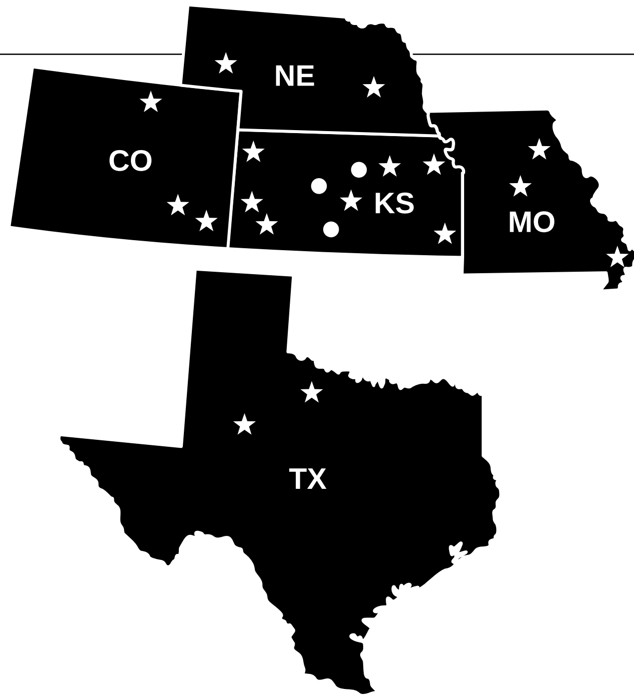
2000
GREAT PLAINS CANOLA RESEARCH



Report of Progress 862

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

CONTENTS

On the map, stars show locations of the national trial, and circles show locations of the production centers.

2000 Great Plains Canola Research[1]

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SUMMARY

This report includes results from the Great Plains locations of the 2000 National Winter Canola Variety Trial and the Kansas Canola Production Centers. During the 1999-2000 growing season, canola production centers were established in Saline, Pawnee, and Kingman counties, Kansas. Results are given for performance of eight varieties and studies of seeding rate and nitrogen rate at those centers. Finally, an example of a cost-return budget for canola is presented.

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2000 Great Plains Canola Research

INTRODUCTION

Canola is a specific crop developed from rapeseed. Canola also has been called double zero rapeseed because of the low contents of erucic acid (less than 2 percent in the oil) and glucosinolates (less than 30 micromoles per gram in the oil-free meal). Food and oil-processing industries have a great interest in canola, because it produces a high-quality oil that is lower in saturated fat than other sources of dietary fats. The meal remaining after oil extraction is used as a protein supplement by the livestock industry.

Production of rapeseed was first reported in Europe in the 13th century, but it probably has been cultivated in Asia for thousands of years. It always has been used in Asia for cooking oil, but it was used originally in Europe as a source of lamp oil and lubricant. During World War II, Canada grew millions of acres to provide a marine lubricant, but production declined as diesel replaced steam engines.

The first oilseed rape with low levels of erucic acid in the oil was developed in Canada in 1957. Interest in rapeseed increased, and Canadian production reached 1 million acres in 1965. In 1971, 'Span', the first low erucic acid variety, was released. Three years later, 'Tower' was released. It is low in both erucic acid and glucosinolates and became the first true canola variety. The term canola was trademarked by the Western Canadian Oilseed Crushers Association in 1978 and still is used to describe rapeseed that is genetically low in erucic acid and glucosinolates. In 1985, the FDA in the United States ruled that rapeseed oil with less than 2 percent erucic acid is safe for human consumption. One year later, the American Heart Association urged Americans to reduce their saturated fat intake. Canola oil contains 6 percent saturated fat, the lowest level of any commercially available vegetable oil.

Canola oil consumption increased from zero prior to 1986 to the equivalent of over 2 million acres of production in 1994. This represented an increase in consumption of 50% since 1992. Most of this oil was imported from Canada. Canola is one of the few new crops that possessed a substantial market before its production was established. United States canola production tripled over 3 years and reached 1.13 million acres in 1998, but consumption still outpaces production at the rate of nearly 3 to 1. Most of this production is from spring types in the northern Great Plains states of North Dakota, Montana, and Minnesota. Over the past few years, interest in winter cultivars also has increased in areas where production is feasible, especially the Pacific Northwest, Southern Great Plains, and the Southeast.

Canola-quality seed has been developed in three *Brassica* species *Brassica napus*, also called Argentine rape, summer rape, winter rape, or Swede rape, was the first and is the most common canola grown. *Brassica rapa*, also called *B. campestris*, Polish rape, summer turnip rape, or field mustard, has many canola-quality cultivars and is grown on a large acreage where it is adapted. *Brassica juncea* (yellow mustard) lines with canola quality have been identified. Cultivars are just now being released, and all *B. juncea* lines are spring types. Most winter canola varieties grown in the United States have been developed from *B. napus*

Winter canola yields are generally 30% greater than yields of the spring types. Winter canola is planted in late summer. The plants need to reach the 6 to 8 true-leaf stage and about 8 to 10 inches in height before freeze down to increase winter survival. Plants overwinter as rosettes and bolt early the next spring. Harvest takes place about the same time as winter wheat harvest in a given area.

Canola research began in the United States in the late 1980's. Industrial rapeseed had been investigated prior to this, but because of the limited demand for this product, interest was low. Winter canola production was attempted in the late 1980's but was not successful. The failure was primarily due to the lack of adapted varieties, the lack of management recommendations for the area, and the lack of a local market for the crop. Since that time, canola-quality lines have been developed that are significant improvements over previously tested varieties. Advancements in production research have led to management recommendations consistent with the conditions of the region. Increased oil consumption has led to increased demand for canola seed and a market interest by oil processors.

