PROJECT TITLE: 2009 Statewide Spring Dry Pea and Lentil Variety Evaluations

EXPERIMENT NOs.: #8008; 8508

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OBJECTIVES: The objectives of these trials were to evaluate spring dry pea and lentil varieties for grain production potential in the diverse Montana environments.

METHODS: Two trials were established to evaluate spring dry pea and lentil varieties. The trials were conducted at the seven Montana State University - Montana Agricultural Experiment Stations (MSU-MAES) Agricultural Research Centers across Montana, at the Post Research Farm at MSU-Bozeman, and in a producer's field south of Richland, Valley County, Montana (**Table 1**). The 2009 Statewide Spring Dry Pea Trial consisted of 13 varieties, of which, five are commercially available smooth green, five are commercially available smooth yellow and three are experimental smooth yellow dry pea lines from the USDA-ARS Grain Legume Genetics and Physiology program at Pullman, Washington (**Table 2a**). The 2009 Statewide Spring Lentil Trial consisted of 13 lentil varieties, of which, four are commercially available medium green varieties, two are commercially available small red varieties, three are commercially available large green varieties, and four are experimental lines from the USDA-ARS program **(Table 2b).** All seed in the trial was pre-treated with fludioxinil and mefenoxam fungicides (Apron MAXX® RTU, Syngenta Crop Protection, Inc) to protect against soil seed and seedling diseases. The trials were organized and packaged at CARC in Moccasin, then shipped to each individual testing site. All seed was properly inoculated prior to seeding. Best management practices were employed using available resources at each site. Important management information, including but not limited to, seeding date, previous crop, crop-year precipitation, etc., are presented in **Table 1**.

RESULTS: **Note**: The following results and summary are for informational purposes only. Inclusion of any commercial variety in this summary does not constitute a recommendation by MSU-MAES or CARC. **Dry Pea Grain Yields** were respectable among most of the testing sites (**Table 3**). Conrad had the greatest production, with a trial average of nearly 60 bushels acre^{-1} (3,585 lbs acre^{-1}). For the second straight year, Moccasin had the worst yield averaging less than 17 bushels acre^{-1} (988 lbs acre^{-1}) which is much below long-term means and is thought to be due to poor sub-soil moisture, followed by an extremely dry and cold May and June. CDC Mozart, although not statistically significant, was the top trial yielding entry at seven of the nine locations and was similar to the highest yielding entry at the other two locations (**Table 3**). Interestingly, trial means at Richland and Sidney were very similar (1951 and 1964 lbs acre^{-1}, respectively), but the top producing variety were not the same for each location. CDC Golden yellow was the top variety at Richland (2522 lbs acre^{-1}) while CDC Mozart yellow was the top producer at Sidney (2386 lbs acre^{-1}). This difference illustrates the importance of continuing variety evaluations in Northeastern Montana. **Kernel Weights,** measured as both test weight and 1,000-kernel weight, varied from location to location. Test Weights ranged from 61.0 up to 65.0 pounds per bushel (**Table 4**), with Havre reporting the highest trial mean (65.0 lbs bu^{-1}). Delta yellow pea consistently had the highest test weight at three of six sites reporting test weights. Kernel size ranged from 219 to 276 grams per 1,000-

kernels. The smooth yellow line PS0010836 had the largest seed size at all six of seven sites reporting thousand kernel weights. **Flowering and Maturity** differed from site to site due to differences in seeding dates and environmental conditions (**Table 5**), however, Stirling green pea was found to flower first among all reporting sites. **Plant Heights**, differed from location to location with the Conrad site having the highest trial mean (31.3", **Table 6**). No single variety was found to be consistently the tallest cultivar at either physiological or grain maturity. **Harvestability** or ease of harvest, defined as the ratio of grain maturity height to physiological maturity height, was evaluated for four sites (**Table 7**). No variety appeared to have a superior harvestability over the any others.

