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The Canola Council of Canada is the co-ordinating body of the Canola Production Centre Program across Canada and is a major contributor to the program.

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

In 2002, the Canola Production Centre program was supported by the following Contract Research participants:

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- Manitoba Canola Growers Association
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- Hetland Seeds
- Milligan Bio-Tech Inc.
- Pioneer
- Saskatchewan Wheat Pool
- Syngenta Crop Protection Canada Inc.

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Selkirk, MB - Brian Kazuk (Co-operator) 80 acres

- Esso/Imperial Oil Ltd. (Terraco – Selkirk)
- Leo's Sales and Service Ltd. (Winnipeg, MB)
- Brian Kazuk
- Michael Sykes (ag rep)

Dauphin, MB - Jim Kaleta (Co-operator) 65 acres

- CanAmera Foods
- Cargill AgHorizons (Dauphin)
- Dauphin Co-op Agro (Dauphin and Ste. Rose, MB)
- Fisher Seeds Ltd. (Dauphin)
- Riding Mountain Agri Ltd.
- Super 8 Motel (Dauphin)
- Sydor Farm Equipment Ltd.
- Triple "S" Seeds Ltd. (Grandview, MB)

Yorkton, SK - Dale Rhinas (Co-operator) 80 acres

- CJGX Radio
- Crop Mate
- Dale Rhinas
- David Dedmans Pontiac GMC Ltd.
- Fred Cross
- Harvest Technologies
- Hetland Seeds
- Kevin's Custom Ag.
- Key Chev Olds Ltd.
- Maple Farm Equipment Ltd.
- Monsanto Canada Inc.
- Nykolaishen Farm Equipment Ltd.
- Pattison Liquid Systems
- Powell Fertilizers & Chemicals
- Royal Ford
- Saskatchewan Wheat Pool
- Wardale Equipment Ltd.
- Western Development Museum
- Yellowhead Sales and Leasing
- York Lake Regional Park
- Yorkton Chamber of Commerce
- Yorkton Distributors Ltd.
- Yorkton Downtown Business Association
- Yorkton Economic Development Association
- Yorkton Exhibition Association

Nipawin, SK – Kent Baxter and Eric Thomson (Co-operators) 75 acres

- CanAmera Foods
- CJNE "The Storm " Radio
- CJVR Radio
- Dennis Gilert
- Eric Thomson
- Flamen Sales and Service (Terry Gates)
- Gates Fertilizers Ltd.
- Harvest Technologies
- Hetland Seeds
- Kent Baxter
- Kevin's Custom Ag
- Lakewood GM
- Newfield Seeds Ltd.
- Nipawin and District Regional Park
- Nipawin Chamber of Commerce
- Nipawin Chrysler Dodge
- Nipawin Credit Union
- Nipawin Economic Development Association
- Nipawin Journal
- PA Bottlers Ltd. (Coco-Cola)
- Pattison Liquid Systems
- Rick McCauley Auctions
- Rural Municipality of Nipawin
- Saskatchewan Wheat Pool
- Town of Codette
- Verkland Motors

North Battleford, SK - Bob Bartkewich (Co-operator) 80 acres

- Bob Bartkewich
- Canadian Seed Coaters
- Dennis Blais
- Esso/Imperial Oil (Northwest Agro)
- Leo Blais
- North Battleford Agricultural Society
- Pioneer Grain/JRI (Hamlin, SK)
- R.M. of North Battleford

Vegreville, AB - Willco Farms (Co-operator) 80 acres

- Canadian Seed Coaters
- Dennis Blais
- Leo Blais
- Willco Farms

Beiseker, AB - JHB Farms (Co-operator) 50 acres

- Agricore United (Beiseker)

Lethbridge, AB (Irrigation) Tom & Joe Shigehiro (Co-operators) - 80 acres

- Agricore United (Broxburn, AB)
- Lloyd Dosdall
- Rob Dunn

Lethbridge, AB (Dryland) - Rod & Ike Lanier (Co-operators) 50 acres

- Pioneer Grain
- Lloyd Dosdall
- Rob Dunn

Rycroft, AB - Calvin Dika (Co-operator) 80 acres

- Agricore United (Spirit River, Silverwood Terminal and Grande Prairie, AB)
- City of Dawson Creek, B.C.
- United Spring & Brake

Dawson Creek, B.C. - Gene Vipond (Borek Farms) (Co-operator) 70 acres

- Agricore United (Silverwood Terminal and Grande Prairie)
- Borek Farms
- City of Dawson Creek, B.C.
- Garnet Berge
- Peace Tractor Ltd.
- United Spring & Brake

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WESTERN CANADA SUMMARY

The Canola Production Centre program continued to be a success in 2002, in spite of many environmental challenges. These included spring frost, hail, flooding, drought and insect damage. In 2002, the program looked not only at new agronomic issues and management techniques suggested by growers and industry, but also at ongoing trials. Some of the new trials looked at seed size, seed bulking and foliar nutrient application. Ongoing trials included variety and system evaluation, canopy manipulation, minimizing cabbage seedpod weevil damage, and time of swathing trials. These trials were carried out in a non-biased, in-depth, quality fashion as demanded by the Canola Council of Canada. Use the information outlined in this report as part of a complete information gathering process to assist in making decisions.

SEED PRIMING TRIAL

Objective: Evaluate the impact of a novel seed priming system on emergence, maturity and yield of canola.

Background: A method of priming seed has been developed and commercialized by Kamterter II L.L.C. for several vegetable crops including some crucifers. This priming system enhances the germination speed and rates of these small seeded vegetable crops. The aim of this trial was to determine whether primed canola would exhibit similar advantages. Potential benefits include faster germination rates, which should reduce the incidence of seedling diseases such as *Rhizoctonia, Fusarium and Pythium*; better crop competition with weeds; shorter days to maturity; and higher yields.

