Spring Canola Variety Performance in Iowa
2007 Final Report

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Significance of this Research

Canola is not routinely grown in Iowa. However, recent increases in the value of oilseed crops for biodiesel production and the search for alternative crops in Iowa has resulted in increasing interest in canola in the state. Iowa State University conducted a research program on canola from 1986 to 1991, but little research on canola has been done in the state since that time. Over the past two decades, canola production has become common in Canada and several northern U.S. states. In Europe, oilseed rape has become the dominant crop for biofuel production.

The primary benefits of canola for fuel production include high oil content (40-44%) and the ability to produce a high quality biodiesel from this oil. The canola meal left after oil extraction contains 36% protein and is best suited for ruminant livestock (beef, dairy, sheep, and goats) diets. The genetics of canola have improved substantially over the past decade. The renewed interest in canola for Iowa and the need to test current genetics led to the planting of these tests.

The variety tests reported here provide important information for choosing the right canola varieties for grain production and further research in Iowa. Since climatic conditions, prevalence of important diseases, and relative performance of varieties vary by site and year, the results from at least two years of testing at two sites will be required for a reliable appraisal of a variety's productivity and value. This report is preliminary since we will be analyzing oil content, which we will place in the final report.

Methods

Eighteen spring canola lines from six sources (Table 1) were tested in 2007. Variety trials were planted at two Iowa sites, Ames and Fort Dodge. In addition, a trial was planted on two planting dates at each site. The tests were planted on April 9 and May 16 at Ames and April 19 and May 2 at Fort Dodge. The test site at Fort Dodge was provided by the Iowa Central Community College Agriculture Program.

Land previously in soybean was fertilized with 130 lbs/acre N, 50 lbs/acre P_2O_5, 100 lbs/acre K_2O, and 30 lbs/acre S at both sites. The areas for each trial were field cultivated within 48 hours of the first planting date at each site. The experimental area for the second planting date was field cultivated a second time within 48 hours of planting. Seed of most of the varieties was planted at 10 seeds per square foot and a 1 inch depth with a Hege 1000 cone planter. The Nexera varieties were planted at 14 seeds per square foot at the request of the company. Each plot was six rows wide with 7 inches between rows. The centers of adjoining plots were spaced 5 feet apart, which allowed space between plots for wheel traffic from the tractor and planter. Each genotype was planted in four replications for a planting date at a location using a randomized complete block design. The length of planted area in each plot was 28 feet, which was trimmed to 24 feet shortly after the crop emerged. No herbicides or pesticides were used during the trial. Weed pressure within the plots was low throughout the growing season at both locations. Plots were hand weeded once in May.

Table 1. Sources of spring canola varieties tested by Iowa State University in 2007.

Bayer CropScience 2 T.W. Alexander Drive P.O. Box 12 Research Triangle Park, NC 27009 919-549-2000 www.bayercropscienceus.com	**Dow AgroSciences LLC** 9330 Zionsville Road Indianapolis, IN 46268 317- 337-3000 www.dowagro.com
Croplan Genetics PO Box 64406 MS 7455 St Paul, MN 55112 651-765-5714 800-851-8810 www.croplangenetics.com	**Interstate Seed** PO Box 338 West Fargo, ND 58078 1-800-437-4120 www.interstateseed.com
DEKALB Monsanto Company 800 North Lindbergh Blvd. St. Louis, Missouri 63167 1-800-768-6387 www.dekalb.com	**Pioneer Hi-Bred International, Inc.** PO Box 1000 Johnston IA 50131-1000 (515-270-3200 www.pioneer.com

Date to first flower was recorded in Ames as a measure of relative maturity. A plot was considered to have reached first flower when 50% of the plants in the plot had a flower. Average height of the plants in each plot was measured on the day of harvest. Final stand density of each plot was determined by counting the number of stems after harvest in two of the six rows.