Lentil Grain Yields ranged from 1200 to 2522 lbs $acre^{-1}$ and were respectable across the state (**Table 8**), with the exception of the Moccasin site which was abandoned due to chemical injury. In 2009, the new USDA-ARS release, Essex, appeared to have the most consistent yield, being the top grain producer in three of the sites, however not having a statistically significant larger yield over other varieties and lines. Line LC01602300R showed good grain production across all locations, with the exceptions being the Richland and Huntley sites (**Table 8**). Trial grain yield means were similar between Havre, Sidney, and Huntley (1399, 1351, and 1397 lbs ac^{-1}, respectively) with Essex appearing to be performing well at all three sites (**Table 8**). **Kernel Weights**, measured as test weight and thousand kernel weight, varied from site to site (**Table 9**). Test weights ranged from 59.9 to 62.4 lbs bu^{-1} (**Table 9**), with the Pardina-type line LC01602245P consistently having the heaviest test weight (statistically significant, based on $LSD_{0.05}$ at Moccasin and Sidney). As expected, kernel weight varied greatly within the trial, due to the size differences in lentil classes tested (**Table 9**). Kernel sizes also varied from location to location, however, the large green lentil Riveland had the largest seed size (significant) at all locations (**Table 9**). **Flowering and Maturity** was not consistent across all sites (**Table 10**), with Merrit being consistently the earliest variety tested. **Plant Heights** at both physiological and grain maturity varied greatly from site to site (**Table 11**). At grain maturity canopy heights ranged from 9.4 to 24.6 inches, however no variety was consistently the tallest grain height across the state (**Table 11**). **Harvestability** or shrinkage or lodging was measured at Havre and Creston and reported in **Table 11**.

SUMMARY: Statewide, dry pea and lentil yields over the past two years were very promising across all testing sites, with the sole exception being at Moccasin (**Table 12** & **Table 13**). In spring dry pea, the same variety topped grain production in both 2008 and 2009 at only three of the testing sites (Moccasin, Sidney, and Conrad; **Table 12**). There were no varieties of lentils that performed similarly between 2008 and 2009, at each site. However, the new small green release, Essex, and the large green line LC01602300R did appear to be significantly equal to the highest yielding variety at each location over both years (**Table 13**). In 2009, not one single variety appeared to dominate across all locations in both dry pea and lentil. The variability seen among varieties in the different climates across the State further illustrates the need for continued variety evaluations in areas where pulse crop production may expand in the future.

FUTURE PLANS: Statewide spring dry pea and lentil variety evaluations will continue across Montana as industry funding and support continues. During 2009 these pulse crop trials were made possible, in part, by the generosity and grant funding secured through the Northern Pulse Growers Association and the U.S.A. Dry Peas, Lentils & Chickpeas.

Table 1a. 2008 Statewide Srping Dry Pea Variety Evaluations - Variety Characteristic Table
-Exp. 80xx08. Montana State University - Montana Agricultural Experiment Stations.

Variety	Color	Type	Size[1/]	Plant Physiology	Maturity[2/]
Majoret	Smooth Green	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Late
Delta	Smooth Yellow	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Moderate
CDC Mozart	Smooth Yellow	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Late
DS Admiral	Smooth Yellow	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Moderate
Cruiser	Smooth Green	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Moderate
Stirling	Smooth Green	Food/Feed	Small	Semi-Leaf/Semi-Dwarf	Early
Medora	Smooth Green	Food/Feed	Small	Semi-Leaf/Semi-Dwarf	Late
PS01102958	Smooth Yellow	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Moderate
PS9910140	Smooth Yellow	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Moderate
PS0010836	Smooth Yellow	Food/Feed	Medium	Semi-Leaf/Semi-Dwarf	Moderate

[1/] - Seed Size Ranges (g/1000 seeds) : Very Large = >290-295 Medium = 190-250
- {Size of seed at planting} Large = 250-290 Small = <190

[2/] - Relative Maturity (days to flower) as compared with other varieties tested;
Late: 2+ Days later than average
Mod: ± 1 Day from average
Early: 2+ Days earlier than average

