PROJECT TITLE: Evaluation of dry field pea for forage production in Montana (Uniform Dry Pea Forage Trial).

EXPERIMENT NO: #87

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OBJECTIVES:
To evaluate Austrian winter pea variety forage yield performance in pure stands and with a companion cereal forage (Haybet hay barley) under different cropping and environmental conditions in Montana.

METHODS:
The 2002 **Uniform Dry Pea Forage Trial (UPFT)** was established at two dryland sites (Moccasin and Bozeman) and two irrigated sites (Huntley and Corvallis) and included four Austrian winter pea varieties and Trapper small yellow pea, in pure stands and mixed with Haybet hay-barley (**Table 24**). Successful seeding of the trial occurred during the third week of April and first of May and harvest dates varied by location, but were conducted at optimal forage production and quality (**Table 25**).

RESULTS: Due to management concerns, the Bozeman dryland site was abandoned.
Forage Yields: Haybet hay-barley (pure stand) was the top dry matter forage producer at Moccasin and at two of the three irrigated sites and had the highest irrigation average, averaging 9,397 pounds dry matter per acre (4.7 tons/acre; **Table 26**). Haybet was observed to have significantly higher yields at Corvallis and Huntley only. At Moccasin dryland and Creston irrigated sites, as well as for the irrigated average yield, most of the dry pea/hay barley mixes produced similar yields to Haybet. When pure barley, pure dry pea and dry pea/hay barley mixed treatment effects were evaluated, pure stands of Haybet hay barley produced the most dry matter production (**Table 27**), but was not significant greater than the dry pea/barley mixed plots at Moccasin dryland site. At all locations, pure pea stands had significantly less dry matter production than the dry pea/barley mixed and pure barley plots.
Plant Canopy Heights: Plant canopy heights varied among locations, and treatments, and, although Melrose Austrian winter pea was observed to have the tallest plant heights under irrigation (averaged 36.4 inches), it was not significant (**Table 26**). There was no significant differences among treatments, relative to plant canopy height (**Table 27**).
Flower/Heading Dates: Wahlechia Austrian winter pea was earliest dry pea to reach flowering (**Table 28**). Under dryland conditions, barley heading occurred nine days from when dry peas flowered. However, under irrigation, barley appeared to head prior to dry pea flowering. Averaged over all locations, interspecies competition did not affect either flower onset or head emergence (**Table 29**).
Multi-Year Summaries: Since 1999, pure Haybet hay barley stands had the highest dry matter forage production under both dryland and irrigated conditions (significant under dryland), with an average annual forage production of 3,600 and 9,694 pounds per acre under dryland and irrigation, respectively (**Table 30**). Dry pea cultivars mixed with barley had significantly higher yields than their pure dry pea equivalents. Dry matter protein contents were highest in the pure Sioux Austrian winter pea stands under both dryland and irrigated sites (**Table 31**). However, total protein production was greatest (although not significantly) for the Melrose Austrian winter pea mixed with barley plots and Granger Austrian winter pea mixed with barley plots under dryland and irrigated sites, respectively. By combining treatment effects, pure Haybet hay barley consistently out-yielded dry pea/barley mixed and pure dry pea treatments (**Table 32**). Quality analysis, by measure of dry matter protein content, indicates that, although pure pea stands and mixed dry pea stands have higher protein contents, no significant differences in protein yield were seen among treatments (**Table 33**).

FUTURE PLANS:
At this time, there are no future plans for this trial.

Table 24. 2002 Uniform Pea Forage Trial (UPFT) - Pea forage entry characteristics and target seeding rates. - Exp. 870702. Central Agricultural Research Center, Moccasin, MT **{File: 870702:Character}**

Species/Varie	Type	Treatment	Seed Size		Target	Actual Rates	
			(g/1,000seeds)	(seeds/lb)	(seeds/ft2)	(lbs/acre)	Pea:Barley
Barley:							
Haybet	Hay-barley	Pure Stand	45	10,080	14	59	
		Mix w/ Pea			6	25	
Field Peas:							
Melrose	Austrian winter pea	Pure Stand	135	3,360	8	105	
		Mix w/ barley			6	80	3.2:1
Granger	Austrian winter pea	Pure Stand	160	2,835	8	130	
		Mix w/ barley			6	98	3.9:1
Sioux	Austrian winter pea	Pure Stand	110	4,124	8	95	
		Mix w/ barley			6	72	2.9:1
Whalechia	Austrian winter pea	Pure Stand	140	3,240	8	116	
	(Early Maturing)	Mix w/ barley			6	87	3.5:1
Trapper	Small yellow pea	Pure Stand	117	3,877	8	124	
		Mix w/ barley			6	93	3.7:1
						Average Pea:Barley Ratio:	**3.4:1**

