North Central Region Canola Research Program
Application Cover Page
(Must fit on one page)

Project Title: The Minnesota Canola Production Centre & Canola Research

Lead Principal Investigator and Institution: Dr. Paul Porter, Department of Agronomy and Plant Genetics, University of Minnesota

Co-Principal Investigator(s):

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Funds Requested for 2007: $31,174

Project Status: New ___X_____Renewal _____

Does this project involve recombinant DNA, human subjects or vertebrate animals?
____ Yes __X__ No
If yes, please complete a CSREES Assurance Statement Form 2008 or a Research & Related Other Project Information Form that is available as part of the new application kit through Grants.gov.

Does this project involve the sale of goods or services? _____ Yes ___X__ No
If yes, please indicate the nature of the sale in this space:

By signing this proposal, the applicant certifies that the information contained herein is true and complete to the best of their knowledge and accepts as to any award the obligation to comply with the terms and conditions of the Cooperative State Research, Education and Extension Service in effect at the time of the award.

_____
PI Signature

_____
Dept. Chair/REC Director signature
(applies only to NDSU applicants)

_____
Authorized Organizational Representative
(applies only to non-NDSU applicants)

RESEARCH & RELATED Other Project Information

1. * Are Human Subjects Involved? ☐ Yes ☑ No

1.a If YES to Human Subjects

Is the IRB review Pending? ☐ Yes ☐ No

IRB Approval Date:

Exemption Number: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6

Human Subject Assurance Number:

2. * Are Vertebrate Animals Used? ☐ Yes ☑ No

2.a. If YES to Vertebrate Animals

Is the IACUC review Pending? ☐ Yes ☐ No

IACUC Approval Date:

Animal Welfare Assurance Number

3. * Is proprietary/privileged information included in the application? ☐ Yes ☑ No

4.a. * Does this project have an actual or potential impact on the environment? ☐ Yes ☑ No

4.b. If yes, please explain:

4.c. If this project has an actual or potential impact on the environment, has an exemption been authorized or an environmental assessment (EA) or environmental impact statement (EIS) been performed? ☐ Yes ☐ No

4.d. If yes, please explain:

5.a. * Does this project involve activities outside the U.S. or partnership with International Collaborators? ☐ Yes ☑ No

5.b. If yes, identify countries:

5.c. Optional Explanation:

6. * Project Summary/Abstract Add Attachment | Delete Attachment | View Attachment

7. * Project Narrative Add Attachment | Delete Attachment | View Attachment

8. Bibliography & References Cited Add Attachment | Delete Attachment | View Attachment

9. Facilities & Other Resources Add Attachment | Delete Attachment | View Attachment

10. Equipment Add Attachment | Delete Attachment | View Attachment

11. Other Attachments Add Attachments | Delete Attachments | View Attachments ☐

OMB Number: 4040-0001

Expiration Date: 04/30/2008

North Central Region Canola Research
FY 2007 Proposal

Project Title:

The Minnesota Canola Production Centre & Canola Research

(Variety and Systems Comparison Trial, Nitrogen Application Trial, Product Evaluation Studies, and Winter Canola Variety Evaluation)

Principal Investigator:

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Amount Requested:

$ 31,174

History:

The Minnesota Canola Production Centre has been a public-private partnership between the Minnesota Canola Council and the University of Minnesota since 1998. The Canola Council of Canada initiated Canola Production Centres to address the ongoing need for canola production technology transfer. The Canola Production Centre is a joint effort between producer groups, industry representatives, and government and extension personnel. Field scale agronomic trials utilizing commercial farm equipment are conducted at the Centre, and the information generated is utilized for extension activities throughout the year.

Part 1: Variety and Systems Comparison Trial

Objectives:

To establish agronomic and economical criteria (such as yield, contribution margin, crop quality, lodging resistance, harvestability, and disease resistance) for choosing among canola (*Brassica napus L.*) varieties and their respective herbicide options.

Procedures:

This study will be located at the Canola Production Centre, which in 2007 will most likely be located on the Amundson Brothers Farm near Wannaska, MN. Varieties for the Variety and Systems Comparison Trial are submitted for testing by the canola seed industry. An invitation is sent to all the area seed dealers in February with final confirmations made by April 1. The seed is treated with the strongest commercially available seed treatment for each variety, either Helix Xtra or Prosper 400. Varieties are seeded with a 10-foot 9350 JD double-disk press drill at seed company recommended seeding rates. Plots are 400 feet long by 30 feet wide. The trial is laid out in a modified RCB design with four replicates. The Roundup Ready varieties are grouped together to help avoid drift problems between the different systems. The other herbicide systems are also grouped together. All varieties receive the same tillage, fertilizer and post-emergent fungicide treatments. Due to the reduced acreage of conventional varieties there may not be a conventional variety/system in the trial in the 2007 systems trial. All the herbicide tolerant varieties are sprayed with their respective herbicides at the recommended rates for the weed spectrum in the field. Herbicide spraying is done with a 30 foot open boom sprayer on a calm day. If conditions are conducive for sclerotinia, all varieties are sprayed with a fungicide such as Ronilan at 20 to 50% bloom to reduce the risk of yield loss due to this disease. Each plot is swathed individually when seed color change in that plot reaches 30 to 40 % on the main stem and threshing is completed when suitable conditions exist. Swathing is done with an 18 foot Versatile 400 swather with side cutter bar and the plots are threshed with a commercial combine rented from a grower or local dealership. Yields are measured with a weigh wagon and 5 lb samples taken for dockage and quality testing.

Data collection during the season includes; canopy closure, beginning and end bloom dates, height, lodging, maturity date, swathing harvestability, and combining harvestability. After harvest, seed quality is measured by evaluating for damaged seed, green seed count, and oil and protein content. Contribution margins are calculated using

the value of the crop at harvest minus variable costs (seed, fertilizer, herbicides, fungicides, insecticides, fuel, lube and machinery repair, check-off, and interest/opportunity costs).

