

PROJECT TITLE: Annual Forage Performance Evaluations near Havre, Montana.
Winter Cereal Forage (Exp. 11-FR02)
Spring Cereal Forage (Exp. 11-FR03)
Pea Forage (Exp. 11-FR05)

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OBJECTIVES:

To provide annual 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 and pea forage entries submitted for testing by participating commercial and university entities. This information should help forage producers in north central Montana select varieties best suited to this region of the state.

METHODS:

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 3). The four publically available varieties in the trial included one winter triticale, 'Trical 102', and three winter wheats, 'Elduraldo', 'Newturk', and 'Willow Creek'.

There were seventeen spring cereal forage experimental lines and named varieties tested under no-till, dryland, chemical fallow conditions near Havre, MT (Table 6). The six named varieties in the trial included 'Haxby', 'Haybet', 'Hays', 'Hockett', 'Lavina' and 'Cowboy'. Lavina is the newest hay barley approved for release by Montana State University in 2009.

Both cereal forage trials were seeded as randomized complete-block designs, 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. One entire row (18 feet) was hand clipped from each plot for determination of forage dry matter. Following dry matter determination, samples from selected entries were ground and submitted for quality analyses. Results of these quality analyses are still pending. Trial management information is listed for the winter and spring cereal forage trials in Tables 5 and 8, respectively. Seed component data for the winter cereal forage is summarized in Table 4 and spring cereal forage in Table 7. Seed component data is not collected every year on the spring cereal forage due to wildlife depredation, where no heads are left to harvest.

There were six pea varieties tested for forage production under no-till, dryland, recrop conditions near Havre, MT (Table 9). The publically available entries in the trial included '4010', 'Arvika', 'Delta', 'Majorette', 'Tucker' and 'Granger'.

The pea forage trial was seeded as a randomized complete-block design, in replicated, 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 9 seeds per square foot. Seeding depth was 1 ½ inches. Flowering date was recorded as the date when 50 percent of the plants within a plot had one open blossom. Harvest timing for pea forage is typically after the first pod has formed, but not filled. Due to harvest constraints, all plots in this trial were cut the same day. The entire 72 square foot plot was harvested and weighed using an Almaco Forage Harvester. Subsamples were taken from the total plot production for determination of dry matter. Once dry matter was determined samples were ground and submitted for quality analyses (results pending).

RESULTS and SUMMARY:

The cereal forage cropping environment in 2011 at the Research Center was categorized as above average with higher than normal precipitation and lower than normal temperatures. At Havre, total annual growing season precipitation (9/1/10 through 8/31/11) was 15.45 inches, 29 percent more than the average for all years since 1916

(Table 2). April 1 through July 31 precipitation was 8.75 inches or 129 percent of the 96 year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through October, were 2338, 98 percent of the average for the last 60 years (1951-2011). The last spring frost and first fall frost fell on the 96 year averages of May 14 and September 20, resulting in 129 frost-free days. September 2010 through March 2011 precipitation was 156 percent of the long-term average. The April through June growing season saw an average daily temperature at 50.6 degrees F, 2.5 degrees below normal. July and August average temperatures were 1.3 percent higher than normal with the high for 2011 recorded on July 19 at 101 degrees F. There were 32 days 90 degrees F or above, and only 1 day with temperatures 100 degrees F or above. Overall, the growing season was cooler than the 96-year average. The minimum winter temperature was -37 degrees F on February 1 and February 2. Crop outlook was very good with adequate fallow-stored soil moisture and generally favorable growing conditions, however with the weather wetter and cooler than normal, disease pressure including stripe rust, tan spot and powdery mildew was significant in some areas.

Potential nitrate accumulation in cereal forage is a real concern when determining appropriate harvest timing and whether or not the forage can be utilized safely for specific classes of livestock. The effect of nitrate concentration on livestock is reported in Table 1.

Winter Cereal Forage: The winter cereal forage entries performed well with the excess spring moisture and below average temperatures. Overall, winter cereal forage dry matter yields averaged 3.40 ton/ac. Eight of the 16 entries yielded forage dry matter equal to 'F289' winter wheat, the highest yielding entry at 4.18 tons per acre (Table 3).