Table 25. 2002 Uniform Dry Pea/Barley Forage Trial - Site management information. -Exp. 870002. Central Agricultural Research Center, Moccasin, MT **{File- 870002:Manage}**

	Moccasin	Bozeman	Corvallis	Creston	Huntley
Field Summary					
Environment:	Dryland		Irrigated	Irrigated	Irrigated
Tillage History:	No-Till		Conventional	Conventional	Conventional
Previous Crop:	Barley		Buckwheat	Spearmint	?
Trial Management					
Seeding Date:	4/25	Abandoned	5/1	5/1	Data Not Available at Printing
Fertilizer: (lbs/ac)	20-20-20(50lbs)		11-52-0 (100)		
	46-0-0(60 lbs)		34-0-0 (300 - 90lbN)		
Pesticides:(rates)	None		Thristol (2,3 pints)	Poast (1qt)	
	Hand weeded		Malathion (1 pt)	Dash (1 qt)	
				Po-E	
Harvest Dates:	7/10		7/15-7/16	7/22	
Sample Management					
Sub-Samples:	Collected from each plot - Barley separated from pea in "mixed" plots Weighed wet (fresh) - Barley and pea kept separate for processing. Weighed dry - for moisture content and dry matter forage production Ground (coarse) for quality analysis - Not available at printing.				
Precipitation:	6.12"		3.99" + 5" irr.	6.45"	4.5" + 3" irr.
Elevation:	4300'	4780'	3590'	2920'	2990'

Table 26. 2002 Uniform Dry Pea/Barley Forage Trial - Dry matter forage production and canopy heights.
-Exp. 870002. Central Agricultural Research Center, Moccasin, MT **{File- 870002:Yield}**

	Dry Matter Forage Yields					Canopy Heights			
	Dryland	Irrigated Sites				Dryland	Irrigated Sites		
Treatment	Mocc.	Corvallis	Creston	Huntely	Average	Mocc.	Corvallis	Creston	Average
	(lbs/acre)					(inches)			
Haybet Barley	**3,626** [a]	**8,430** [a]	9,986 [a]	**9,775** [a]	**9,397** [a]	24.6 [a]	**35.4** [a]	31.8	33.6
Melrose	2,441	1,720	5,090	3,455	3,422	22.9 [a]	26.1	**46.8** [a]	**36.4** [ns]
w/Haybet Barley	3,196 [a]	6,764	8,192	8,205	7,720	22.5	32.1 [a]	33.8	32.9
Granger	2,593	1,350	5,590	3,507	3,482	**24.8** [a]	26.3	45.0 [a]	35.6
w/Haybet Barley	3,274 [a]	7,060	10,285 [a]	8,086	8,477 [a]	24.7 [a]	32.9 [a]	38.0	35.4
Sioux	2,225	1,380	3,746	2,718	2,615	21.5	28.1	41.3 [a]	34.7
w/Haybet Barley	3,176 [a]	6,510	10,106 [a]	7,412	8,009	22.0	31.6 [a]	41.0 [a]	36.3
Wahlechia	2,124	1,360	4,496	3,118	2,991	20.1	23.2	41.8 [a]	32.5
w/Haybet Barley	3,046	6,784	8,962	7,744	7,830	21.6	29.1 [a]	37.5	33.3
Trapper	2,223	1,570	4,424	2,636	2,877	23.0 [a]	24.0	42.8 [a]	33.4
w/Haybet Barley	3,148 [a]	6,580	**11,028** [a]	7,752	8,453 [a]	23.7 [a]	31.8 [a]	37.8	34.8
Means	2,825	4,500	7,446	5,855	5,934	22.9	29.1	40.0	34.4
LSD (0.05 by t)	518	1,142	1,968	1,436	1,009	2.1	7.1	7.9	12.6
CV% (s/means)	12.7	17.57	18.3	16.98	10	6.42	16.81	13.7	16.5

[a] - Denotes values equal to highest value (in **bold**), based on $LSD_{0.05}$.

[ns] - Indicates no statistical significance at 0.10 level.

Table 27. 2002 Uniform Dry Pea/Barley Forage Trial - Treatment affect on dry matter yields and height.
-Exp. 870002. Central Agricultural Research Center, Moccasin, MT **{File- 870002:Treatment}**

	Dry Matter Forage Yields					Plant Canopy Heights			
	Dryland	Irrigated Sites				Dryland	Irrigated Sites		
Treatment	Moccasin	Creston	Corvallis	Huntley	Average	Mocc.	Creston	Corvallis	Average
	(lbs/acre)					(inches)			
Pure Barley	**3,626** [a]	**9,980** [u]	**8,430** [a]	**9,775** [a]	**9,397** [a]	**24.6** [a]	31.8	33.4 [a]	33.6
Mixed	3,168 [a]	9,715	6,740	7,899	8,098	22.9 [a]	37.6	28.5	**34.5** [n]
Pure Pea	2,321	4,669	1,476	3,087	3,077	22.5	**43.5** [u]	28.9	34.5
Means	3,038	8,121	5,549	6,290	6,857	23.3	37.6	30.3	34.2
LSD (0.05 by t)	721		1,441	1,618	1,186	1.9		3.6	32.9
CV% (s/mean)	13.7		15.01	13.52	7.635	4.59		6.84	22.37

[a] - Denotes values equal to highest value (in **bold**), based on $LSD_{0.05}$.