The canola grain was harvested from a standing crop (the plots were not windrowed) with a Wintersteiger Nursery Master Elite plot combine containing a 6 mm concave, a 6 mm shaker, and 6 mm cleaning sieve. Harvest for the first planting dates was done on July 17 at Ames and July 26 at Fort Dodge. Harvest for the second planting dates was done on August 1 at Ames and August 3 at Fort Dodge. The harvested grain was dried to equilibrium moisture content with forced air. Chaff and fines were removed from the grain samples using a Clipper grain cleaner containing a number 7 (7/64 inch) scalping screen and forced air. Grain yield was calculated using the weight of the cleaned grain. Moisture and test weight of the dried grain were determined using a DICKEY john GAC 2100 grain analyzer. Yield was presented in the tables as pounds per acre based on 8.5% moisture. Thousand kernel weight (TKW) was determined by weighing 1000 kernels counted with an electronic seed counter. Oil content was determined by the Iowa State University Grain Quality Lab and reported in the tables based on 8.5% grain moisture content. Oil yield per acre was calculated as yield per acre multiplied by oil content. It takes 7.6 lbs of oil to make one gallon of biodiesel, so maximum biodiesel yield was calculated for each entry by dividing the oil yield per acre by 7.6.

Results Summary

Temperature was above average and rainfall was below average throughout the growing season at both locations. Variety performance for each of two planting dates at the two locations is presented in Tables 1-6. The minimum stand density for maximum canola yield is generally recognized as 4 plants per square foot. Stand density was lower for the first planting dates than the second planting dates primarily because the planter was set to plant shallow for the first planting dates. The planter was reset to plant at approximately 1/2- to 3/4-inch depth for the second plantings, which resulted in better stand densities. Maturity, as measured by the date of first flower, varied among the varieties at Ames by 13 days in the first planting and 12 days in the second planting.

The wide range of maturity among the varieties created a challenge for harvest timing of the standing crop. Harvest timing of canola is a compromise between seed maturity and avoiding yield loss to seed shatter. Shatter before harvest was low in all four tests and we minimized shattering losses by harvesting in the morning when the plants were damp. We felt it was important to harvest the bulk of the varieties before they shattered. Therefore, some of the later maturing varieties had green seed that was not harvested in the early plantings at both locations and the late planting at Ames. This reduced harvested yield of these varieties and the average yields for these sites and planting dates. The exact amount of unharvested yield was not determined. There was little unharvestable, green seed in the second planting date at Fort Dodge. This resulted in fewer harvest losses than in the other three tests.

The grain yield of entries in the top 50% of the test was above 2,000 lbs per acre at Ames and 2,700 lbs acre at Fort Dodge. These yields compared favorably with recent canola yield levels in the United States, Canada, and Europe. Grain yield for the past five growing seasons averaged 1,400 lbs/acre in the U.S. and Canada and 2,700 lbs/acre in Europe. Oil content averaged 41 to 42% in this Iowa test, which is in the middle of the range typically reported for canola in the U.S. and Canada.

Table 1. Agronomic performance of spring varieties canola planted on April 9, 2007 at Ames, Iowa.

Brand	Cultivar	Type	Stand Density	First Flower	Height	Yield	Test Weight	1000 Kernel Weight
			plants per square foot		inches	lbs per acre	lbs per bushel	grams
Croplan Genetics	HyClass 431	Synthetic	5.4	June 1	51.2	1659	48.7	2.90
Croplan Genetics	HyClass 712	Synthetic	4.7	June 3	55.5	1594	48.5	2.97
Croplan Genetics	HyClass 924	Hybrid	5.0	May 30	53.2	1858	49.9	2.86
Croplan Genetics	Python 2	Hybrid	6.0	June 1	53.2	1473	49.7	2.77
DeKalb	DKL 38-25	Hybrid	5.4	June 1	55.1	2040	49.1	3.06
DeKalb	DKL 52-10	Hybrid	5.7	June 3	52.6	1802	51.3	2.88
Interstate Seeds	Hyola 357 Magnum	Hybrid	5.9	May 24	38.8	2245	49.5	2.82
Interstate Seeds	IS 7145 RR	Hybrid	5.6	May 31	51.0	2407	50.6	2.76
Interstate Seeds	SW Titan RR	Hybrid	4.7	June 1	52.4	1588	50.4	2.88
Interstate Seeds	SW Marksman RR	Hybrid	4.8	June 2	50.8	1319	46.5	2.87
InVigor	5550	Hybrid	6.6	May 29	54.6	2201	51.4	2.66
InVigor	5630	Hybrid	6.4	May 30	51.0	2231	49.5	2.57
Nexera	828 CL	Open Pollinated	7.4	June 6	53.7	968	47.7	2.78
Nexera	830 CL	Open Pollinated	7.1	June 4	54.5	1521	50.3	3.06
Nexera	845 CL	Open Pollinated	6.4	May 31	48.4	1304	50.1	3.22
Pioneer	45H24	Hybrid	5.7	May 30	51.6	2275	50.3	2.59
Pioneer	45H26	Hybrid	6.3	May 29	47.5	2164	50.3	2.70
Pioneer	45H73	Hybrid	6.4	May 29	51.6	2539	49.9	2.47
	Mean		5.9	May 31	51.5	1844	49.6	2.82
	$LSD_{0.05}$		1.8	2	3.0	281	1.1	0.12

