

**PROJECT TITLE:** Western Regional Dry Pea, Lentil and Chickpea Trials

**EXPERIMENT NO.:** #8107; 8607; 8907

**PROJECT LEADERS:** D.M. Wichman, Agronomist, CARC, Moccasin, MT  
C. Chen, Asst. Prof. of Cropping Systems, CARC, Moccasin, MT

**PROJECT PERSONNEL:** K. McPhee, Breeder, USDA-ARS, Pullman, WA  
F.J. Muehlbauer, Geneticist, USDA-ARS, Pullman, WA  
K.E. Neill, Research Associate, CARC, Moccasin, MT  
R.W. Short, Agronomist, USDA-ARS, Pullman, WA  
J. Vavrovsky, Research Specialist, CARC, Moccasin, MT

**OBJECTIVES:** To evaluate dry pea, lentil and chickpea lines for grain production potential in dryland environments.

**METHODS:** The Western Regional Dry Pea Trial consisted of nine smooth green and smooth yellow dry pea lines from the USDA-ARS breeding program at Pullman, Washington, along with Majoret green and Delta yellow peas as checks (**Table 1**). The Western Regional Lentil Trial consisted of 12 lentil (6 commercially separate types: Laird, Brewer, Chilean, Turkish, Eston and Pardina-types) lines from the USDA-ARS program, along with CDC Richlea as a check (**Table 1**). The Western Regional Chickpea Trial consisted of 7 USDA-ARS breeding lines, as well as Dwelley kabuli- and Myles desi-type chickpeas as checks (**Table 1**). The trials were seeded no-till into chemical fallow barley stubble on April 7, 2004 (**Table 2**). Dry peas, lentils and chickpeas trials were harvested August 2; August 7 and 17<sup>th</sup>; and August 30<sup>th</sup>, respectively. Additional trial production methods can be found in **Table 2**.

**RESULTS:** Despite receiving 74% of the normal crop-year precipitation (April-August), pulse crop yields were higher than in recent years. This rise in yields is attributed to early seeding (April 7<sup>th</sup>), being seeded into fallow soil conditions, timely precipitation events and cool summer temperatures.

**Dry Pea Grain Yields** averaged 2,209 pounds of dry pea production per acre (**Table 3**). Delta yellow pea had the highest grain production (2,538 lbs acre<sup>-1</sup>) but was only significantly different from three of the lines evaluated (based on LSD<sub>(0.05)</sub>). **Kernel Weights:** The average dry pea seed size for the trial was 206.5 grams per 1,000 kernels and the average test weight was 63.4 pounds per bushel (**Table 3**). The yellow pea selection PS0010836 had the largest seed size (seed weight), but was not significantly larger than lines PS0010806 yellow and PS0010792 green peas. Delta yellow pea had the highest test weight but was not significantly higher than Lifter, line PS0010804 and Majoret green peas. **Plant Heights:** Majoret green pea had the tallest grain maturity plant canopy height but was not significantly taller than line PS0010792 green, PS0010806 yellow and Delta yellow peas (**Table 3**). **Growth Stage Dates:** Although not replicated, line PS810162 green pea was the first selections to reach flowering (**Table 3**).

**Lentil Grain Yields** averaged 1,431 pounds of lentil grain production per acre (**Table 4**). The Eston-type line LC01602307E green lentil had the greatest production (1,748 lbs acre<sup>-1</sup>), but was statistically similar to six other entries. **Kernel Weights:** Seed size among the lines tested varied and averaged 50.8 grams per 1,000 kernels (**Table 4**). The Laird-type lentil line LC99602075L was largest (71.2 g 1,000seeds<sup>-1</sup>), but was not larger than Castillion. The test weight averaged 62.5 pounds per bushel. The Eston-type line LC01602341E had the heaviest test weight (65.2 lbs bushel<sup>-1</sup>), but was not statistically heavier than three other lines. **Plant Heights:** There was no significant differences among lentil lines in plant height. Line LC01602062T was the tallest entry at grain maturity (**Table 4**). **Growth Stage Dates:** The two Turkish lines, LC01602062T and LC01600405T, were the earliest lines to reach flower (data not replicated).

