MIDWEST REGIONAL

CANOLA

RESEARCH PROGRAM

Progress Report for the period 9/1/08 to 1/31/10

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Table of Contents

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Executive Summary

The U.S. demand for canola oil is increasing rapidly due to its low content of saturated fatty acids, and moderate content of polyunsaturated fatty acids. This healthy perception of canola oil for human nutrition has resulted in a consumption increase. Most of the demand for US canola oil is supplied by Canada. While canola production in the U. S. has increased over recent years, domestic consumption continues to outpace production, now by a 6:1 margin.

Canola production in the U. S. is primarily limited to spring type varieties grown in the northern Great Plains states of North Dakota, Montana, and Minnesota. With the advent of better winter type varieties suitable for the Great Plains area, acreage is on an increase in Kansas and Oklahoma. The Midwest grain producer is in need of winter type varieties that will produce a profitable yield and that provide a quality ground cover thus preventing soil erosion over winter. Winter planting of canola was first introduced to the Midwest during the 1984/85 season. Planted acreage peaked in the 1988/89 growing season at approximately 50,000 and 13,000 in Kentucky and Illinois, respectively. Since this initial increase in acres, severe winter kill of those varieties available at that time have plagued canola production in of the states of IL, KY, IN, VA, and OH.

Research to identify winter-hardy, high yielding varieties continues to be a high priority in the Midwest. The availability of proven varieties is a prerequisite to the establishment of canola as a Midwestern crop. Thus, researchers in our region believe that variety development and testing is a top priority for the expansion of winter canola in our region. We will continue to collaborate with the existing breeding programs at Kansas State University, the University of Idaho and the university of Arkansas. Our research has shown that the new hybrid varieties are capable of higher yields and believe the future of winter canola lies in these tyoe varieties. Therefore we will expand our efforts toward the testing of inbred lines and hybrid varieties to identify those best suited to our region. Toward this end we will continue to participate in the National Canola Variety Trial as more hybrids varieties are entered each year..

The efforts of the Midwest Regional Canola Research program are categorized under the following objectives:

1) To develop winter canola varieties adapted to the Midwest in cooperation with breeding programs within the other regional programs.

2) To evaluate winter canola varieties in cooperation with seed companies and the National Winter Canola Variety Trial (NWCVT) to identify current varieties and advanced lines that possess high yield potential, winter hardiness, resistance to shattering, standability, and resistance to diseases and insect pests.

3) To determine the appropriate cultural practices including planting date, seeding rates, pest control strategies, and fertility requirements for canola production in the Midwest region.

4) To conduct studies to evaluate the impact that the inclusion of canola might have on the ecological and economic sustainability of our current Midwest cropping systems.

5) To develop on-farm demonstrations, field day presentations, seminars, and other venues as a means of transferring technology to producers.

Key accomplishments through this period:

- A meeting of the MRCRP collaborators and producer industry persons occurred on January 13-14, 2010. Research priorities, and canola marketing were the principal discussion topics. A copy of the agenda is attached.

- Ten locations were provided the NWCVT for 2008/09 and are planted for the 2009/10 season. Fifty two entries were included in 2008/09 and 40 entries were included in 2009/10. The results were compiled in the annual report published by Kansas State University. This information is critical for the final evaluation of variety performance prior to release. Data from the NWCVT indicates that the yield of the better varieties makes canola a profitable crop for the Midwest region. As in previous years, yields of over 3000 lbs./acre (60 bushels) have been reported for several varieties as tested under several environments in Illinois, Indiana, Ohio, Michigan and Virginia. The yield potential of the newer varieties has been proven to exceed that of older ones. Several of the hybrid varieties consistently yielded at the top of the trials and few were found at the bottom.

- Collaborative breeding efforts continue based on population development programs at Kansas State University and the University of Arkansas. Populations were tested throughout the Midwest region in collaboration with Southern Illinois University, Ohio State University, Michigan State University, Virginia State University, and Purdue University. Given that the NCRP funds a public breeding program at Kansas State, University of Arkansas, and The University of Idaho, we have decided not to continue population development within our region. We will continue to collaborate with these programs to maximize the return form them.

- Several agronomic studies are underway to provide information on optimal planting dates, efficient fertility rates, pest control practices, and rotational possibilities for canola production.

- Several canola field days and indoor meetings were conducted in each state.

Individual institutional reports follow.

Southern Illinois University Carbondale Report

Principal Investigator: Michael Schmidt

INTRODUCTION

The production research objectives of our program are:

1) To identify winter hardy canola varieties suitable for production in the southern Illinois region.
2) To collaborate on a winter canola breeding program utilizing populations developed at Kansas State University, University of Arkansas, and the University of Idaho, and other sources.
3) To conduct agronomic studies to evaluate the best management practices for canola production in our region and to determine how canola might best fit into our current cropping system.