Canola production would fit well into Great Plains agriculture. Canola makes an excellent rotational crop with winter wheat. Yields of wheat following canola are reported to be 8 to 12% better than yields of wheat following wheat. Because canola is a broadleaf crop, more effective and less expensive herbicides can be used to control grass weeds. No major diseases are common between the two crops, so canola can help break some disease cycles. Canola also is produced with the same equipment used for small grains. A major investment in equipment is not needed to try a small canola acreage. Because canola is an oilseed, its commodity price is not tied to that of grains, and it can be used to help spread economic risk to more than one commodity class.

Marketing Canola

Favorable loan deficiency payment rates have given an economic incentive to canola production over the past few years. During the summer of 2000, the commodity price plus the loan deficiency payment added up to $4.80 per bushel. Colorado Mills, Lamar, CO, began crushing canola and other oilseeds in 1999 and was the delivery point for the 1999 and 2000 crops from the southern Great Plains. Colorado Mills coordinated back haul shipping, and the crop was picked up at the farm and delivered to Lamar. In the future, several elevators throughout the region will serve as delivery points and will coordinate delivery to Lamar or other terminal markets. Several other oilseed crushers in the Great Plains are capable of crushing canola and will do so when sufficient quantities become available.

Canola Varieties

A canola breeding program was established at Kansas State University in 1992 to develop varieties adapted to the southern Great Plains. Since that time, two varieties have been released and are now commercially available. ‘Plainsman’ was released in 1998 has performed well in northern Kansas and areas in the high plains. ‘Wichita’ was released in 1999 and has performed better in southern Kansas and Oklahoma. Certified seed of both of these varieties is available from Kansas Foundation Seed Center, Manhattan, KS. Additional varieties are scheduled for release in the next few years. These include lines with increased yield potential for the region and lines with tolerance to sulfonylurea herbicides (e.g., Glean, Amber, Finesse). This tolerance will allow canola to be included more easily in a rotation with winter wheat. Other canola varieties that were not developed in the region are available, and a list of those tested in 1999-2000 and possible sources of seed can be found in Table 7 at the end of this publication. Additional information on canola production can be found in the ‘Canola Production Guide for the Great Plains’, a special publication of the Kansas Agricultural Experiment Station, which is available at county extension offices and from the first author.

KANSAS CANOLA PRODUCTION CENTERS

Introduction

Canola production centers were established in Kansas for the first time during the 1999-2000 growing season. The primary goals were to perform research that would be beneficial for improving canola production in the region and to use these centers as an extension tool to help transfer the results to current and new canola growers. These centers were placed on farmers' fields in potential canola-growing regions.

Procedures

Production centers were established at three locations: site 1 in Saline Co. (3 miles east of Salina), site 2 in Pawnee Co. (1 mile west of Ft. Larned), and site 3 in Kingman Co. (6 miles south of Murdock). Site information can be found in Table 1. All plots were planted with a plot drill (6 rows, 8 inches) to a length of 40 feet. Plots were trimmed later to a harvest length of 34 feet. All studies included four replications. The seeding rate was 5 lb/a (except for the seeding rate study), and nitrogen was applied to all plots (except the fertility study) at rates of 30 lb/a in the fall and 50 lb/a in the spring. The tests were sprayed as needed with Capture 2EC for insects (cut worms and aphids) and Assure II for grassy weeds. The tests were harvested, direct cut at maturity, with a plot combine.

Variety Performance Tests

The same eight lines were grown at each location. Wichita, Plainsman, and KS1701 were developed by Kansas State University. Spectrum Crop Development of Ritzville, WA, markets Casino. Ceres and Olsen are marketed by Integra Seeds of Bozeman, MT. Arctic is marketed by Pride Seeds, Chatham, ON. Jetton was marketed by AmeriCan Seeds but is no longer commercially available. Wichita, Plainsman, and Casino have demonstrated excellent winter hardiness in the canola-growing areas

Table 1. Descriptions of the three locations for the 1999-2000 Kansas Canola Production Centers.

Location and Cooperator	Dates of Planting and Harvest	Soil Type and Previous Crop	Soil Test N	Soil Test P	Soil Test K	Soil Test S	Soil Test pH	Elevation and Latitude
Saline County	03-Sep	Detroit silty clay loam	6	398	327	4.7	6.2	1200 ft
Pete Roberts	not harvested	wheat						38o 46'
Pawnee County	02-Sep	Harney silt loam	3.5	20	431	2.1	5.9	2100 ft
John Haas	21-Jun	fallow						38o 12'
Kingman County	15-Sep	Farnum sandy loam	4.6	35	101	2.5	6.2	1570 ft
Leon Sowers	12-Jun	wheat						37o 31'

of the southern Great Plains. Ceres winter hardiness is not quite as good but is sufficient for most years in south-central and southeast Kansas and the eastern two-thirds of Oklahoma. Jetton possesses excellent yield potential, but its winter hardiness is suspect under normal winter conditions in many areas. Olsen and Arctic have not been tested under adverse conditions in the Great Plains, so their winter hardiness levels are unknown.

Seeding Rate Study

The recommended seeding rate for canola has been 5 lb/a. This recommendation resulted from research that showed no difference in seed yield with seeding rates ranging from 3 lb/a to 10 lb/a. However, this research was performed outside of the Great Plains region. Questions about seeding rates by growers in the Great Plains demonstrated the importance of validating previous research under local conditions. The tests were established in a split plot design with seeding rates as the whole plots and cultivars as the subplots. Four seeding rates of 2.5, 5, 7.5, and 10 lb/a were used. Wichita and Plainsman were used in these tests.