Methodology: This trial was conducted in conjunction with the seed bulking trial. InVigor 2663 was used. The primed treatment was seeded at 3 lb/ac and compared to unprimed 3 lb/ac and 5 lb/ac treatments. Seed lots were identical for both primed and unprimed treatments. Each treatment was replicated four times.

Discussion: Seed priming did not significantly improve yields at any of the locations this year (Table 1). Quicker emergence was observed at all sites. However, this only translated into earlier maturity at the Lethbridge (Irrigation) location.

Table 1. Impact of Seed Priming on Yield and Contribution Margin

CPC Location	Dauphin, MB		Yorkton, SK		Nipawin, SK		Lethbridge (Irr), AB		Dawson Creek, B.C.	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD
SEED PRIMING TRIAL										
3 lb/ac unprimed	31.7	158	22.3	85	19.3	57	57.1	380	39.2	169
3 lb/ac primed	33.9	172	22.8	84	17.1	57	53.5	342	39.9	168
5 lb/ac unprimed	35.0	177	24.8	96	20.4	32	51.6	319	-	-
LSD (bu/ac)	2.44		2.20		3.40		3.12		5.22	
CV (%)	5.6		6.5		14.0		4.5		7.9	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac)
(-) Indicates treatment not conducted. An estimated/projected price of $1.71/lb for seed priming was used for calculating contribution margins.

VARIETY AND SYSTEMS COMPARISON TRIAL

Objective: Establish agronomic criteria for choosing varieties and herbicide options.

Background: The availability of canola with innovative traits (herbicide tolerance, specialty trait oils) has given growers 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 trait oil premiums, weed spectrum, tillage system and herbicide rotation.

Methodology: Each treatment was replicated four times in a modified split block system. Hybrids (including synthetics) were seeded at 4 to 5 lb/ac. Other varieties were seeded at 'normal' seeding rates. The companies that submitted each variety provided the seed treatments. Herbicide applications were appropriate for the particular variety. The check variety for this trial was Q2 sprayed with conventional herbicides. Swathing commenced when seed colour change reached 30 to 40%, and harvest was completed when appropriate.

Discussion: Adverse environmental conditions impacted the performance of the varieties at a number of locations. The differences in yield performance of the varieties among sites are in part a reflection of each system's ability to control the weed spectrum (Table 2). Yields and contribution margins tended to be the highest with the Liberty Link system at half of the locations. Contribution margins were a function of yield, herbicide cost (including TUA for Roundup Ready), seed cost, grade and oil premiums. Therefore, check on specific premiums associated with those varieties and the required specifications to obtain the premium.

Differences in oil contents varied from variety to variety and from site to site. Weed conditions and growing conditions (frost, excessive moisture and drought) varied greatly, and the ideal combination of herbicide system and variety varied accordingly. The ideal system (in terms of variety and herbicide package) for one grower is not necessarily the best combination for a neighbour. A grower must consider the spectrum of weeds present, typical growing conditions for the area, disease concerns, crop rotation, herbicide rotation, volunteer canola control, and genetic potential of the varieties before making the choice of one particular system for a field.

Keep proper records of varieties and herbicide systems used. This is crucial in planning the weed control strategy for the entire rotation, and in reducing the chance of developing weed resistance to specific herbicides or classes of herbicides that may be frequently used in the rotation.

Due to adverse growing conditions at many sites, crop canopies were generally light and, therefore, there were few differences in harvestability at most locations. Varieties that were more susceptible to lodging were consistently more difficult to swath. No noticeable differences were noted during combining at most locations.

PRE-SEEDING BURNOFF TIMING TRIAL

Objective: Investigate the appropriate timing for a pre-seeding burnoff treatment with glyphosate prior to seeding a speciality oil (conventional herbicide) canola variety.

Background: Preseeding application of glyphosate has become a relatively standard practice for growers in reduced tillage operations. The addition of a pre-seed or pre-emergent burnoff may also be an advantage when using conventional canola varieties in controlling weeds that are competing with the crop near the time of canola emergence. The timing of the pre-emergent burnoff may be critical in extracting the most benefit from the application.

Methodology: Four treatments were used in a randomized complete block (RCB) design with four replicates:

- five to seven days before seeding (DBS)
- 1/2 to one day before seeding (DBS)
- three to five days after seeding (DAS) (before crop emergence)
- check (no burnoff)

Table 3. Impact of Pre-Seed Burnoff on Yield and Contribution Margin

CPC Location	Selkirk, MB		Lethbridge (Dry), AB		Lethbridge (Irri), AB		Rycroft, AB	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD
PRE-SEEDING BURNOFF TIMING TRIAL								
Burnoff five to seven days before seeding	30.8	146	10.5	28	49.5	318	22.1	65
Burnoff one day before seeding	29.3	131	9.9	22	51.2	334	24.4	84
Burnoff three to five days after seeding	30.3	141	11.0	33	48.8	311	23.3	75
Check - no burnoff	28.5	134	5.1	(17)	46.0	295	18.5	45
LSD (bu/ac)	2.88		1.51		2.31		3.01	
CV (%)	7.5		12.7		3.6		10.5	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) Brackets in the CMD column reflect a negative value.

