PROJECT TITLE: Winter Cereal Forage Performance Evaluation under No-Till, Dryland, Chemical Fallow Conditions near Havre, Montana. (Exp. 07-FR02-FR).

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OBJECTIVES:

To provide winter cereal forage producers in north central Montana with a reliable, unbiased, up-to-date source of information that will permit valid dryland forage production comparisons among improved and experimental cereal forage entries submitted for testing by participating commercial and university entities. This information should help cereal forage producers in north central Montana select varieties best suited to this region of the state.

METHODS:

In 2007 there were 16 winter cereal forage experimental lines and named varieties submitted for testing under no-till, dryland, chemical fallow conditions near Havre, MT (Table 2). The five (5) publically available varieties in the trial included four winter triticale's ('Boreal', 'Koldtana', 'Trical 102' and 'Windrift').and one winter wheat ('Willow Creek'). The trial was seeded a randomized complete-block design, in replicated, 3-row, 22-foot plots on a 12-inch row spacing utilizing a self-propelled cone seeder. The cone-seeder was equipped with `Haybuster' openers modified to provide narrow, paired-row seed placement for enhanced seed/fertilizer separation. Each plot was seeded with 41 grams, equal to seeding 60 lbs per acre. Seeding depth was 1 ½ inches. Heading date was recorded as the date when 50 percent of the heads within a plot had elongated above the collar of the flag leaf. Forage harvest date of each plot was seven days post heading. A three-foot hand clipping was taken from each plot for determination of forage dry matter. Following dry matter determination, samples from the publically available varieties were ground and submitted for quality analyses. Results of these analyses are summarized in Table 3. Following forage harvest, the remaining plot area (45 sq ft) was allowed to ripen and then was cut to determine seed yield of these potential forage lines (Table 4). The plots were 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 12 percent grain moisture content and are reported in pounds per acre. Trial management information is listed following Table 4.

RESULTS and SUMMARY:

The cereal forage cropping environment in 2007 at the Research Center was categorized as good to excellent with higher than normal precipitation. At Havre, total annual growing season precipitation (9/1/06 through 8/31/07) was 12.42 inches, 4.46 percent more than the average for all years since 1916 (Table 1). April 1 through July 31 precipitation was 7.43 inches or 111 percent of the 92-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50), May through October, were 2517, 105.4 percent of the average for the last 57 years (1951-2007). The last spring frost was 20 days early with the first fall frost 4 days early, resulting in 145 frost-free days, 16 days longer than the 92-year average. September 2006 through March 2007 precipitation was 116 percent of the long-term average. The April through June growing season saw an average daily temperature at 53.8 degrees F, 0.6 degrees above normal. July and August average temperatures were 6.9 percent higher than normal with the high for 2007 recorded on July 24 at 107 degrees F. There were 37 days 90 degrees F or above, and 8 days with temperatures 100 degrees F or above. Early growing season conditions were generally wetter than normal. The month of April started off cool and wet, delaying spring seeding in many areas but also providing extra moisture for fall-seeded crops. June and July were drier than normal. The overall growing season was on average warmer than the 92-year average. The minimum winter temperature was -25 degrees F on February 14 and 15. Crop outlook was initially very good with adequate fallow-stored soil moisture and generally favorable conditions. Winter cereal forage crops thrived with the combination of excess early moisture followed by above normal temperature in May and June. Overall winter cereal forage dry matter yields averaged 3.38 ton/ac.

FUTURE PLANS:

Although there is currently no funding available to support this research, Northern Agricultural Research Center, near Havre, Montana believes that this information is very important for local farmers and ranchers and will continue the winter cereal forage trial in 2008.

Table 1. Summary of climatic data by months for the 2006-2007 crop year (September to August) and averages for the period 1916-2007 at the Northern Agricultural Research Center, Havre, Montana.

Month Year	Sep 2006	Oct 2006	Nov 2006	Dec 2006	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007	Jun 2007	Jul 2007	Aug 2007	Crop Year
Precipitation (inches)													**Total**
Current Year	1.16	0.71	0.38	0.37	0.41	0.82	0.76	2.07	2.27	2.06	1.03	0.38	12.42
92-Year Average (1916 to 2006-07)	1.14	0.66	0.42	0.44	0.43	0.32	0.55	0.97	1.76	2.55	1.43	1.20	11.89
Mean Temperature (^{o}F)													**Average**
Current Year	57.7	44.8	28.8	25.9	22.6	17.8	40.1	42.0	55.8	63.7	76.8	69.1	45.4
92-Year Average (1916 to 2006-07)	56.1	45.9	30.0	19.7	15.3	20.0	30.0	43.6	54.1	61.9	69.2	67.3	42.7