PROGRESS TOWARD OBJECTIVES

Objective 1. To identify winter hardy canola varieties suitable for production in the southern Illinois region.

All but the Roundup-ready canola varieties entered in the 2008/09 National Winter Rapeseed Variety Trials (NWRVT) were tested at two Southern Illinois University supported locations, the Agronomy Research Center at Carbondale IL, and the Belleville Research Center, Belleville IL. This test included 40 entries. A collaboration with Fred Luzti of Western Illinois University allowed the planting of another NWCVT at Macomb, IL. WIU planted the trial and SIUC will harvest. Each of the field trials consisted of 3 replications arranged in a completely randomized design. Individual plots consisted of 6 rows on 7 inch centers planted to a length of 20 feet. Characteristics evaluated were:

1) Fall stand - percentage plot cover after full emergence.
2) Spring stand - percentage plot cover after spring re-growth occurs.
3) Plant height.
4) Bloom date - date to 50% bloom.
5) Standability – a lodging score of 1 - 5 is assigned (1 = no lodging).
6) Harvest maturity date.
7) Shattering - percentage pre-harvest seed loss.
8) Seed yield at 9% moisture.

Plots were observed for the occurrence of disease and insect damage. Particular concern was directed toward Sclerotinia white mold and Phoma stem canker (black leg), two diseases of rapeseed known to have damaged canola in the Midwest. No evidence of these diseases was detected at either location.

Planting dates were September 12 at Carbondale and September 22 at Belleville. Fields were maintained to insure 60+ lbs/acre Phosphorus and 260+ lbs/acre Potassium were available. Nitrogen was applied at the rate of 27 lbs/acre pre-plant and 120 lbs/acre after spring re-growth began (late February). Weed control was facilitated through use of trifluralin pre plant incorporated at the labeled rate, followed by hand cultivation when necessary.

In addition to the NWCVT trials, a Great Plains test (60 entries), a Arkansas test (40 entries), a SIUC Composite test (36 entries) and a Blue Sun Biodiesel test (40 entries) were planted at Carbondale on September 9. In addition, 178 F2 populations from the Kansas state program were planted at Carbondale in a single rep trial. All trials considered, for 2008/09 there were a total of 1144 research plots planted.

Carbondale, experienced a severe wind storm (a derecho), which destroyed our yield trial plots. Actually, Carbondale was declared a nation disaster area as a result. Prior to this storm we had excellent fall stands and winter survival for all varieties under test. The Belleview location suffered two hail events, one May 1 and another May 7 (related to the Carbondale area storm), which stripped the plants of pods. Neither location was harvested. As estimated in the first week of May, the yield mean was expected to top 50bu/acre at both locations. This information was provided to Kansas State University for inclusion in the 2008 NWCVT report.

Objective 2. To collaborate on a canola breeding program utilizing populations developed at Kansas State University, the University of Arkansas and the University of Idaho.

An SIUC trial composited from experimental lines from the breeding programs of Idaho, Kansas and Arkansas, previously tested in southern Illinois, was planted at several locations for 2008/09 in cooperation with Purdue University, Ohio State University, Michigan State University, and Virginia State University researchers. The best performing lines will receive further testing in 2009-10.

Objective 3. To conduct agronomic studies to evaluate the best management practices for canola production in our region and to determine how canola might best fit into our current cropping systems.

A study was conducted over three years, 2005-2006, 2006-2007, and 2007-2008 to compare the profitability of winter canola versus winter wheat following corn and soybean under a reduced till and no till regime. Yield of double crop soybean production behind canola vs. wheat was also studied.

The experimental was designed as a complete factorial with a split-plot arrangement using 4 replications. Corn/soybean served as the main effect. Tillage was the sub-plot, and winter canola/wheat served as the sub-sub-plot. Two varieties each of canola and wheat were tested as sub-sub-sub plot. Fall stand, seed yield, and double crop soybean yield were measured for all plots.

In the 2006-2007 season, problems were encountered with the establishment of canola stands under the no-till environments such that no valid comparisons could be made over that season.

Interactions between either pair of canola or wheat varieties with previous crop or tillage system were not detected either of the other seasons. Thus canola and wheat variety results were pooled for comparisons.

Canola yields were higher after a previous crop of corn than after a previous crop of soybean in 2005-2006. In 2007-2008, the canola yield was higher after soybean, however this difference was not significant. No influence of previous crop on wheat yield was detected either season.

The influence of tillage on canola and wheat yield was inconsistent across seasons. Canola yields were higher under reduced till in 2007-2008, with no difference detected in 2005-2006. Wheat yields were higher under no-till in 2005-2006 and higher under reduced till in 2007-2008

The yield of double crop soybean did not differ following winter canola or winter wheat either season. The double crop soybean yield was 1421 hg/ha in 2005-2006 and was 3161 kg/ha in 2007-2008.