[u] - Denotes site averages were unreplicated, unalyzed averages.

[n] - Denotes no statistical significance at 0.10 level.

Table 30. 2002 Uniform Pea/Barley Forage - Multi-year (1999-2002) dry matter and canopy height summary. -Exp. 870002. Central Agricultural Research Center, Moccasin, Montana.

	Dry Matter Forage Production							Plant Canopy Heights				
	Dryland			Irrigated				Dryland	Irrigated			
	Mocc	Boze	Ave.	Creston	Corvallis	Huntley	Ave.	Ave.[1/]	Creston	Corvallis	Huntley	Ave.
Haybet	**3,462** [a]	**4,150** [a]	**3,600** [a]	9,063 [a]	**9,290** [a]	**10,650** [a]	**9,694** [a]	**28.5** [ns]	31.8	**39.5** [ns]	32.5	35.9
Melrose	2,384	2,295	2,366	4,205	5,227	4,171	4,648	25.7	46.8 [a]	32.0	26.5	32.7
w/Barley	3,050	3,203 [a]	3,080	7,816 [a]	7,999 [a]	8,921	8,265	26.6	33.8	38.4	33.3	36.0
Granger	2,521	2,534	2,524	4,625	4,231	3,877	4,200	27.2	45.0 [a]	32.8	27.9	33.2
w/Barley	3,143 [a]	3,006	3,115	**9,163** [a]	8,188 [a]	8,726	8,584 [a]	27.4	38.0	36.5	**36.5** [ns]	**36.7** [ns]
Sioux	2,106	2,141	2,113	2,771	4,312	3,288	3,727	23.0	41.3 [a]	30.3	26.3	30.7
w/Barley	3,009	3,053	3,018	9,131 [a]	8,560 [a]	8,639	8,652 [a]	27.9	41.0 [a]	37.2	33.6	36.6
Trapper	2,316	1,839	2,220	3,882	4,521	3,433	4,016	26.8	42.8 [a]	30.8	27.8	31.8
w/Barley	2,923	3,201 [a]	2,979	9,014 [a]	8,971 [a]	8,540	8,837 [a]	26.8	37.8	36.8	29.8	34.7
Means	2,768	2,825	2,779	6,630	6,811	6,694	1,000	26.6	39.8	34.9	30.4	34.3
LSD	355	950	327	1,819	1,918	1,309	1,119	3.0	7.9	7.3	9.0	5.4
CV	8.8	14.6	9.1	11.2	19.3	11.3	15.8	7.8	13.7	12.1	12.8	13.5
F-Value	13.8	5.8	19.07	26.2	10.95	44.93	49.82	2.27		2.03	1.75	1.39

[ns] - Indicates no significant differences at 0.05 level.

[a] - Denotes values equal to highest value (in **bold**) based on $LSD_{0.05}$.

[1/] - Dryland plant heights were collected at the Moccasin site only.

Table 31. 2002 Uniform Pea/Barley Forage - Multi-year (1999-2002) dry matter protein content-yield summary. -Exp. 870002. Central Agricultural Research Center, Moccasin, Montana.