Last killing frost in spring*

2007 _____ **April 22th**
Ave. 1916-2007 _____ **May 13th**

First killing frost in fall*

2007 _____ **September 15th**
Ave. 1916-2007 _____ **September 19th**

Frost free period

2007 _____ **145 days**
Ave. 1916-2007 _____ **129 days**

Growing degree days (base 50)

May 1-Oct 31, 2007 _____ **2517.0**
Ave. 1951-2007 _____ **2387.7**

Maximum summer temperature _____ **107 on July 24th**
Minimum winter temperature _____ **-25 on February 14th & 15th**

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

TABLE 2. WINTER CEREAL FORAGE - forage components. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2007. (Exp# 07-FR02-FR)

Species	CULTIVAR or SELECTION	2007 FORAGE DRY YIELD Lb/Ac	2006 FORAGE DRY YIELD Lb/Ac	2006-07 AVE FORAGE DRY YIELD Lb/Ac	2007 FORAGE DRY YIELD Ton/Ac	MOISTURE %	HEADING DATE Julian	HEADING DATE Calendar	PLANT HT inches
Triticale	BOREAL	5992.6			3.00	72.3	155.7	5-Jun	50.1
Winter Wheat	FWW 25	6879.4	3348.9	5114.2	3.44	60.8	161.0	10-Jun	42.0
Triticale	HT4104 655	6543.1			3.27	71.3	155.0	4-Jun	46.6
Triticale	HT4106 165	7293.9			3.65	69.3	153.7	3-Jun	54.1
Triticale	HT4106 362	6254.3			3.13	76.2	153.0	2-Jun	47.1
Triticale	HT516 288	6116.5			3.06	75.0	152.3	1-Jun	40.8
Triticale	KOLDTANA	8120.4	4027.9	6074.2	4.06	67.3	159.3	8-Jun	38.2
Triticale	KT940608P9029	7450.1			3.73	70.9	154.7	4-Jun	38.8
Triticale	KT940874 8002 36	6668.5	3960.2	5314.3	3.33	69.0	156.7	6-Jun	47.0
Triticale	KT941289	6275.8	3517.7	4896.8	3.14	74.7	152.3	1-Jun	44.0
Triticale	KT941864 5002	7564.3	3738.2	5651.2	3.78	76.5	153.3	2-Jun	40.1
Triticale	KW941531 6005	5054.7	3067.3	4061.0	2.53	71.8	154.0	3-Jun	36.6
Winter Wheat	SF08 48	5771.5			2.89	69.4	157.0	6-Jun	40.6
Triticale	TRICAL 102	7911.1	4265.2	6088.1	3.96	68.4	155.7	5-Jun	50.4
Winter Wheat	WILLOW CREEK	7189.5	4502.0	5845.8	3.59	60.8	163.7	13-Jun	42.5
Triticale	WINDRIFT	7169.1	3638.3	5403.7	3.58	70.0	154.7	4-Jun	46.9
EXPERIMENTAL MEANS		6765.9	3785.1	5383.3	3.38	70.2	155.8	5-Jun	44.12
LSD (0.05)		ns	-	-	-	2.07	1.46		4.72
C.V.: (S / MEAN)*100		18.37	-	-	-	1.76	0.56		6.41

TABLE 3. WINTER CEREAL FORAGE - forage quality. Winter Cereal Forage Yield and Quality of Publically Available Varieties. Northern Agricultural Research Center. Havre, Montana. 2007. (Exp# 07-FR02-FR)

Species	CULTIVAR or SELECTION	FORAGE DRY YIELD Lb/Ac	FORAGE DRY YIELD Ton/Ac	NITROGEN %	PROTEIN %	ACID DET FIBER %	NEUTRAL DET FIBER %	CRUDE FIBER %
Triticale	BOREAL	5992.6	3.00	3.57	22.31	37.19	58.32	32.51
Triticale	KOLDTANA	8120.4	4.06	3.69	23.07	34.22	57.31	29.43
Triticale	TRICAL 102	7911.1	3.96	2.80	17.49	34.42	55.39	30.03
Winter Wheat	WILLOW CREEK	7189.5	3.59	2.90	18.13	34.56	54.21	29.45
Triticale	WINDRIFT	7169.1	3.58	2.81	17.55	36.13	57.03	32.01
EXPERIMENTAL MEANS		7276.5	3.64	3.15	19.71	35.30	56.45	30.69
LSD (0.05)		-	-	-	-	-	-	-
C.V.: (S / MEAN)*100		-	-	-	-	-	-	-

TABLE 4. WINTER CEREAL FORAGE - seed components. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Ag Research Center. Havre, Montana. 2007. (Exp# 07-FR02-FR)