Table 2. Impact of Variety and Herbicide System on Yield and Contribution Margin

CPC Location	Selkirk, MB		Dauphin, MB		Yorkton, SK		Nipawin, SK		Beiseker, AB		Lethbridge (Irr), AB		Lethbridge (Dry), AB		Dawson Creek, B.C.	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD
VARIETY AND SYSTEMS COMPARISON TRIAL																
InVigor 2573	-	-	34.7	175	25.0	98	-	-	-	-	55.3	342	9.3	1	-	-
InVigor 2663	33.9	182	-	-	-	-	24.6	94	24.1	100	-	-	-	-	43.6	275
InVigor 2733	33.1	171	30.8	136	24.9	93	23.0	84	21.9	77	47.6	272	8.2	(9)	48.4	311
LBD 2393	-	-	33.1	160	-	-	-	-	-	-	-	-	-	-	-	-
Canterra 1604 CL	-	-	-	-	24.1	79	20.1	43	-	-	-	-	-	-	-	-
SW RazoR	-	-	-	-	23.7	87	23.3	84	-	-	-	-	-	-	-	-
LBD 612RR	27.4	127	29.5	126	23.1	85	23.7	90	22.7	90	-	-	-	-	-	-
IMC 208*	18.5	70	22.2	87	22.1	102	16.0	41	17.3	63	31.9	186	-	-	35.2	227
IMC 109*	-	-	26.6	130	20.4	85	21.0	90	14.0	32	42.4	289	-	-	36.0	233
IMC 304*	15.8	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canterra 1812	-	-	-	-	25.4	102	-	-	-	-	-	-	-	-	-	-
Canterra 1841	-	-	-	-	26.0	105	-	-	-	-	-	-	-	-	-	-
DKL 35-85	-	-	-	-	-	-	-	-	-	-	46.7	286	-	-	-	-
DKL 34-55	-	-	-	-	25.6	107	22.7	81	-	-	-	-	-	-	43.1	247
45H21	-	-	-	-	-	-	26.2	107	-	-	-	-	-	-	-	-
Field King 811RR	-	-	-	-	-	-	24.6	98	-	-	-	-	-	-	-	-
MilleniUM 03*	24.4	97	26.4	123	12.7	(20)	15.6	23	17.8	48	38.1	228	-	-	38.4	265
ACS C7	-	-	-	-	-	-	5.9	(73)	-	-	-	-	-	-	-	-
Nex 705*	29.5	140	33.1	181	23.2	80	23.7	74	13.7	(9)	45.1	277	10.3	22	36.7	195
Nex 715*	24.7	90	30.1	149	21.5	59	22.2	56	17.8	35	47.3	297	9.6	13	36.4	191
Nex 720*	28.7	130	-	-	-	-	-	-	-	-	47.6	300	10.0	17	-	-
Q2	24.8	74	28.1	109	15.9	(3)	19.5	43	18.1	19	43.3	222	11.6	26	37.9	168
AC Sunbeam	-	-	-	-	-	-	6.5	(73)	-	-	-	-	-	-	-	-
LSD	2.84		2.02		2.78		2.30		2.93		5.80		1.43		6.37	
CV%	9.0		5.7		10.4		9.7		13.0		10.8		11.8		12.2	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) (-) Indicates treatment not conducted.
*Brackets in the CMD column reflect a negative value. * Specialty oil canola varieties*

The variety used was Nex 715. The herbicide used was Vantage Plus applied at 1/2 to 1 L/ac depending on the weed spectrum present (i.e.: presence of quackgrass, dandelion, or thistle would require the 1 L/ac rate). In-crop applications of appropriate herbicides were used.

Discussion: A burnoff application of glyphosate prior to emergence tended to improve yield and economic returns at all locations (Table 3). Regardless of when the burnoff was applied, the weed control advantage was still obtained and provided an additional $12/ac return on average. The closer the burnoff is applied to crop emergence, the longer the weed-free period will be extended during early crop development. However, there are risks involved in delaying the burnoff application until after seeding. If weather conditions are not favourable prior to emergence, the opportunity for applying a burnoff can be lost. If a burnoff opportunity is missed, there is potential for weeds to reach a stage of development that will make them harder to control with an in-crop herbicide application.

SEED TREATMENT TRIAL

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

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

Methodology: The seed treatment trial included some or all of the following treatments:

- check (Foundation Lite) (fungicide only)
- Foundation Lite (fungicide only) + Sevin (foliar insecticide)
- Foundation Premium
- Gaucho CS
- Gaucho Platinum
- Prosper
- Helix
- Tribune (fungicide only) + Matador (foliar insecticide)

The following flea beetle damage guide was used to estimate the percentage of (shot hole) damage to leaf area:

0 = no leaf damage

1 = less than 10% leaf damage

2 = 11 to 25% leaf damage

3 = 26 to 50% leaf damage

4 = 51 to 75% leaf damage

5 = 76 to 100% leaf damage

For assistance in estimating per cent damage, the Flea Beetle Damage Guide (BASF) was used.

All other agronomic practices remained the same.

Discussion: At all locations, canola treated with fungicide only seed treatments experienced greater levels of flea beetle damage than treatments that included insecticides (Table 4).

Table 4. Impact of Seed Treatments on Yield and Contribution Margin

CPC Location	Selkirk, MB		Yorkton, SK		Lethbridge (Irr), AB		Dawson Creek, B.C.	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD
SEED TREATMENT TRIAL								
Foundation Premium	27.5	N/A	23.4	N/A	45.2	N/A	36.4	N/A
Foundation Lite + Sevin	-	-	23.4	90	45.1	270	38.1	231
Foundation Lite (check)	29.9	157	17.8	45	45.0	274	36.7	225
Gaucho CS	30.2	N/A	23.4	N/A	49.3	N/A	34.8	N/A
Gaucho Platinum	-	-	-	-	49.1	N/A	40.4	N/A
Prosper	29.2	N/A	27.5	N/A	44.3	N/A	40.7	N/A
Tribune + Matador	*29.8	N/A	-	-	48.5	N/A	35.3	N/A
Helix	29.7	150	27.4	126	48.9	306	33.1	192
LSD	1.69		4.19		4.09		5.22	
CV%	4.9		14.2		7.2		11.6	

*Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) N/A – At time of writing, no cost figures were supplied for these seed treatments. The Foundation Lite (check) treatments would normally have been sprayed with a foliar insecticide for flea beetle control. In these trials, a foliar insecticide was not applied to these treatments. * Matador was not applied at this site based on low levels of flea beetle damage.*

This tended to reduce yields although the losses were not always significant. There were no clear trends among the seed treatments containing insecticides. The treatments containing insecticide require flea beetles to feed on the leaves to obtain control. Therefore, growers can expect to see some minor feeding damage on the leaves. Results with foliar insecticides were variable. Foliar insecticides can be an effective rescue treatment when damage exceeds action thresholds, provided conditions allow for timely applications.

