PROJECT TITLE: Evaluation of fall seeded winter pea and lentil line performance.

EXPERIMENTS: 8207 & 8407

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OBJECTIVES: To evaluate winter hardiness of fall seeded winter dry pea and lentil lines.

METHODS:
Winter pea and winter lentil trials were seeded September 17, 2004 into barley stubble. The winter pea trial consisted of eight winter pea lines from the USDA-ARS dry pea breeding program at Pullman, Washington and one Austrian winter pea (Granger; **Table 1**). The winter lentil trial consisted of eight winter lentil lines from the USDA-ARS program and one Montana State University winter lentil release (Toni; **Table 1**). Seedling counts were conducted on May 5, 2005. Biomass samples were collected at the 2-4 podding nodes stage. Grain harvest was conducted during the last week of July and the first week of August. **Table 2** provides additional agronomical information.

RESULTS:
Dry Pea Winter Survival: All winter pea lines exhibited good winter hardiness, having a spring stand of 7.1 plants ft^{-2} or 95% of the target seeding rate (7.4 plants ft^{-2}; **Table 3**). No differences were observed among the winter pea lines. **Forage Biomass**: When cut at the 2-4 podded nodes growth stage, forage production averaged 4,079 lbs $acre^{-1}$ (**Table 3**). The green winter pea, PS7530726, produced the most dry matter (4,418 lbs $acre^{-1}$), but was not significantly different (based on $LSD_{0.05}$) than the other dry pea lines. **Grain Production**: The winter pea trial averaged 1,959 lbs $acre^{-1}$ of grain production (**Table 3**). The yellow pea line PS9830S358 produced significantly more seed (2,386 lbs $acre^{-1}$) than the other lines. The yellow pea line, PS9830F011, produced the next most with 2,204 lbs $acre^{-1}$. **Seed Weights**: The trial had an average test weight of 63.9 pounds per bushel (**Table 3**) with line PS0930S431 having the heaviest weight (64.3 lbs bu^{-1}), but was similar (based on $LSD_{0.05}$) to five other lines.

Lentil Winter Survival: The winter lentil lines exhibit slightly poorer winter survival than the winter pea lines. The trial had an average spring stand of 9.8 plants ft^{-2} or 89% of the target seeding rate (11.1 plants ft^{-2}; **Table 4**). **Forage Biomass**: The lentil trial produced an average of 2,638 lbs $acre^{-1}$ at the 2-4 podded nodes stage (**Table 4**). Line LC9978057 lentil had the most forage production (3,223 lbs $acre^{-1}$), but was not significantly different (based on $LSD_{0.05}$) than five other lines. **Grain Production**: The lentils averaged 1,031 lbs $acre^{-1}$ seed production (**Table 4**). Morton (formerly LC9979010) had the highest grain yield (1,278 lbs $acre^{-1}$), but was not significantly greater than three other lines. **Seed Weights**: The winter lentil's test weights averaged 65.4 lbs bu^{-1} (**Table 4**), with line LC9979120 being the heaviest (65.9 lbs bu^{-1}), but was not significantly heavier than three other lines.

Future Plans: Evaluation of winter hardy lines of dry pea and lentils will continue at CARC, with the hope of releasing a line suitable for forage and seed production in Central Montana's environment.

Table 1. 2005 Winter Pea and Lentil Evaluation Trial - Dry pea and lentil characteristics.
-Exp. 82-840705. Central Agricultural Research Center, Moccasin, MT. **{File- 820705:Character}**

Peas	Type	Vine Length	Leaf-Type	Seed Size [1/]	Maturity
Granger	Austrian	Long	Afilia	115	Medium
PS9430706	Smooth Yellow	Long	Afilia	130	Late
PS9530726	Smooth Green	Semi-Dwarf	Afilia	130	Medium
PS9830S431	Smooth Yellow	Semi-Dwarf	Normal	110	Early
PS9830F009	Smooth Yellow	Long	Afilia	120	Late
PS9830F010	Smooth Yellow	Long	Afilia	120	Late
PS9830F011	Smooth Yellow	Semi-Dwarf	Afilia	120	Early
PS9630448	Smooth Yellow	Long	Afilia	120	Late
PS9830S358	Smooth Yellow	Semi-Dwarf	Afilia	120	Early
Lentils	Type	Cotyledon Color	Seed Color	Seed Size	Maturity
Toni	Small Red	Red	Brown	25	Very Late
LC9978094	Small Red	Red	Purple Mottled	30	Late
WA8649041	Small Red	Red	Brown	25	Very Late
LC9978057	Small Red	Red	Brown	30	Early
LC9979120	Small Red	Red	Brown	25	Medium
LC9979065	Small Red	Red	Green	30	Late
LC9979062	Small Red	Red	Green	30	Medium
LC9976079	Small Red	Red	Brown	30	Medium
Morton	Small Red	Red	Green	30	Medium

[1/] - Seed sizes were similar among culitvars, values are average seed size at planting.

