 6 inch row spacing. Plots were end trimmed so that the harvested area was 6 ft x 55 ft. The trial was fertilized with 90-0-0-10 (N-P-K-S). The trial was located close to a grove of trees to provide the best availability to flea beetles as possible.

The treatments included Helix Xtra, Prosper 400, Fungicide only (check) and G7087 (an experimental seed treament). There was no flea beetle activity on the plots until the canola was in the 2 to 3 leaf stage, and that pressure was very minimal. There was some diamond back moth activity early in the bloom period. However, it was not heavy enough to warrant spraying and there did not appear to be any difference in feeding levels among treatments.

Results:

Yield and agronomic data from Seed Treatment Trial at Grygla, MN – 2005.

Treatment	Yield	Oil	Protein	Stand counts 17-May	24-May	31-May	Harvest	Height	31-May Beetles
	lb/ac	% DM	% DM	plnt/sqft	plnt/sqft	plnt/sqft	plnt/sqft	inches	(0-9)
Prosper	1740	44.2	18.7	5.1	8.4	7.8	8.7	40	1.5
G7087	1727	43.8	19.0	4.7	8.4	7.7	8.8	39	1.5
HelixXtra	1693	44.3	18.2	5.5	8.4	7.9	8.8	40	1.2
Check	1650	44.2	18.8	5.5	8.4	7.8	8.7	38	1.0
Mean	1702	44.1	18.6	5.2	8.4	7.8	8.7	39	1.3
LSD (0.05)	79.5	1.5	0.72	0.90	1.07	0.78	1.06	2.6	0.85
Pr>f	0.1172	0.9008	0.1286	0.1938	0.9998	0.9754	0.9918	0.5683	0.5184
C.V.	3.8	2.1	2.4	14.2	10.4	8.1	9.9	5.4	53.4

Dark shaded LSD's are not significant at the 95% confidence interval.

There were no differences among any of the treatments due to lack of flea beetle pressure this year.

XVIII FOLIAR APPLIED MICRONUTRIENT TRIAL

Procedures:
This trial was conducted to test the effectiveness of a foliar applied micronutrient solution called 'Canola Booster'. The trial was located near Grygla, MN and was on the same non-tiled field as the MicroEssentials S15 Trial on the Canola Production Centre. A spring soil test of the field indicated 11 and 26 lb/ac of nitrogen at 0-6" and 0-18" depths, respectively. Phosphorous (12 ppm) and potassium (40 ppm) levels were low to very low at 0-6 inches deep. Sulfur tests indicated 66 and 210 lb/ac at 0-6" and 0-18" depths, respectively. The trial was laid out in a randomized complete block (RCB) design with six replicates. Plots were 6 ft x 60 ft with 6 inch row spacing. The canola variety InVigor 5630 was seeded at a rate of 4.0 lb/ac with very little seed place MAP fertilizer (approximately 5 lb/ac) due to equipment malfunction. Liberty herbicide (34 oz/ac) was applied at about 5 to 6 leaf stage on June 10. Weed control was good. The Bolting application of Canola Booster was applied on June 15. The 20% Bloom application of Canola Booster was applied on June 21. Canola Booster was applied with Turbo T-jets 04 nozzles,10 psi and 34.5 gal/ac of solution. The solution did not drip off of the leaf tissue. It was sunny both application days. Plots were end trimmed so that the harvested area was 6 ft x 55 ft. Plots were swathed at 90 Days after Planting (DAP) (Aug 2) when the maturity in each plot varied from 30 to 50% SCC. Plots were combined on August 16. Only four replicates were used in the data analysis due to excessive variability in two reps caused by standing water damage.

Canola Booster Analysis: 16-8-16-5 (N-P-K-S)
Ammoniacal nitrogen (3%), Nitrate nitrogen (4.8%), Urea nitrogen (8.2%), available Phosphate (P_2O_5) (8.0%), Soluble Potash (K_2O) (16.0%), Magnesium (0.5%), Sulfur (5%), soluble Boron (1.5%), soluble Copper (0.15%), chelated Iron (0.10%), soluble Manganese (1.0%), and soluble Zinc (1.0%).

Results:

Yield and agronomic data from Foliar Topdressing Trial at Grygla, MN – 2005.

Canola Booster Timing & rates	Yield lb/ac	Test Wt. lb/bu	Oil % DM	Protein % DM	Begin Bloom DAP	End Bloom DAP	Phyio. Maturity DAP	Height Inches
No Booster	1462	53.0	43.8	19.9	48	72	90	36
Bolting 5 lb	1367	52.8	43.1	20.6	48	71	90	35
Bolting 10 lbs	1549	52.9	43.4	20.2	48	71	90	36
Bloom 5 lbs	1394	52.7	43.9	19.8	48	71	90	34
Bloom 10 lbs	1468	52.9	43.3	20.6	48	72	90	34
Mean	1448	52.9	43.5	20.2		71		35
LSD (0.05)	177.2	0.46	1.08	0.93		1.0		2.6
Pr>F	0.2530	0.6082	0.5091	0.3310		0.6114		0.3056
C.V.	7.9	0.6	1.6	3.0		0.9		4.7

Dark shaded LSD's are not significant.