SEED SIZE TRIAL

Objective: Determine the effect of seed size on maturity, yield, oil and contribution margin.

Background: Research conducted by Dr. R. Elliott at the Agriculture and Agri-Food Canada Saskatoon, SK Research Centre in cooperation with the seed industry indicates that seed size has an effect on seed vigour and agronomic performance.

Methodology: One seed lot of MilleniUM 03 was sized to produce a sample, which included the largest 50% of the seed lot. The larger seed was compared to a regular seed size portion from the same seed lot. This trial was conducted within the variety and systems comparison trial. Treatments were seeded adjacent to each other within each replicate.

Discussion: At two of the three locations there was an advantage in yield and economic return from large sized seed (Table 5).

CANOPY MANIPULATION TRIAL

Objective: Compare the effects of various planting dates and seeding rates on yield, maturity, insects and diseases of *B. napus* canola.

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

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

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

- early planting date @ 1 lb/ac swath @ 30 to 40% SCC on main stem
- early planting date @ 1 lb/ac
- early planting date @ 3 lb/ac
- early planting date @ 5 lb/ac
- normal planting date @ 1 lb/ac swath @ 30 to 40% SCC on main stem
- normal planting date @ 1 lb/ac
- normal planting date @ 3 lb/ac
- normal planting date @ 5 lb/ac (check)

Weeds were removed at the recommended leaf stage with Liberty and/or Select. Fertilizer rates were applied based on a 25% probability of precipitation according to soil test results. Corncob grit was used to bulk up the 1 lb/ac and 3 lb/ac seeding rates. All other agronomic practices were similar for all treatments.

Swathing in this trial commenced when the main stem was at 30 to 40% seed colour change (SCC) unless the seeds in the pods on the side branches were translucent and soft. In this case, swathing was delayed until the seeds in the side

Table 5. Impact of Seed Size on Yield and Contribution Margin

CPC Location	Dauphin, MB		Yorkton, SK		Nipawin, SK	
	NYD	CMD*	NYD	CMD*	NYD	CMD*
SEED SIZE TRIAL						
MilleniUM 03 (regular sized seed)	24.7	98	10.4	15	15.2	20
MilleniUM 03 (large sized seed)	24.1	85	13.8	43	16.5	25
LSD	2.97		1.33		0.92	
CV (%)	7.3		6.6		3.5	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac)
**Estimated cost of seed sizing was 35% above the value of commercially produced MilleniUM 03.*

branches were firm. The exceptions to this were treatments #1 and #5, which were swathed at 30 to 40% SCC on the main stem.

Discussion: Differences were significant between planting dates and among seeding rates at most sites (Table 6). With the exception of the Beiseker site, yield was usually higher at the 3 and 5 lb/ac seeding rates. The 1 lb/ac seeding rate rarely reached complete canopy closure and resulted in delayed maturity and increased branching at all sites. This contributed to increased weed pressure, due to lack of crop competition. Low seeding rates had increased lodging at the majority of the sites. "The plant grew too big for its branches." Seed colour change evaluation and swathability were more difficult at the lower plant densities. Due to low disease pressure, there were no noticeable differences in sclerotinia stem infection at all locations. Low plant populations are more susceptible to stresses that cause mortality (e.g., spring frost, insect damage). Achieving plant populations of 60-160 plants/m^2 allows for plant loss due to stress. It is important to realize that seeding rates are not as important as the plant populations produced.

Table 6. Impact of Seeding Rate and Seeding Date of Yield and Contribution Margin

CPC Location	Dauphin, MB		Yorkton, SK		Beiseker, AB		Lethbridge (Irr), AB		Dawson Creek, B.C.		Thief River Falls, MN	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD*
CANOPY MANIPULATION TRIAL												
Early 1 lb/ac (30 to 40% SCC)	23.4	118	19.9	41	31.8	163	37.0	191	35.2	132	22.5	33
Early planting at 1 lb/ac	21.0	96	20.4	46	36.3	226	42.4	235	-	-	24.2	42
Early planting at 3 lb/ac	32.2	188	21.7	57	26.7	124	51.4	320	44.9	206	31.3	69
Early planting at 5 lb/ac	35.4	207	23.7	74	19.5	53	51.6	314	47.4	218	33.4	69
Normal 1 lb/ac (30 to 40% SCC)	22.8	112	24.6	84	37.6	211	42.2	238	29.0	107	31.7	82
Normal planting at 1 lb/ac	21.3	99	26.1	97	38.3	233	45.5	262	-	-	34.9	100
Normal planting at 3 lb/ac	36.8	229	26.6	106	26.7	113	52.3	328	33.9	135	36.5	98
Normal planting at 5 lb/ac (check)	37.7	227	27.1	110	23.8	91	57.2	364	34.6	136	35.5	82
LSD (bu/ac)	4.45		2.18		2.88		3.95		6.0		2.97	
CV (%)	12.7		7.5		7.9		7.5		13.7		7.8	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) SCC = Seed Colour Change * Note: Thief River Falls Contribution Margins are in U.S.$.

Table 7. Effect of Nitrogen on Canola Yield, Contribution Margin and Oil Content

CPC Location	Selkirk, MB			Nipawin, SK			Lethbridge (Irr), AB		
	NYD	CMD	Oil	NYD	CMD	Oil	NYD	CMD	Oil
NITROGEN RATE FERTILITY TRIAL									
50% above soil test	31.6	153	48.3	20.2	33	44.1	43.7	231	47.3
Soil test recommendation	27.8	123	48.4	18.0	33	45.2	41.5	227	46.8
50% below soil test	22.0	73	48.2	13.9	15	46.1	38.1	212	46.8
LSD	1.63		0.56	2.77		0.96	2.15		0.42
CV%	4.4		0.8	11.6		1.5	3.8		0.7

Note: NYD – Net Yield Data (bu/ac), CMD – Contribution Margin Data ($/ac)

NITROGEN RATE FERTILITY TRIAL

Objective: Investigate the effect of nitrogen (N) rate on yield, oil content and quality of specialty trait oil canola.

