

**PROJECT TITLE:** Evaluation of fall seeded winter pea and lentil line performance.  
(Western Regional Winter Dry Pea and Lentil Evaluation Trials)

**EXPERIMENTS:** # 82 & 84

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

**METHODS:**

Winter dry pea and winter lentil trials were seeded September 25, 2007 into emmer stubble. The winter pea trial consisted of 10 winter pea lines. Nine were smooth green and yellow lines from the USDA-ARS Grain Legume Genetics and Physiology dry pea breeding program at Pullman, Washington and one was an Austrian winter pea (Granger; **Table 1**). The winter lentil trial consisted of 10 winter lentil lines from the USDA-ARS program and one Montana State University winter lentil release (Toni; **Table 1**). Biomass samples were collected at the 2-4 podded node stage. Grain harvest was conducted in mid- to late-July (see **Table 2**). **Table 2** provides additional agronomical information.

**RESULTS:**

**Dry Pea Winter Survival:** A difference in spring stand (visual evaluation) amongst the winter pea lines was exhibited, with Granger Austrian winter pea having the best stand, but was significantly similar to five other lines (**Table 3**). **Forage Biomass:** When cut at the 2-4 podded nodes growth stage, dry matter forage production averaged 2,810 lbs acre<sup>-1</sup> (**Table 3**). The yellow winter pea, Windham, produced the most dry matter (3,512 lbs acre<sup>-1</sup>), but was not significantly different (based on LSD<sub>0.05</sub>) than seven other lines. **Grain Production:** The winter pea trial averaged 1,851 lbs acre<sup>-1</sup> of grain production (**Table 3**). Windham yellow pea showed the highest production (2,309 lbs acre<sup>-1</sup>), but had a similar yield (based on LSD<sub>0.05</sub>) to line PS9830F011 yellow pea. **Seed Weights:** The trial had an average test weight of 64.4 pounds per bushel (**Table 3**) with line PS0230F092(a) smooth green pea having the heaviest weight (66.1 lbs bu<sup>-1</sup>). One thousand kernel weights for the trial averaged 135.4 grams, with line PS0230F092(a) having the largest size with 151.1 grams per 1,000 kernels, which was similar in size (based on LSD<sub>0.05</sub>) to lines PS03101150 and PS03101160 smooth green peas.

**Lentil Winter Survival:** Upon visual observations, large differences in winter survival among the winter lentil lines were observed (**Table 4**). Turkish-type ("T") lines LC02600449T and LC03600295T had the poorest spring stands with an average score of 1.6 and 1.8 (out of possible of 5), respectively. **Forage Biomass:** Only lines, which showed visible potential for biomass production, were harvested. Those lines harvested had an average dry matter production of 1,657 lbs acre<sup>-1</sup> at the 2-4 podded nodes stage (**Table 4**). Line LC9979062 lentil had the most forage production (2,266 lbs acre<sup>-1</sup>), but was significantly similar to (based on LSD<sub>0.05</sub>) four other lines. **Grain Production:** The lentils averaged 1,147 lbs acre<sup>-1</sup> seed production (**Table 4**). Line LC9977116 had the highest grain yield (1,475 lbs acre<sup>-1</sup>), but was not significantly greater than six other lines (including Morton). **Seed Weights:** The winter lentil's test weights averaged 65.8 lbs bu<sup>-1</sup> (**Table 4**), with line LC03600232T being the heaviest (67.2 lbs bu<sup>-1</sup>). Seed size ranged from 24.5 (WA8649090) to 46.9 g 1,000 kernels<sup>-1</sup>, with line LC9440070R having the largest seed (significant, based on LSD<sub>0.05</sub>).

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

Table 1. 2006 Winter Pea and Lentil Evaluation Trial - Dry pea and lentil characteristics.

-Exp. 82-840706. Central Agricultural Research Center, Moccasin, MT.