Table 1b. 2008 Statewide Spring Lentil Variety Evaluation - Variety Characteristic Table
- Exp: 85xx08. Montana State University - Montana Agricultural Experiment Stations

Entry	Type	Seed Color Coat	Cotyledon	Size1/	Maturity	Seed Source
CDC Vantage	Richlea	Green	Yellow	Medium	Moderate	CARC
Brewer	Brewer	Mottled Green	Yellow	Medium	Mod Early	Spokane Seeds
Crimson	Turkish	Brown	Red	Small	Mod Early	Spokane Seeds
Merrit	Richlea	Green	Yellow	Large	Moderate	USDA-ARS
Pennell	Richlea	Green	Yellow	Large	Moderate	USDA-ARS
Riveland	Laird	Green	Yellow	Large	Late	USDA-ARS
LC01602307E	Eston	Green	Yellow	Small	Early	CARC
LC01602062T	Turkish	Brown	Red	Small	Moderate	CARC
LC01602245P	Pardina	Brown	Yellow	Small	Moderate	CARC
LC01602300R	Richlea	Green	Yellow	Medium	Moderate	CARC

[1/] - Seed Size Classes: Small: < 40.0 g/1000 Large: > 60.0 g/1000
Medium: 40.0 - 60.0 g/1000

Table 1. 2009 Statewide Spring Pulse Variety Evaluations - Site management summary.
-Exp. 80 & 85. Montana State University - Montana Agricultural Experiment Stations, Central Ag. Research Center, Moccasin, MT

Field Summary	Moccasin[1/]	Havre	Sidney	Richland[2/]	Conrad	Huntley	Bozeman	Corvallis	Creston
Environment:	Dryland	Dryland	Dryland	Dryland	Dryland	Dryland	Dryland	Irrigated	Dryland
Tillage History:	No-Till	No-Till	Cov-Till	No-Till	Conv-Till	No-Till	No-Till	Conv-Till	Conv-Till
Previous Crop:	Brly/W W	Barley	Fallow	Spr Wht	Fallow	Fallow	Spr Wht	Buckwheat	Alfalfa
Soil Type:	Judith C-L	Joplin C-L	Williams C-L	Farnuf Loam	Scobey C-L	Ft Collins C-L	AmstrdmSi-L	Burnt Fork L	Creston Si-L
Elevation:	4250'	2700'	2200'	2950'	3665'	3020'	4500'	3600'	2970'
Trial Management									
Seeding Date:	04/13/09	04/13/09	04/22/09	05/07/09	04/13/09	03/23/09	04/22/09	04/24/09	05/01/09
Fertilizer:	None	None	None	None	3-20-10 (w/sd)	30lbsN	5.5-26-26-9	11-52-40	None
Plot Size:	90 ft^2	88 ft^2	50 ft^2	50 ft^2	125 ft^2	140 ft^2	120 ft^2	80 ft^2	80 ft^2
Pesticides: (rates)	sulfentrazone ($5oz\ ac^{-1}$) glyphosate (14-16oz/ac) quizalofop (10oz/acre) carbaryl	glyphosate ($16oz\ ac^{-1}$) Hand-Weed	ethalfluralin ($2\ pt\ ac^{-1}$)	ethalfluarlin (?) [Farmer	ethalfluralin ($2\ pt\ ac^{-1}$) bentazon salt (1.5 pt/a)	none	none	pendimethalin ($2\ pt\ ac^{-1}$) MCPB () bentazon salt ()	none
Harvest Date:	8/1-11/09	7/24& 8/1/09	08/13/09	08/25/09	08/17/09	07/21/09	08/20/09	8/18/09	8/11&8/20/09
Crop-Yr Precip:	8.15"	5.56"	8.87"	9.50"	8.29"	7.07"	7.14"	2.01"	7.03"
	4/1 - 7/31	4/1-7/24	4/1 - 8/31	5/4 - 9/25	4/1 - 8/31	3/23 - 7/21	4/27 - 8/4	grow season	5/1 - 8/31
Site Ave:	8.89"	['6.13"-Lent]	9.41"		7.05"	[7.91" - Lent]			
Observations:	Cool Dry May - June		Dry May-June Rain in July	Some Shatter			Some hail in mid-bloom	+ 6.00" Irr	

