PROJECT TITLE: Montana Specialty Mills, LLC Mustard Variety Performance Evaluation under No-Till, Dryland, Chemical Fallow Conditions near Havre, Montana. (Exp. 08-OC10-OC).

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OBJECTIVES:

To provide Montana Specialty Mills with a reliable, unbiased, up-to-date source of information that will permit valid dryland seed and oil production comparisons among selected mustard varieties submitted for testing.

METHODS:

In 2008, Montana Specialty Mills, LLC submitted two mustard entries for testing near Havre, MT. The trial was seeded on April 16, under no-till, dryland, chemical fallow conditions in replicated, 22-foot, 4-row plots with 12-inch row spacing utilizing a three-point-mounted `Hege 1000' plot drill equipped with `John Deere Tru-Vee' disk openers. Each plot was seeded with 7.33 grams, equal to seeding 8 lbs per acre. Seeding depth was 1". Percent plant stand was determined by visually determining the amount of "open" space six-inches and larger between plants within all rows. No post-emergence herbicides were applied, and all plots were kept weed free utilizing hand labor. Flowering date was recorded as the date when 50 percent of the plants within a plot had at least one open floret. Pod shatter was determined by visual assessment prior to harvest, and was recorded as a total percent in each plot. Tilled 4-foot alleys were used for plot differentiation, reducing the harvested area to 4 rows wide by 18 feet long. The 72 square-foot plots were direct harvested using a `Wintersteiger Elite 1541-21' plot combine. Seed samples were cleaned in the laboratory using a 'Clipper Office Tester and Cleaner' and then weighed following cleaning to determine seed yield. Seed test weight (pounds per bushel) and percent grain moisture content were obtained for each plot using a 'Dickey-john GAC 2100' grain analyzer. Recorded grain yields were adjusted to eight percent grain moisture content and are reported in pounds per acre. Grain oil percentages were determined using nuclear magnetic resonance (NMR) spectroscopy and are reported on a 92 % dry matter basis. Trial management information for the trial located at NARC is listed in Table 4.

RESULTS and SUMMARY:

The oilseed cropping environment in 2008 at Havre was categorized as good with higher than normal precipitation. Total annual growing season precipitation (9/1/07 through 8/31/08) was 12.21 inches, 2.69 percent more than the average for all years since 1916 (Table 2). April 1 through July 31 precipitation was 8.09 inches or 120 percent of the 93-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through July were 1182.5, or 91 percent of the average for the last 58 years (1951-2008). The last spring frost was 2 days early with the first fall frost 20 days late, resulting in 151 frost-free days, 22 days longer than the 93-year average. September 2007 through March 2008 precipitation was 85 percent of the long-term average. The April through June growing season saw an average daily temperature at 51.1 degrees F, 2.1 degrees below normal. July and August average temperatures were 1.3 percent higher than normal with the high for 2008 recorded on August 8 at 100 degrees F. There were 27 days 90 degrees F or above, and 1 day with temperatures 100 degrees F or above. April growing conditions were drier and cooler than normal resulting in delayed emergence of early seeded crops. May and June were wetter and cooler than normal resulting in phenomenal oilseed production at NARC. Overall, the growing season was on average warmer than the 93-year average. The minimum winter temperature was -29 degrees F on January 29. Oilseed crop outlook was initially not very good with March and April conditions drier and cooler than normal. Rainfall during May, coupled with adequate fallow-stored soil moisture resulted in spring crop performance that was substantially better than anticipated.

Contact information for mustard seed sources submitted for this trial is summarized in Table 1.

Overall mustard seed yield at NARC averaged 1555 lb/ac. 'Ida Gold', a submission from Montana Specialty Mills, LLC produced 1652 lb/ac, statistically equal to the highest yielding variety, 'Pacific Gold', at 1887 lb/ac. Ida Gold was also the entry to have the earliest flowering date (June 7) of all mustards tested. Early flowering mustard varieties have a tendency for increased seed yield because the plants are finished flowering and have begun to set seed by the time high temperatures may affect production potential. Grain oil ranged from 29.2 to 33.7 % with no statistical difference

between entries.

Company, ID, plant stand, flowering date, plant height, pod shatter, grain yield, test weight, grain moisture and grain oil data are summarized for NARC in Table 3.

FUTURE PLANS:

With continued support from Montana Specialty Mills, LLC, evaluations will continue in 2009 at Havre and potentially other selected sites across Montana.

Table 1. Contact Information for Seed Sources of Two Commercial Mustard Entries Tested near Havre, MT. 2008.
(Exp. 08-OC10-OC)

COMPANY	HYBRIDS TESTED	CONTACT
Montana Specialty Mills, LLC	Andante Ida Gold	Mr. Justin Hager Merchandiser 525 3rd St. NW Great Falls, MT 59403 PH: 1-800-332-2024 FX: 1-406-761-7926 EM: Justin.Hager@mtspecialtymills.com WB: www.mtspecialtymills.com

Table 2. Summary of climatic data by months for the 2007-2008 crop year (September to August) and averages for the period 1916-2008 at the Northern Agricultural Research Center, Havre, Montana.