Seed production across all winter wheat and triticale entries averaged just over 61 bu/ac. Experimental triticale '12 10Advwcf12' produced the highest seed yield at 74 bu/ac. Seed component data including stand percent, heading date, plant height, yield, moisture, test weight, protein and sawfly cutting are reported in Table 4.

Spring Cereal Forage: Spring cereal forage dry matter yields averaged 2.1 ton/ac. 'Hays', 'Hockett', 'Lavina' and 'Cowboy' barley were standouts along with seven Montana experimental lines, all yielding over 2 ton/ac. Forage yield, moisture, heading data and plant height data are summarized in Table 6.

Seed production of the spring cereal forage entries ranged from 19 to nearly 70 bu/ac. No entry produced as much seed as the experimental entry 'MT 103022'. Heading date, plant height, seed yield, moisture, test weight and protein are presented in Table 7.

Pea Forage: Pea forage dry matter yields in 2011 averaged 0.74 ton/ac. Dry matter production of 'Arvika', a forage type pea, along with the two seed type spring pea varieties, Delta and Majorette, significantly out yielded the other three entries. Forage yield, forage moisture, flowering date, canopy height and vine length data are presented in Table 9.

FUTURE PLANS:

Although there is currently limited 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 2012.

TABLE 1. Effect of nitrate concentration on livestock.

(Note: These guidelines for Montana are more conservative than those published from other states.)

Reported on 100% dry matter basis* as:		
NO₃-N (ppm)	NO₃ (ppm)	Comment
< 350	< 1500	Generally safe for all conditions and livestock.
350-1130	1500-5000	Generally safe for nonpregnant livestock. Potential early-term abortions or reduced breeding performance. Limit use to bred animals to 50% of the total ration.
1130-2260	5000-10,000	Limit feed to 25-50% of ration for nonpregnant livestock. DO NOT FEED TO PREGNANT ANIMALS - may cause abortions, weak calves and reduced milk production.
> 2260	> 10,000	DO NOT FEED. Acute symptoms and death.

*If nitrate content of a feed is reported on an "as is" basis, convert to 100% dry matter basis to compare it to levels in this table. For example, silage at 50% moisture that contains 600 ppm NO₃-N on an "as is" basis contains 1200 ppm on 100% dry basis; thus, it fits the second group in this table.

Information adapted from MontGuide MT 200205 AG, "Nitrate Toxicity of Montana Forages", by Dennis Cash, Rick Funston, Marc King and Dave Wichman.

Table 2. Summary of climatic data by months for the 2010-2011 crop year (September to August) and averages for the period 1916-2011 at the Northern Agricultural Research Center. Havre, Montana.

Month	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Crop Year
Year	2010	2010	2010	2010	2011	2011	2011	2011	2011	2011	2011	2011	
<u>Precipitation (inches)</u>													<u>Total</u>
Current Year	2.19	0.27	1.45	0.72	0.88	0.12	0.60	0.68	3.57	2.79	1.71	0.47	15.45
96-Year Average (1916 to 2010-11)	1.15	0.65	0.44	0.45	0.44	0.32	0.54	0.99	1.80	2.56	1.43	1.19	11.96
<u>Mean Temperature (°F)</u>													<u>Average</u>
Current Year	55.6	49.0	26.6	11.3	14.1	12.6	23.7	41.6	51.1	59.3	68.9	70.2	40.3
96-Year Average (1916 to 2010-11)	56.2	45.7	30.1	19.4	15.4	19.8	29.9	43.6	54.0	61.8	69.2	67.3	42.7

Last killing frost in spring*

2011 _____ May 14th (31°)
Ave. 1916-2011 _____ May 14th

First killing frost in fall*

2011 _____ September 20th (32°)
Ave. 1916-2011 _____ September 20th

Frost free period

2011 _____ 129 days
Ave. 1916-2011 _____ 129 days

Growing degree days (base 50)

May 1-Oct 31, 2011 _____ 2338.5
Ave. 1951-2011 _____ 2374.5

Maximum summer temperature _____ 101° July 19th

Minimum winter temperature _____ -37° February 1st and February 2nd

*In this summary 32° is considered a killing frost.