The results of this study indicate that canola can be profitably grown behind either corn or soybean and under either a reduced till or a no-till system. However, these results are inconclusive as to which combination of previous crop or tillage system should be recommended. It does appear that there is a greater concern establishing a canola stand under a no-till system.

Canola provided a greater gross revenue over that of wheat both seasons, even after considering the additional canola seed and nitrogen costs. When combined across seasons, based on crop values at the time of harvest each season, canola had a mean yield of 3838 kg/ha and a mean revenue of $1236/ha. Wheat had a mean yield of 5511kg/ha and a mean revenue of $939/ha. The seed and nitrogen cost differential was computed at $70/ha. Thus, the canola crop provided a mean revenue that was 25% higher per hectare than that of the wheat crop.

Extension Efforts

I participated in a May field day in Kentucky hosted by Miles Enterprises and presented at two winter meetings in August, one held in southwest Illinois and another in southeast Illinois. The indoor meetings were hosted by AgStrong, a company providing contracts to regional growers to have seed shipped to Georgia for processing.

There were 8 producers of canola in southern Illinois for the 2008-2009 season (Up from 2 the previous season.). Approximately 1000 acres were grown. Yields were consistently reported at 60bu/acre and producers were pleased with the crop. The single most limiting factor for the expansion of canola in our region is having a regional outlet for producers to sell seed.

Research for 2009-2010

The NWCVT (60 entries) and a Great Plains test (60 entries) were planted at Carbondale on September . The NWCVT was planted at Belleville on September . All tests were planted in three replications.

Purdue University Report

Principal Investigator: Shaun Casteel, Tony Vyn and Ellsworth Christmas

This report provides a brief summary of the canola research and demonstration efforts carried out in Indiana at the Southwest Purdue Agricultural Center (SWPAC), the Northeast Purdue Agricultural Center (NEPAC) and the Agronomic Research Center (ACRE) during 2008-2009.

The SWPAC is located just North of Vincennes in Knox County. The dominant soil type in the area selected for canola plots is a Lomax clay loam. The NEPAC is located southeast of Columbia City in Whitley County. The dominant soil type in the canola plot area is a Blount silt loam. The ACRE is located about 7 miles northwest of West Lafayette. Chalmers silty clay loam is the dominant soil type in the plot area.

The previous crop on the plot area selected was soybean at ACRE, wheat NEPAC and watermelons at SWPAC. The plot area was prepared conventionally with a moldboard plow or chisel plow and a field cultivator and/or disc. Prior to planting, 60 lbs/ac of P_2O_5 and K_2O was applied and incorporated. Twenty-five to 30 lbs/ac of N was applied in the fall at planting at NEPAC and ACRE with an additional 120 lbs/ac of N applied in the spring as a top-dress at all three sites. Past experience indicated that significant residual nitrogen is present following the vegetable crop at SWPAC. Therefore, the fall application of nitrogen was omitted at SWPAC on all plots to prevent excessive fall growth.

Temperatures during the fall establishment period were near normal with September mean temperatures 2 to 5 degrees Fahrenheit above normal. Spring temperatures were cooler than normal at NEPAC and near normal at SWPAC.

Precipitation was slightly below normal during fall establishment and near normal the remaining of the growing season for SWPAC. Winter and early spring precipitation was about eight inches above normal at NEPAC. Winter canola stand establishment and winter survival was poor at ACRE. This site was deemed unsalvageable in May 2009 due to the combination of poor stands and wet spring, and thus, data are not available for the regional winter canola variety (SIUC) and seeding rate by variety studies.

<u>SEEDING RATE BY CULTIVAR</u>

The objective of this experiment was to evaluate the influence of seeding rate on two canola cultivars (non-hybrid, hybrid) on winter hardiness and yield. The experiment was implemented at ACRE and NEPAC. The treatments consisted of the non-hybrid, Wichita, and the hybrid, Hornet, planted at three seeding rates of 2, 4, and 6 lb per acre. Both cultivars were treated with Helix Xtra. The experiment was a randomized complete block factorial design with four replications. The experiment was planted utilizing a plot drill equipped with a belted cone with the NEPAC site being planted on September 11 at NEPAC and September 15, 2008 at ACRE. At maturity, the plots were end trimmed to a length of 40 feet and harvested with a Kincaid 8-SP plot combine equipped with a 5 foot table, giving a harvest area of 200 square feet. The combine was equipped with Harvestmaster HM-400 weighing system which provided an electronic copy of the plot weight, moisture and test weight for each plot. The data was analyzed using analysis of variance. The ACRE site was abandoned as a result of poor fall establishment and limited winter survival followed by extensive weed pressures.