All data, except the contribution margins, will be analyzed using SAS. The data will be compiled and published in a report that is made available to growers during winter meetings.

Justification:

Many canola growers prefer to see how varieties perform and compare in "field scale" plots rather than small plots. When appropriately designed, field scale plots take into account more field variability in the yield equation by including high ground and ditches. Small plots are typically located in an area of the field where the soil is uniform and well drained to reduce variability among treatments. The large plots allow each variety to be treated with its' respective herbicide so that the varieties are treated like they would be in the grower's field. Many growers select varieties based on not only yield and disease resistance, but also on ease of harvest. Comparing harvestability of varieties is not possible in small plots because the equipment is not comparable to what a grower uses.

The Canola Production Centre provides a focal point for canola producers to come to a summer field day and look at the plots. They will hear from industry representatives as well as from University of Minnesota and North Dakota State University extension personnel about important current topics such as insect and disease concerns on canola and other crops.

Literature Review:

The Variety and Systems Comparison Trial has been conducted on the Canola Production Centres across Canada since 1997 and in Minnesota since 1999. Results have been published in each year's copy of the Canola Production Centre annual report. One exception occurred in 2006 when the trials at the Canola Production Centre failed due to lack of timely rainfall resulting in a variable and ultimately unacceptable plant stand. Other systems comparison work has been done in company strip trials which are also large plot. To our knowledge, no one else but the above mentioned has done the same kind of systems and variety comparison like we have conducted in the past and propose to conduct in 2007.

Current Work:

In 2005, the Variety and Systems Comparison Trial at the Minnesota Canola Production Centre near Grygla included ten varieties. Of these, one variety was conventional, one was Clearfield, two were Liberty Link, and six were Roundup Ready.

In 2006 there were eight entries in the Variety and Systems Comparison Trial.

Part 2: Nitrogen Top Dressing Trial

Objectives:

1. Evaluate canola response to multiple rates of nitrogen (N) applied pre-plant or at the 4- to 6-leaf stage of growth using field-scale equipment.

2. Evaluate the effectiveness of top dressing urea N (46-0-0) compared to Ammonium Nitrate (34-0-0).

Procedures:

This study will be located at the Canola Production Centre near Wannaska, MN. The exact field has yet to be determined. In spring 2007 soil samples will be taken at 0 to 6" and at 0 to 24" depths in order to identify a location with relatively low residual soil nitrogen. The trial area also be sampled for phosphorous, potassium, and sulfur, and fertilized accordingly to its needs. All treatments will have approximately 50 lb/ac seed placed MAP (6-26-0). The canola variety Hyola 357 Magnum will be seeded at a rate of 5 lb/ac. The field layout will consist of a randomized complete block (RCB) design with four replicates. Plots will be field scale (30 ft by 400 ft) and managed and harvested with field scale equipment.

Nitrogen treatments will consist of a set of pre-plant and top dress application rates of dry urea (46-0-0) and dry ammonium nitrate (34-0-0) fertilizer. All top dress applications will be applied at the 4- to 6-leaf stage or as close to that stage as possible. The no N check and pre-plant N application treatments will allow for meaningful treatment yield comparisons. Top dress applications will be applied prior to a rainfall event if possible. Urea requires approximately 0.30 inches of rain within 2 to 4 days after application for proper incorporation and the reduction of volatilization.

Rates of pre-plant (PPI) and post emergence N applications

Trt	PPI	4 to 6 leaf stage	N source	Targeted total N
	-Applied lbs N/ac -			lb/ac
1.	0	0	no additional N applied	45
2.	30	0	(46-0-0)	75
3.	60	0	(46-0-0)	105
4.	90	0	(46-0-0)	135
5.	0	30	(46-0-0)	75
6.	0	60	(46-0-0)	105
7.	0	90	(46-0-0)	135
8.	0	60	(34-0-0)	105

Canola growth stage data will be collected at canopy, begin bloom, end bloom and maturity. Plant height, lodging, sclerotinia infection ratings, seed yield, oil content, contribution margins, and weather data will also be collected. Abnormal growing conditions and pest occurrence will be monitored and managed if possible. The results will be statistically analyzed using SAS, and the data will be made available to the public and private sectors through a variety of oral and written presentations (SAS, 1999).

This study is a good example of what the Canola Production Centres were designed for: taking the best treatments from small plot research and putting them into large production scale plots that are more closely related to the grower's experiences.

Justification:

Research has indicated that 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 (Thomas, 2000). Rainfall during this period of rapid nitrogen accumulation could leach soil N beyond the canola-rooting zone. A top dress application of N, with a little or no N applied preplant and the remainder applied at 4- to 6- leaf stage, could be more efficiently utilized by the plants, which could result in less N needing to be applied. A split application of N would provide growers an additional month to evaluate their canola crop prior to purchasing and applying the additional N.

Literature Review:

Canola requires high levels of N and usually shows increased yields with an N fertilizer application. The high N requirement of canola is one reason why canola acreage in Minnesota is being replaced with soybeans, which require very little to no additional N. If canola N levels could be managed to obtain more yield with the same or lower N input, then canola would be more economically competitive with soybean. Minnesota and North Dakota both recommend 130 lb/ac of available N to obtain a 2000 lb/ac yield (Rehm et al., 2001; and Franzen, 1999). Manitoba Agriculture recommends 150 lb/ac of available N to reach a 2000 lb/ac.

