ROJECT TITLE: Winter Cereal Forage Performance Evaluation under No-Till, Dryland, Chemical Fallow Conditions near Havre, Montana. (Exp. 08-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 2008 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 two winter triticales ('Koldtana', and 'Windrift').and three winter wheats ('Newturk', 'Willow Creek' and 'Yellowtone'). 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 row in all plots, equaling nine-feet 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. Trial management information is listed following Table 4.

RESULTS and SUMMARY:

The cereal forage cropping environment in 2008 at the Research Center was categorized as good to excellent with higher than normal precipitation. At Havre, 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 1). 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 October, were 2221, 93.1 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. The month of April was cool and dry and the months of May and June were cool and wet. Cooler than normal temperatures early in the spring growing season slightly delayed maturity of the winter cereal forage entries. Overall, the growing season was warmer than the 93-year average. The minimum winter temperature was –29 degrees F on January 29. Crop outlook was initially very good with adequate fallow-stored soil moisture and generally favorable conditions. Winter cereal forage crops thrived with the excess early spring moisture. Excess spring moisture coupled with delayed maturity resulted in phenomenal dryland winter cereal forage yields. Overall winter cereal forage dry matter yields averaged 4.33 ton/ac, up nearly 1.0 ton from 2007.

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 2009.

Table 1. 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 2. WINTER CEREAL FORAGE - forage components. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2008. (Exp# 08-FR02-FR)

Species	CULTIVAR or SELECTION	2008 FORAGE DRY YIELD Ton/Ac	2008 FORAGE DRY YIELD Lb/Ac	2007 FORAGE DRY YIELD Lb/Ac	2006 FORAGE DRY YIELD Lb/Ac	2006-08 AVE FORAGE DRY YIELD Lb/Ac	MOISTURE %	HEADING DATE Julian	HEADING DATE Calendar	PLANT HT inches	Sawfly % Cut
Triticale	HT4106-165	4.12	8244	7294			77.4	168.7	17-Jun	49.69	10.0
Triticale	HT4106-362	4.55	9105	6254			75.4	168.3	16-Jun	49.17	5.0
Triticale	HT4114	3.78	7558				79.3	167.7	16-Jun	48.18	6.7
Triticale	K99SRT119-528	3.33	6665				76.0	165.0	13-Jun	36.39	8.3
Triticale	KOLDTANA	5.18*	10360*	8120	4028	7503	73.4	174.0	22-Jun	36.55	18.3
Triticale	KT940608P9029	3.46	6913	7450			78.1	168.7	17-Jun	38.79	18.3
Triticale	KT940874-8002-36	3.84	7685	6668	3960	6105	75.0	170.7	19-Jun	51.31	8.3
Triticale	KT941864-5002	4.19	8378	7564	3738	6560	77.0	166.0	14-Jun	40.89	21.7
Triticale	KW941531-6005	4.11	8230	5055	3067	5451	76.8	168.0	16-Jun	43.36	18.3
Winter Wheat	NEWTURK	4.11	8228				75.5	170.7	19-Jun	44.93	5.0
Winter Wheat	SF08-48	5.29*	10582*	5772			72.5	172.0	20-Jun	45.93	10.0
Triticale	TRICAL 102	5.08*	10154*	7911	4265	7443	73.7	169.0	17-Jun	48.37	10.0
Triticale	W07-Bz-69W20-112	3.32	6646				79.9	165.0	13-Jun	39.44	25.0
Winter Wheat	WILLOW CREEK	5.83**	11661**	7190	4502	7784	71.1	178.7	27-Jun	44.33	6.7
Triticale	WINDRIFT	4.30	8597	7169	3638	6468	76.8	169.3	17-Jun	48.20	8.3
Winter Wheat	YELLOWSTONE	4.77	9531				71.6	173.3	21-Jun	33.64	11.7
EXPERIMENTAL MEANS		4.33	8658.6	6949.8	3885.6	6759.1	75.6	169.7	18-Jun	43.70	11.98
LSD (0.05)		0.89	1788.2	-	-	-	2.83	1.96	-	5.23	ns
C.V.: (S / MEAN)*100		12.39	12.39	-	-	-	2.24	0.69	-	7.18	91.33

** 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.

ns denotes no significant difference between cultivars within a column at the 0.05 probability level.