Species	CULTIVAR or SELECTION	SEED YIELD Lb/Ac	TEST WEIGHT Lb/Bu	SEED MOISTURE %	HEADING DATE Julian	HEADING DATE Calendar	PLANT HT inches	SAWFLY CUTTING %
Triticale	BOREAL	2476.0	49.8	6.3	155.7	5-Jun	54.1	13.3
Winter Wheat	FWW 25	1896.0	53.8	7.1	161.0	10-Jun	51.7	50.0
Triticale	HT4104 655	2819.2	51.1	6.6	155.0	4-Jun	54.2	10.0
Triticale	HT4106 165	2800.9	51.0	6.6	153.7	3-Jun	54.7	10.0
Triticale	HT4106 362	2591.9	50.8	6.4	153.0	2-Jun	52.8	8.3
Triticale	HT516 288	2768.7	52.8	6.5	152.3	1-Jun	47.6	18.3
Triticale	KOLDTANA	3492.1	48.7	6.1	159.3	8-Jun	39.5	8.3
Triticale	KT940608P9029	3615.6	52.9	6.6	154.7	4-Jun	42.3	8.3
Triticale	KT940874 8002 36	3023.2	52.1	6.8	156.7	6-Jun	52.9	16.7
Triticale	KT941289	3923.9	53.6	6.9	152.3	1-Jun	49.9	10.0
Triticale	KT941864 5002	3633.8	52.1	7.0	153.3	2-Jun	44.2	11.7
Triticale	KW941531 6005	3730.1	53.6	6.9	154.0	3-Jun	38.4	11.7
Winter Wheat	SF08 48	3301.5	58.9	7.5	157.0	6-Jun	42.1	36.7
Triticale	TRICAL 102	2704.0	47.6	6.0	155.7	5-Jun	51.8	46.7
Winter Wheat	WILLOW CREEK	2420.1	59.4	7.5	163.7	13-Jun	47.1	36.7
Triticale	WINDRIFT	2636.2	54.9	6.6	154.7	4-Jun	52.2	13.3
EXPERIMENTAL MEANS		2989.6	52.7	6.7	155.8	5-Jun	48.5	19.4
LSD (0.05)		467.16	1.02	0.27	1.46		4.37	15.97
C.V.: (S / MEAN)*100		9.55	1.16	2.44	0.56		5.41	49.44

Site Resource & Management Data: (Exp# 07-FR02-FR)							
Field	A-6-4	SaltHaz (MMHOS/cm) 6-24"	-	Dry Surf Soil (in.) @ Plnt'g	2.0
Quarter	NW	Soil Texture 0-6"	CL	2" Soil Temp (°F) @ Plnt'g	74
Section	33	Soil Texture 6-24"	CL	4" Soil Temp (°F) @ Plnt'g	65
Township	32N	Soil Texture 24-36"	CL	Fertilizer Formulation	none
Range	15E	Soil Texture 36-48"	CL	Fertilizer Placement	na
Latitude	N48 29.461'	Ca (ppm)	4546	Fert. Rate (lbs/ac) N	na
Longitude	W109 47.946'	Init Zn (ppm) 0-6"	0.4	Fert. Rate (lbs/ac) P2O5	na
Soil Series	Hillon CLm	Init Mn (ppm) 0-6"	3.96	Fert. Rate (lbs/ac) K2O	na
pH 0-6"	8.3	Init Mg (ppm) 0-6"	0	Herbicide App. Date	none
Org.Matter (%) 0-6"	1.5	Init Cu (ppm) 0-6"	1.49	Herbicide (not on cm,m,cn)	na
Init N (lbs/ac) 0-6"	23	Init Fe (ppm) 0-6"	9.8	Herbicide Rate (/ac)	na
Init N (lbs/ac) 6-24"	84	CEC 0-6"	27	Precip (in.) Plnt'g-Harvest	9.79
Init N (lbs/ac) 24-36"	144	Init PAW (in.) 0-6"	1.19	Precip (>.1) Plnt'g-Harvest	7.79
Init N (lbs/ac) 36-48"	72	Init PAW (in.) 6-24"	3.78	Harvest Date	7/11
Init N (lbs/ac) 0-48"	323	Init PAW (in.) 24-36"	1.93	Rooting Depth (in.)	28
Init P (ppm) Olsen 0-6"	15	Init PAW (in.) 36-48"	2.07	Post PAW (in.) 0-6"	0.48
Init K (ppm) 0-6"	298	Cropping System	NT-ChmFlw	Post PAW (in.) 6-24"	1.93
Init S (ppm) 0-24"	106	Planting Date	10/5	Post PAW (in.) 24-36"	1.58
Init Na (MEQ/100g) 0-6"	15	Planting Depth (in.)	0.125	Post PAW (in.) 36-48"	1.94
SaltHaz (MMHOS/cm) 0-6"	0.07	Moist Soil Depth @ Plnt'g	48+	Precip (>.1) Hvst-Post	0.42