Cultivar and seeding rate did not influence canola grain yield, grain moisture, test weight, and height at harvest (Table 1). Yields averaged 33.9 bu acre^{-1} for Wichita and 31.5 bu acre^{-1} for Hornet with average heights of 51.7 and 50.3 in, respectively. Interestingly, yield and harvest heights were numerically lower for the higher seeding rate of 6 lb acre^{-1}. Perhaps, the higher seeding rate promoted more vegetative growth that led to some lodging and reduced yield.

Table 1. Summary of the analysis of variance for the harvest data for Wichita and Hornet cultivars seeded at 2, 4, and 6 lb acre^{-1} at NEPAC.

	df	**Grain Yield**	**Grain Moisture**	**Test Weight**	**Harvest Height**
		bu acre^{-1}	%	lb bu^{-1}	in
ANOVA					
Cultivar	1	NS	NS	NS	NS
Seed Rate	2	NS	NS	NS	NS
Culivar x Seed Rate	2	NS	NS	NS	NS
	CV (%)	27	9	2.6	5.3
Cultivar					
Wichita (non-hybrid)		33.9	9.7	58.1	51.7
Hornet (hybrid)		31.5	9.4	58.6	50.3
	LSD	-	-	-	-
Seeding Rate					
2 lb acre^{-1}		33.3	9.4	58.7	51.4
4 lb acre^{-1}		33.5	9.6	58.3	50.9
6 lb acre^{-1}		31.5	9.7	58.3	50.8
	LSD	-	-	-	-

Significance at alpha 0.05, 0.01, and 0.001 are represented by *, **, and ***, respectively.
NS, no significance.

NATIONAL VARIETY PERFORMANCE TRIAL

Purdue University provided two independent sites (SWPAC and NEPAC) for establishment of the national canola variety performance trial.

The objective of the national variety performance trial is to evaluate commercially available winter canola varieties and advanced breeding lines for yield potential, winter survival, lodging susceptibility, and potential insect and disease problems when grown under Indiana conditions. Entries into the national variety performance trial were provided by Kansas State University, the coordinator of the national trials Fifty-four entries were included in the variety trial. The entries were planted according to the planting diagram supplied with the seed in replications at each site. Plots 54 inches wide and 50 feet long were planted 5 feet on center. The plots were seeded at a rate of 12 seeds per square foot with a Hege Plot Drill equipped with a belted cone. The NEPAC site was planted on September 11 and the SWPAC site on September 19, 2008.

At maturity, the plots were end trimmed to a length of 40 feet and harvested with a Kincaid 8-SP plot combine equipped with a five foot table giving a harvest area of approximately 200 square feet. The combine was equipped with a Harvestmaster HM-400 weighing system which provided an electronic copy of the plot weight, moisture and test weight for each plot. All data collected was furnished to Kansas State University. The results of the two sites will be published by Kansas State University in the annual summary of the National Winter Canola Variety Performance.

The national winter canola variety trial at NEPAC ranged from 29.0 to 53.9 bu $acre^{-1}$ with a mean of 41.6 bu $acre^{-1}$ (CV = 9.9%, $LSD_{0.05}$ = 6.7 bu). The national winter canola variety trial at SWPAC ranged from 14.1 to 55.7 bu $acre^{-1}$ with a mean of 41.1 bu $acre^{-1}$ (CV = 13.4%, $LSD_{0.05}$ = 8.9 bu). Plant heights at harvest were higher at SWPAC (48.0 to 62.0 in, mean 57.3 in) than NEPAC (42.7 to 55.0 in, mean 48.9 in), but this had little correlation to yield. Varieties at both locations harvested well and moisture content ranged from 5.7 to 10.8%.

The results of this experiment continue to demonstrate that canola can be successfully grown in Indiana. With the recent emphasis on renewable energy and biodiesel, this research provides growers with a viable alternative to winter wheat and provides the opportunity to increase biodiesel yield substantially (200%) by double cropping soybean after canola in southern Indiana.

REGIONAL EVALUATION OF ADVANCED LINES

The objective of the regional performance trial was to evaluate F 2 to F4 lines of winter canola developed through the KSU and SIU breeding programs along with a few commercially available varieties for yield potential, winter survival, lodging susceptibility, and potential insect and disease problems when grown under Indiana conditions.

Winter canola stand establishment and winter survival was poor at ACRE. This site was deemed unsalvageable in May 2009 due to the combination of poor stands and wet spring, and thus, data are not available for the regional winter canola variety (SIUC).