Table 2. 2005 Winter Pea and Lentil Evaluation Trial - Site management summary.
- Exp. 82-840705. Central Agricultural Research Center, Moccasin, MT. **{File: 820705:Manage}**

Field Summary				
Environment:	Dryland			
Tillage History:	Conventional		Previous Crop:	Barley
Trial Management				
Seeding Date:	09/17/04		Plot Dimensions:	5-rows x 11" spacing x 40'
Fertilizer: (lbs/ac)	None			
Pesticides:(rates)	Assure II	(10oz/acre)	Hand Weeded:	Prickly Lettuce; Wild Buckwheat Volunteer Barley
Harvest Dates:				
Forage:	Peas:	7/5/2005	Hand harvested - 1.0 m x 3 rows	
	Lentils:	7/5/2005		
Grain Harvest:	Peas:	7/29-8/1/2005	Timing: At grain maturity	
	Lentils:	7/29-8/5/2005		
Precipitation:	9.88"	- Crop-year (9/17/2004 - 7/29/2005)		
	12.90"	- 95-year Average:(9/1 - 7/31)		
Elevation:	4300'			

Table 3. 2005 Western Regional Winter Dry Pea Trial - Dry-land winter dry pea agronomy results.
- Exp. 820705 Central Ag Research Center, Moccasin, MT **{File: 820705-Summary}**

	Spring	Dry Matter		---------- Dry Pea Grain Production ----------				
Selection	Density	Height	Yield	Height	Stand	Test Wt	Moisture	Yield
	#/ft^2	in	lbs/acre	in	index	lbs/bu	%	lbs/acre
PS9830S358	7.0	21.6	3,752	21.3	**0.986** [a]	64.3 [a]	**10.9** [a]	**2,386** [a]
PS9830F011	6.8	21.8	3,723	19.9	0.915 [a]	64.1 [a]	10.8 [a]	2,204
PS7530726	7.2	24.0	**4,418** [n]	18.9	0.828	63.0	10.5	1,982
PS0930S431	6.7	33.1	4,293	**21.7** [n]	0.662	**64.3** [a]	10.7 [a]	1,972
PS9630448	6.4	35.8 [a]	4,246	21.1	0.592	63.5	10.4	1,908
PS9830F010	6.7	36.3 [a]	3,981	20.8	0.571	63.5	10.1	1,868
PS9830F009	**8.1** [n]	36.8 [a]	4,281	20.7	0.566	64.1 [a]	10.4	1,850
Granger	7.7	37.7 [a]	4,212	20.8	0.552	64.3 [a]	10.8 [a]	1,808
PS9430706	7.1	**38.2** [a]	3,803	21.3	0.558	64.2 [a]	10.3	1,653
Means (n = 36)	7.1	31.7	4,079	20.7	0.692	63.9	10.5	1,959
LSD (t = 0.05)	1.5	4.5	878	2.7	0.144	0.5	0.3	133
CV % (s/mean)	14.8	9.8	14.8	8.8	14.3	0.6	2.0	4.6
F-value	1.1	21.0	0.8	0.8	12.0	6.9	6.6	23.1

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

[n] - Denotes not statistically significant at 0.05 level.

Table 4. 2005 Western Regional Winter Lentil Trial - Dry-land winter lentil agronomy results.
- Exp. 840705 Central Ag Research Center, Moccasin, MT **{File: 840705-Summary}**

	Spring	**Dry Matter**		**---------- Dry Pea Grain Production ----------**				
Entry	**Density**	**Height**	**Yield**	**Height**	**Stand**	**Test Wt**	**Moisture**	**Yield**
	#/ft^2	in	lbs/acre	in	index	lbs/bu	%	lbs/acre
Morton	9.8 [a]	12.4	2,593 [a]	12.3	0.992	65.6 [a]	8.8	**1,278** [a]
LC9979065	10.1 [a]	11.7	2,511	11.0	0.943	65.6 [a]	8.7	1,259 [a]
LC9979120	8.3	12.3	2,666 [a]	11.8	0.954	**65.9** [a]	9.1 [a]	1,203 [a]
LC9979062	10.5 [a]	13.6	3,001 [a]	13.0 [a]	0.962	64.9	8.8	1,128 [a]
LC9976079	8.3	12.7	2,407	13.0 [a]	**1.027** [n]	64.7	**9.6** [a]	1,004
LC9978094	**10.6** [a]	13.8 [a]	2,770 [a]	12.7	0.927	65.6 [a]	9.3 [a]	930
LC9978057	10.3 [a]	12.8	**3,223** [a]	12.6	0.990	65.4	8.8	871
WA8649041	9.8 [a]	**14.8** [a]	2,291	14.2 [a]	0.972	65.4	9.4 [a]	819
Toni	10.4 [a]	14.7 [a]	2,283	**14.3** [a]	0.978	65.3	9.2 [a]	784
Means (n = 36)	9.8	13.2	2,638	12.8	0.972	65.4	9.1	1,031
LSD (t = 0.05)	2.1	1.1	673	1.4	0.123	0.4	0.5	176
CV % (s/mean)	14.7	5.5	17.5	7.6	8.7	0.4	3.9	11.7
F-value	1.52	8.78	1.9	4.8	0.5	8.29	3.13	10.11

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

[n] - Denotes not statistically significant at 0.05 level.