{File- 820706:Character}

Peas	Variety	Type	Vine Length	Leaf-Type	Seed Size <sup>1/</sup>	Maturity
-----	Granger	Austrian	Long	Afilia	115	Medium
PS9430706		Smooth Yellow	Long	Afilia	130	Late
PS9530726		Smooth Green	Semi-Dwarf	Afilia	130	Late
PS9830S431		Smooth Yellow	Semi-Dwarf	Normal	110	Early
PS9830F009	Specter	Smooth Yellow	Long	Afilia	120	Medium
PS9830F010		Smooth Yellow	Long	Afilia	120	Late
PS9830F011		Smooth Yellow	Semi-Dwarf	Afilia	120	Late
PS9630448		Smooth Yellow	Long	Afilia	120	Late
PS9830S358	Windham	Smooth Yellow	Semi-Dwarf	Afilia	120	Early
PS9830F009	Specter	Smooth Yellow	Long	Afilia	120	Late
PS03100635		Smooth Yellow	Long	Normal	120	Early
PS03100660		Smooth Yellow	Long	Normal	120	Early
Lentils		Type	Cotyledon Color	Seed Color	Seed Size	Maturity
-----	Toni	Small Red	Red	Brown Mottled	30	Very Late
LC9978094		Small Red	Red	Purple Mottled	30	Late
WA8649041		Small Red	Red	Brown Mottled	30	Very Late
LC9978057		Small Red	Red	Brown	30	Early
LC9979120		Small Red	Red	Brown	30	Medium
LC9979065		Small Red	Red	Green	30	Late
LC9979062		Small Red	Red	Green	30	Medium
LC9976079		Small Red	Red	Brown	30	Medium
LC9979010	Morton	Small Red	Red	Green	30	Medium
LC9440070R		Medium Red	Red	Green	50	Medium
LC02600449T		Medium Red	Red	Brown	40	Medium
LC03600218T		Medium Red	Red	Brown	40	Early
LC03600232T		Medium Red	Red	Purple Mottled	35	Medium
LC03600295T		Medium Red	Red	Brown Mottled	40	Early
LC9977116		Medium Yellow	Yellow	Green	40	Medium
LC9979016		Small Red	Red	Green	30	Medium
LC9977019		Medium Yellow	Yellow	Green	40	Medium
WA8649090		Medium Yellow	Yellow	Green	40	Medium

<sup>1/</sup> - Seed sizes were similar among cultivars, values are average seed size at planting.

Table 2. 2006 Winter Pea and Lentil Evaluation Trial - Site management summary.  
 - Exp. 82-840706. Central Agricultural Research Center, Moccasin, MT. **{File: 820706:Manage}**

Field Summary			
Environment:	Dryland		
Tillage History:	Conventional	Previous Crop:	Winter Wheat
Trial Management			
Seeding Date:	09/16/05	Plot Dimensions: 5-rows x 11" spacing x 30'	
Fertilizer: (lbs/ac)	None		
Pesticides:(rates)	Assure II (10oz/acre)	Hand Weeded: Prickly Lettuce; Wild Buckwheat	
Harvest Dates:			
Forage:	Peas: 6/6-6/22/2006	Hand harvested - 1.0 m x 5 rows	
	Lentils: 6/15-6/22/2006		
Grain Harvest:	Peas: 7/17-7/19/2006	Timing: At grain maturity	
	Lentils: 7/17-7/19/2006		
Precipitation:	12.43"	- Crop-year (9/16/2005 - 7/15/2006)	
	13.74"	- 96-year Average:(9/1 - 7/31)	
Elevation:	4300'		

Table 1. 2008 Western Regional Winter Pea Line Evaluation. Agronomic Summary  
 - Exp: 820708. Central Agricultural Research Center, Moccasin, MT **{820708:WRSum}**

Selection	Stand*	Hail Damage <sup>@</sup>	Forage Biomass		Grain Harvest				
			Height (cm)	Dry Matter (lbs/ac)	Plot Height (cm)	Yield (lbs/ac)	Test Wt (lbs/bu)	Moist (%)	Adjust Yield 13% (lbs/ac)
Specter	4.9 <sup>a</sup>	3.8 <sup>a</sup>	60.5	2642 <sup>a</sup>	60.8 <sup>a</sup>	1059 <sup>a</sup>	63.1	12.4 <sup>a</sup>	1120 <sup>a</sup>
Windham	4.4 <sup>a</sup>	0.0	35.3	2199 <sup>a</sup>	35.5	945	63.4	11.8	1046 <sup>a</sup>
PS0230F210	4.1	1.8	59.5	2409 <sup>a</sup>	53.5 <sup>a</sup>	1122 <sup>a</sup>	63.3	12.1 <sup>a</sup>	1205 <sup>a</sup>
PS03100848	4.4 <sup>a</sup>	3.5 <sup>a</sup>	63.0 <sup>a</sup>	2768 <sup>a</sup>	42.5	1054 <sup>a</sup>	62.5	12.3 <sup>a</sup>	1111 <sup>a</sup>
PS03100635	3.6	4.0 <sup>a</sup>	50.0	1593	45.3	905	63.7 <sup>a</sup>	12.0 <sup>a</sup>	983
PS0017018	4.1	2.5	66.0 <sup>a</sup>	2471 <sup>a</sup>	48.8	1135 <sup>a</sup>	63.8 <sup>a</sup>	12.4 <sup>a</sup>	1191 <sup>a</sup>
PS03101160	4.4 <sup>a</sup>	0.5	----	----	33.5	857	62.5	11.5	965
PS0230F092	4.0	0.5	----	----	31.8	1086 <sup>a</sup>	63.1	11.6	1219 <sup>a</sup>
PS0230F063	3.2	0.0	----	----	32.5	1047 <sup>a</sup>	63.8 <sup>a</sup>	11.6	1174 <sup>a</sup>
Granger	4.4 <sup>a</sup>	3.3 <sup>a</sup>	61.5 <sup>a</sup>	2016	49.8	1099 <sup>a</sup>	63.9 <sup>a</sup>	12.4 <sup>a</sup>	1154 <sup>a</sup>
Means	4.1	2.0	56.5	2300	43.4	1031	63.3	12.0	1117
LSD (0.05 by t)	0.7	1.0	5.2	705	7.7	172	0.5	0.4	195
CV% (s/means)	12.2	36.4	6.2	20.6	12.3	11.5	0.60	2.6	12.1
F-Value	3.8	20.3	36.3	2.9	13.9	2.6	7.3	5.5	1.8