Studies on top dress applications of N fertilizer are limited. An Australian study on irrigated canola indicated that top dress applications were not effective (Taylor et al., 1991). Ty Dewitz, a canola grower from Tappen, North Dakota has been seeing a 15 to 20% yield increase by using top dress applications of N on both irrigated and dry-land canola (personal communications through Eric Eriksmoen). A 2001 study conducted at two locations in North Dakota showed a yield increase of up to a 30% when top dress 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 dress was conducted at 7 locations in North Dakota. Results from this trial showed no yield difference between applying fertilizer PPI and top dressing (John Lukach, personal communications). The results also indicated a range of 5 to 10 lb/ac of canola increase per pound of nitrogen applied, depending on location. In the last 4 years, 3 out of 10 site years (Langdon, Carrington and Valley City) showed yield increases of 300 to 500 lb/ac from top dressing nitrogen compared to PPI.

In 2003 a nitrogen trial was conducted at the Canola Production Centre near Roseau which looked at adding 30 and 60 lb/ac N at PPI and the 4 to 6 leaf stage as a top dress treatment. The field was flooded in 2002 and had high levels of residual nitrogen. Top dress treatments included three nitrogen sources; urea, ammonium nitrate and 28-0-0 liquid. The only significant yield increase obtained from top dressing occurred with urea at 30 lb/ac N. In 2004 the trial was repeated near Roseau looking at applications of 60 and 90 lb/ac PPI and topdress with no difference in yield between the two application timings.

In 2004 an extensive nitrogen application trial including 7 nitrogen levels PPI and 4 nitrogen levels top dress was conducted at 7 locations in North Dakota. Results from the Valley City location showed significant yield increase of approximately 300 lb/ac from top dressing (John Lukach, personal communications). Langdon also showed yield increases from top dressing.

Studies on the timing of top dress applications are also limited. In 1999, the Canola Production Centres conducted a study at 5 sites with top dressing 10 lb N/ac and 10 lb S/ac at 7, 14, 21, and 7 plus 21 days after emergence (Canola Council of Canada, 1999). The total recommended rate of N fertilizer was applied prior to seeding. Increased yield from top dressing was observed at only one site. The 2001 North Dakota trials showed no yield difference with a split application at bolting compared to a 9% yield increase with the split application at the 3 to 5-leaf stage (Eric Eriksmoen, personal communications). A top dress application of N for winter canola seed production is recommended in Kansas with one third to one half applied in the fall and the remainder applied in late winter (Kansas State University, 1989).

References:

Canola Council of Canada. 1999. Top dressed sulphur and nitrogen trial. 1999 Canola Production Center annual report. pp. 108-112.

Franzen, D. W. 1999. Fertilizing mustard and canola. NDSU Ext. Bul. SF-1122.

Kansas State University. 1989. Canola Production Handbook. Ext. Bul. C-706. p. 7.

Rehm, G., M. Schmitt, J. Lamb, and R. Eliason. 2001. Fertilizer Recommendations for Agronomic Crops in Minnesota. Univ. of Minnesota Ext. Bul. BU-06240-S.

SAS. 1999. SAS/STAT user's guide. Version 8. SAS Inst., Cary, NC.

Taylor, A.J., C.J. Smith, and I.B. Wilson. 1991. Effect of irrigation and nitrogen fertilizer on yield, oil content, nitrogen accumulation and water use of canola (*Brassica napus L.*). Fert. Res. 29:249-260.

Thomas, P. 2000. Nutrient uptake by canola. Alberta Canadian Agric, Melfort, AAFC.

Current Work:

A trial very similar to this proposed trial was conducted on the 2005 CPC near Grygla in a tile drained field, see attached data for 2005 results. Very wet weather from 20 to 50 days after planting provided optimum conditions to show significant differences between the PPI and top dress treatments. 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. 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.

This research was proposed for the 2006 Canola Production Centre. Preplant nitrogen applications were made and the trial was planted. Lack of rainfall at the site for over a month resulted in a very uneven stand. Because of that the trial was terminated prior to topdress application

To our knowledge, there has been no other nitrogen fertilizer research on canola in Minnesota in the last 9 years, and current N recommendations have not been adequately field-tested.

Facilities and Equipment (Canola Production Centre):

The research will be conducted on-farm at the Canola Production Centre near Wannaska, MN. Dr. Paul Porter has had canola responsibilities since 2000. He and a technician (previously Dave LeGare, currently Derek Crompton) implement the majority of the University of Minnesota canola research and the canola variety evaluation trials. They are equipped with the appropriate field equipment (tractor, 10 foot press drill, 30 foot sprayer, 18 foot swather) to plant, maintain and harvest the crops grown in this effort. The canola project has a 12' drop spreader for applying the fertilizer on the nitrogen plots. The weigh wagon is borrowed and the combine is rented locally at threshing time. They also have the ability to transport the all the equipment to the Wannaska site with the exception of the combine. Paul and Derek have access to the necessary laboratory infrastructure to process plant samples, as well as the statistical packages required for the analysis (SAS, 1999).

Project Timetable:

Invitation to companies for variety testing will be sent out in February, 2007 with variety confirmation by April, 2007. These projects will consist of field trials during the 2007 growing season. A summer field day will held in late June or early July to show the research and offer other extension information to growers from industry people and University personnel. Results will be available via the internet web pages, presented at scientific and grower meetings, cited in area and regional extension newsletters, and published in an extension fact sheet and scientific journals when applicable.

Personnel:

Dr. Paul Porter (1%) & Derek Crompton (20%).
Minnesota Canola Council - support will provided by organizing the summer field day, writing the land rental agreement, and providing the land rent to the grower.

Part 3: Product Evaluation Studies: Contans and BioBoost

Objectives:

To evaluate products sold by industry which purport to increase canola yield. Specific products to be evaluated include Contans and BioBoost.