TABLE 3. WINTER CEREAL FORAGE - forage components. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2011. (Exp# 11-FR02-FR)

Species	CULTIVAR or SELECTION	2011	2011	FORAGE MOISTURE %	HEADING DATE		PLANT HT inches	SAWFLY % Cut	PROTEIN %	ACID	NEUTRAL	CRUDE	NITRATES
		FORAGE DRY YIELD Lb/Ac	FORAGE DRY YIELD Ton/Ac		DET FIBER %	DET FIBER %				FIBER %	NO3 ppm		
Triticale	106 WCF 57	7072.0	3.54*	67.8	175.0	24-Jun	55.9	10.0					PENDING
Triticale	108 WCF 28	7525.8	3.76*	70.3	171.7	21-Jun	54.4	11.7					
Triticale	111 WCF 57	7459.9	3.73*	68.8	173.7	23-Jun	49.7	11.7					
Triticale	12 10Advwcf12	6293.9	3.15	70.7	174.3	23-Jun	57.3	10.0					
Triticale	120 WCF 57	6027.1	3.01	69.2	171.7	21-Jun	57.3	10.0					
Triticale	19 WCFBz2207	6679.3	3.34	73.3	173.0	22-Jun	44.8	8.3					
Triticale	20 10AdvWCF20	5920.2	2.96	68.1	173.3	22-Jun	53.4	11.7					
Triticale	43 WCFBz2207	5534.5	2.77	68.4	174.3	23-Jun	42.6	8.3					
Triticale	9 10AdvWcf 9	7584.0	3.79*	71.7	171.7	21-Jun	58.0	11.7					
Triticale	Trical 102	7874.8	3.94*	69.0	174.0	23-Jun	50.3	13.3					
Triticale	WCFKP61	6717.8	3.36	73.9	174.3	23-Jun	49.1	8.3					
Winter Wheat	08TRS398	7390.5	3.70*	67.4	176.3	25-Jun	38.6	11.7					
Winter Wheat	Elduraldo	5186.6	2.59	70.8	174.0	23-Jun	36.5	20.0					
Winter Wheat	F289	8358.8	4.18**	67.8	178.7	28-Jun	36.6	10.0					
Winter Wheat	Newturk	5659.0	2.83	68.1	174.0	23-Jun	42.2	36.7					
Winter Wheat	Willow Creek	7393.8	3.70*	54.6	182.0	1-Jul	44.9	40.0					
EXPERIMENTAL MEANS		6792.4	3.4	68.7	174.5	23-Jun	48.2	14.6					
LSD (0.05)		1472.6	0.7	4.5	2.6	-	6.5	6.3					
C.V.: (S / MEAN)*100		13.0	13.0	4.0	0.9	-	8.1	26.1					
P-VALUE (Entries)		0.0023	0.0023	<0.0001	<0.0001	-	<0.0001	<0.0001					

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

** 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.

Sawfly rating is reported as percentage of cut stems.

TABLE 4. WINTER CEREAL FORAGE - seed components. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2011. (Exp# 11-FR02-FR)