Nitrogen Rate Study

Nitrogen (N) recommendations used in the southern Great Plains also are the results of research performed outside of the region. In previous studies, high levels of available N in the fall have led to excessive fall growth and reduced levels of winter hardiness. The tests were established using a split-split plot design with fall-applied N rates as the whole plots, spring-applied N rates as the subplots, and cultivars as the sub-subplots. Nitrogen was applied at rates of 25 and 50 lb/a in both the fall and the spring. The control plots received no N. The cultivars used were Wichita and Plainsman.

Results and Discussions

Conditions at Individual Locations

Saline County. Available moisture was sufficient to germinate the seeds, and the plants at this location established rapidly. After establishment, moisture was limited until a rain in mid-October, so plants went into the winter much smaller than desired. Mild winter conditions allowed the plants to come through the winter with near 100% survival. Cutworms invaded the plots in early spring and resulted in substantial damage before pesticides could be applied. The tests were abandoned in late spring because of this damage.

Pawnee County. Establishment was rapid, and sufficient moisture was available to allow for excellent growth in the fall. Cutworms and aphids were present, and the plots were sprayed, but some damage was observed. A very high incidence of aster yellows was observed in the plots in the spring and contributed to a significant yield reduction. This disease is vectored by leafhoppers in the fall. The combination of a long, mild fall and the fact that this small area of plots represented the only lush growth in a large area accounted for the abnormally high incidence. Aster yellows also was observed in commercial fields in the region, but the large acreage of plants limited the amount of the disease, and its effect on seed yield was insignificant.

Kingman County. Establishment was rapid, and fall growth was sufficient for the plants to enter the winter. Cutworms and aphids were also present at this location, and the plots were sprayed with Capture. Volunteer wheat and winter annual brome grasses were controlled with Assure II. Insect damage was observed throughout the tests but was sufficient to cause us to abandon the results only in the first replication.

Variety Performance Tests

Winter conditions were mild at all locations, and all lines had 100% survival. Yields were less than expected, especially in Pawnee Co., and this was due primarily to the high levels of aster yellows (Table 2). Plainsman topped the test at Pawnee Co. with yields of about 23 bu/a. At these yield levels, Plainsman would have had an economic return similar to that of a 50 bu/a wheat crop. Wichita was the top-yielding variety at the Kingman Co. test, with yields of about 34 bu/a (Table 3). The economic return of these yields would be similar to that of a 74 bu/a wheat crop. Casino and Ceres were not significantly different from the top-yielding line at either location. Both varieties previously have shown winter hardiness levels that are high enough for most years in south-central and southeast Kansas as well as areas south of Kansas. Plainsman historically has performed well in areas near or north of I-70 and in the High Plains. Wichita consistently has outperformed most lines in southern Kansas.

Seeding Rate Study

Conditions at seeding were excellent, and all plots were established with good stands (Table 4). Establishment at the Saline County location was also excellent; all plots had stands of near 100%. However, the test later was abandoned, and the data are not reported in the table. The same trends were observed at both the Pawnee and Kingman county locations, so the data were combined. The final stands of the 5, 7.5, and 10 lb/a seeding rates were significantly greater than the stands with the 2.5 lb/a seeding rate, but these differences were not observed in the final yields. Plant heights did decrease as seeding rates were increased. This likely was due to the ability of canola plants to compensate for reduced stands. No differences in harvest moisture content or test weights were attributed to seeding rates. Test weights did tend to decrease slightly as seeding rate was increased, but these differences were not significant. Expected differences were observed between Plainsman and Wichita. Yields of Wichita were greater at the Kingman Co. site, and Plainsman outyielded Wichita in Pawnee Co. Plainsman was 6 inches taller than Wichita and had about 2% higher moisture content at harvest, which was due to its delayed maturity.

Canola possesses an excellent ability to compensate for reduced stands. These results support the recommendation that increasing the seeding rate will not increase final yields. The 10 lb/a seeding rate yielded only about 0.6 bu/a more than the 2.5 lb/a seeding rate in these studies. The return from this increase would be much less than the additional cost of the seed.

Nitrogen Rate Study

As with the seeding rate study, the same trends were observed at both the Pawnee and Kingman county locations, so the data were combined. Excellent conditions at seeding allowed for good stands, and no significant differences were observed for either N rates or variety treatments (Table 5). Mild winter conditions allowed all treatments to come through the winter with no death loss. Previous studies have shown a correlation between increased levels of fall-applied N and increased winter death loss, but this was not observed in these

Table 2. Results of the Variety Performance Test in the 1999-2000 Canola Production Center, Pawnee County, KS.

Variety	Yield	Winter Survival	Fall Stand	Aster Yellows	Plant Height 1/	Shatter-ing	Moisture	Test Weight
	lb/a	%	%	%	in	%	%	lb/bu
Plainsman	1157 *	100	90 *	12 *	59 t	0 *	5.6 *	45.1 *
Jetton	964 *	100	85 *	21	48 s	1 *	6.8 *	45.4 *
Casino	921 *	100	88 *	24	55	1	5.9 *	46.0 *
Ceres	909 *	100	88 *	31	51	2	6.1 *	46.8 *
Wichita	779	100	93 *	25	51	1	6.1 *	44.7 *
Arctic	746	100	88 *	23	56 t	1	6.2 *	46.4 *
Olsen	694	100	88 *	24	48 s	2	6.3 *	43.9
KS1701	524	100	78	29	52	0 *	9.6	44.2 *
Mean	837	100	87	24	52	1	6.5	45.3
LSD	264	NS	9	7	3	1	2.4	2.1
C.V. (%)	21	----	7.1	21	3	72	25.0	3.2

* Upper LSD group - Differences among those marked with an asterisk are not statistically significant.