Procedures:

In the spring of 2007 Dr. Porter and Derek Crompton will work with industry representatives who are promoting the products Contans and BioBoost to design appropriate large-scale evaluations of their products on the Canola Production Centre. These trials will involve randomized and replicated treatments either as stand alone experiments or embedded within the Variety and Systems Comparison Trial. In the case of Contans, we will explore the possibility of conducting a research trial involving a fall (2007) applied treatment for 2008 canola in addition to the standard (spring) 2007 trial.

Justification:

Contans is a product that has been on the market for a number of years. It contains as the active inoculant a fungal spore of *Coniothyrium minitans*, a specific

parasite that attacks the resting state (sclerotia) *of Sclerotinia sclerotiorum* which causes white mold in canola. It is soil applied and typically worked into the soil either the fall before planting or just ahead of planting. Typically, the more time the better, between the application of Contans and the typical onset of disease. In theory, Contans reduces or eliminates the disease-causing fungus from treated soil.

BioBoost is a relatively new sulfur-oxidizing bacterial inoculant for canola (http://www.cropscience.org.au/icsc2004/poster/2/5/6/1040_banerjee.htm). BioBoost is a peat-based inoculant, having a shelf life over five months with the adequate level of viable bacterial cells. The active ingredient of the inoculant BioBoost is a selected strain of *Delftia acidovorans* isolated from Canadian soil, which is also a canola plant growth promoting rhizobacteria (PGPR). The concept is that it hastens the process of sulfur (S) oxidation in soil. It has been used as a canola seed treatment to meet the plant S requirement and to increase canola production in Western Canada. Multi-year, multi-sites field studies with BioBoost showed that the bacterial inoculant significantly enhanced canola performance and yield. Being PGPR, According to researchers, BioBoost inoculant promoted canola production irrespective of the soil S status of the fields. Seed analysis showed that BioBoost inoculant helped in canola S-uptake but did not change the seed quality traits like oil, protein, oleic acid, linolenic acid and glucosinolate content of canola seed.

Canola producers are hearing stories about both Contans and BioBoost, and this research would provide independent validation utilizing a large-scale plots and farm-scale equipment.

The **Facilities and Equipment, Project Timetable** and **Personnel** have been described in Parts 1 and 2 above.

Part 4: Variety Evaluation of Winter Canola

Objectives:

To evaluate different winter canola varieties for their ability to survive the winter and produce grain yield in northwestern Minnesota.

Procedures:

A collection of 50 winter canola varieties were seeded on September 6, 2006 on a wheat stubble field just north of Roseau, MN. The canola was seeded at 5 lb/ac with a Hege 1000 double disk small plot seeder. Emergence was fairly erratic due to dry conditions at planting and the canola was in a range of 2 to 8 leaf stages going into the winter. Plots were 6 feet wide X 30 feet long and replicated 4 times. Ammonium Nitrate was top dressed on September 8 at 100 lb/ac (34-20-10) prior to emergence.

As of early January the plants appeared to be in good shape. At that time there was approximately 8 inches of snow cover on the site.

Justification:

Winter canola has the potential of producing larger yields than the spring canola currently grown in northwestern Minnesota. Winter canola is seeded in the fall after

small grain harvest. It grows to a large rosette plant in the fall and over winters that way. In the spring, most of the old leaves appear frozen and dead however the crown shoots out new leaf growth in early to mid April and is flowering by the end of May. The early flowering avoids the heat stress of July and August and harvest is usually earlier than spring wheat. Winter canola variety trials were conducted in northern Minnesota in the late 1980s with limited success. Most years the trials were seeded on tilled soil , and 'winter kill' resulted. In fall 2001 a National winter canola variety trial was seeded south of Thief River Falls, MN into heavy wheat straw residue. Germination was delayed due to dry weather and poor seed/soil contact. The plants were very small going into the winter and none survived. In fall 2002 a seeding date x seeding rate trial was conducted west of St. Hilaire, MN into approximately 10 inch wheat stubble that had the straw removed by raking and baling it. Plant sizes varied from large 6-leaf to very small 2-leaf. There was good snow cover that winter with excellent survivability. In fall 2003 the trial was repeated just south of Thief River Falls, MN along with the national winter canola variety trial into 12 inch wheat stubble with the straw baled off. The canola was good and healthy going into the winter, but only one range near the gravel road survived to make a crop.

Current Work:

In fall of 2005, 34 winter canola varieties were seeded on a wheat stubble field west of St. Hilaire, MN. The straw was light and was raked off of half of the plot area prior to seeding. The canola was seeded at 5 lb/ac with a Hege 1000 double disk small plot seeder with 80 lb/ac MAP (9-42-0) seed placed fertilizer. 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.

As of January 1, the plants were in good shape because there was adequate ice and snow cover. Because of that insulation, when the air temperatures dropped to below 0 ^{o}F in early December the surface soil temperature never dropped below +11 ^{o}F. Winter survivability was a problem in portions of the plots where there was excess wheat residue which hampered stand establishment and in compacted areas from tire-tracks during small-grain harvest. Average yield of the canola varieties across all 34 entries was 1,510 lbs/acre, with the best yielding variety averaging over 2,200 lbs/acre. In 2005-2006, average yield of the canola varieties was 9580 lb/ac. Late application of spring nitrogen may have contributed to the lower than anticipated yields.

Results from the individual entries in the trial can be found in the University of Minnesota Varietal Trials Results bulletin (MP 113-2007) as well as the January 2007 Northwest and West Central Minnesota On-Farm Cropping Trials (Univ. of Minnesota Extension Service).