Background: Canola is a relatively high user of N and N rates usually have a large effect on yield. However, there is often an inverse relationship between N rate and seed oil content. With the increasing acreage of specialty trait oil varieties, it is important to determine the effect of N rates on the quantity and quality of oil produced by these varieties.

Methodology: This trial consisted of the following treatments:

- N rate 50% below soil test recommendations
- soil test recommendation levels of N (based on 25% probability of receiving this amount of moisture as per Enviro-Test Lab soil test results)
- N rate 50% above soil test recommendations

The majority of the nitrogen fertilizer was banded prior to seeding. The phosphorous (P), potassium (K) and sulphur (S) fertilizer were applied at the soil test recommended rates for all treatments, provided the ratio of N to S did not exceed a ratio of 7 to 1. When it did, additional sulphate S was added to maintain that ratio. The variety used was Nex 705.

Discussion: Higher rates of N fertilizer resulted in yield increases at all locations (Table 7). With increasing N rates, oil content declined at only one of the three locations. At Selkirk and Lethbridge Irrigation, the yield trend indicates that the additional N was still contributing to yield rather than increased protein content of the seed. Protein content and oil content are inversely related. Yields at Nipawin, were limited by environmental factors.

SEED BULKING (ACCUSEED) TRIAL

Objective: Investigate the use of Accuseed granular elemental sulphur (S) as a seed-bulking agent to assist in reducing canola seeding rates.

Background: One way to increase a crop's ability to fight disease while reducing lodging and overall crop height is to decrease plant population.

Over the years, the agronomy unit of Alberta Agriculture has done preliminary research investigating the possibility of using agronomic rates (10 to 30 lb/ac) of seed-sized elemental S fertilizer to reduce canola seeding rates. By blending seed-sized S with canola seed, seeding can be reduced without compromising an even stand. Many growers use seeding rates of 5 to 7 lb/ac, which often translates to 200 or more plants/m^2. By harvest, canola stands seldom contain half of this number. Respectable yields can be obtained from stands as low as 20 plants/m^2 with proper management. However, achieving low (below 5 lb/ac) seeding rates with commercial seeding equipment is often difficult.

Methodology: Accuseed at 10 lb/ac was applied with canola seed at 3 lb/ac and was an additional treatment within the seed priming trial. This treatment was compared with the unprimed plots seeded at 5 lb/ac.

Discussion: The yield difference was not significant between the 3 lb/ac with Accuseed and the 5 lb/ac seeding rate without Accuseed (Table 8).

OPTIMIZING CANOLA PRODUCTION TRIAL

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

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

While University of Manitoba experiments focused on three general "packages" of inputs including fertilization,

Table 8. Effect of Seed Bulking on Canola Yield and Contribution Margin

CPC Location	Dauphin, MB		Nipawin, SK		Lethbridge (Irr), AB	
	NYD	CMD	NYD	CMD	NYD	CMD
SEED BULKING (ACCUSEED) TRIAL						
Seed rate @ 3 lb/ac + Accuseed	34.7	181	18.1	32	52.1	331
Seed rate @ 5 lb/ac (check)	35.0	177	20.4	55	51.6	320
LSD	2.44		3.40		3.12	
CV%	5.6		14.0		4.5	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) crop protection and genetic yield potential, the trials at Canola Production Centres focused only on the interaction between fertilization and crop protection levels. This allowed the trials to be conducted in the larger field scale format commonly used at Canola Production Centre sites.

Methodology: The optimizing canola production trial consisted of six treatments in a RCB design, using InVigor 2663:

- medium level of crop protection, low level of fertilization
- medium level of crop protection, medium level of fertilization
- medium level of crop protection, high level of fertilization
- high level of crop protection, low level of fertilization
- high level of crop protection, medium level of fertilization
- high level of crop protection, high level of fertilization

Low level of fertilization = no fertilizer applied

Medium level of fertilization = fertilizer applied to 35 bu/ac target yield

- micronutrients are foliar applied (if deficient)
- macronutrients are soil applied

High level of fertilization = fertilizer applied to 50 bu/ac target yield

- micronutrients are foliar applied (if marginal)
- macronutrients are soil applied

Medium level of crop protection = Foundation Lite seed treatment, one application of Liberty (1.35 L/ac) at the appropriate crop and weed stage. No foliar fungicide was applied. Foliar insecticides were applied as per appropriate thresholds at the low rate.

High level of crop protection = Helix Xtra seed treatment, two applications of Liberty (1.35 L/ac @ 2-leaf stage and 1.08 L/ac @ 4 to 6-leaf stage). Select (0.025 L/ac) was applied along with the first application of Liberty if grassy weed pressure was high. Fungicide was applied for sclerotinia (Ronilan EG @ 0.3 to 0.4 kg/ac) if required. Foliar insecticides were applied as per appropriate thresholds at the high rate.

Discussion: Yield responses to additional levels of fertility were greater under high levels of pest control at most sites (Table 9). This may have been attributed to the fact that pest control was no longer a limiting factor for yield. With the adverse environmental conditions and lack of disease pressure experienced this season at most locations, the best returns were obtained under a medium level of pest control and medium fertility level. Potential benefits in yield and economic return from higher levels of fertility and pest control were not obtained due to these environmental factors. The law of diminishing returns, the level of crop inputs, crop price and how much risk is involved all play a role in determining what inputs to use when.

CABBAGE SEEDPOD WEEVIL TRIAL

Objective: Evaluate the effectiveness of management tools, such as seeding date and variety choice, to minimize cabbage seedpod weevil damage.