Species	CULTIVAR or SELECTION	STAND %	HEADING DATE		PLNT HT Inches	1/ SEED YIELD		MOISTURE %	TEST WT Lbs/Bu	2/ PROTEIN	3/ SAWFLY
			Julian	Calendar		Lb/Ac	Bu/Ac			%	%
Triticale	106 WCF 57	91.5	175.0	24-Jun	55.9	3056.8*	61.1	9.7	54.5	PENDING	10.0
Triticale	108 WCF 28	87.5	171.7	21-Jun	54.4	2652.0	53.0	9.3	54.5		11.7
Triticale	111 WCF 57	83.7	173.7	23-Jun	49.7	2568.2	51.4	9.4	52.2		11.7
Triticale	12 10Advwcf12	91.5	174.3	23-Jun	57.3	3699.0**	74.0	9.9	54.6		10.0
Triticale	120 WCF 57	93.3	171.7	21-Jun	57.3	3512.2*	70.2	9.6	52.9		10.0
Triticale	19 WCFBz2207	79.2	173.0	22-Jun	44.8	2493.9	49.9	9.2	51.0		8.3
Triticale	20 10AdvWCF20	95.8	173.3	22-Jun	53.4	2993.6	59.9	9.2	51.3		11.7
Triticale	43 WCFBz2207	85.2	174.3	23-Jun	42.6	3085.4*	61.7	9.2	48.8		8.3
Triticale	9 10AdvWcf9	89.8	171.7	21-Jun	58.0	2855.6	57.1	9.9	53.9		11.7
Triticale	Trical 102	72.4	174.0	23-Jun	50.3	1592.2	31.8	8.9	49.3		13.3
Triticale	WCFKP61	82.0	174.3	23-Jun	49.1	2335.2	46.7	9.0	53.3		8.3
Winter Wheat	08TRS398	86.6	176.3	25-Jun	38.6	2911.6	48.5	8.9	62.1		11.7
Winter Wheat	Elduraldo	92.6	174.0	23-Jun	36.5	3080.6*	51.3	8.7	61.8		20.0
Winter Wheat	F289	87.5	178.7	28-Jun	36.6	2792.2	46.5	8.3	57.5		10.0
Winter Wheat	Newturk	90.8	174.0	23-Jun	42.2	2877.3	48.0	8.9	61.7		36.7
Winter Wheat	Willow Creek	92.9	182.0	1-Jul	44.9	2508.9	41.8	8.6	61.5		40.0
EXPERIMENTAL MEANS		87.6	174.5	23-Jun	48.2	2813.4	-	9.2	55.1		14.6
LSD (0.05)		12.3	2.6	-	6.5	667.8	-	0.2	0.6		6.3
C.V.: (S / MEAN)*100		8.4	0.9	-	8.1	14.2	-	1.2	0.6		26.1
P-VALUE (Entries)		0.0472	<0.0001	-	<0.0001	0.0003	-	<0.0001	<0.0001		<0.0001

1/ Volumetric yields are based on plot weights adjusted to uniform 12 percent grain moisture and 60 lbs/bu as the standard test weight for winter wheat & 50 lbs/bu as the standard test weight for triticale.

2/ Protein values are adjusted to 12 percent grain moisture.

3/ Sawfly rating is reported as the percentage of cut stems.

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

** 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 5. Winter Cereal Forage Site Resource & Management Data: (Exp# 11-FR02)

Field	B-1-3	SaltHaz(MMHOS/cm) 6-24	0.43	Dry Surf Soil (in.) @ Plnt'g	0.25
Quarter	NE	S (ppm) 0-24	27	2" Soil Temp (°F) @ Plnt'g	70
Section	32	Zn (ppm) 0-6	0.8	4" Soil Temp (°F) @ Plnt'g	67
Tow nship	32N	Fe (ppm) 0-6	8.0	Fertilizer Formulation	Gran.Blend
Range	15E	Mn (ppm) 0-6	5.9	Fertilizer Placement	Bnd at Plntg
Latitude	N48 29.571'	Cu (ppm) 0-6	1.2	Fert. Rate (lbs/ac) N	50
Longitude	W109 47.025'	CEC 0-6	21.1	Fert. Rate (lbs/ac) P2O5	28
Soil Series	Joplin Clay Loam	Soil Texture 0-6		Fert. Rate (lbs/ac) K2O	18
pH 0-6	7.9	Soil Texture 6-24		Herbicide App. Date	5/17
Org.Matter (%) 0-6	1.5	Soil Texture 24-36		Herbicide Product	Brox- M
N (lbs/ac) 0-6	13	Soil Texture 36-48		Herbicide Rate (/ac)	24 oz
N (lbs/ac) 6-24	5	Init PAW (in.) 0-6"	1.23	Precip (in.) Plnt'g-Harvest	9.03
N (lbs/ac) 24-36	21	Init PAW (in.) 6-24"	4.31	Precip (>.1) Plnt'g-Harvest	8.19
N (lbs/ac) 36-48	77	Init PAW (in.) 24-36"	2.47	Harvest Date Seed	8/14
N (lbs/ac) 0-48	115	Init PAW (in.) 36-48"	2.16	Rooting Depth (in.)	
P (ppm) Olsen 0-6	21	Init PAW (in.) 0-48"	10.17	Post PAW (in.) 0-6"	
K (ppm) 0-6	360	Cropping System	NT-ChmFlw	Post PAW (in.) 6-24"	
Ca (ppm)	3214	Previous Crop	Fdn Spr Bar	Post PAW (in.) 24-36"	
Mg (ppm) 0-6	485	Planting Date	10/7	Post PAW (in.) 36-48"	
Na (ppm) 0-6	20	Planting Depth (in.)	1.25	Post PAW (in.) 0-48"	
SaltHaz (MMHOS/cm) 0-6	0.58	Moist Soil Depth @ Plnt'g	48+	Precip (>.1) Hvst-Post	