Facilities and Equipment:

The research will be conducted on land farmed by Richard Magnuson north of Roseau. Paul Porter and Derek Crompton are equipped with the appropriate field equipment (tractor, Hege small plot seeder, 30 foot sprayer, 6 foot swather, small plot

combine) to plant, maintain and harvest the crops grown in this project. The hay rake was borrowed from a local farmer. The canola project has a 12' drop spreader for applying the fertilizer. We also have the ability to transport the all the equipment to the Roseau site. Both Paul and Derek have access to the necessary laboratory infrastructure to dry and process plant samples, as well as the statistical packages required for the analysis (SAS).

Project Timetable:

The canola will be evaluated for winter survival in spring after the frost is out and the canola has a chance to grow. Spring stand counts will be compared to fall stand counts in the exact areas in each plots. Nitrogen and sulfur (approximately 100-0-0-25) will be top dress applied in early spring before bolting. Data will be collected throughout the summer and harvest will commence when the plots are mature. Results will be available via the internet web pages, presented at scientific and grower meetings, cited in area and regional extension newsletters, and published in an extension fact sheet and scientific journals when applicable.

Literature Review:

Currently all canola cultivars grown in Minnesota are spring-type cultivars, and virtually all the crop is sown in the spring. Winter-type canola cultivars differ from spring-type canola cultivars in that they generally have a greater vernalization requirement and are typically planted in the fall. They germinate in the fall, develop to the rosette stage prior to freeze-up, flower the following spring, and are harvested that summer. In general, winter-type cultivars have a greater yield potential than spring-type cultivars. One disadvantage of growing spring-type cultivars is that they need to be planted as early in the spring as possible in order to obtain maximum yield potential. Research suggests a yield decrease of approximately 1.6% per day that planting is delayed from late April to late June (Oelke et al., 2000). Spring planting is often delayed until soils are dry enough for sowing. In Minnesota, severe winter-kill of fall-planted winter-type canola cultivars occurred at 13 of 16 location/years from 1988 through 1990 (Putnam et al., 1991). Based on these and other results (Auld and Mahler, 1991), the canola industry that has developed in the north-central U.S. consists of spring-planted, spring-type canola cultivars. In the 1990s little to no University and private industry research has been conducted on fall-planted, winter-type canola cultivars. Topinka et al. (1991) stated a greater range in plant size prior to winter freeze-up could be tolerated in winter canola seeded into standing stubble, as it would not be exposed to the extremes of temperature. Putnam et al. (1991) concluded that when winter-type canola survived the winter, time of seeding and use of small grain stubble was critical, but no research has been conducted on this. They found mid-August sowing performed best, and late August or September sowing produced lower yields. This window for sowing effectively precludes the use of winter-type canola following long-season crops such as corn and soybean. However, it does not preclude the use of winter-type canola following most small grains (MN Ag. Statistics, 2003). Recent weather patterns in northwest Minnesota across the last 20 years relative to the long-term 100-year data set suggest that there has been a higher frequency of mild winters (Mark Seeley, personal communication). This trend favors chances of over-wintering success of winter-type canola.

References:

Auld, D.L. and K.A. Mahler. 1991. Production of canola and rapeseed in the U.S. *In* McGregor, D.I. (ed.) *Proc. of the Eight Int. Rapeseed Congress*, Saskatoon, Canada. pp. 978-983.

MN Ag. Statistics. 2000. Minnesota Ag. Statistics Service. 90 West Plato Boulevard, St. Paul MN 55107. Electronic version at: http://www.nass.usda.gov/mn/

Northwest and West Central Minnesota On-Farm Cropping Trials. 2007. p.42. Univ. of Minnesota Extension Service.

Oelke, E.A., D.G. LeGare, K.B. Andol, P.M. Porter. 2000. Planting date influences canola yield and growth in northwestern Minnesota. Agron. Abst. p.38.

Putnam, D.H., L.L. Hardman, E.A. Oelke, M.O. Johnson, E.I. Fuller, D.M. Noetzel, R.A. Meronuck, M.E. Morris, and K.N. Sannes. 1991. Prospects for canola in Minnesota. Center for Alternative Plant and Animal Products, Univ. of MN.

Topinka, A.R.C., R.K. Downey, and G.F.W. Rakow. 1991. Effect of agronomic practices on the overwintering of winter canola in southern Alberta. *In* McGregor, D.I. (ed.) *Proc. of the Eight Int. Rapeseed Congress*, Saskatoon, Canada. pp. 665-670.

University of Minnesota Varietal Trials Results bulletin. 2007. p.53. (MP 113-2007).

Budget: All Trials

Technician	(700 hours x $18.00/hr)	$12,600
Student	(600 hours x $10.50/hr)	6,300
Fringe	(36.5% T & 7.7% S)	5,084
Travel (St. Paul – Roseau: 800 miles X 5 X $0.485		1,940
Combine rental and fuel (CPC)		1,000
Materials & Supplies (chemicals, fertilizer, stakes)		1,250
NDAWN Weather stations maintenance and service at Mavie, Roosevelt, and Greenbush		3,000
Total costs		**$31,174**

Budget breakdown by trial:

		Treatments	Dollars
1-3	Base costs of having a CPC site		9,099
1.	Systems Comparison Trial	(~8 x $800)	6,400
2.	Nitrogen Top Dress Trial	(~8 x $800)	6,400
3.	Product Evaluation	to be determined	1,775
4.	Winter Canola Variety Trial	(50 x $90)	4,500
5.	NDAWN Stations		3,000
	Total costs		**$31,174**

Budget justification:

Items listed as wages will be used for summer support staff to assist in conducting the field research, collecting samples, and data summarization. Labor will be paid at a rate of $10.50/hr for a summer student at 650 hours, and $18.00/hr for a technician at 700 hours. Fringe benefits are calculated at 7.7% and 36.54% for students and technicians, respectively.

Materials and supplies include the herbicides, insecticides and fertilizer needed to conduct the trials. On the CPC we will utilize a field combine to harvest the plots. The owner of the combine will be compensated for the use of that equipment.