Ohio State University Report

Principal Investigator: Edwin Lentz

INTRODUCTION

On-going research has been investigating the feasibility of winter canola for Ohio agriculture. Areas that have been identified as potential obstacles for the adoption of the crop by local producers are 1) varieties adapted to Ohio 2) unknown nutrient requirements for Ohio production and 3) management practices for a new crop. To address these questions studies were established to 1) evaluate performance of existing varieties available to producers as well as new experimental varieties, 2) establish a long term N rate study to establish an optimal and economical N rate under Ohio conditions, 3) determine if supplemental S or B benefit production, 4) establish seeding rates for optimal production on Ohio soils. Results from these studies are given in the following report.

METHODS

Studies were planted at two sites: Ohio Agricultural and Research Development Center's North Central Research Station (Fremont) and Northwest Research Station (Custar) of The Ohio State University. The soil fertility studies were abandoned at the Fremont site, and the S and B study at the Custar site because of inadequate and/or uneven plot stands.

<u>Variety Evaluation</u>
Experimental design was a randomized complete block with 39-51 varieties replicated three times. Plots were established by seeding approximately 7.0 lb/A. Seed was obtained as part of the Winter Canola National Performance Trials. Urea was spring applied on all plots at a N rate of 100 lb/A.

Agronomic characteristics were evaluated as follows:
Fall establishment was determined by a visual estimate of the plot that contained plants prior to winter freezing.
Winter injury was determined by a visual estimate of the plot that contained dead plants several weeks after growth resumed in early spring.
Flowering date was determined when 50% of the plants in the plot were estimated to have at least one flower.
Plant height was determined by one measurement that typified the maximum height of the plot canopy.

<u>Nitrogen Rate Study</u>
The variety 'Wichita' was established at a seeding rate of 7 lb/A. Fall N was applied at 30 lb/A. Eight N rates were spring applied at 20 lb increments from 0 to 140 lb N/A. Treatments were applied in a randomized block design with four replications.

<u>Seeding Rate Study</u>

Experimental design was a two-factor randomized complete block with four replications. Two varieties ('Wichita' and 'Hornet') were established at three seeding rates (2, 4, and 6 lbs/A).

Stand counts were taken at initial stem elongation.

RESULTS AND DISCUSSION

<u>Variety Evaluations</u>
Results for the variety evaluations are given in Table 1 and 2. Grain yields were significantly different among varieties. Yield means for Custar ranged between 2770.7 and 4849.6 lb/A, with a site average of 4042.4. At the Fremont site, yield means ranged between 1922.2 and 3340.9 lb/A and a site average of 2488.8. Very little winter injury occurred at either site; as a result, statistical differences for winter survival were not detected among varieties.

<u>Soil Fertility Studies</u>
Grain yield responses to N are given in Table 3. Yields responded to larger rates of N. Rate curve suggests that at least 100 - 120 lb/A of spring N should be applied for winter canola production.

<u>Seeding Studies</u>
Yields were significantly reduced at the lowest seeding rate for both sites; however no differences were detected at the upper two rates (Table 4). Spring population estimates confirmed that there were differences among stands for the different seeding rates (Table 4). There were yield differences between the two varieties but no interaction with seeding rate (Table 5).

SUMMARIES AND CONCLUSIONS

- Winter injury was not a problem for the variety trials at either site. However, stand establishment was a concern particular at the Fremont location. Conditions were very dry at planting, more so at Fremont than Custar. Both sites received heavy rains within two weeks after planting. However, emergence was a greater problem at Fremont than Custar. Heaving losses were also evident at the Fremont location. Because of the reduced stand establishment, yields were lower at the Fremont site than would be expected for most years.

- Under Ohio conditions, winter canola responds to nitrogen. Data at this time suggest that the N requirement may be larger than winter wheat. Several years of N rate studies will be required to establish an optimum and economic N rate. This and past studies have used an open-pollinated variety. Future nitrogen studies may consider using hybrid varieties to see if yield response is similar to open-pollinate.

- Grain yield may be lowered at seeding rates less than 4 lb/A. Yields were not affected by seeding rates greater than 4 lb/A. Final plant population was increased with each larger seeding rate but did not necessary increase yields, e.g., 4 lb and 6 lb rate.

Table 1. Grain yield and other agronomic trait means for winter canola varieties, Northwest OARDC Research Station Custar, OH -- 2009.