TABLE 3. WINTER CEREAL FORAGE - forage quality. Winter Cereal Forage Yield and Quality of Publically Available Varieties. Northern Agricultural Research Center. Havre, Montana. 2008. (Exp# 08-FR02-FR)

Species	CULTIVAR or SELECTION	FORAGE DRY YIELD Ton/Ac	FORAGE DRY YIELD Lb/Ac	NITROGEN %	PROTEIN %	ACID DET FIBER %	NEUTRAL DET FIBER %	CRUDE FIBER %
Triticale	KOLDTANA	5.18*	10360*					
Winter Wheat	NEWTURK	4.11	8228					
Winter Wheat	WILLOW CREEK	5.83**	11661**			DATA PENDING		
Triticale	WINDRIFT	4.30	8597					
Winter Wheat	YELLOWSTONE	4.77*	9531*					
EXPERIMENTAL MEANS		4.83	9675.5					
LSD (0.05)		1.12	2244.8					
C.V.: (S / MEAN)*100		12.32	12.32					

** 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.

Table 4. Winter Cereal Forage Site Resource & Management Data: (Exp# 08-FR02)							
Field	A-5-3		SaltHaz(MMHOS/cm) 6-24	-		Dry Surf Soil (in.) @ Plnt'g	0.25
Quarter	NE		S (ppm) 0-24	56		2" Soil Temp (^{o}F) @ Plnt'g	56
Section	35		Zn (ppm) 0-6	0.71		4" Soil Temp (^{o}F) @ Plnt'g	52
Township	32N		Fe (ppm) 0-6	23.30		Fertilizer Formulation	Gran.Blend
Range	15E		Mn (ppm) 0-6	9.64		Fertilizer Placement	Bnd at Plntg
Latitude	N48 29.575'		Cu (ppm) 0-6	1.12		Fert. Rate (lbs/ac) N	50
Longitude	W109 47.912'		CEC 0-6	12.1		Fert. Rate (lbs/ac) P2O5	28
Soil Series	Joplin CLm		Soil Texture 0-6	CL		Fert. Rate (lbs/ac) K2O	18
pH 0-6	6.50		Soil Texture 6-24	CL		Herbicide App. Date	5/19
Org.Matter (%) 0-6	1.10		Soil Texture 24-36	CL		Herbicide Product	Bronate Adv
N (lbs/ac) 0-6	22		Soil Texture 36-48	CL		Herbicide Rate (/ac)	20 oz
N (lbs/ac) 6-24	18		Init PAW (in.) 0-6"	0.95		Precip (in.) Plnt'g-Harvest	8.90
N (lbs/ac) 24-36	50		Init PAW (in.) 6-24"	3.65		Precip (>.1) Plnt'g-Harvest	7.55
N (lbs/ac) 36-48	74		Init PAW (in.) 24-36"	2.63		Harvest Date	6/26
N (lbs/ac) 0-48	164		Init PAW (in.) 36-48"	2.20		Rooting Depth (in.)	n/a
P (ppm) Olsen 0-6	28		Init PAW (in.) 0-48"	9.43		Post PAW (in.) 0-6"	0.61
K (ppm) 0-6	303		Cropping System	NT-ChmFlw		Post PAW (in.) 6-24"	3.28
Ca (ppm)	1358		Previous Crop	SW		Post PAW (in.) 24-36"	1.92
Mg (ppm) 0-6	539		Planting Date	10/1		Post PAW (in.) 36-48"	1.89
Na (ppm) 0-6	19		Planting Depth (in.)	1.5		Post PAW (in.) 0-48"	7.69
SaltHaz (MMHOS/cm) 0-6	0.25		Moist Soil Depth @ Plnt'g	48+		Precip (>.1) Hvst-Post	0.00