Table 2. Variety performance of spring canola planted on May 1, 2007 at Ames, Iowa.

Brand	Cultivar	Type	Stand Density	First Flower	Height	Yield	Test Weight	1000 Kernel Weight
			plants per square foot		inches	lbs per acre	lbs per bushel	grams
Croplan Genetics	HyClass 431	Synthetic	8.5	June 15	46.3	1531	47.7	3.25
Croplan Genetics	HyClass 712	Synthetic	7.2	June 18	51.6	1586	47.0	3.22
Croplan Genetics	HyClass 924	Hybrid	9.7	June 14	49.8	1982	49.3	3.13
Croplan Genetics	Python 2	Hybrid	8.5	June 16	48.2	932	47.8	2.93
DeKalb	DKL 38-25	Hybrid	9.8	June 15	48.0	1775	48.3	3.10
DeKalb	DKL 52-10	Hybrid	10.8	June 15	47.8	1659	50.9	3.09
Interstate Seeds	Hyola 357 Magnum	Hybrid	9.1	June 8	37.4	2266	49.0	3.03
Interstate Seeds	IS 7145 RR	Hybrid	10.6	June 14	45.1	2062	50.1	2.86
Interstate Seeds	SW Titan RR	Hybrid	10.3	June 13	44.1	1322	41.9	2.99
Interstate Seeds	SW Marksman RR	Hybrid	8.5	June 18	47.6	1195	47.3	3.07
InVigor	5550	Hybrid	10.4	June 16	52.2	1616	50.1	2.68
InVigor	5630	Hybrid	10.6	June 15	51.0	1870	49.1	2.83
Nexera	828 CL	Open Pollinated	10.6	June 20	45.5	720	47.3	3.16
Nexera	830 CL	Open Pollinated	11.1	June 17	45.3	906	47.8	3.44
Nexera	845 CL	Open Pollinated	12.1	June 14	42.7	1587	47.7	3.58
Pioneer	45H24	Hybrid	9.5	June 15	47.8	1799	49.5	2.99
Pioneer	45H26	Hybrid	10.9	June 13	45.7	2164	50.3	2.96
Pioneer	45H73	Hybrid	11.3	June 13	45.5	2039	49.0	2.76
	Mean		10.0	June 15	46.8	1612	48.3	3.06
	$LSD_{0.05}$		1.8	2	2.8	352	5.1	0.24

Table 3. Oil and biodiesel performance of spring canola varieties planted on April 9 and May 1, 2007 at Ames, Iowa.