[1/] - Lentil trial failed due to chemical damage

[2/] - Richland site was on Marvin Tarum's farm near Richland, Valley County, Montana

Table 2. 2009 Statewide Spring Pulse Variety Evaluations - Variety characteristics table.
- Exp: 80 & 85. MSU-MAES, Central Ag. Research Center, Moccasin, MT

a. - Dry Pea Varieties:

Variety	Color	Size[1/]	Maturity[2/]	Resistance/Claim	Breeding Co.	Release Yr
Delta	Yellow	Medium	Mod	*Fusarium*- 1, Old Var.	Cebeco-Zaden (Limagrain)	1990-95
DS Admiral	Yellow	Medium	Mod	Powdery Mildew	Danisco	2000
CDC Golden	Yellow	Medium	Mod	Stem Strength	Crop Development Centre	2003
SW Midas	Yellow	Medium	Late	Stem Strength, PM	Swalöf-Weibull AB	2004
CDC Mozart	Yellow	Medium	Late	Powdery Mildew	Crop Development Centre	2002
Majoret	Green	Medium	Late	None; Old Variety	Swalöf-Weibull AB	1994
Cruiser	Green	Medium	Mod	*Fusarium*- 1, Mosaic Virus, PM, Color	Progene Plant Research-Crop Food Research, NZ	2002
Medora	Green	Medium	Late	Tall, Powdery Mildew	USDA-ARS	2006
Stirling	Green	Medium	Early	Early, *Fusarium* - 1, PM	USDA-ARS	2002
CDC Striker	Green	Medium	Late	Mod plant height	Crop Development Centre	2002
PS01102958	Yellow	Medium	Mod	Experimental	USDA-ARS	Not
PS9910140	Yellow	Medium	Mod	Experimental	USDA-ARS	Not
PS0010836	Yellow	Medium	Mod	Experimental	USDA-ARS	Not

[1/] - Seed Size Ranges (g/1000 seeds) Very Large = >290-295 Medium = 190-250
- {Size of seed at planting} Large = 250-290 Small = <190

b. - Lentil Varieties:

Entry	Type	Seed Color: Coat	Seed Color: Cotyledon	Size[1/]	Maturity	Breeding Co	Release
CDC Richlea	Richlea	Green	Yellow	Medium	Mod Late	Crop Development Centre	1994
CDC Vantage	Richlea	Green	Yellow	Medium	Mod	Crop Development Centre	1998
CDC Meteor	Richlea	Green	Yellow	Medium	Mod	Crop Development Centre	2006
Brewer	Brewer	Green-Mtld	Yellow	Medium	Mod Early	USDA-ARS	1984
Crimson	Turkish	Brown	Red	Small	Mod Early	USDA-ARS	1990
CDC Redberry	Turkish	Gray	Red	Small	Mod	Crop Development Centre	2005
Merrit	Richlea	Green	Yellow	Large	Mod	USDA-ARS	2003
Pennell	Richlea	Green	Yellow	Large	Mod	USDA-ARS	2003
Riveland	Laird	Green	Yellow	Large	Late	USDA-ARS	2007
Essex (2307E)	Eston	Green	Yellow	Small	Early	USDA-ARS	2009
LC01602062T	Turkish	Brown	Red	Small	Mod	USDA-ARS	Not
LC01602245P	Pardina	Brown	Yellow	Small	Mod	USDA-ARS	Not
LC01602300R	Richlea	Green	Yellow	Medium	Mod	USDA-ARS	Not

[1/] - Seed Size Classes: Small: < 40.0 g/1000 Large: > 60.0 g/1000
Medium: 40.0 - 60 g/1000