Variety	Grain Yield @9%	Grain Moisture	Winter Survival	Fall Establishment	Flower Date @50%	Canopy Height
	----lb/A----	---------------------	%	---------------------		--in--
45D03	4303.3	10.5	100	87	Apr 27	41
46W14	4650.0	10.4	97	95	Apr 25	39
46W99	4144.3	8.3	97	91	Apr 25	38
AAMU-18-07	3749.6	6.5	98	92	Apr 25	35
AAMU-33-07	4255.2	7.8	98	92	Apr 26	36
ARC00004-2	4156.3	8.7	98	92	May 1	45
ARC00005-2	4166.7	9.8	99	91	Apr 27	41
ARC00024-2	3868.4	9.2	99	88	May 2	42
ARC2189-2	3956.6	6.7	98	92	Apr 27	43
Baldur	4173.6	7.7	99	89	Apr 26	40
BSX-501	4234.7	7.0	99	85	Apr 28	46
BSX-6131	3707.4	7.7	99	92	Apr 29	42
BSX-6242	4537.9	6.5	99	89	Apr 27	44
BSX-6271	4515.5	8.7	99	90	Apr 26	40
BSX-6406	4437.7	7.4	99	90	Apr 27	42
CWH095D	4643.5	9.3	100	89	Apr 27	42
CWH101D	4849.6	8.7	99	89	Apr 27	41
CWH111	2944.0	20.0	99	90	Apr 25	35
CWH633	3463.6	7.0	99	89	Apr 27	38
Dimension	4118.0	9.5	99	88	Apr 26	39
DKW41-10	3408.1	7.7	99	91	Apr 26	38
DKW45-10	3820.8	8.1	99	90	Apr 27	38
DKW46-15	2770.7	5.5	100	92	Apr 27	35
DKW47-15	3511.2	7.0	98	91	Apr 27	39
Flash	3849.7	13.8	100	88	Apr 27	42
Hornet	4001.3	15.5	98	91	Apr 27	44
Hybrigold	3800.7	8.5	99	90	Apr 30	39
Hybrilux	4376.0	8.3	97	91	Apr 25	42
Hybristar	4278.0	8.9	98	93	Apr 26	38
Hybrisurf	4414.9	11.3	97	93	Apr 27	39
HyClass107	3385.2	6.6	100	88	Apr 27	40
HyClass154	4106.4	10.0	99	91	Apr 27	41
Kadore	4810.0	7.9	99	90	Apr 27	38
Kiowa	4055.9	7.8	99	94	Apr 27	44
Kronos	4278.4	7.7	98	88	Apr 27	42
KS3074	4267.0	8.5	100	92	Apr 27	42
KS3077	4046.7	7.6	100	89	Apr 27	42
KS3132	4396.8	8.6	99	90	Apr 28	45
KS3254	4183.9	7.4	99	95	Apr 28	42
KS3302	3230.4	6.0	99	86	Apr 27	41
KS4022	3730.9	8.3	98	92	Apr 27	42
KS4085	3236.4	8.0	100	89	Apr 27	39
KS4158	4334.7	7.0	98	91	Apr 26	41
NPZ0604	4360.0	8.5	98	93	Apr 25	36
Rossini	4084.6	7.7	99	90	Apr 25	39
Safran	4605.5	9.9	97	92	Apr 26	42
Sitro	4288.0	9.7	99	90	Apr 26	40
Sumner	3728.6	7.4	99	93	Apr 27	39
Virginia	3876.2	7.7	99	91	Apr 26	34
Visby	4161.5	10.2	98	86	Apr 26	41
Wichita	3886.1	8.0	99	89	Apr 26	41
Average	4042.4	2.3	99	90	Apr 27	44
lsd (0.05)	578.7	8.7	NS	NS	---	4
c.v. (%)	8.8	16.2	1.6	6.0	---	5.9

Table 2. Grain yield and other agronomic trait means for winter canola varieties, North Central OARDC Research Station Fremont, OH -- 2008.