The data from the NDAWN Weather stations at Mavie, Wannaska, and Greenbush are used to help generate the Sclerotinia Forecasting Maps that provide growers timely information for then to decide how to manage sclerotinia. Costs included here are for telephone line service ($500 x 3 stations = $1500) and maintenance provided by NDSU ($500 x 3 stations = $1500).

See attached page for CSREES-2007 budget page.

Paul M. Porter

411 Borlaug Hall
1991 Buford Circle, St. Paul MN 55108
Tel: 612-625-6719 Fax: 612-625-1268 Email: pporter@umn.edu

Education

Ph.D.	1986	Univ. of Illinois – Urbana IL	Agronomy (soil-plant relations)
M.S.	1983	Univ. of Illinois – Urbana IL	Agronomy (soil chemistry)
B.S.	1978	Moorhead State Univ. – Moorhead MN	Chemistry

Thesis Titles

Ph.D. Effects of simulated acid rain on growth and yield of field-grown corn and soybeans.
M.S. Identification of phenolic acids and flavonoids in the roots of the soybean.

Professional Recognition

- Outstanding Service Award – Minnesota Canola Council 2003
- Service Learning Faculty Fellows Program – Univ. of Minnesota 2002
- Past President, Agronomy Society of South Carolina 1994
- Meritorious Honor Award – Univ. of Wyoming 1988

Positions Held

Professor	Univ. of Minnesota	St. Paul, MN	07/06 to present
Associate Professor	Univ. of Minnesota	St. Paul, MN	07/98 to 06/06
Associate/Assistant Prof.	Univ. of Minnesota		
Southwest Research and Outreach Center		Lamberton, MN	01/95 to 01/00
Assistant Professor	Clemson Univ.		
Edisto Research and Education Center		Blackville, SC	08/89 to 01/95
Research Associate	Univ. of Illinois	Urbana, IL	01/89 to 08/89
Assistant Professor	Univ. of Wyoming	Baidoa, Somalia	01/86 to 10/88
Graduate Research and			
Teaching Assistant	Univ. of Illinois	Urbana, IL	08/81 to 01/86
Peace Corps Volunteer	Minova, Zaire (Democratic Republic Congo)		07/78 to 06/80

Major Research and Teaching Emphasis

Cropping systems research involving rye as a cover crop, canola, alternative crops and organic production strategies. Teach several courses annually. Examples include World Food Problems, Agroecosystem Analysis Summer Field Course, Organic Agriculture – Science and Society, Management Strategies for Crop Production, and Student Organic Farm Planning.

Paul M. Porter, continued

Recent Journal Articles

Feyereisen, G.W., G.R. Sands, B.N. Wilson, J.S. Strock, and P.M. Porter. 2006. A probabilistic assessment of the potential for winter cereal rye to reduce field nitrate-nitrogen loss in southwestern Minnesota. Agron. J. 98:1416-1426.

Bradley, C.A., R.A. Henson, P.M. Porter, D.G. LeGare, L.E. del Río, and S.D. Khot. 2006. Response of canola cultivars to *Sclerotinia sclerotiorum* in controlled and field environments. Plant Disease. 90:215-219.

Miller, D.R , S.Y. Chen, P.M. Porter, G.A Johnson, D.L. Wyse, S.R. Stetina, L.D. Klossner, and G.A. Nelson. 2006. Evaluation of rotation crops for management of the soybean cyst nematode in Minnesota. Agron. J. 98:569-578.

De Bruin, J.L., N.R. Jordan, P.M. Porter, and S.C. Huerd. 2006. Effects of soil microbiota on rye growth: implications for integration of a rye cover crop into temperate cropping systems. Renewable Agriculture and Food Systems (RAFS) 21:245-252.

Bradley, C.A., H.A. Lamey, G.J. Endres, R.A. Henson, B.K. Hanson, K. McKay, M. Halvorson, D.G. LeGare, and P.M. Porter. 2006. Efficacy of fungicides for control of sclerotinia stem rot of canola. Plant Dis. 90:1129-1134.

Chen, S., D.L. Wyse, G.A. Johnson, P.M. Porter, S.R. Stetina, D.R. Miller, K.J. Betts, L.D. Klossner, and M.J. Haar. 2006. Effect of cover crops alfalfa, red clover, and perennial ryegrass on soybean cyst nematode population and soybean and corn yields in Minnesota. Crop Sci. 46:1890-1897.

Warnke, S.A., S.Y. Chen, D.L. Wyse, G.A. Johnson, and P.M. Porter. 2006. Effect of rotation crops on *Heterodera glycines* population density in a green house screening study. J. of Nematology. 38:391-398.

Carr, P.M., H.J. Kandel, P.M. Porter, R.D. Horsley, and S.F. Zwinger. 2006. Wheat cultivar performance on certified organic fields in Minnesota and North Dakota. Crop Sci. 46:1963-1971.

Feyereisen, G.W., G.R. Sands, J.S. Strock, B.N. Wilson, and P.M. Porter. *(in press – April 2007)* Hydrology and nitrogen cycle components of a simple rye growth model. J. of Irrigation and Drainage Engineering.

Feyereisen, G.W., G.R. Sands, B.N. Wilson, J.S. Strock, and P.M. Porter. *(in press)* Development of a cereal rye growth model. Transactions of the American Society of Agricultural and Biological Engineers (ASABE).

Porter. P., G. Feyereisen, J. De Bruin, and G. Johnson. 2005. No-till organic soybean production following a fall-planted rye cover crop. Proceedings of the First Scientific Conf. of the International Society of Organic Agriculture Research (ISOFAR) Researching Sustainable Systems. Adelaide, Australia. 20-23 September, 2005. p 26-30.