**Chickpea Grain Yields** averaged 974 pounds of grain production per acre (**Table 5**). Myles desi-type chickpea produced the most grain (1,245 lbs acre<sup>-1</sup>), but was only significantly more than line CA9783163C, Sierra and Dwelley. **Kernel Weights:** The trial encompassed both Desi- and Kabuli-type chickpeas, therefore, a large variation in 1,000 seed weights would exist and that attribute was not analyzed. Test weights averaged 55.85 pounds per bushel (**Table 5**) with the Café, Kabuli-type line CA0090B383C weighing the most (58.8 lbs bushel<sup>-1</sup>) and was matched only by Sierra (statistically). **Plant Heights:** The average canopy height of the trial was 40.9 centimeters (**Table 5**). The Desi-type line CA0090B659D had the highest canopy height at harvest (52.3 cm; statistically significant). **Growth Stage Dates:** Café, Kabuli lines CA99901604C, CA0090B383C and Myles, the desi-type, chickpeas were the earliest to flower (not analyzed) and were also the highest yielding cultivars tested.

**FUTURE PLANS:** Western Regional dry pea and lentil trials will continue at Moccasin.

Table 1. 2004 Western Regional Dry Pea, Lentil and Chickpea Trial - Variety characteristics summary.  
- Exp. 81,86&890704. Central Ag. Research Center, Moccasin, MT. **{File: 810704:Character}**

<b>PEA TRIAL:</b>						
Selection	Seed Source	Type	Useage	Seed Size <sup>1/</sup>	Vine Length	Leaf Type
Delta	Central Ag.	Smooth Yellow	Food/Feed	Medium	Semi-dwarf	Semi-leafless
PS9910140	USDA-ARS	Smooth Yellow	Food/Feed	Medium	Semi-dwarf	Semi-leafless
PS0010806	USDA-ARS	Smooth Yellow	Food/Feed	Medium	Semi-dwarf	Semi-leafless
PS0010836	USDA-ARS	Smooth Yellow	Food/Feed	Medium	Semi-dwarf	Semi-leafless
Majoret	Central Ag.	Smooth Green	Food/Feed	Medium	Semi-dwarf	Semi-leafless
Stirling	USDA-ARS	Smooth Green	Food/Feed	Small	Semi-dwarf	Semi-leafless
PS810162	USDA-ARS	Smooth Green	Food/Feed	Medium	Semi-dwarf	Semi-leafless
PS9910592	USDA-ARS	Smooth Green	Food/Feed	Small	Semi-dwarf	Semi-leafless
PS0010792	USDA-ARS	Smooth Green	Food/Feed	Medium	Semi-dwarf	Semi-leafless
PS0010804	USDA-ARS	Smooth Green	Food/Feed	Medium	Semi-dwarf	Semi-leafless
Lifter	USDA-ARS	Smooth Green	Food/Feed	Small	Dwarf	Normal

<sup>1/</sup> - Size Classes (g/1000 seeds): Very Large = >290-295; Medium = 190-250; Large = 250-290; Small = <190

<b>LENTIL TRIAL:</b>						
Variety	Seed Source	Type	Color		Size	Maturity
			Seedcoat	Cotyledon	Class <sup>1/</sup>	
Pennell	USDA-ARS	Laird	Green	Yellow	Large	Medium
LC860359L	USDA-ARS	Laird	Green	Yellow	Large	Late
LC860616L	USDA-ARS	Laird	Green	Yellow	Large	Medium
LC99602075L	USDA-ARS	Laird	Green	Yellow	Large	Medium
Merritt	USDA-ARS	Brewer	Green	Yellow	Medium	Early
Castillion	USDA-ARS	Chilean	Green	Yellow	Large	Medium
CDC Richlea	USDA-ARS	Chilean	Green	Yellow	Medium	Medium
LC01602307E	USDA-ARS	Eston	Green	Yellow	Small	Medium
LC01602341E	USDA-ARS	Eston	Green	Yellow	Small	Early
LC01602062T	USDA-ARS	Turkish	Green	Yellow	Small	Very Early
LC01600405T	USDA-ARS	Turkish	Green	Yellow	Small	Very Early
LC01602245P	USDA-ARS	Pardina	Green	Yellow	Small	Early
LC01601640P	USDA-ARS	Pardina	Green	Yellow	Small	Early

<sup>2/</sup> - Size Classes (g/1000 seeds): Large: >60-65; Medium: 50-60; Small <50