Brand	Cultivar	Type	April 9			May 1		
			Oil Content	Oil Yield	Maximum Biodiesel Yield	Oil Content	Oil Yield	Maximum Biodiesel Yield
			%	lbs per acre	gallons per acre	%	lbs per acre	gallons per acre
Croplan Genetics	HyClass 431	Synthetic	42.5	866	114	41.5	636	84
Croplan Genetics	HyClass 712	Synthetic	40.8	736	97	43.0	682	90
Croplan Genetics	HyClass 924	Hybrid	42.8	709	93	42.0	832	109
Croplan Genetics	Python 2	Hybrid	43.6	694	91	40.9	382	50
DeKalb	DKL 38-25	Hybrid	43.3	804	106	40.6	722	95
DeKalb	DKL 52-10	Hybrid	39.6	889	117	41.2	686	90
Interstate Seeds	Hyola 357 Magnum	Hybrid	44.0	1059	139	40.2	910	120
Interstate Seeds	IS 7145 RR	Hybrid	42.3	932	123	43.8	904	119
Interstate Seeds	SW Titan RR	Hybrid	42.8	956	126	40.0	529	70
Interstate Seeds	SW Marksman RR	Hybrid	42.4	559	74	41.3	493	65
InVigor	5550	Hybrid	38.4	371	49	40.6	655	86
InVigor	5630	Hybrid	41.2	628	83	41.3	772	102
Nexera	828 CL	Open Pollinated	44.8	584	77	36.9	265	35
Nexera	830 CL	Open Pollinated	42.8	974	128	41.1	371	49
Nexera	845 CL	Open Pollinated	43.8	949	125	44.1	700	92
Pioneer	45H24	Hybrid	43.5	1105	145	41.1	740	97
Pioneer	45H26	Hybrid	42.2	623	82	42.5	921	121
Pioneer	45H73	Hybrid	39.8	632	83	42.4	865	114
	Mean		42.2	782	103	41.4	670	88
	$LSD_{0.05}$		1.1	118	16	1.0	145	19

Table 4. Variety performance of spring canola planted on April 19, 2007 at Fort Dodge, Iowa.

Brand	Cultivar	Type	Stand Density	Height	Yield	Test Weight	1000 Kernel Weight
			plants per square foot	inches	lbs per acre	lbs per bushel	grams
Croplan Genetics	HyClass 431	Synthetic	4.6	49.8	2220	48.6	3.15
Croplan Genetics	HyClass 712	Synthetic	4.5	52.8	2396	47.6	3.12
Croplan Genetics	HyClass 924	Hybrid	5.2	52.0	2714	50.5	2.84
Croplan Genetics	Python 2	Hybrid	5.1	53.6	2196	49.1	3.01
DeKalb	DKL 38-25	Hybrid	5.1	50.3	2484	48.5	2.99
DeKalb	DKL 52-10	Hybrid	5.3	53.8	2599	51.5	2.94
Interstate Seeds	Hyola 357 Magnum	Hybrid	5.8	38.6	2656	49.3	2.70
Interstate Seeds	IS 7145 RR	Hybrid	5.6	49.8	3071	51.1	2.75
Interstate Seeds	SW Titan RR	Hybrid	5.5	52.4	2410	50.0	2.92
Interstate Seeds	SW Marksman RR	Hybrid	3.9	53.1	1964	47.1	3.09
InVigor	5550	Hybrid	5.3	57.5	2721	51.0	2.80
InVigor	5630	Hybrid	5.7	53.1	2544	49.2	2.77
Nexera	828 CL	Open Pollinated	5.3	54.8	1504	45.7	3.03
Nexera	830 CL	Open Pollinated	5.8	55.9	2040	49.4	3.28
Nexera	845 CL	Open Pollinated	6.3	50.8	2258	50.0	3.41
Pioneer	45H24	Hybrid	5.9	52.8	2258	50.0	2.55
Pioneer	45H26	Hybrid	6.1	49.6	2803	49.8	2.55
Pioneer	45H73	Hybrid	5.7	50.8	2988	49.8	2.41
	Mean		5.4	51.7	2470	49.4	2.90
	$LSD_{0.05}$		0.9	3.5	374	1.4	0.12

Table 5. Variety performance of spring canola planted on May 2, 2007 at Fort Dodge, Iowa.