1/ Values marked "s" are not statistically different from the shortest value, and those marked "t" are not statistically different from the tallest value.

Table 3. Results of the Variety Performance Test in the 1999-2000 Canola Production Center, Kingman County, KS.

Variety	Yield	Winter Survival	Fall Stand	Plant Height	Moisture	Test Weight
	lb/a	%	%	in	%	lb/bu
Wichita	1712 *	100	100 *	44	10.7 *	45.6
Ceres	1647 *	100	100 *	42 s	13.2	46.4
Olsen	1597 *	100	95 *	43 s	15.3	46.6
Casino	1594 *	100	86	47 t	15.8	47.0 *
Jetton	1441	100	95 *	41 s	12.1 *	45.0
Arctic	1272	100	95 *	43 s	11.6 *	47.8 *
Plainsman	1158	100	100 *	44	13.1	45.7
KS1701	470	100	83	44	13.7	48.4 *
Mean	1361	100	94	43	13.2	46.5
LSD	271	-----	6	3	2.2	1.4
C.V. (%)	13.1	-----	4.5	4.7	11.4	2.1

* Upper LSD group - Differences among those marked with an asterisk are not statistically significant.

1/ Values marked "s" are not statistically different from the shortest value, and those marked "t" are not statistically different from the tallest value.

Table 4. Results of the Seeding Rate Test in the 1999-2000 Canola Production Centers, Pawnee County and Kingman County, KS

Rate	Variety	Yield	Fall Stand	Plant Height	Moisture	Test Weight
		lb/a	%	in	%	lb/bu
2.5 lb/a	Mean	985	85	51	8.5	45.2
5.0 lb/a	Mean	962	95	49	8.7	45.1
7.5 lb/a	Mean	849	95	48	8.7	44.7
10 lb/a	Mean	1018	97	48	8.4	44.1
LSD (0.05)		NS	9	2	NS	NS
Mean	Plainsman	902	93	52	9.6	44.3
Mean	Wichita	1004	93	46	7.5	45.2
LSD (0.05)		NS	NS	2	1.5	NS
Mean	Mean	953	93	49	8.6	44.7
C.V. (%)		17.6	3.9	4.0	17.2	4.3

tests. Seed yields at both locations were less than expected. Plant vigor in Kingman County was poor. This was likely the result of earlier damage caused by cutworms and aphids. The test in Pawnee County had good plant growth and vigor, but yields were reduced because of a high incidence of the disease aster yellows. With the conditions of the 1999-2000 growing season, N applied in the fall had an equal effect on final seed yield as spring-applied N. Under these conditions, each additiona1 lb of l N resulted in about 2.5 lb of additional seed yield up to 75 lb N. In these tests, plant height was not affected by N rates. However, it is well known that excess N can result in excessive plant growth. Test weights and harvest moisture also were not influenced by N rates in this study

Conclusions

As in previous research, Wichita performed well in a southern environment, that is prone to spring heat. Plainsman out-performed other lines at the more northern testing location. Both Casino and Ceres also performed well.

No differences in seed yield were detected between the four seeding rates evaluated in these studies. The current recommendation of 5 lb/a seems to be appropriate for the Great Plains.

Because canola produces seed that is very high in protein, it has a higher N requirement than winter wheat. Based on the results from this and other studies, a recommendation of 2.5 to 3 lb of actual N per bu of expected yield should be a good rule of thumb. With yield goals of 30 to 40

Table 5. Results of the Nitrogen Rate Test in the 1999-2000 Canola Production Centers, Pawnee County and Kingman County, KS

Spring-Applied N lb/a	Fall-Applied N lb/a 0	25	50	Mean
	Seed Yield - lb/a			
0	865	893	948	902
25	881	967	1081	977
50	975	1041	998	1005
Mean	907	967	1009	961
LSD (0.05)		97		
CV (%)		13.9		

Fall N	Spring N	Variety	Yield lb/a	Fall Stand %	Plant Height in	Moisture %	Test Weight lb/bu
0	*	*	907	93	48	8.4	46.4
25	*	*	967	93	49	8.4	46.4
50	*	*	1009	93	49	8.0	45.6
	LSD (0.05)		NS	NS	NS	NS	NS
*	0	*	902	93	48	8.3	46.2
*	25	*	977	93	49	8.4	46.0
*	50	*	1005	93	48	8.1	46.3
	LSD (0.05)		95	NS	NS	NS	NS
*	*	Plainsman	949	92	51	8.6	45.5
*	*	Wichita	973	94	46	7.9	46.8
	LSD (0.05)		NS	NS	1	0.5	0.6

bu/a, N rates of 75 to 120 lbs/a should be used. Ideally, 25% of the N should be applied in the fall, and the remainder applied in early spring.

Acknowledgements

This work was funded in part by a grant from the Kansas Department of Commerce and Housing, Agricultural Products Development Division, and the Kansas Agricultural Experiment Station. Three farmer cooperators, Leon Sowers, John Haas, and Pete Roberts, provided the land and field preparation work for this project.