<b>CHICKPEA TRIAL:</b>						
Variety	Type	Class	Seed Size <sup>1/</sup>	Leaf Structure <sup>2/</sup>	Ascochyta Tolerance	Maturity
Myles	Desi		Very Small	Fern-like	Fair	Early
CA0090B659D	Desi		Small	Fern-like	Unkonw	Moderate
Dwellely	Kabuli	Café	Very Large	Unifoliate	Very Poor	Very Late
Sierra	Kabuli	Café	Large	Unifoliate	Unkown	Very Late
CA9783163C	Kabuli	Café	Very Large	Fern-like	Unkown	Very Late
CA99901604C	Kabuli	Café	Very Large	Fern-like	Unkown	Early
CA0090B383C	Kabuli	Café	Med-Large	Unifoliate	Unkown	Early
CA9890233W	Kabuli	White	Very Large	Fern-like	Unkown	Late
CA9990B015W	Kabuli	White	Very Large	Fern-like	Unkown	Moderate

<sup>1/</sup> - Seed Size class ranges (g/1,000 seeds):  
Very Small: 175 - 250  
Small: 250 - 350  
Large: 375 - 475  
Very Large: 475+

<sup>2/</sup> - "Fern-like" indicates a pinnately compound leaf structure

Table 2. 2004 Western Regional Dry Pea, Lentil and Chickpea Trials - Trial management summary.  
 -Exp. 81,86&890704. Central Ag Research Center, Moccasin, MT. **{File: 810704-Manage}**

Field Summary			
Environment:	Dryland		
Tillage History:	No-Till	Previous Crop:	Fallow
Trial Management			
Seeding Date:	4/7	Plot Dimensions:	5-rows x 11" spacing x 16'
Fertilizer:	None		
Pesticides: (rates) Assure II (10oz/acre) - Post Emergence (6/18/04)			
Harvest Dates:		Dry Pea:	8/2
- Using a 5' plot harvester		Lentil:	8/7&8/17
- At grain maturity		Chickpea:	8/30
Precipitation:	6.28"	- Pea/Lentil Crop year (4/7 - 7/31)	
	7.33"	- Chickpea Crop year (4/7 - 8/24)	
Elevation:	4300'		

Table 3. 2004 Western Regional Dry Pea Trial - Dry-land dry pea agronomic summary.  
 - Exp: 810704 Central Ag Research Center, Moccasin, MT. **{File: 810704-Summary}**

	Flower (date)	Grain Harvest				
		Plant Ht (cm)	Yield (lbs/acre)	Test (lbs/bu)	Moisture (%)	Seed Wt (g/1,000 sds)
Delta	6/26	53.0 <sup>a</sup>	<b>2,358<sup>a</sup></b>	<b>64.43<sup>a</sup></b>	12.0 <sup>a</sup>	207.0
PS0010792	6/25	55.5 <sup>a</sup>	2,293 <sup>a</sup>	63.48	11.0	222.7 <sup>a</sup>
PS0010806	6/27	53.3 <sup>a</sup>	2,282 <sup>a</sup>	62.75	11.6 <sup>a</sup>	227.2 <sup>a</sup>
PS9910140	6/28	50.5	2,258 <sup>a</sup>	63.38	12.0 <sup>a</sup>	211.1
PS0010836	6/28	42.8	2,251 <sup>a</sup>	62.80	<b>12.4<sup>a</sup></b>	<b>230.0<sup>a</sup></b>
Majoret	6/27	<b>60.8<sup>a</sup></b>	2,232 <sup>a</sup>	63.78 <sup>a</sup>	11.1	206.8
PS9910592	6/27	39.5	2,210 <sup>a</sup>	63.15	11.5	182.2
PS810162	<b>6/14</b>	45.5	2,207 <sup>a</sup>	62.58	11.2	200.1
PS0010804	6/27	47.8	2,111	63.73 <sup>a</sup>	11.8 <sup>a</sup>	215.6
Stirling	6/18	45.5	2,110	63.05	11.6 <sup>a</sup>	184.4
Lifter	6/27	32.0	1,990	63.80 <sup>a</sup>	11.7 <sup>a</sup>	185.2
Means (n = 44)	6/24	47.8	2,209	63.4	11.6	206.5
LSD (0.05 by t)		9.4	221	0.9	0.8	14.1
CV% (s/mean)		13.6	6.9	1.0	4.7	4.73
F-Value		6.12	1.82 <sup>n</sup>	3.12	2.23	12.25

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

<sup>n</sup> - Denotes not statistically significant at 0.05 level.

Table 4. 2004 Western Regional Lentil Trial - Dry-land lentil agronomic summary.