Month Year	Sep 2007	Oct 2007	Nov 2007	Dec 2007	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	Jul 2008	Aug 2008	Crop Year
Precipitation (inches)													**Total**
Current Year	1.76	0.26	0.07	0.31	0.17	0.69	0.12	0.35	3.01	3.57	1.16	0.74	12.21
93-Year Average (1916 to 2007-08)	1.15	0.66	0.42	0.44	0.43	0.33	0.54	0.97	1.78	2.57	1.42	1.19	11.89
Mean Temperature (^{o}F)													**Average**
Current Year	57.3	48.0	33.6	21.1	18.2	20.6	34.6	39.7	53.1	60.4	69.8	68.6	43.7
93-Year Average (1916 to 2007-08)	56.1	45.9	30.0	19.7	15.3	20.0	30.0	43.6	54.1	61.8	69.2	67.3	42.8

Last killing frost in spring*

2008 _____ **May 11th**

Ave. 1916-2008 _____ **May 13th**

First killing frost in fall*

2008 _____ **October 9th (21°)**

Ave. 1916-2008 _____ **September 19th**

Frost free period

2008 _____ **151 days**

Ave. 1916-2008 _____ **129 days**

Growing degree days (base 50)

May 1-Oct 31, 2008 _____ **2220.5**

Ave. 1951-2008 _____ **2384.8**

Maximum summer temperature _____ **100° on August 8th**

Minimum winter temperature _____ **-29° on January 29th**

*In this summary 32^{o} is considered a killing frost.

Table 3. Agronomic Performance of Condiment Mustard Entries Grown under Dryland, Fallow, No-till Conditions near Havre. Northern Agricultural Research Center. Havre, MT. 2008. (Exp. 08-OC10-OC)

Entry	ID	Mustard Type	Sponsor	Plant Stand	Grain Yield		Test Weight	Grain Moisture	Flowering Date Julian	Flowering Date Calendar	Plant Height	Pod Shatter	Grain Oil
				%	lb/ac		lb/bu	%	day	date	inches	%	%
1	Forge	Oriental	MSU - Check	95.8	1569.6		54.2	10.7	173.5	Jun 22	55.2	0.00	29.2
4	Pacific Gold	Oriental	MSU - Check	99.7	**1886.9**	**	53.0	7.5	169.8	Jun 18	54.8	0.25	32.4
2	Andante	Yellow	Montana Specialty Mills, LLC	99.1	1443.8		56.8	5.8	160.8	Jun 9	44.6	0.00	33.5
3	Ida Gold	Yellow	Montana Specialty Mills, LLC	98.4	**1651.9**	*	56.9	5.7	159.0	Jun 7	48.9	0.00	33.7
5	Pennant	Yellow	MSU - Check	99.7	1567.5		56.7	5.9	160.5	Jun 9	44.9	0.00	29.5
6	Tilney	Yellow	MSU - Check	99.5	1212.0		55.5	6.3	165.8	Jun 14	46.1	0.00	31.6
Average				98.7	1555.3		55.5	7.0	164.9	Jun 13	49.1	0.04	31.6
LSD (p=0.05)				1.87	284.84		1.05	1.75	0.65	-	5.30	ns	ns
CV%				1.26	12.15		1.25	16.69	0.26	-	7.15	489.90	11.91

Grain yield and percent oil is adjusted to 8 percent grain moisture content.

** Indicates highest yielding cultivar within a column.

***** Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Seeding Date: April 16, 2008
Harvest Date: August 5, 2008

Table 4. Site Resource and Management Data: HAVRE ONLY (Exp. 08-OC10-OC)

Field	A-7-1	K (ppm) 0-6	391	Init PAW (in.) 0-6"	0.56	Fert. Rate (lbs/ac) P2O5	n/a
Quarter	NW	Ca (ppm) 0-6	2751	Init PAW (in.) 6-24"	3.31	Fert. Rate (lbs/ac) K2O	n/a
Section	33	Mg (ppm) 0-6	508	Init PAW (in.) 24-36"	2.15	Herbicide App. Date	none
Township	32N	Na (ppm) 0-6	22	Init PAW (in.) 36-48"	1.52	Herbicide Product	n/a
Range	15E	SaltHaz (MMHOS/cm) 0-6	0.40	Init PAW (in.) 0-48"	7.54	Herbicide Rate (/ac)	n/a
Latitude	N48 29.724'	SaltHaz(MMHOS/cm) 6-24	0.44	Cropping System	NT-ChmFlw	Precip (in.) Plnt'g-Harvest	6.64
Longitude	W109 47.987'	S (ppm) 0-24	98	Previous Crop	SB	Precip (>.1) Plnt'g-Harvest	5.67
Soil Series	Joplin CLm	Zn (ppm) 0-6	0.46	Planting Date	4/16	Harvest Date	8/5
pH 0-6	7.9	Fe (ppm) 0-6	9.00	Planting Depth (in.)	1.00	Rooting Depth (in.)	36"
Org.Matter (%) 0-6	1.3	Mn (ppm) 0-6	3.53	Moist Soil Depth @ Plnt'g	48+	Post PAW (in.) 0-6"	0.43
N (lbs/ac) 0-6	36	Cu (ppm) 0-6	1.05	Dry Surf Soil (in.) @ Plnt'g	2.0	Post PAW (in.) 6-24"	1.30
N (lbs/ac) 6-24	102	CEC 0-6	19.00	2" Soil Temp (^{o}F) @ Plnt'g	58	Post PAW (in.) 24-36"	1.24
N (lbs/ac) 24-36	60	Soil Texture 0-6	CL	4" Soil Temp (^{o}F) @ Plnt'g	53	Post PAW (in.) 36-48"	1.60
N (lbs/ac) 36-48	32	Soil Texture 6-24	CL+	Fertilizer Formulation	none	Post PAW (in.) 0-48"	4.58
N (lbs/ac) 0-48	230	Soil Texture 24-36	CL+	Fertilizer Placement	n/a	Precip (>.1) Hvst-Post	0.00
P (ppm) Olsen 0-6	27	Soil Texture 36-48	CL+	Fert. Rate (lbs/ac) N	n/a		