\* - Stand evaluation based on a scale of 1 (poor) to 6 (excellent)

<sup>@</sup> - Hail Damage score based on a scale from 0 (no visible damage) to 5 (severe damage); Hail storm of June 11, 2008

<sup>a</sup> - Denotes values statistically equal to highest value (in **bold**) based on LSD<sub>0.05</sub>.

Table 2. 2008 Western Regional Winter Lentil Line Evaluations. Agronomic Summary.  
 - Exp: 840708. Central Agricultural Research Center, Moccasin, Montana

{840708:WR}

Selection	Stand <sup>\$</sup>	Biomass <sup>#</sup>		Height	Yield	Test Wt	Moist	Yield 12%
		Height	Dry Matter					
Toni	<b>5.3</b> <sup>a</sup>	33.3 <sup>a</sup>	3050 <sup>a</sup>	31.8 <sup>a</sup>	1171 <sup>a</sup>	64.5	10.1 <sup>a</sup>	1393 <sup>a</sup>
Morton	5.1 <sup>a</sup>	29.3	<b>3461</b> <sup>a</sup>	24.5	1125 <sup>a</sup>	65.1	9.8	1383 <sup>a</sup>
WA8649041	4.8 <sup>a</sup>	<b>34.3</b> <sup>a</sup>	2442	30.5 <sup>a</sup>	<b>1189</b> <sup>a</sup>	64.8	10.1 <sup>a</sup>	<b>1410</b> <sup>a</sup>
LC9440070R	4.2	30.8	2830 <sup>a</sup>	29.5 <sup>a</sup>	1012 <sup>a</sup>	60.9	10.3 <sup>a</sup>	1191 <sup>a</sup>
LC02601276T	3.7	31.8	2258	30.5 <sup>a</sup>	735	66.0 <sup>a</sup>	9.8	910
LC03600230T	2.9			26.8	588	65.6	10.4 <sup>a</sup>	696
LC03600232T	4.1	32.8 <sup>a</sup>	2007	<b>33.3</b> <sup>a</sup>	1048 <sup>a</sup>	<b>66.4</b> <sup>a</sup>	9.8	1290 <sup>a</sup>
LC04600754T	2.3	31.3	1778	26.8	668	65.8 <sup>a</sup>	10.1 <sup>a</sup>	794
LC05600006T	2.2			25.8	417	64.2	10.4 <sup>a</sup>	479
LC05600685T	3.3			28.3	853	66.1 <sup>a</sup>	9.5	1082
LC05600720T	3.3			29.5 <sup>a</sup>	890	66.1 <sup>a</sup>	9.7	1114
Means	3.7	31.9	2547	28.8	882	65.0	10.0	1067
LSD (0.05 by t)	0.7	2.4	723	4.6	201	0.7	0.5	264
CV% (s/means)	12.1	5.0	19.1	10.9	15.8	0.7	3.7	17.1
F-Value	21.5	4.5	6.0	2.9	13.5	45.0	2.8	11.7

<sup>a</sup> - Values equal to highest value (in **bold**) based on LSD<sub>0.05</sub>.

<sup>\$</sup> - Stand evaluation based on a scale of 1 (poor) to 6 (excellent)

<sup>#</sup> - Only selections with growth habits conducive to green manure were evaluated