Table 9. Effect of Varying Levels of Fertilizer and Pesticides on Canola Yield and Contribution Margin

CPC Location	Selkirk, MB		Yorkton, SK		Nipawin, SK		Beiseker, AB		Lethbridge (Irr), AB		Rycroft, AB		Thief River Falls, MN	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD*
OPTIMIZING CANOLA PRODUCTION TRIAL														
Medium Level of Pest Control														
Low fertility	20.8	122	15.5	70	13.7	104	21.5	113	35.4	233	11.4	29	28.5	84
Medium fertility	30.9	191	23.3	74	21.2	111	25.4	112	53.8	359	24.7	70	30.6	72
High fertility	35.5	218	25.0	62	24.5	92	21.4	65	56.1	360	23.5	42	31.9	67
High Level of Pest Control														
Low fertility	21.5	98	18.0	37	15.8	49	19.8	91	27.3	166	14.2	47	26.7	31
Medium fertility	30.1	154	23.9	68	23.8	92	23.6	90	54.4	370	29.9	91	33.6	45
High fertility	36.0	193	29.5	99	28.2	102	24.5	86	59.6	397	30.1	72	31.8	24
LSD	1.15		2.50		1.90		2.72		7.39		3.80		2.39	
CV %	3.2		7.6		7.2		8.1		10.5		11.5		6.3	

*Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) * Note: Thief River Falls Contribution Margins are in U.S. $.*

Background: Cabbage seedpod weevil (*Ceutorhynchus obstrictus*) was first discovered in 1996 at the Lethbridge Canola Production Centre. Since 1996, cabbage seedpod weevil numbers have steadily increased and have been found as far north as Olds, AB and as far east as Medicine Hat, AB and in southwestern Saskatchewan.

Life Cycle: The cabbage seedpod weevil attacks plants within the *Brassica* family. In the early spring, overwintering adults emerge and begin feeding on stinkweed, flixweed, volunteer canola and wild mustard. The adult weevils begin to move into the fields once canola reaches the bud stage. Damage is inflicted by both adults and larvae. The adult weevils first feed on the flower by piercing the centre of the bud. The resulting damage can either be an aborted flower or damage to petals on fertile flowers. Feeding continues until females reach sexual maturity.

Adults then begin to search for developing (1-2 cm long) pods and begin egg laying. Each female will lay between 60 to 70 eggs. Eggs are typically laid on one side of the pod, but can be laid on both sides of the septum. The larvae hatch within the pod and begin to feed on developing seeds. Each larva consumes approximately six seeds. They then burrow out of the pod, leaving an exit hole. Infection of the pod from fungal agents can occur depending on environmental conditions.

Larvae migrate to the ground to pupate in the soil. A week to 10 days later, the next generation of adults begins to emerge. Under normal conditions, these new adults feed on late maturing canola and other host plants. If the crop is delayed in maturity, the new adults will begin feeding on the immature seeds within the pods. The adults extract the nutrients from the centre of the seed leaving an outer shell.

Control: Presently the only method is to apply an insecticide at early bud or bloom stage. Seed treatments and varietal resistance are being examined.

Methodology: InVigor 2663 was seeded at three rates (1 lb/ac, 3 lb/ac and 5 lb/ac) on two seeding dates. All treatments were doubled to allow for spraying if cabbage seedpod weevil populations were above the action threshold. The trial had four replicates in a split plot design. The main plots were combinations of planting date and seeding rate. Sub-plots were sprayed vs. unsprayed. Each treatment was monitored over the growing season for weevil populations and exit holes. Emergence traps were set within each treatment to monitor populations of new adults.

Table 10. Effect of Planting Date, Seeding Rate and Insecticide Application for Control of Cabbage Seedpod Weevil on Canola Yield and Contribution Margin

Treatment	Yield (%)	Yield (bu/ac)	Contribution Margin ($/ac)	Oil (%)	1,000 Kernel Weight(g)	Growing Degree Days	Days to Maturity
CABBAGE SEEDPOD WEEVIL TRIAL (Lethbridge Irrigation)							
Early Planting Date							
1 lb/ac sprayed	74	42.4	234.50	44.3	4.5	1252	122
1 lb/ac unsprayed	69	39.5	213.60	44.3	4.6	1252	122
3 lb/ac sprayed	90	51.4	320.15	44.3	4.4	1135	105
3 lb/ac unsprayed	86	49.0	303.75	44.4	4.4	1135	105
5 lb/ac sprayed	90	51.6	314.11	45.1	4.0	1135	105
5 lb/ac unsprayed	87	49.7	302.21	44.9	4.6	1135	105
Normal Planting Date							
1 lb/ac sprayed	80	45.5	262.40	45.0	4.1	1223	114
1 lb/ac unsprayed	72	41.2	228.90	45.0	3.9	1223	114
3 lb/ac sprayed	91	52.3	328.25	45.0	4.3	1196	111
3 lb/ac unsprayed	84	47.8	292.95	44.9	4.3	1196	111
5 lb/ac sprayed (check)	100	57.2	364.51	45.5	4.4	1216	113
5 lb/ac unsprayed	96	55.5	354.41	45.5	4.5	1216	113
LSD for any two treatments		**6.52**		**0.73**			
LSD for sprayed vs. unsprayed CV%		**2.35** **4.0**		**0.37** **0.7**			

Discussion: Spraying the 1 lb/ac and 3 lb/ac seeding rates produced a significant yield advantage for both planting dates. Spraying to control the cabbage seedpod weevil gave a definite contribution margin advantage (Table 10).

Damage to pods was more evident on the early-planted treatments. Early planted treatments were at a more vulnerable stage when the weevils infested the trial. Although populations were just at action threshold levels (three weevils/sweep), there was enough damage to cause yield losses in unsprayed treatments.

TIME OF SWATHING TRIAL

Objective: Compare the effects of various swathing dates and seeding rates on yield and quality of a hybrid canola.

Background: Traditionally, the recommended stage of swathing has been 30 to 40% seed colour change (SCC) on the main stem to maximize yield and quality and minimize green seed and shattering. The introduction of hybrids, with associated lower seeding rates and lower plant densities induces proliferation of extra secondary branching. The secondary branching results in a wider range of seed development and maturation as compared to traditional seeding rates. Therefore, the normal time of swathing (30 to 40% SCC) may need to be delayed to a later stage to allow for optimum development and fill of the secondary branches.