- Exp: 860704 Central Ag Research Center, Moccasin, MT.

**{File: 860704-Summary}**

	Flower (date)	Grain Harvest				
		Height (cm)	Yield (lbs/acre)	Test Weight (lbs/bu)	Moisture (%)	Kernel Wt (g/1,000seeds)
LC01602307E	6/29	34.3	<b>1,748</b> <sup>a</sup>	63.97	<b>14.3</b> <sup>a</sup>	43.3
LC01602245P	6/25	30.0	1,651 <sup>a</sup>	65.15 <sup>a</sup>	12.4 <sup>a</sup>	33.6
LC01602062T	<b>6/23</b>	<b>34.9</b> <sup>n</sup>	1,622 <sup>a</sup>	63.95	12.4 <sup>a</sup>	40.3
LC01601640P	6/25	30.3	1,580 <sup>a</sup>	65.10 <sup>a</sup>	12.3 <sup>a</sup>	33.0
CDC Richlea	6/28	29.2	1,575 <sup>a</sup>	62.29	13.7 <sup>a</sup>	50.1
LC01600405T	<b>6/23</b>	31.8	1,466 <sup>a</sup>	64.78 <sup>a</sup>	11.9 <sup>a</sup>	35.8
Merrit	6/26	33.3	1,461 <sup>a</sup>	60.30	12.6 <sup>a</sup>	57.8
LC99602075L	6/28	30.5	1,361	59.72	12.8 <sup>a</sup>	<b>71.2</b> <sup>a</sup>
Pennell	6/28	33.3	1,315	59.65	13.0 <sup>a</sup>	61.3
Castillion	6/27	31.5	1,303	60.05	12.8 <sup>a</sup>	70.7 <sup>a</sup>
LC01602341E	6/26	32.2	1,230	65.22 <sup>a</sup>	12.2 <sup>a</sup>	29.3
LC860616L	6/29	31.3	1,147	60.55	11.5	66.2
LC860359L	7/2	27.5	1,144	61.75	10.4	61.3
Means ( <i>n</i> = 52)	6/26	31.5	1,431	62.50	12.5	50.8
LSD (0.05 by t)		8.2	296	0.89	2.5	2.9
CV% (s/mean)		17.96	14.33	0.98	13.86	4.01
F-Value		0.54 <sup>n</sup>	3.71	54.4	1.28 <sup>n</sup>	240.13

<sup>a</sup> - Denotes values equal highest value (in **bold**) based on LSD<sub>(0.05)</sub>.<sup>n</sup> - Denotes not statistically significant at 0.05 level.

Table 5. 2004 Western Regional Chickpea Trial - Dry-land chickpea agronomic summary.

- Exp: 890704 Central Ag Research Center, Moccasin, MT.

**{File: 890704-Summary}**

	Flower (date)	Grain Harvest			
		Plant Ht (cm)	Yield (lbs/acre)	Test (lbs/bu)	Moisture (%)
Myles	6/28	37.3	<b>1,245</b> <sup>a</sup>	55.23	10.7
CA0090B383C	6/30	47.0	1,122 <sup>a</sup>	<b>58.79</b> <sup>a</sup>	11.5 <sup>a</sup>
CA99901604C	6/27	37.0	1,112 <sup>a</sup>	54.72	11.4 <sup>a</sup>
CA0090B659D	7/2	<b>52.3</b> <sup>a</sup>	1,031 <sup>a</sup>	54.58	10.5
CA9890233W	7/5	33.3	1,005 <sup>a</sup>	55.38	12.5 <sup>a</sup>
CA9990B015W	7/3	37.3	994 <sup>a</sup>	55.63	11.5 <sup>a</sup>
CA9783163C	7/5	39.3	912	54.68	<b>12.9</b> <sup>a</sup>
Sierra	7/4	43.3	683	57.60 <sup>a</sup>	11.3 <sup>a</sup>
Dwellely	7/5	41.8	664	56.10	<b>12.9</b> <sup>a</sup>
Mean ( <i>n</i> = 36)	7/2	40.9	974	55.85	11.7
LSD (0.05 by t)		3.0	316	1.40	1.8
CV% (s/mean)		5.0	22.2	1.7	10.6
F-Value		33.38	3.26	9.16	2.07 <sup>n</sup>

<sup>a</sup> - Denotes values equal highest value (in **bold**) based on LSD<sub>(0.05)</sub>.<sup>n</sup> - Denotes not statistically significant at 0.05 level.