2000 NATIONAL WINTER CANOLA VARIETY TRIAL
Great Plains Locations

Objectives

The objectives of these tests are to evaluate germplasm over a wide range of environments, determine what canola varieties and experimental lines are adapted to what areas, and to increase the visibility of winter canola across the regions. The National Winter Canola Variety Trial (NWCVT) has been coordinated from Kansas State University since the 1994-95 growing season. The NWCVT was established to evaluate released cultivars and material that had been selected and advanced and has potential to become new released canola varieties. Information obtained from these tests will help determine what experimental lines should be released and where released cultivars might be marketed. Over the past few years, this nursery has expanded the number of environments and now has locations in the Great Plains, Midwest, and Southeast. The wide diversity in environments has increased our knowledge and understanding of rapeseed germplasm for use in the eastern half of the United States.

Test Locations

Of the 17 tests distributed in 1999, all but two were established successfully (Ottawa and Tribune, KS). Only one location did not survive the winter (Portageville, MO). Three other sites were lost during the spring growing season (Ft. Collins, Rocky Ford, and Walsh, CO), leaving yield data from 11 locations in 4 states (Colby, Garden City, Hutchinson, Manhattan, and Parsons, KS; Columbia and Novelty, MO; Lincoln and Sidney, NE; and Lubbock and Munday, TX).

Procedures

The NWCVT was distributed to 17 locations in 5 southern Great Plains states during the fall of 1999. This test included 14 released varieties and 17 experimental lines. Management guidelines were supplied to each cooperator, but past experience at that locality was used for final management decisions. All tests were planted in small plots (approximately 100 square feet) and replicated three times. Results for yield from the 11 harvested locations are found in Table 6. Lines are listed in order from highest to lowest relative yields for 2000, but actual yields for each location also are presented. The summary of the results for yield, winter survival, plant height, and flowering date for the Great Plains locations over the past 5 years are found in Figure 1.

1999-2000 Growing Conditions

Moisture conditions at most locations were favorable to facilitate establishment. Conditions over the winter months were very mild and drier than normal at most locations. Dry conditions continued into the spring and resulted in reduced yields at several locations. Excessive high temperatures in early June also contributed to reduced yields at several locations.

Acknowledgments

This work was funded in part by the National Canola Research Program, United States Department of Agriculture, Cooperative States Research Program and the Kansas Agricultural Experiment Station. Assistant Scientist Cindy LaBarge, as well as student workers Gaylon Corley and Aaron Koehn, helped with planting, care, harvest, and data preparation of some of these tests.

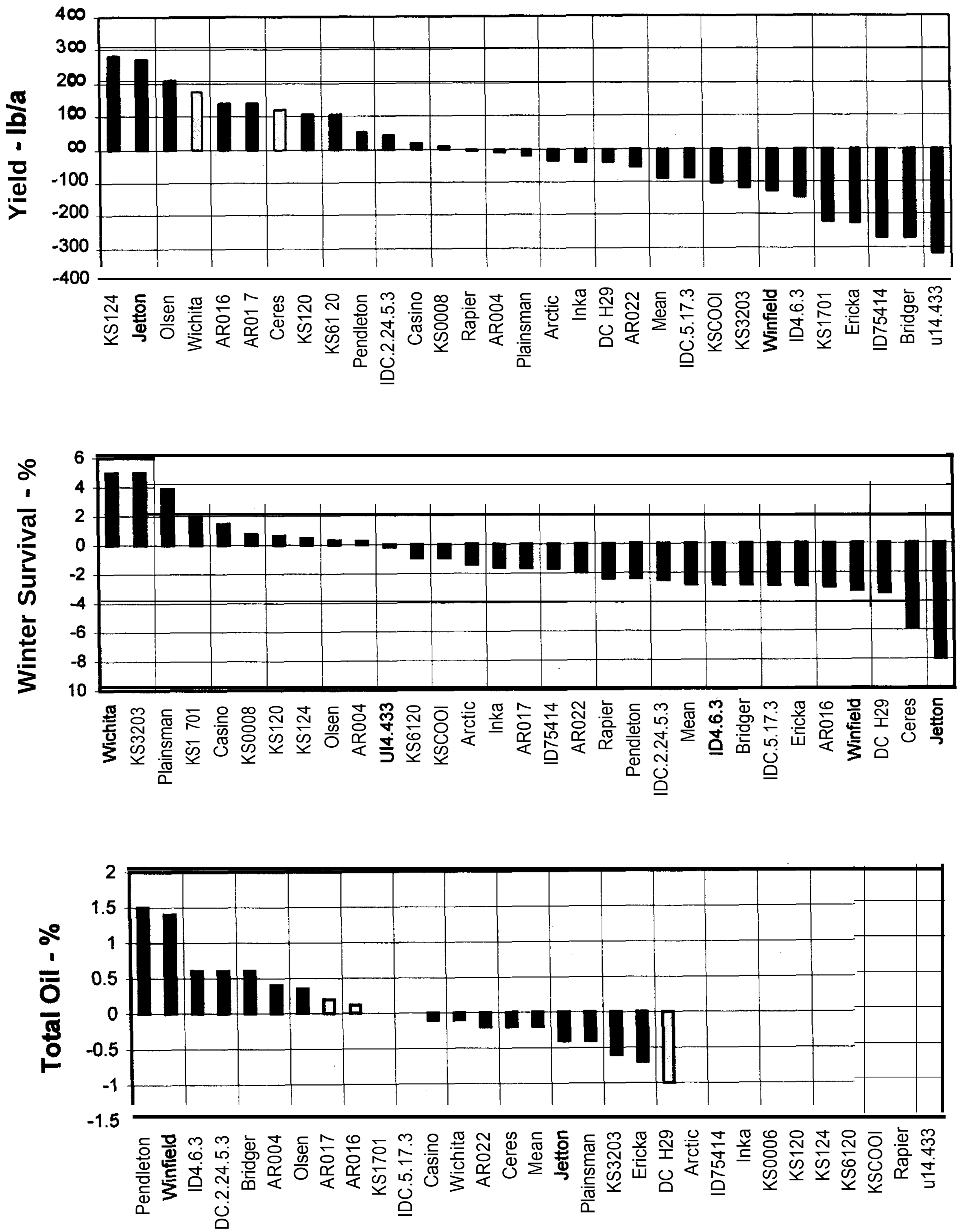
Table 6. Yield Results from the 1999-2000 National Winter Canola Trial Sites in the Great Plains Region.