RESEARCH & RELATED BUDGET - SECTION A & B

*ORGANIZATIONAL DUNS: 555917996

*Budget Type: X Project Subaward/Consortium

Enter name of Organization: North Central Region Canola Research Program

Reset Entries *Start Da 7/1/2007 *End Date: 6/30/2008 Budget Period: ___1_____

(If the Reset entries button is pressed, please navigate to previous year to enable the submission of the form.)

A. Senior/Key Person

	Prefi›	*First Name	Middle N	*Last Name	Suffix	*Project Role	Base Salary	Cal. Months	Acad. Months	Sum. Months	*Requested Salary ($)	*Fringe Benefits ($)	*Funds Requested ($)
1						PD/PI							0
2													0
3													0
4													0
5													0
6													0
7													0
8													0
9	Total Funds requested for all Senior Key Persons in the attached file												0
											Total Senior/Key Person		0

B. Other Personnel

*# of Personnel		Cal. Months	Acad. Months	Sum. Months	*Requested Salary ($)	*Fringe Benefits ($)	*Funds Requested ($)
	Post Doctoral Associates						0
	Graduate Students						0
1	Undergraduate Students				6300	485	6785
	Secretarial/Clerical						0
1	Technician				12600	4599	17199
							0
							0
							0
							0
							0
	Total Number Other Personnel					Total Other Personnel	23984
						Total Salary, Wages and Fringe Benefits (A+B)	23984

C. Equipment Description

List items and dollar amount for each item exceeding $5,000

	Equipment Item	*Funds Requested ($)
1		
2		
3		
4		
5		
6		
7		
8		
9		
#		
#	Total funds requested for all equipment listed in the attached file	
	Total Equipment	0

Additional Equipment

D. Travel

		*Funds Requested ($)
1	Domestic Travel Costs (Incl. Canada, Mexico and U.S. Possessions)	1940
2	Foreign Travel Costs	
	Total Travel Cost	1940

E. Participant/Trainee Support Costs

		*Funds Requested ($)
1	Tuition/Fees/Health Insurance	
2	Stipends	
3	Travel	
4	Subsistence	
5	Other	
	Number of Participants/Trainees	**Total Participant/Trainee Support Costs** 0

F. Other Direct Costs

		*Funds Requested ($)
1	Materials and Supplies	1250
2	Publication Costs	
3	Consultant Services	
4	ADP/Computer Services	
5	Subawards/Consortium/Contractual Costs	
6	Equipment or Facility Rental/User Fees - (NDAWN Weather Station $3000, combine rental $1000 - see budget justification)	4000
7	Alterations and Renovations	
8		
9		
#		
	Total Other Direct Costs	5250

G. Direct Costs

Total Direct Costs (A thru F) 31174

H. Indirect Costs

Total Indirect Costs 0

I. Total Direct and Indirect Costs

Total Direct and Indirect Institutional Costs (G + H) 31174

J. Fee 0

K. *Budget Justification (Only attach one file)

RESEARCH & RELATED BUDGET - SECTION A & B

*ORGANIZATIONAL DUNS: 555917996

*Budget Type: X Project Subaward/Consortium

Enter name of Organization: North Central Region Canola Research Program

Reset Entries *Start Dat 7/1/2007 *End Date: 6/30/2008 Budget Period: Cumulative

(If the Reset entries button is pressed, please navigate to previous year to enable the submission of the form.)

A. Senior/Key Person

	Prefix	*First Name	Middle Na	*Last Name	Suffix	*Project Role	Base Salary	Cal. Months	Acad. Months	Sum. Months	*Requested Salary ($)	*Fringe Benefits ($)	*Funds Requested ($)
1						PD/PI							
2													0
3													0
4													0
5													0
6													0
7													0
8													0
9	Total Funds requested for all Senior Key Persons in the attached file												0
											Total Senior/Key Person		0

B. Other Personnel

*# of Personnel		Cal. Months	Acad. Months	Sum. Months	*Requested Salary ($)	*Fringe Benefits ($)	*Funds Requested ($)
	Post Doctoral Associates						0
	Graduate Students						0
1	Undergraduate Students				6300	485	6785
	Secretarial/Clerical						0
1	Technician				12600	4599	17199
							0
							0
							0
							0
							0
	Total Number Other Personnel					Total Other Personnel	23984
						Total Salary, Wages and Fringe Benefits (A+B)	23984

C. Equipment Description

List items and dollar amount for each item exceeding $5,000

	Equipment Item	*Funds Requested ($)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11	Total funds requested for all equipment listed in the attached file	
	Total Equipment	0

Additional Equipment

D. Travel

		*Funds Requested ($)
1	Domestic Travel Costs (Incl. Canada, Mexico and U.S. Possessions)	1940
2	Foreign Travel Costs	
	Total Travel Cost	1940

E. Participant/Trainee Support Costs

		*Funds Requested ($)
1	Tuition/Fees/Health Insurance	
2	Stipends	
3	Travel	
4	Subsistence	
5	Other	
	Number of Participants/Trainees	**Total Participant/Trainee Support Costs** 0

F. Other Direct Costs

		*Funds Requested ($)
1	Materials and Supplies	1250
2	Publication Costs	
3	Consultant Services	
4	ADP/Computer Services	
5	Subawards/Consortium/Contractual Costs	
6	Equipment or Facility Rental/User Fees (NDAWN Weather Station $3000, combine rental $1000 - see budget justification)	4000
7	Alterations and Renovations	
8		
9		
10		
	Total Other Direct Costs	5250

G. Direct Costs

Total Direct Costs (A thru F) 31174

H. Indirect Costs

Total Indirect Costs 0

I. Total Direct and Indirect Costs

Total Direct and Indirect Institutional Costs (G + H) 31174

J. Fee 0

K. *Budget Justification (Only attach one file)

UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved 0524-0039
Expires 03/31/2004

CURRENT AND PENDING SUPPORT

Paul M. Porter

Instructions:

1. Record information for active and pending projects, including this proposal. (Concurrent submission of a proposal to other organizations will not prejudice its review by CSREES.)
2. All current efforts to which project director(s) and other senior personnel have committed a portion of their time must be listed, whether or not salary for the person involved is included in the budgets of the various projects.
3. Provide analogous information for all proposed work which is being considered by, or which will be submitted in the near future to, other possible sponsors including other USDA programs.