	Dryland						Irrigated					
	Moccasin		Bozeman		Average		Corvallis		Huntley		Average	
	Content	Yield	Content	Yield	Content	Yield	Content	Yield	Content	Yield	Content	Yield
	%	lbs/a	%	lbs/a	%	lbs/a	%	lbs/a	%	lbs/a	%	lbs/a
Haybet	10.9	427	10.4	425	10.8	426 [a]	11.7	1,023	11.2	1,266 [a]	11.5	1,144 [a]
Melrose	15.8 [a]	403	18.5 [a]	425	16.7 [a]	410	18.3 [a]	**1,078** [ns]	18.0 [a]	795	18.1	936 [a]
w/Barley	13.6	475	15.3	**492** [ns]	14.2	**480** [a]	13.3	989	13.8	1,078	13.5	1,034 [a]
Granger	15.2 [a]	419	18.3	464	16.2 [a]	434 [a]	16.8	581	18.5 [a]	851	17.6	716
w/Barley	12.8	**467** [ns]	15.0	452	13.6	462 [a]	13.8	969	15.4	**1,419** [a]	14.6	**1,194** [a]
Sioux	**16.2** [a]	375	**21.2** [a]	452	**17.9** [a]	401	**19.8** [a]	949	**21.9** [a]	1,012	**20.8** [a]	981 [a]
w/Barley	14.2	464	15.0	460	14.5	463 [a]	13.6	965	14.1	1,279 [a]	13.8	1,122 [a]
Trapper	15.1 [a]	406	18.0	330	16.1 [a]	381	19.2 [a]	948	19.0 [a]	849	19.1 [a]	899
w/Barley	14.0	471	13.3	432	13.8	458 [a]	13.9	984	14.2	1,292 [a]	14.1	1,138 [a]
Means	14.2	434	16.1	437	14.8	435	15.6	943	16.2	1,093	15.9	1,018
LSD	1.4	88	2.8	171	2.2	63	2.2	548	5.2	239	2.2	292
CV	10.1	20.3	7.4	16.9	8.6	8.4	6.2	25.2	14.0	9.5	9.6	19.7
F-Value	10.2	1.4	14.7	0.8	8.4	2.5	18.6	0.7	4.3	9.9	16.4	2.1

[ns] - Indicates no significant differences at 0.05 level.

[a] - Denotes values equal to highest value (in **bold**) based on $LSD_{0.05}$.

Table 32. 2002 Uniform Pea/Barley Forage - Mulit-year (99-02) treatment effects yield-height summary. -Exp. 870002. Central Agricultural Research Center, Moccasin, Montana.

	Dry Matter Forage Production							Plant Canopy Heights				
	Dryland			Irrigated				Dryland	Irrigated			
	Mocc	Boze	Ave.	Crest	Corval	Huntley	Ave.	Ave.[1/]	Creston	Corvallis	Huntley	Ave.
Pure Barley	**3,462** [a]	**4,150** [ns]	**3,600** [a]	**9,063** [a]	**9,290** [a]	**10,650** [a]	**9,694** [a]	**28.5** [ns]	31.8	**39.5** [ns]	32.5	35.9
Mixed	3,031	3,116	3,048	8,698 [a]	8,429 [a]	8,706	7,990 [a]	27.1	37.8	37.2	33.3 [ns]	36 [ns]
Pure Pea	2,332	2,202	2,306	3,646	4,295	3,692	4,760	25.7	**44.0**	31.5	27.1	32.1
Means	2,942	3,156	2,985	7,136	7,338	7,684	7,482	27.1	37.8	36.1	31	34.7
LSD (0.05)	405	ns	405	857	2,289	1,365	1,864	2.8		9.6	13.8	6.47
CV%	8.0	14.5	9.3	2.8	18.0	7.8	24.9	5.9		11.7	10.4	14.5
F-Value	23.8	9.1	27.4	462	16.29	106.7	16.26	3.07		2.88	2.21	1.18

[ns] - Indicates no significant differences at 0.05 level.

[a] - Denotes values equal to highest value (in **bold**) based on $LSD_{0.05}$.

[1/] - Dryland plant heights were collected at the Moccasin site only.

Table 33. 2002 Uniform Pea/Barley Forage - Mulit-year (99-02) treatment effects protein summary. -Exp. 870002. Central Agricultural Research Center, Moccasin, Montana.

	Dryland						Irrigated					
	Moccasin		Bozeman		Average		Corvallis		Huntley		Average	
	Content	Yield	Content	Yield	Content	Yield	Content	Yield	Content	Yield	Content	Yield
	%	lbs/a	%	lbs/a	%	lbs/a	%	lbs/a	%	lbs/a	%	lbs/a
Pure Barley	10.9	427	10.4	425	10.8	426	11.7	1,023 [ns]	11.2	1,266	11.5	1,144 [ns]
Mixed	13.7	469 [ns]	14.7 [a]	459 [ns]	14.0 [a]	466 [ns]	13.6	977	14.4 [a]	1,267	15.1	1,027
Pure Pea	**15.6** [a]	401	**19.0** [a]	418	**16.7** [a]	406	**18.5**	889	**19.3** [a]	877	**18.9** [a]	883
Means	13.4	432	14.7	434	13.8	433	14.6	963	15.0	1,136	15.2	1,018
LSD (0.05)	1.5	89	6.0	210	3.2	45			7.3	346	2.8	338
CV%	10.6	19.14	9.5	11.2	10.24	4.629			11.4	7.07	10.8	19.2
F-Value	21.6	1.4	19.1	4	13.27	6.85	53.24	0.16	11.5	15.7	20.6	1.8

[ns] - Indicates no significant differences at 0.05 level.

[a] - Denotes values equal to highest value (in **bold**) based on $LSD_{0.05}$.