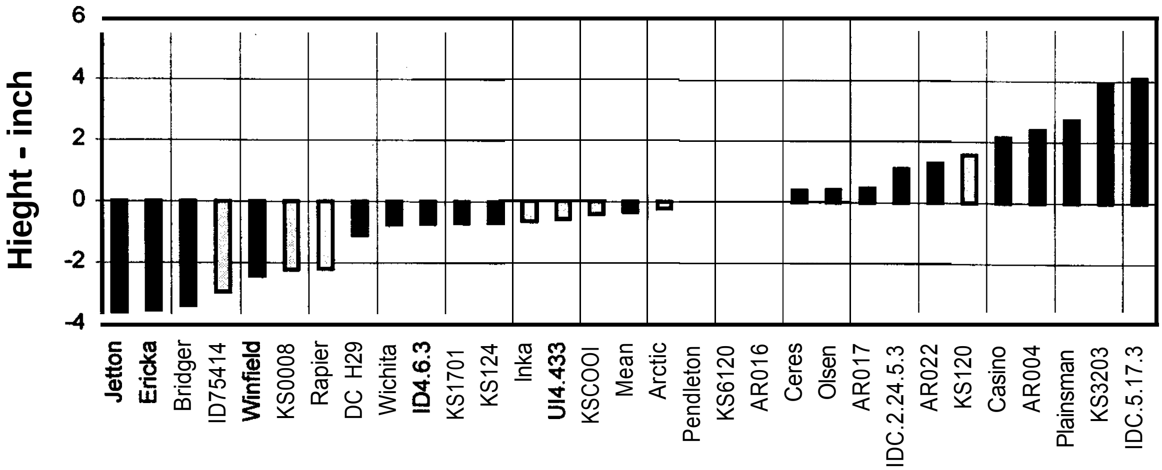
Line	Colby KS	Garden C. KS	Hutchinson KS	Manhattan KS	Parsons KS	Columbia MO	Novelty MO	Lincoln NE	Sidney NE	Lubbock TX	Munday TX	2000 Mean 1/
	lb/a											%
KSM3-1-124	1381 *	843 *	2396 *	1443 *	1426 *	1843 *	2845 *	2141 *	505 *	347 *	1062 *	131 *
ARC91016-41L-2	1278 *	1360 *	2333 *	1719 *	1641 *	1136	2846 *	1890 *	354	259	1312 *	130 *
ARC91017-44E-5	1125	1105 *	2268 *	1393 *	1086	1765 *	2692	2146 *	296	363 *	1043 *	122 *
Jetton	1164 *	869 *	2085	1111	1107	1808 *	3258 *	1897 *	273	468 *	1161 *	122 *
Wichita	1089	787 *	2128	1369 *	1551 *	1425 *	3007 *	1662	407	333 *	929	118
KS6120	1194 *	890 *	1882	1558 *	1123	1431 *	2539	2071 *	353	417 *	809	117
ARC91022-59L-4	978	928 *	2148	1482 *	1202	1428 *	2713 *	2324 *	306	269	1160 *	117
Pendleton	1019	696	2246 *	1205	1097	1359	2478	1873	785 *	263	800	117
ARC91004	947	682	2312 *	1594 *	994	1095	3034 *	1784	553 *	291	987	114
KSM3-1-120	1079	741 *	2328 *	1249	1094	1491 *	2836 *	1960 *	274	405 *	812	111
Casino	1350 *	658	2587 *	1512 *	1362 *	829	2795 *	1988 *	150	354 *	664	106
Winfield	1441 *	552	2404 *	1506 *	1197	1196	3138 *	1986 *	62	239	803	103
KSB0008	1083	707 *	1640	1011	1087	1419 *	2851 *	2006 *	237	317 *	836	102
Ceres	1129	477	2516 *	1257	968	624	2272	2034 *	499 *	276	731	101
Olsen	972	495	1695	1289	-----	-----	-----	2090 *	411	-----	-----	101
Rapier	771	460	2077	1144	871	1280	2889 *	2241 *	451	261	609	99
DCH 29	1031	812 *	2105	1247	1078	902	2294	2015 *	144	289	943	99
Arctic	1142	411	1696	1000	978	1609 *	2621	2022 *	388	215	631	97
UI2.3453	797	500	1760	985	1482 *	1515 *	2788 *	1615	228	344 *	597	97
KS3203	1128	597	1497	1002	1302 *	1786 *	2403	1220	210	346 *	595	97
Plainsman	1103	927 *	2099	1153	1289 *	1629 *	2704 *	1274	74	240	563	97
Inka	884	479	1920	1046	1370 *	886	2727 *	2061 *	221	301	775	96
KSC001	950	531	1994	983	1241 *	1197	2195	1502	431	224	690	95
Bridger	907	823 *	1396	826	997	1137	2734 *	1903 *	305	224	685	92
UI.3.426	-----	-----	-----	-----	931	556	1866	-----	-----	223	976	85
UI5.17.3.5	762	479	1810	1124	964	723	2602	1755	309	226	489	84
Ericka	828	354	1423	689	768	1330	2264	1553	208	295	714	81
UI4.433	635	-----	1391	792	891	664	2407	1719	251	205	636	77
UI4.634	552	342	1311	802	978	948	2021	1605	313	254	435	75
UI76.75414	822	366	1653	760	998	1202	2138	1259	139	209	582	75
KS1701	1102	170	1794	805	899	919	1479	923	6	120	277	59
Mean	1021	650	1989	1174	1171	1238	2581	1817	305	286	777	103
LSD (0.05)	282	358	407	457	418	472	561	444	305	152	276	10
CV (%)	16.9	33.7	15.2	23.8	27.0	23.3	13.3	14.9	61.3	32.6	21.7	25.8