[2/] - Relative Maturity (days to flower) as compared with other varieties tested;

Late: 2+ Days later than average
Mod: ± 1 Day from average
Early: 2+ Days earlier than average

Table 3. 2009 Statewide Dry Pea Variety Evaluation Trial. Statewide grain yield summary.
-Exp. 80. Montana State University - Montana Ag. Experiment Stations, Central Ag. Research Center, Moccasin, MT

Entry	Moccasin	Havre	Sidney	Richland	Conrad	Huntley	Bozeman	Corvallis	Creston
	(lbs acre^{-1})								
Delta	1057 [a]	2446 [a]	1887	2029 [a]	3996 [a]	2211	2122	3276	3590
DS Admiral	**1125** [a]	2331 [a]	1757	1993 [a]	3607	2322	2444 [a]	2882	3120
CDC Golden	944	2349 [a]	2072	**2522** [a]	3400	2050	2232	3125	3397
SW Midas	951 [a]	2314 [a]	1511	1414	3620	2026	1983	2828	3687
CDC Mozart	973 [a]	**2554** [a]	**2386** [a]	1982 [a]	**4223** [a]	**2592** [a]	**2746** [a]	**3457** [ns]	**4051** [ns]
Majoret	978 [a]	2352 [a]	2080	2238 [a]	3345	2176	2180	3278	3625
Cruiser	970 [a]	2254	1806	1820	3154	2193	2209	3046	3175
Medora	1108 [a]	2172	1956	2355 [a]	2917	1987	2348	3252	3551
Stirling	1115 [a]	2327 [a]	1658	1620	3932 [a]	2291	1997	3144	2638
CDC Striker	921	2154	1988	2004 [a]	3189	2102	2304	3144	3248
PS01102958	934	1974	1392	1203	3931 [a]	2124	1925	2531	3100
PS9910140	929	2368 [a]	2239 [a]	1793	3932 [a]	2273	1736	3072	3332
PS0010836	836	2383 [a]	1826	1929 [a]	3606	2438 [a]	2062	3284	3277
Trial Means	988	2361	1964	1951	3585	2214	2176	3101	3368
$LSD_{0.05}$(by t)	175	290	301	594	479	239	305	ns	ns
CV% (s/means)	12.28	8.68	9.2	21.29	8.0	7.5	9.7	14.09	17.01

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

[ns] - Denotes no statistical significance based on protected $LSD_{0.05}$.

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Table 4. 2009 Statewide Dry Pea Variety Evaluations - Seed weight summary.
- Exp: 80. MSU-MAES, Central Ag. Research Center, Moccasin, MT

Variety	Moccasin	Havre	Sidney	Richland	Conrad	Huntley
a.	---------- (lbs bu^{-1}) ----------					
Delta	**65.7** [ns]	**66.5** [a]	64.5 [a]	61.1	64.6	**65.8** [a]
DS Admiral	63.1	64.6	64.0	60.7	65.1 [a]	64.9
CDC Golden	63.1	65.3	64.3 [a]	**62.3** [a]	65.2 [a]	65.4 [a]
SW Midas	63.4	64.6	64.3 [a]	61.3	64.8 [a]	64.5
CDC Mozart	63.2	65.7	**64.8** [a]	61.8 [a]	64.5	65.7 [a]
Majoret	63.8	65.8	63.8	60.6	64.6	65.5 [a]
Cruiser	62.8	63.7	63.2	60.5	64.1	63.6
Medora	63.0	64.4	62.2	60.0	63.5	64.7
Stirling	62.6	64.2	64.3 [a]	61.7 [a]	64.7 [a]	64.5
CDC Striker	63.9	65.5	64.0	62.2 [a]	**65.6** [a]	65.2 [a]
PS01102958	62.8	65.3	64.5 [a]	61.1	65.1 [a]	65.1 [a]
PS9910140	62.5	63.9	62.5	60.0	63.9	63.4
PS0010836	63.0	64.9	63.2	59.5	64.1	63.9
Trial Means	63.3	65.0	63.8	61.0	64.5	64.8
$LSD_{0.05}$ (by t)	ns	0.7	0.8	0.8	1.0	0.7
CV% (s/means)	1.94	0.75	0.7	0.8746	0.9	0.8