Variety	Grain Yield @ 9%	Grain Moisture	Winter Survival	Fall Establishment	Date @ 50% Flower	Plant Height
	--lb/A--	--------------------%----------------				--in--
45D03	2374.0	5.1	97	89	Apr 27	42
46W14	2959.4	6.4	91	89	Apr 26	43
46W99	1922.0	5.7	96	85	Apr 26	45
AAMU-18-07	1845.3	5.2	96	91	Apr 26	35
AAMU-33-07	2488.0	7.0	97	88	Apr 27	42
ARC00004-2	2544.6	8.5	97	91	May 3	49
ARC00005-2	2123.0	8.2	91	88	Apr 29	47
ARC00024-2	2209.4	8.4	90	83	May 5	52
ARC2189-2	2334.1	7.3	92	86	Apr 27	49
Baldur	2607.8	7.9	92	91	Apr 26	44
BSX-501	2853.9	7.8	95	84	Apr 27	48
BSX-6131	2298.9	7.6	96	90	Apr 27	47
BSX-6242	2216.3	6.0	83	82	Apr 27	47
BSX-6271	2573.8	8.4	95	88	Apr 27	45
BSX-6406	2501.7	8.3	98	89	Apr 27	47
Dimension	2499.4	9.4	97	86	Apr 26	45
Flash	2805.3	8.9	90	86	Apr 27	44
Hornet	3206.4	8.7	97	87	Apr 27	47
Hygrigold	2268.3	7.5	83	86	Apr 27	45
Hybrilux	2427.0	8.6	94	79	Apr 27	49
Hybristar	2873.9	8.1	96	89	Apr 27	44
Hybrisurf	3059.3	9.8	96	92	Apr 27	45
HyClass154	2496.9	8.5	96	89	Apr 27	45
Kadore	2401.8	5.9	88	87	Apr 30	42
Kiowa	2452.8	7.9	97	89	Apr 27	47
Kronos	1964.4	7.7	95	82	Apr 27	48
KS3074	2397.4	7.1	97	88	Apr 27	46
KS3132	2502.4	6.9	96	89	Apr 28	46
KS3254	2330.9	6.3	85	89	Apr 29	44
KS4022	2059.6	8.3	91	83	Apr 27	44
KS4085	2221.2	7.6	94	87	Apr 26	46
KS4158	2071.3	5.1	98	88	Apr 27	42
NPZ0604	2762.3	6.1	95	91	Apr 26	42
Safran	3043.4	7.1	96	87	Apr 27	44
Sitro	3340.9	7.3	98	88	Apr 27	47
Sumner	2247.2	6.8	95	84	Apr 26	43
Virginia	2462.9	5.1	98	88	Apr 27	39
Visby	2434.8	7.4	96	76	Apr 26	46
Wichita	2882.3	7.0	96	91	Apr 27	46
Average	2488.8	7.4	94	87	April 27	45

lsd (0.05)	621.3	2.4	NS	6	---	4
c.v. (%)	15.4	19.5	6.0	4.4	---	5.7

Table 3. Winter canola grain yield means and spring nitrogen rates at the Northwest OARDC Research Station, Custar, OH -- 2009.

Spring N Rate lb/A							
0	20	40	60	80	100	120	140
----------lb/A----------							
2321.9	2703.2	3271.1	3477.3	3536.6	3745.2	3895.1	4090.2

Table 4. Main effect of seeding rate on winter canola grain yield and population means at the Northwest and North Central OARDC Research Stations-- 2009.

Seeding Rate	Grain Yield		Spring Population	
	Custar	Fremont	Custar	Fremont
---lb/A---	---lb/A---		---plants/ft^2---	
2	3022.4	2142.8	1.1	1.1
4	3628.9	2488.6	2.3	2.4
6	3820.3	2616.5	3.3	3.1
lsd (0.05)	262.2	292.1	0.6	0.5
Seed Rate x Variety	NS	NS	NS	NS
CV (%))	7.2	14.5	23.7	22.0

Table 5. Grain yield and population means for winter canola varieties across seeding rates at the Northwest and North Central OARDC Research Stations -- 2009.

Variety	Grain Yield		Spring Population	
	Custar	Fremont	Custar	Fremont
	---lb/A---		---plants/ft^2---	
Hornet	3901.4	2910.0	2.7	2.3
Wichita	3079.6	1921.9	1.8	2.1
lsd (0.05)	214.0	238.5	0.5	NS
Seed Rate x Variety	NS	NS	NS	NS
CV (%))	7.2	14.5	23.7	22.0

Michigan State University Report

Principal Investigator: Russ Freed

Breeding/Variety trials:
The highest yield in the National KSU trial was 2429 lbs/acre. Several of the entries did not yield because of excessive winter kill. The average winter survival was 34%. The SIU winter trial had yields of over 60 bushels. However, the winterkill was over 68% for the trial. No disease or insect problems were identified in the trials.

Two spring trials consisting of 36 entries were planted. The Marion, MI site had yields of 46 bushels. One trial was abandoned because of a 5 week drought.

Current status:
The National KSU trial and the SIU early generation material was planted on September 15, 2009 and is doing well.

Extension/education:
I held two canola extension meetings, one in Cadillac (20) and one in Traverse City (30). I also held two canola field days, one in Marion (20) and one in Bellaire. Three Kellogg personnel attended the Marion field day, looking at the possibilities of using canola oil for their Kashi product line.

I provided hybrid seed (spring and winter) to several farmers. I worked with two extension specialists on getting farmers to grow canola. We got farmers to plant about 400 acres of canola. I am working with an organic farmer to use an early winter canola variety in his rotation with pumpkins.

Future plans:
I am working with an entrepreneur and two extension workers to get farmers to plant between 750 and 1,000 acres of canola in 2010.