TABLE 6. SPRING CEREAL FORAGE - forage components. Spring Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2011. (Exp# 11-FR03-FR)

Species	CULTIVAR or SELECTION	2011		FORAGE		HEADING DATE		PLANT HT inches	PROTEIN %	ACID DET FIBER %	NEUTRAL DET FIBER %	CRUDE FIBER %	NITRATES NO3 ppm
		FORAGE DRY YIELD		MOISTURE %	MOISTURE								
		Lb/Ac	Ton/Ac		Julian	Calendar							
Barley	Cowboy	4712.2*	2.36	67.4	189.7	Jul 9	28.22						PENDING
Barley	Haxby	3067.3	1.53	63.7	193.3	Jul 12	25.21						
Barley	Haybet	3755.8	1.88	62.9	195.0	Jul 14	23.67						
Barley	Hays	4698.7*	2.35	60.0	197.3	Jul 16	22.30						
Barley	Hockett	4262.0*	2.13	62.2	192.0	Jul 11	22.93						
Barley	Lavina	4288.7*	2.14	64.1	195.3	Jul 14	24.02						
Barley	MT 103022	4125.1	2.06	57.5	196.3	Jul 15	21.02						
Barley	MT 103030	3147.7	1.57	65.6	194.3	Jul 13	18.83						
Barley	MT 103034	3235.3	1.62	67.6	194.0	Jul 13	20.67						
Barley	MT 103037	4165.6*	2.08	66.5	194.7	Jul 14	18.56						
Barley	MT 103038	4167.9*	2.08	61.9	193.3	Jul 12	23.79						
Barley	MT 103039	4605.2*	2.30	62.0	197.3	Jul 16	19.41						
Barley	MT 103045	4374.3*	2.19	58.0	198.3	Jul 17	24.20						
Barley	MT 103081	4573.8*	2.29	62.2	196.0	Jul 15	26.31						
Barley	MT 103083	5019.7**	2.51	59.3	197.7	Jul 17	20.13						
Barley	MT 103085	4545.9*	2.27	64.9	195.3	Jul 14	26.17						
Barley	Unknown	3911.7	1.96	67.1	194.0	Jul 13	22.15						
EXPERIMENTAL MEANS		4156.4	2.1	63.1	194.9	Jul 14	22.8						
LSD (0.05)		864.2	0.4321 ▯	2.9	2.4	-	3.0						
C.V.: (S / MEAN)*100		12.5	12.5	2.8	0.7	-	7.8						
P-VALUE (Entries)		0.0009	0.0009	<0.0001	<0.0001	-	<0.0001						

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

** 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 7. SPRING CEREAL FORAGE - seed components. Spring Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2011. (Exp# 11-FR03-FR)

Species	CULTIVAR or SELECTION	STAND %	HEADING DATE		PLNT HT Inches	1/ YIELD	MOISTURE %	TEST WT Lbs/Bu	2/ PROTEIN
			Julian	Calendar		Bu/Ac			%
Barley	Cowboy	88.0	189.7	Jul 9	28.2	58.1	10.1	53.2	14.0
Barley	Haxby	78.6	193.3	Jul 12	25.2	32.6	9.7	53.8	14.0
Barley	Haybet	84.9	195.0	Jul 14	23.7	15.5	9.8	50.1	13.5
Barley	Hays	87.5	197.3	Jul 16	22.3	22.4	10.0	52.0	14.4
Barley	Hockett	90.1	192.0	Jul 11	25.4	55.7	10.3	54.1	12.5
Barley	Lavina	90.1	195.3	Jul 14	24.0	19.5	10.5	50.7	13.7
Barley	MT 103022	82.8	196.3	Jul 15	21.0	69.6**	10.2	52.2	13.9
Barley	MT 103030	78.6	194.3	Jul 13	18.8	21.1	10.7	57.5	17.1
Barley	MT 103034	93.2	194.0	Jul 13	20.7	25.7	9.4	49.8	16.9
Barley	MT 103037	85.9	194.7	Jul 14	18.6	18.5	9.4	48.8	18.9
Barley	MT 103038	89.1	193.3	Jul 12	23.8	36.3	9.6	50.2	17.2
Barley	MT 103039	89.6	197.3	Jul 16	19.4	17.3	9.9	47.1	16.3
Barley	MT 103045	94.3	198.3	Jul 17	24.2	47.8	9.7	49.0	14.3
Barley	MT 103081	56.3	196.0	Jul 15	26.3	23.4	9.3	60.3	17.0
Barley	MT 103083	84.9	197.7	Jul 17	20.1	22.6	10.1	50.2	17.0
Barley	MT 103085	89.1	195.3	Jul 14	26.2	19.3	10.0	47.2	18.0
Barley	Unknown	93.2	194.0	Jul 13	22.2	19.7	10.0	51.7	13.3
EXPERIMENTAL MEANS		85.7	194.9	Jul 14	22.8	30.9	9.9	51.7	15.4
LSD (0.05)		8.9	2.4	-	3.0	7.0	ns	0.9	-
C.V.: (S / MEAN)*100		6.2	0.7	-	7.8	13.6	5.3	1.15	-
P-VALUE (Entries)		<0.0001	<0.0001	-	<0.0001	<0.0001	0.1161	<0.0001	-