There were no differences among any of the treatments for any of the parameters measured here. The excessive moisture conditions early in the season resulted in too much variability within replications to accurately determine the possible benefits of using Canola Booster.

XIX STAFF INFORMATION

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XX FARMER COOPERATORS - 2005

We would like to express our great appreciation to the farmer cooperators who have allowed us to use their land for the trials this year. **Thanks to you all.**

Location	Grower	Studies
Crookston	Jim Reitmeier and Dan Cooley	Blackleg nursery – fungicide evaluation, fungicide economic trial
Fertile	Jim & Pat Todahl	Organic wheat VT and flax date of planting trial
Grygla	Arnold, Todd and Brian Stanley	CPC, Spring canola variety trials, seed treatment trial, foliar application trial, flax date of planting trial
Red Lake Falls	Monte Casavan	Sclerotinia misting site – variety evaluation, 05-06 winter canola trials
Roseau	Steve Dahl	Spring canola VT
Roseau	Magnusson Farms	Soybean VT, niger VT
Thief River Falls	Ken & Connie Mehrkens	03CRye, 04CRye,
Thief River Falls	Lyle Olson	04-05 winter canola trials, soybean VT, niger VT

To: Canola Growers and Industry Reps

From: Dave LeGare

In case you haven't already heard, I will be done working for the University of Minnesota as of January 15, 2006. I accepted a new position at Monsanto as their Canola Testing Manager out of their Glyndon station east of Moorhead, MN. I'll be field testing the new canola material that Monsanto is working on.

When I started working on canola research at the University of Minnesota in '94, there was about the same state wide acreage as there is now. The only difference is that acreage was climbing exponentially, and so did our research trials. Over the years Erv Oelke, Bill Lueschen, Paul Porter and I organized many different trials to look at the questions that you brought to us. We conducted seed treatment trials, nitrogen and sulfur trials (with George Rehm), herbicide tolerance trials to get information for labeling new herbicides, date of planting trials to help Risk Management determine a better cut off date for late spring seeding, swathing trials, and countless variety trials at Roseau, Kennedy, Red Lake Falls, Fosston, Morris and Grygla. We researched variety tolerance and fungicide effectiveness against sclerotinia under misted environments (with Art Lamey and Luis DelRio), fungicide effectiveness against blackleg (with Carl Bradley), and used medium sized plots to look at seed placed fertilizers, foliar applied micronutrients and rotation studies at Roseau and Thief River Falls.

Once the Canola Production Centre (CPC) began in '98, we used commercial size equipment and looked at swath timing, straight combining, pushers, seeding rates and dates, fall dormant seeding, row spacing, direct seeding, phosphorous rates, nitrogen rates and timings, fungicide rates and timings, herbicide rates and timings, variety and systems comparisons, and comparing aerial and ground applications of fungicides.

There are many people I would like to thank for helping us over the years. Karen Andol was there from the beginning to help when needed and in 1998 she dramatically increased the help she was giving us so we could get it all done. Even after she had her children, she still was willing to help out whenever she could, which was quite often. Erik Leverson was here for two years when things were growing fast. Thanks to Derwyn Hammond and the rest of the gang from the Canola Council of Canada who helped with CPC planning, planting, harvesting and reporting. Extension educators, Hans Kandel and Howard Person, were repeatedly willing to help out whenever I was short-handed and needed help with seeding. I am grateful for all 23 of my hard working U of MN summer students that put up with me when I pushed them hard to get the work done. Thanks to the growers who helped us for multiple years, namely Steve Dahl, Magnusson Farms, Monte Casavan, Rob and Tim Rynning, Ken and Kyle Mehrkens, Todd Stanley, Mike Baumgartner and also the many others not mentioned that helped us a year or two by allowing us to put our trials on their land. Without their cooperation none of our research would have been possible. The farmer coops from Roseau, Grygla, Kennedy, Red Lake Falls and Thief River Falls were always available with advice and services. I greatly appreciate the help you all provided me over the years and hope you will continue to support Paul Porter and whoever replaces me in the future.

Even though I made some mistakes along the way, I can say that I put my heart and soul into doing the best I could to get you the most accurate data that Mother Nature would allow us to glean. I have enjoyed working with each of you and appreciate the guidance you have given me. I hope you learned a few things from us also and may our paths continue to cross.

Thanks for the time together.