Brand	Cultivar	Type	Stand Density	Height	Yield	Test Weight	1000 Kernel Weight
			plants per square foot	inches	lbs per acre	lbs per bushel	grams
Croplan Genetics	HyClass 431	Synthetic	7.2	50.0	2572	48.1	3.21
Croplan Genetics	HyClass 712	Synthetic	5.7	55.1	2631	48.0	3.03
Croplan Genetics	HyClass 924	Hybrid	6.7	51.6	2614	49.0	2.81
Croplan Genetics	Python 2	Hybrid	7.1	52.2	2308	48.3	2.89
DeKalb	DKL 38-25	Hybrid	6.7	52.0	2644	47.6	3.12
DeKalb	DKL 52-10	Hybrid	8.0	55.3	2850	50.0	2.87
Interstate Seeds	Hyola 357 Magnum	Hybrid	7.7	39.4	2162	46.8	2.83
Interstate Seeds	IS 7145 RR	Hybrid	7.6	48.4	2877	49.9	2.64
Interstate Seeds	SW Titan RR	Hybrid	7.0	48.8	2510	49.1	2.93
Interstate Seeds	SW Marksman RR	Hybrid	5.2	52.6	2119	47.3	3.08
InVigor	5550	Hybrid	6.5	56.3	2531	49.7	2.66
InVigor	5630	Hybrid	7.0	50.8	2794	49.1	2.70
Nexera	828 CL	Open Pollinated	8.6	52.6	2074	47.9	3.01
Nexera	830 CL	Open Pollinated	8.5	47.8	2498	48.5	3.07
Nexera	845 CL	Open Pollinated	9.5	44.3	2152	48.1	3.25
Pioneer	45H24	Hybrid	7.0	50.8	2554	48.9	2.79
Pioneer	45H26	Hybrid	8.9	50.4	2558	48.4	2.78
Pioneer	45H73	Hybrid	9.1	47.3	3084	49.3	2.48
	Mean		7.4	50.3	2529	48.5	2.90
	$LSD_{0.05}$		1.6	3.6	576	1.6	0.14

Table 6. Oil and biodiesel performance of spring canola varieties planted on April 19 and May 2, 2007 at Fort Dodge, Iowa.

Brand	Cultivar	Type	April 19			May 2		
			Oil Content	Oil Yield	Maximum Biodiesel Yield	Oil Content	Oil Yield	Maximum Biodiesel Yield
			%	lbs per acre	gallons per acre	%	lbs per acre	gallons per acre
Croplan Genetics	HyClass 431	Synthetic	42.2	939	124	41.5	1067	140
Croplan Genetics	HyClass 712	Synthetic	43.9	1054	139	42.8	1127	148
Croplan Genetics	HyClass 924	Hybrid	42.5	1152	152	41.6	1086	143
Croplan Genetics	Python 2	Hybrid	42.2	929	122	41.1	946	124
DeKalb	DKL 38-25	Hybrid	42.2	1054	139	41.3	1097	144
DeKalb	DKL 52-10	Hybrid	41.2	1073	141	40.2	1150	151
Interstate Seeds	Hyola 357 Magnum	Hybrid	39.7	1054	139	38.2	829	109
Interstate Seeds	IS 7145 RR	Hybrid	44.0	1353	178	42.9	1235	163
Interstate Seeds	SW Titan RR	Hybrid	40.4	980	129	39.7	1001	132
Interstate Seeds	SW Marksman RR	Hybrid	42.6	841	111	41.1	877	115
InVigor	5550	Hybrid	42.2	1148	151	41.0	1040	137
InVigor	5630	Hybrid	43.0	1095	144	41.9	1181	155
Nexera	828 CL	Open Pollinated	39.4	593	78	38.9	806	106
Nexera	830 CL	Open Pollinated	42.2	863	114	40.7	1018	134
Nexera	845 CL	Open Pollinated	43.6	985	130	42.6	916	121
Pioneer	45H24	Hybrid	42.1	1216	160	41.3	1058	139
Pioneer	45H26	Hybrid	43.0	1206	159	41.4	1066	140
Pioneer	45H73	Hybrid	42.7	1277	168	42.4	1308	172
	Mean		42.2	1045	138	41.2	1045	137
	$LSD_{0.05}$		0.8	159	21	0.9	251	33