b.	Moccasin	Havre	Sidney	Conrad	Huntley	Bozeman	Creston
	---------- (g 1,000-kernels^{-1}) ----------						
Delta	231	248	285	266 [a]	223	235	246
DS Admiral	233	244	270	249 [a]	240	243	224
CDC Golden	210	218	270	235	217	220	188
SW Midas	214	214	248	218	206	213	184
CDC Mozart	233	237	281	258 [a]	221	230	244
Majoret	205	222	261	227	200	216	205
Cruiser	207	216	252	239	204	205	232
Medora	207	226	275	223	210	212	212
Stirling	219	220	232	222	190	212	205
CDC Striker	235	242	283	250 [a]	237	242	248
PS01102958	242	257	287 [a]	265 [a]	**260** [a]	255 [a]	249
PS9910140	231	244	288 [a]	252 [a]	210	226	235
PS0010836	**249** [a]	**266** [a]	**306** [a]	**266** [a]	233	**266** [a]	**263** [ns]
Trial Means	224	236	276	242	219	229	226
$LSD_{0.05}$ (by t)	6	8	20	17	17	12	ns
CV% (s/means)	1.8	2.5	4.4	4.3	5.5		17

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

[ns] - Denotes no statistical significance was observed

Table 5. 2009 Statewide Dry Pea Variety Evaluations - Bloom date summary.
- Exp: 80. MSU-MAES, Central Ag. Research Center, Moccasin, MT

Variety	Moccasin	Havre	Sidney	Conrad	Huntley	Corvallis	Creston
Delta	27-Jun	16-Jun [a]	20-Jun	23-Jun	7-Jun	22-Jun [a]	25-Jun
DS Admiral	27-Jun	19-Jun	22-Jun	25-Jun	10-Jun	26-Jun	27-Jun
CDC Golden	27-Jun	18-Jun	22-Jun	25-Jun	10-Jun	25-Jun	28-Jun
SW Midas	27-Jun	19-Jun	22-Jun	26-Jun	11-Jun	26-Jun	28-Jun
CDC Mozart	28-Jun	17-Jun	20-Jun	23-Jun	6-Jun	23-Jun [a]	28-Jun
Majoret	28-Jun	19-Jun	22-Jun	26-Jun	11-Jun	24-Jun	25-Jun
Cruiser	27-Jun	17-Jun	19-Jun	23-Jun	6-Jun	23-Jun [a]	29-Jun
Medora	29-Jun	19-Jun	23-Jun		11-Jun	28-Jun	2-Jul
Stirling	**24-Jun** [a]	**15-Jun** [a]	**15-Jun** [a]	**22-Jun** [na]	**2-Jun** [a]	**22-Jun** [a]	**20-Jun** [a]
CDC Striker	28-Jun	18-Jun	23-Jun	25-Jun	11-Jun	29-Jun	2-Jul
PS01102958	28-Jun	19-Jun	23-Jun	25-Jun	10-Jun	26-Jun	1-Jul
PS9910140	27-Jun	17-Jun	21-Jun	25-Jun	10-Jun	24-Jun	28-Jun
PS0010836	28-Jun	18-Jun	22-Jun	25-Jun	11-Jun	22-Jun [a]	27-Jun
Trial Means	27-Jun	17-Jun	21-Jun	24-Jun	9-Jun	24-Jun	28-Jun
LSD0.05 (by t)	1	1	1		1	1	2
CV% (s/means)	0.31	0.41	1.0		0.5	0.00	0.60

[a] - Denotes dates equal to earliest date (in **bold**), based on $LSD_{0.05}$.