Methodology: The time of swathing trial consisted of the following treatments in a split plot design with seeding rate as the main plot and swathing stage as the sub-plot:

- 30 to 40% SCC ~ Prairie 499 @ 5 lb/ac
- 40 to 50% SCC ~ Prairie 499 @ 5 lb/ac
- 50 to 60% SCC ~ Prairie 499 @ 5 lb/ac
- 60 to 70% SCC ~ Prairie 499 @ 5 lb/ac
- Straight Combine ~ Prairie 499 @ 5 lb/ac
- 30 to 40% SCC ~ Prairie 499 @ 3 lb/ac
- 40 to 50% SCC ~ Prairie 499 @ 3 lb/ac
- 50 to 60% SCC ~ Prairie 499 @ 3 lb/ac
- 60 to 70% SCC ~ Prairie 499 @ 3 lb/ac
- straight combine ~ Prairie 499 @ 3 lb/ac

SCC was determined on main stem (not whole plant).

Discussion: Delaying swathing had no negative impact for the hybrid variety (Prairie 499 RR Table 11). The overall yield tended to stay the same or increase. By the 50 to 60% SCC stage most of this yield advantage was captured for both seeding rates. It is important to consider that there are risks involved when trying to capture this potential yield advantage. The risks include shattering or pod drop due to mechanical or environmental damage and fall frost damage that can lead to green seed problems.

Table 11. Effect of Swathing Dates and Seed Rates on Canola Yield and Contribution Margin*

CPC Location	Selkirk, MB		Dauphin, MB		Yorkton, SK		Nipawan, SK		Beiseker, AB		Rycroft, AB	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD*
TIME OF SWATHING TRIAL												
30-40% SCC @ 3 lb/ac	27.3	133	30.7	145	24.1	90	18.3	49	25.2	120	20.1	61
40-50% SCC @ 3 lb/ac	26.6	127	33.2	166	24.7	95	21.0	73	25.6	131	21.1	43
50-60% SCC @ 3 lb/ac	28.6	145	32.9	164	26.1	108	23.4	95	26.8	142	21.9	48
60-70% SCC @ 3 lb/ac	27.9	139	34.7	180	26.6	113	23.6	96	24.1	110	23.8	60
Straight cut @ 3 lb/ac	-	-	-	-	22.3	76	24.4	106	24.8	62	24.1	93
30-40% SCC @ 5 lb/ac	28.1	129	31.8	143	24.2	79	18.6	40	24.3	111	27.7	81
40-50% SCC @ 5 lb/ac	28.1	129	33.2	155	24.5	82	21.8	69	22.3	93	30.0	96
50-60% SCC @ 5 lb/ac	28.2	130	34.0	163	26.0	96	24.7	95	25.4	113	28.8	88
60-70% SCC @ 5 lb/ac	29.0	137	34.8	170	26.6	101	25.6	103	25.0	110	28.7	88
Straight cut @ 5 lb/ac	-	-	-	-	19.3	37	26.9	117	23.8	48	30.1	99
LSD (any two treatments)	2.48		1.62		2.74		3.50		2.62		4.92	
LSD (stage within rate)	1.73		1.84		2.26		1.44		1.74		2.82	
CV%	5.1		4.5		7.6		5.2		4.9		9.1	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data ($/ac) (-) Indicates treatment not conducted.

MINNESOTA SUMMARY

The fifth year of the Minnesota Canola Production Centre program was another success. The trials at the Thief River Falls site were chosen to demonstrate basic canola production principles as well as investigate new technologies and techniques. While many of the trends in the trials reflected past results from the Canadian Canola Production Centre program, other trial results differed. Future work will help reveal if these unexpected trends are regionally specific, or if they were just a feature of this year's less than favourable growing conditions. All of the results will provide good focal points for discussions at extension meetings throughout the winter. This joint project has provided a unique opportunity to share information between Canadian and American growers. Planning for next year's program has already begun with the site for 2003 being 1/2 mile south of Steve Dahl's farm south of Roseau, MN on Highway 89. Contact any of the people listed in the Field Staff Information section with comments or questions about the Minnesota Canola Production Centre.

MINNESOTA CANOLA PRODUCTION CENTRE RESULTS

VARIETY AND SYSTEMS COMPARISON TRIAL

Hyola 357 Magnum, InVigor 2663 and 45H21 yielded significantly higher than the check (Hyola 401) (Table 12). The late herbicide application on the conventional and Clearfield varieties was outside the recommended window of application as a result of poor weather conditions. Hyola 357 Magnum had the highest contribution margin. Contribution margins reflect differences in seed costs, yield and herbicide costs.

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

SEED TREATMENT TRIAL

All the insecticide seed treatments provided good protection from flea beetles, with significantly less injury and denser stands (Table 13). The Canola Fungicide Package (CFP) treatment yielded significantly less than any of the other treatments with the exception of G7030-02. The CFP+Capture treatment produced similar yield to the other insecticide seed treatments. The higher yields of CFP+Capture and Gaucho CS contributed to higher contribution margins than the CFP alone. Contribution margins reflect differences in yield, seed treatments and foliar insecticide costs. Thirteen days after the application of Capture (29 DAP), flea beetle injury ratings of CFP+Capture were slightly better than the insecticide seed treatments, due to mortality of the heavily damaged plants.