1/ Volumetric yields are based on plot weights adjusted to uniform 12 percent grain moisture and 60 lbs/bu as the standard test weight for durum.

2/ Protein values are adjusted to 12 percent grain moisture.

** 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 8. Spring Cereal Forage Site Resource & Management Data: (Exp# 11-FR03)

Field	A-6-3	SaltHaz(MMHOS/cm) 6-24	0.45	Dry Surf Soil (in.) @ Plnt'g	0.25
Quarter	NW	S (ppm) 0-24	26	2" Soil Temp (°F) @ Plnt'g	54
Section	33	Zn (ppm) 0-6	0.8	4" Soil Temp (°F) @ Plnt'g	50
Tow nship	32N	Fe (ppm) 0-6	19.1	Fertilizer Formulation	Gran.Blend
Range	15E	Mn (ppm) 0-6	8.8	Fertilizer Placement	Bnd at Plntg
Latitude	N48 29.571'	Cu (ppm) 0-6	1.1	Fert. Rate (lbs/ac) N	50
Longitude	W109 47.025'	CEC 0-6	16.6	Fert. Rate (lbs/ac) P2O5	28
Soil Series	Telstad CL	Soil Texture 0-6		Fert. Rate (lbs/ac) K2O	18
pH 0-6	7.1	Soil Texture 6-24		Herbicide App. Date	6/13
Org.Matter (%) 0-6	1.4	Soil Texture 24-36		Herbicide Product	Brox- M
N (lbs/ac) 0-6	36	Soil Texture 36-48		Herbicide Rate (/ac)	24 oz
N (lbs/ac) 6-24	48	Init PAW (in.) 0-6"	0.92	Precip (in.) Plnt'g-Seed Harvest	8.35
N (lbs/ac) 24-36	52	Init PAW (in.) 6-24"	3.75	Precip (>.1) Plnt'g-Seed Harvest	7.83
N (lbs/ac) 36-48		Init PAW (in.) 24-36"	2.22	Seed Harvest Date	8/14
N (lbs/ac) 0-48	136	Init PAW (in.) 36-48"		Rooting Depth (in.)	n/a
P (ppm) Olsen 0-6	62	Init PAW (in.) 0-48"	6.89	Post PAW (in.) 0-6"	n/a
K (ppm) 0-6	353	Cropping System	NT-ChmFlw	Post PAW (in.) 6-24"	n/a
Ca (ppm)	2114	Previous Crop	WW	Post PAW (in.) 24-36"	n/a
Mg (ppm) 0-6	598	Planting Date	4/30	Post PAW (in.) 36-48"	n/a
Na (ppm) 0-6	23	Planting Depth (in.)	1.5	Post PAW (in.) 0-48"	n/a
SaltHaz (MMHOS/cm) 0-6	0.68	Moist Soil Depth @ Plnt'g	48+	Precip (>.1) Hvst-Post	n/a

TABLE 9. Montana Pea Forage Evaluation Nursery Grown On-Station Under No-Till Dryland Recrop Conditions at Northern Agricultural Research Center. Havre, Montana. 2011. (Exp# 11-FR05-FR)