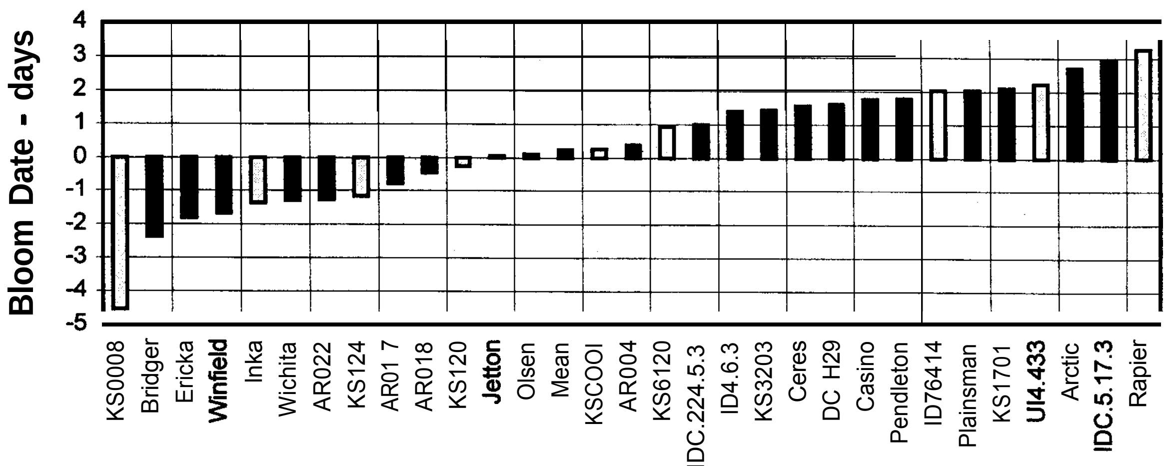
* Upper LSD group - Differences among those marked with an asterisk are not statistically significant.

1/ Mean yields presented as the percent of the average of Bridger, Ceres, Plainsman, and Wichita.

Figure 1. Summary of Winter Canola Performance Results in the Great Plains, 1996-2000.







Note: Values are averages of the differences between each cultivar and the mean of Bridger, Ceres, Plainsman, and Wichita for yield (lb/a), winter survival (%), total oil content (%), plant height (inches), and 50% bloom date (days). The number of observations for each trait is represented by the different colors of the bars (as shown at the right).
Note: Total oil data for 1999-2000 were not available at printing.

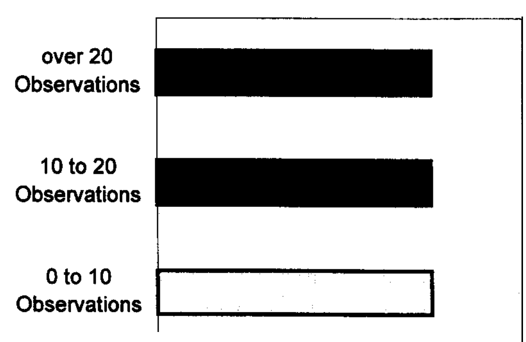


Table 7. Sources of Seed for Entries in the 1999 National Canola Variety Trial.

Seed Source	Entries
Habernick Seeds P.O. Box 40 Bozeman, MT 59771-0040	Ceres Olsen
Kansas State University Department of Agronomy Throckmorton Hall Manhattan, KS 66506-5501	Plainsman Wichita KS1701 KSM3-1-124
Pride Seeds PO Box 1088 Chatham, ON M7M 5L6	Arctic
McKay Seed Company 2945 Road N N.E. Moses Lake, WA 98837	Ericka Pendleton
Spectrum Crop Devlopment Post Office Box 541 Ritzville, WA 99169	Casino Inka Rapier
University of Arkansas Department of Plant Science Fayetteville, AR 72701	ARC91004 ARC91016-41L-2 ARC91017-44E-5 ARC91022-59L-4
University of Idaho Dept. of Plant, Soil, and Envir. Science Moscow, ID 83843-4196	Bridger UI.3.426 UI2.3453 UI4.433 UI4.634 UI5.17.3.5 UI76.75414

CANOLA COST-RETURN BUDGET

Cost-Return Projections

Cost-return projections provide estimated costs and returns for forward farm planning. They are specific to the crop and the region of Kansas. Production costs for individual farmers will vary considerably with the amounts of fertilizer and chemicals applied, the type and amount of farm machinery owned, and land cost.