Table 12. Effect of Variety and Herbicide System on Canola Yield and Contribution Margin

VARIETY AND SYSTEMS COMPARISON TRIAL Thief River Falls, MN			
Treatment/ System	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
InVigor 2663	1684	33.7	50.33
InVigor 2733	1450	29.0	24.64
46A76	1387	27.7	26.58
Canterra 1670	1303	26.1	10.05
Hyola 357 Magnum	1846	36.9	69.85
45H21	1631	32.6	47.59
SW Peak	1598	32.0	49.71
DKL 3455	1592	31.8	50.70
DKL 223	1565	31.3	39.46
Canterra 1812	1514	30.3	33.67
Gladiator	1476	29.5	34.94
RR Hyb 2013	1442	28.8	26.07
DS Roughrider	1420	28.4	32.05
LiBred 499RR	1414	28.3	24.05
DKL 3585	1361	27.2	25.81
Dakota	1126	22.5	1.75
Q2	1495	29.9	20.22
46H02	1486	29.7	11.99
Hyola 401	1404	28.1	3.11
LSD	201.5	4.03	
CV%	11.5	11.5	

FUNGICIDE EVALUATION TRIAL

Yield, oil content and infection rating did not differ among the treatments (Table 14). Infection levels were very low.

However, infection frequency was lower with Endura than the other treatments. With low infection levels and lack of differences in yield, the check had the greatest contribution margin due to the lack of fungicide cost. Contribution margins reflect differences in yield and fungicide application costs.

LIBERTY TANK MIX TRIAL

Tank mixing options did not affect yield or oil. Weed control was excellent in all treatments. Contribution margins reflect differences in yield and chemical costs (Table 15).

Table 13. Effect of Seed Treatment on Canola Yield and Contribution Margin

SEED TREATMENT TRIAL Thief River Falls, MN			
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
Canola fung.	1494	29.9	38.80
Canola fung. Capture	1782	35.6	64.61
G7030-02	1689	33.8	N/A
G7030-02 L0263-A1	1717	34.3	N/A
Gaucho CS	1748	35.0	62.49
LSD	198.8	3.98	
CV%	9.4	9.4	

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

Table 14. Effect of Fungicides on Canola Yield and Contribution Margin

FUNGICIDE EVALUATION TRIAL Thief River Falls, MN			
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
Check (no fung.)	1675	33.5	84.79
Endura 5.7 oz	1733	34.7	68.66
Ronilan 12 oz	1637	32.7	59.13
Rovral Flo 14.4 oz	1715	34.3	67.47
Topsin 1.5 lb	1735	34.7	60.73
Topsin 1 lb	1632	32.6	58.15
Topsin 1 lb + NIS	1635	32.7	57.64
LSD (0.10)	198.1	3.96	
CV%	9.6	9.6	

ROUNDUP TIMING TRIAL

Herbicide application timing had no effect on yield or oil content (Table 16). The lack of good growing conditions this season may not have allowed the crop to capitalize on early weed removal. Earlier trials indicated that early weed removal under heavy weed pressure, such as this year, provided significantly higher yields. Contribution margins reflect differences in yield, seed cost and herbicide and application costs.

Table 15. Effect of Liberty Tank Mixes on Canola Yield and Contribution Margin

LIBERTY TANK MIX TRIAL Thief River Falls, MN			
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
Liberty – full rate	1401	28.0	17.31
Liberty + Assure II	1393	27.9	17.03
Liberty + Poast	1450	29.0	24.64
Liberty + Select	1341	26.8	12.59
LSD	182.5	3.65	
CV%	10.1	10.1	

Table 16. Effect of Roundup Application Timing on Canola Yield and Contribution Margin

ROUNDUP TIMING TRIAL Thief River Falls, MN			
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
DKL 223			
6 leaf (check)	1565	31.3	39.46
2 and 6 leaf	1620	32.4	41.93
DKL 3585			
6 leaf (check)	1361	27.2	25.81
2 and 6 leaf	1358	27.2	22.03
LSD spray timing within a variety	**114.3**	**2.29**	
CV%	**5.6**	**5.6**	

FOLIAR NUTRIENT APPLICATION TRIAL

Foliar-applied boron treatments had no effect on yield or days to maturity (Table 17). Contribution margins reflect differences in yield, micronutrient treatments and application costs.

FALL DORMANT SEEDING TRIAL

Fall seed treatments yielded much less than spring seed treatment due to inadequate plant stands (Table 18). The November 6 Extender treatment had a denser spring stand than the November 6 treatments without Extender. Extender likely helped reduce fall germination during the first 13 days after seeding while soil temperature remained above freezing.

Table 17. Effect of Foliar Nutrients on Canola Yield and Contribution Margin

FOLIAR NUTRIENT APPLICATION TRIAL Thief River Falls, MN			
System	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
Borosol 1 pt + 1 pt	1205	24.1	8.34
Borosol 1 pt	1232	24.6	13.10
Borosol 2 pt	1281	25.6	16.93
Check	1269	25.4	18.97
Molybor	1282	25.6	12.31
LSD	82.2	1.64	
CV%	6.6	6.6	

Table 18. Effect of Seeding Date and Seed Treatments on Canola Yield and Contribution Margin

FALL DORMANT SEEDING TRIAL Thief River Falls, MN			
Seeding Date	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
Oct. 18 – Extender	203	4.1	(106.94)
Nov. 6 – Extender	198	4.0	(106.35)
Nov. 6 – Helix Xtra	NA	NA	NA
Nov. 6 – Tribune	NA	NA	NA
May 21 – Helix Xtra	1069	21.4	(8.46)
LSD	**NA**	**NA**	
CV%			

Note: Brackets indicate a negative contribution margin.

Table 19. Effect of Pushing on Canola Yield and Contribution Margin

PUSHING TRIAL Thief River Falls, MN			
Treatment	**Yield (lb/ac)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**
Swath (check)	1357	27.2	14.69
Straight combine	1267	25.3	5.41
Pushed	1252	25.1	3.40
LSD	**176.8**	**3.54**	
CV%	**7.9**	**7.9**	

PUSHING TRIAL

Pushing and straight combining both yielded slightly lower than the swathed check (Table 19). Contribution margins were also lower than the check. Contribution margins reflect differences in yield and equipment costs. The fuel, lube and repair cost of pushing was calculated at $0.42/ac, which is the same cost as swathing. Oil content was higher in the straight combined and pushed treatments. This was expected because oil is the last component produced in the seed.

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