SPECIES	CULTIVAR or SELECTION	2011 FORAGE DRY YIELD		FORAGE MOISTURE %	FLOWERING DATE		CANOPY HEIGHT in	VINE LENGTH in	NODES w/ PODS no.	PROTEIN %	ACID DET FIBER %	NEUTRAL DET FIBER %	CRUDE FIBER %
		Lb/Ac	Ton/Ac		Julian	Calendar							
Spring Pea	4010	1415.3	0.71	74.3	182.3	Jul 1	20.4	26.4	5.3		PENDING		
Spring Pea	Arvika	1581.7*	0.79	73.0	182.3	Jul 1	21.0	27.2	5.0				
Spring Pea	Delta	1678.6**	0.84	73.9	176.0	Jun 25	14.8	16.5	7.1				
Spring Pea	Majorette	1574.0*	0.79	73.6	178.3	Jun 27	14.7	19.0	5.4				
Spring Pea	Tucker	1297.7	0.65	75.3	180.0	Jun 29	18.9	19.7	9.2				
Winter Pea	Granger	1330.9	0.67	74.1	182.3	Jul 1	18.5	26.3	7.4				
EXPERIMENTAL MEANS		1479.7	0.74	74.0	180.2	Jun 29	18.0	22.5	6.6				
LSD (0.05)		214.5	0.1	ns	1.0	-	2.5	2.7	2.7				
C.V.: (S / MEAN)*100		8.0	8.0	1.3	0.3	-	7.6	6.5	22.6				
P-VALUE (Entries)		0.0139	0.0139	0.1573	<0.0001	-	0.0006	<0.0001	0.0398				

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

** 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 10. Site Resource & Management Data: (Exp# 11-FR05-FR)

Field	An-3-5	SaltHaz(MMHOS/cm) 6-24	0.51	Dry Surf Soil (in.) @ Plnt'g	0.5
Quarter	NW	S (ppm) 0-24	20	2" Soil Temp (°F) @ Plnt'g	54
Section	33	Zn (ppm) 0-6	0.4	4" Soil Temp (°F) @ Plnt'g	46
Tow nship	32N	Fe (ppm) 0-6	7.7	Fertilizer Formulation	none
Range	15E	Mn (ppm) 0-6	3.6	Fertilizer Placement	n/a
Latitude	N48 29.435'	Cu (ppm) 0-6	1.0	Fert. Rate (lbs/ac) N	0
Longitude	W109 47.835'	CEC 0-6	32.3	Fert. Rate (lbs/ac) P2O5	0
Soil Series	Kevin CL	Soil Texture 0-6		Fert. Rate (lbs/ac) K2O	0
pH 0-6	8.1	Soil Texture 6-24		Herbicide App. Date	none
Org.Matter (%) 0-6	1.7	Soil Texture 24-36		Herbicide Product	n/a
N (lbs/ac) 0-6	17	Soil Texture 36-48		Herbicide Rate (/ac)	n/a
N (lbs/ac) 6-24	36	Init PAW (in.) 0-6"	1.02	Precip (in.) Plnt'g-Harvest	6.38
N (lbs/ac) 24-36	56	Init PAW (in.) 6-24"	3.29	Precip (>.1) Plnt'g-Harvest	5.9
N (lbs/ac) 36-48		Init PAW (in.) 24-36"	1.99	Harvest Date	7/7
N (lbs/ac) 0-48	109	Init PAW (in.) 36-48"		Rooting Depth (in.)	n/a
P (ppm) Olsen 0-6	14	Init PAW (in.) 0-48"	6.30	Post PAW (in.) 0-6"	n/a
K (ppm) 0-6	299	Cropping System	NT-Recrop	Post PAW (in.) 6-24"	n/a
Ca (ppm)	5531	Previous Crop	Oilseed	Post PAW (in.) 24-36"	n/a
Mg (ppm) 0-6	458	Planting Date	4/23	Post PAW (in.) 36-48"	n/a
Na (ppm) 0-6	22	Planting Depth (in.)	1.5	Post PAW (in.) 0-48"	n/a
SaltHaz (MMHOS/cm) 0-6	0.43	Moist Soil Depth @ Plnt'g	48+	Precip (>.1) Hvst-Post	n/a