Yield Level

Cost per bushel and net returns in crop production are highly dependent on yields. The following estimated budget includes three different yield levels. These are intended to represent expected yields from land of different qualities for a given level of management. Land values, government payments, and various inputs vary as yield levels vary. Multi-Peril Crop Insurance (MPCI) was not included in the budget as an input expense, because yields reflect an average of all years (good and bad). If crop insurance is included as an input expense, then an expected value for indemnity payment should be included in the returns section. Historically, MPCI indemnity payments have exceeded premiums because of government subsidies.

Variable and Fixed Costs

Table 8 shows some of the assumptions used to develop this budget. The lime amount assumes that 1 ton of effective calcium carbonate (ECC) is applied every 4 years.

Variable costs, such as labor, fertilizer, repairs, and fuel-oil, are costs that vary with the level of production. Labor requirements include time for management and marketing, whether operator or hired labor. Interest on variable costs is estimated by using one-half of the accumulated variable costs for the year.

Fixed costs do not vary with the level of production and are incurred by virtue of owning assets such as land and machinery. Machinery investment was estimated for an average-sized farm to meet tillage, planting, and harvest requirements. Salvage value of machinery was assumed to be 35 percent of the initial investment. Interest on machinery was calculated on one-half the average investment [(initial investment + salvage value) ÷ 2]. Land costs are based on owned land. If the land is rented, the cost of rent per acre should be listed on line 18, and no taxes or interest shown on lines 16 and 17. If land is rented on a crop-share basis, rent is reflected in the yield.

Profit and Return Factors

Net return on investment is the percentage return on investment. This measure enables comparisons to be made among other enterprises and investment alternatives. If the land market is efficient, the return on investment for land of different qualities should be approximately equal. If the return on investment from lower quality land is low relative to the returns on investment from land of higher quality, this is a signal that the land is overpriced relative to better quality land.

Table 8. Factors Used for Cost-Return Budget.

	Yield Level (lb/a)			
Item	1,200	1,500	1,800	Cost
Fertilizer				
N (Anhy.)	30	40	50	$0.11/lb
N (Dry)	10	10	10	$0.20/lb
P	20	20	20	$0.22/lb
K	0	0	0	$0.14/lb
Lime	500	500	500	$0.01/lb
Seed, lb/acre	5	5	5	$2.00/lb
Labor	2.00	2.20	2.40	$10.80
Land value/acre	$509	$636	$764	
Land interest rate				6.00%
Land real estate tax rate				0.50%
Machinery investment				$225
Machinery life				10 yrs
Salvage value				35.00%
Interest rate on machinery				9.00%
Insurance rate on machinery				0.25%
Interest rate on variable costs				9.00%

Table 9. Cost-Return Projection for Canola.

	Yield Level (lb/a)			Your
	1,200	1,500	1,800	Farm
VARIABLE COSTS PER ACRE: 1/				
1. Labor	$ 21.60	$ 23.76	$ 25.92	
2. Seed	10.00	10.00	10.00	
3. Herbicide	7.50	7.50	7.50	
4. Insecticide				
5. Fertilizer and Lime	14.70	15.80	16.90	
6. Fuel and Oil	5.61	6.00	6.39	
7.				
8. Machinery and Equipment Repairs	12.86	13.75	12.86	
9.				
10. Crop Insurance				
11. Drying				
12. Custom Hire				
13. Crop Consulting				
14. Miscellaneous	7.00	7.00	7.00	
15. Interest on 1/2 Variable Costs	3.57	3.77	3.98	
A. TOTAL VARIABLE COSTS	$ 82.83	$ 87.58	$ 92.33	
FIXED COSTS PER ACRE: 1/				
16. Real Estate Taxes	2.55	3.18	3.82	
17. Interest on Land 2/	30.54	38.16	45.84	
18. Rent for Rented Land				
19. Depreciation on Crop Machinery	14.63	14.63	14.63	
20. Interest on Crop Machinery 3/	13.67	13.67	13.67	
21.				
22.				
23. Insurance on Machinery	0.56	0.56	0.56	
B. TOTAL FIXED COSTS	$ 61.94	$ 70.20	$ 78.52	
C. TOTAL COST (A+B)	$144.77	$157.78	$170.85	
D. YIELD PER ACRE	1,200	1,500	1,800	
E. PRICE PER CWT	$ 10.00	$ 10.00	$ 10.00	
F. NET GOVERNMENT PAYMENT 4/	$ 11.95	$ 12.99	$ 14.03	
G. INDEMNITY PAYMENTS	$	$	$	
H. MISCELLANEOUS INCOME	$	$	$	
I. RETURNS PER ACRE ([(DxE)+F+G+H]	$131.95	$162.99	$194.03	
J. RETURNS OVER VARIABLE COSTS (I-A)	$ 49.12	$ 75.41	$101.70	
K. RETURNS OVER TOTAL COSTS (I-C)	$ -12.82	$ 5.21	$ 23.18	
L. VARIABLE COSTS PER CWT ((A/D)x100)	$ 6.90	$ 5.84	$ 5.13	
M. TOTAL COSTS PER CWT ((C/D)x100)	$ 12.06	$ 10.52	$ 9.49	
N. NET RETURN ON INVESTMENT [(K+15+17+20)/ INVESTMENT] 5/	4.76%	7.06%	8.76%	

1/ Totals were derived using information listed in Table 8.

2/ Assumes interest rate shown in Table 8.

3/ Assumes one-half the average investment at interest rate shown in Table 8.

4/ See MF-2236 "Government Program Payments for Crop Cost Return Budgets" for additional information.

5/ Investment equals total value of all fixed assets shown in Table 8.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan 66506

SRP 862 December 2000

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