Virginia State University Report

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Variety Development: During 2008-09 crop season, two separate Preliminary Yield Trials were conducted to evaluate breeding lines. In the first experiment, 20 breeding lines were compared to two established varieties (Virginia and Wichita). The seed yield in this experiment varied from 734 to 2819 pounds per acre with average yield of all entries being 1535 pounds per acre. Eight entries out-yielded Virginia variety with seed yields ranging from 1703 to 2819 pounds per acre. In the second Preliminary Yield Trial, 22 entries were compared with two established varieties (Virginia and Wichita). Seed yields in this experiment varied from two breeding lines gave seed yields superior than both established varieties with seed yields of 2043 and 1948 pounds per acre. Superior breeding lines from these two experiments were advanced for further evaluations during 2009-10 crop season. Additional material received from Kansas State University is also being evaluated for selection of superior breeding lines and varieties.

Variety Evaluations: This test with 52 entries was conducted at two locations: Orange and Petersburg. At Petersburg, seed yields varied from 773 to 2044 pounds per acre with average yield of all 52 entries being 1295 pounds per acre. The best ten entries for seed yield were: Safran, 46W14, Flash, Kadore, CWH101D, Virginia, CWH095D, Hornet, KS3074, and BSX-501 with corresponding yields of 2044, 1993, 1816, 1702, 1692, 1661, 1648, 1583, 1557, and 1555 pounds per acre, respectively. The differences among yields of these entries were not significant. At Orange (Virginia) location, the seed yields of 52 entries varied from 514 to 1885 pounds per acre with an average seed yield of all 52 entries being 1095 pounds per acre. The ten best entries for seed yield were: Hornet, Sitro, Safran, BSX-501, Kadore, Flash, Rossini, Hybrilux, ARC2189-2, and 45D03 with corresponding yields of 1885, 1788, 1628, 1566, 1514, 1509, 1440, 1391, 1378, and 1320 pounds per acre, respectively. The differences among yields of Hornet, Sitro, Safran, BSX-501, Kadore, Flash, and Rossini were not significant.

Fertilizer Tests: Two experiments were conducted at Petersburg. In first experiment, three rates of N (50, 100. And 150 pounds N per acre) and three application rates (all applied in fall, all applied in spring, and half applied in fall and half applied in spring) were evaluated with Virginia canola variety. The results indicated that time of application did not affect canola seed yield. Overall, 50, 100, and 150 pounds of N resulted in 2220, 2326, and 2038 pounds per acre of canola, respectively. The results indicated that 100 pounds of N per acre is optimal for canola in loamy soils of central Virginia. In the second experiment, three rates each of N, P, and K (100, 200, and 300 pounds per acre) and two application times (All in fall or all in spring) were evaluated. Effects of P and K rates or application rates were not significant. N application of 200 or 300 pounds per acre resulted in similar yields (2484 and 2282 pounds per acre) and both were superior than the yield following 100 pounds N per acre (1973 pounds per acre). The application times did not affect canola seed yields in this experiment.

An experiment at Orange (Virginia) location with three rates each of N, P, and K (100, 200, and 300 pounds per acre), all applied in fall indicated that K rates did not affect seed yield whereas 200 pounds per acre of N resulted in superior seed yield over application of 100 pounds rate per acre (2576 vs. 2352 pounds per acre). Similarly, 200 pounds per acre of P resulted in superior seed yield over application of 100 pounds rate per acre (2576 vs. 2352 pounds per acre).

Weed Control: We evaluated five rates each of Treflan (0, 1, 2, 3, and 4 pints per acre) as pre-plant-incorporated and Prowl (0, 1, 2, 3, and 4 pints per acre) as post-emergence in replicated field experiments at Orange (Virginia) location (Clay soils) during 2008-09 crop season. The results indicated rates greater than 1 pint per acre damaged canola and should not be used.

Wheat vs. Canola as a Rotational Crop with Soybean: During 2008-09 crop season, we evaluated effects of canola vs. winter wheat on the succeeding soybean crop at Suffolk (Virginia) location. In this field experiment five soybean varieties (Asgrow-5605, Asgrow-5606, Progeny-P5115, USG-75M16, and USG-75M16). USG-75M16 and Asgrow-5606 soybean vanities yielded less after canola as compared to wheat whereas soybean varieties Asgrow-5605 and USG-75J32 yielded more after canola. Soybean variety Progeny-P5115 yielded similarly after canola or wheat. The average yield for canola was 2,171 pounds per acre whereas wheat averaged 50.9 bushels per acre). Winter crop did not affect soybean yields, which averaged 34 bushels per acre. USG cultivar 75M16 yielded greater than the other four cultivars. Although the field used contained a moderately infestation of nematodes, the susceptible variety yielded more than the other four cultivars. Nematodes are generally more damaging under dry conditions. Rainfall was plentiful in 2009; therefore, any root damage may have not translated into yield. In summary, soybean yielded as well after canola as wheat.