NAME (List/PD #1 first)	SUPPORTING AGENCY AND AGENCY ACTIVE AWARD/PENDING PROPOSAL NUMBER	TOTAL $ AMOUNT	EFFECTIVE AND EXPIRATION DATES	% OF TIME COMMITTED	TITLE OF PROJECT
	Current:				
Porter, P.	North Central Region Canola Research, USDA / CSREES - subcontracts with NDSU	29,549	7/1/06 through 062/30/07	1%	Canola disease projects – Sclerotinia, and fall-seeded winter-type canola evaluation in Minnesota, CPC
D.V. Phillips, Univ. of Georgia; P. Porter, Univ. of Minnesota; and C. Bradley, North Dakota State Univ.	National Administrative Council of the National Canola Research Program	63,000	7/1/04 through 9/30/07	1%	A novel approach to develop elite, Sclerotinia resistant canola cultivars
G.E. Heimpel, P.Porter, D. Ragsdale, and B. Potter	CSREES – USDA Integrated Organic Program	463,645	05/01/04 through 9/30/07	5%	Soybean aphid suppression with a fall-seeded winter rye cover crop
Porter, P.	CSREES – USDA Special Programs	6,500	08-15-06 through 08/14/2007	1%	Land use dynamics: integrating natural resources and environmental issues
	Pending:				
Porter, P.	National Administrative Council of the National Canola Research Program	86,250	7/1/07 through 6/30/10	1%	Farm-scale biodiesel production from canola
Allan, D. S. Snapp, J. Baker, and Porter, P.	USDA-CSREES-NRI-000141	~400,000	7/1/07 through 6/30/10	1%	Quantifying and communicating the benefits of cover crops in the North Central U.S.

UNITED STATES DEPARTMENT OF AGRICULTURE OMB Approved 0524-0039
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE Expires 03/31/2004

CONFLICT OF INTEREST LIST
FOR COMPETITIVE PROGRAMS ONLY

Name: **Paul M. Porter**

For each project director (PD) and other personnel that are required based on the specific program guidelines, list alphabetically by last name (and with last name first), the full names of individuals in the following categories and mark each category which applies with an Ax≅.
Additional pages may be used as necessary. A conflict of interest list for each PD must be submitted before a proposal is considered complete. Inclusion of a C.V. or publication list in the proposal is not sufficient.
All co-authors on publications within the past four years, including pending publications and submissions
All collaborators on projects within the past four years, including current and planned collaborations
All thesis or postdoctoral *advisees/advisors*
All persons in your field with whom you have had a consulting/financial arrangement/other conflict-of-interest in the past four years

Note: Other individuals working in the applicant's specific area are not in conflict of interest with the applicant unless those individuals fall within one of the listed categories.

Name	Co-Author	Collaborator	Advisees/ Advisors	Other – Specify Nature
Allan, D.	X	X		
Arlt, T.J.	X	X		
DeBriun, J.L.	X	X	X	
Bradley, C.A.	X	X		
Breitenbach, F.R.	X	X		
Brummond, B.	X	X		
Carr, P.M.	X	X		
Chen, S.Y.	X	X		
Crookston, R.K.	X	X		
del Rio, L.E.	X	X		
Feyereisen, G.W.	X	X	X	
Fore, Z.	X	X		
Halvorson, M.	X	X		
Hanson, B.K.	X	X		
Harbur, M.	X	X		
Haugh, T.	X	X		
Henson, R.A.	X	X		
Huerd, S.C.	X	X		
Huggins, D.R.	X	X		
Jenks, B.		X		
Jordan, N.R.	X	X		
Johnson, B.L.	X	X		
Johnson, G.A.	X	X		
Kandel, H.J.	X	X		
Khot, S.D.	X	X		
Klossner, L.D.	X	X		
LeGare, D.G.	X	X		
Liebig, M.		X		
Mahoney, P.R.	X	X		

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COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE Expires 03/31/2004

CONFLICT OF INTEREST LIST
FOR COMPETITIVE PROGRAMS ONLY

Name: **Paul M. Porter, continued**

For each project director (PD) and other personnel that are required based on the specific program guidelines, list alphabetically by last name (and with last name first), the full names of individuals in the following categories and mark each category which applies with an Ax≅.
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Note: Other individuals working in the applicant's specific area are not in conflict of interest with the applicant unless those individuals fall within one of the listed categories.

Name	Co-Author	Collaborator	Advisees/ Advisors	Other – Specify Nature
McKay, K.	X	X		
Olson, K.D.	X	X		
Orf, J.H.	X	X		
Perillo, C.A.	X	X		
Phillips, D.V.	X	X		
Podoll, T.	X	X		
Quiring, S.R.	X	X		
Ransom, J.K.		X		
Reese, C.D.	X	X		
Russelle, M.P.	X	X		
Sands, G.R.	X	X		
Schaus, P.J.	X	X		
Stetina, L.D.	X	X	X	
Stienstra, W.C.	X	X		
Stordahl, J.	X	X		
Strock, J.S.	X	X		
Walgenbach, D.D.	X	X		
Wilson, B.N.	X	X		
Wyse, D.L.	X	X		
Young, N.D.	X	X		
Zwinger, S.F.	X	X		