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Table 6. 2009 Statewide Spring Dry Pea Variety Evaluations - Plant canopy heights.
- Exp: 80. Montana State University-Montana Ag. Experiemnt Stations, Central Ag. Research Center, Moccasin, MT

	Physiological Maturity Height				Grain Maturity Height							
ENTRY	Moccasin	Havre	Corvallis	Creston	Moccasin	Havre	Sidney	Richland	Conrad	Huntley	Cor vallis	Creston
	---------- in ----------				---------- in ----------							
Delta	11.4	15.6	18.0	19.5	13.4 [a]	14.0	11.3	11.9	26.0	24.5	16.8	19.3
DS Admiral	15.2 [a]	**18.3** [a]	22.5 [a]	24.3 [a]	14.1 [a]	**16.5** [a]	15.7 [a]	**16.8** [a]	**35.0**	30.5 [a]	21.1 [a]	24.3 [a]
CDC Golden	15.3 [a]	17.3 [a]	21.8	22.5	15.0 [a]	16.1 [a]	16.7 [a]	14.7 [a]	34.0	30.2 [a]	18.6	19.5
SW Midas	13.4	16.3	23.3 [a]	25.5 [a]	13.2 [a]	14.5 [a]	13.8	14.4	32.0	26.6	20.8 [a]	21.5 [a]
CDC Mozart	11.2	13.2	18.3	19.3	10.5	12.4	14.8	11.9	32.0	24.9	13.2	18.3
Majoret	13.7 [a]	15.8	19.4	**26.8** [a]	13.9 [a]	14.3	13.3	12.7	32.0	27.5	15.4	**25.0** [a]
Cruiser	12.5	17.3 [a]	21.0	21.0	12.2	15.6 [a]	15.6 [a]	13.0	30.0	29.1 [a]	20.5 [a]	18.3
Medora	**15.9** [a]	17.8 [a]	**24.9** [a]	24.3 [a]	**15.5** [a]	16.0 [a]	**18.4** [a]	14.7 [a]	33.0	**31.3** [a]	**24.1** [a]	23.8 [a]
Stirling	9.7	14.8	14.7	16.5	10.7	13.3	10.8	9.4	28.0	23.5	10.1	15.5
CDC Striker	12.8	16.9 [a]	22.3 [a]	24.0 [a]	12.9 [a]	15.9 [a]	17.2 [a]	15.1 [a]	36.0	30.1 [a]	19.9	21.8 [a]
PS01102958	10.1	14.1	19.2	19.5	9.6	13.9	12.1	11.2	29.0	27.6	17.3	18.3
PS9910140	10.7	13.1	9.3	20.5	10.5	12.5	11.3	12.0	29.0	24.4	8.3	18.5
PS0010836	9.4	13.6	15.4	18.5	8.8	12.2	10.1	10.4	26.0	25.9	14.2	17.3
Trial Means	12.4	16.22	19.2	21.7	12.3	14.9	14.3	13.0	31.3	27.4	16.9	20.1
$LSD_{0.05}$ (by t)	2.4	1.57	2.8	3.4	3.0	2.07	2.9	2.4		3.5	3.6	5.3
CV% (by t)	13.21	6.83	10.03	11	6.58	9.81	12.4	13.11		8.8	14.77	18.29

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

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Table 7. 2009 Statewide Spring Dry Pea Variety Evaluations - Shrinkage/Harvestability summary.
- Exp: 80. MSU-MAES, Central Ag. Research Center, Moccasin, MT

	Shrinkage/Harvestability				
Variety	Moccasin	Havre	Corvallis	Creston	LODGING
	Grain Ht/Phys. Ht				rating
Delta	**1.213** [ns]	0.892	0.934	0.998	0.8
DS Admiral	0.984	0.898	0.936	**1.002** [ns]	0.8
CDC Golden	0.975	0.935	0.852	0.856	1.0
SW Midas	0.933	0.887	0.892	0.859	0.8
CDC Mozart	0.961	0.937	0.722	0.959	1.2
Majoret	1.023	0.907	0.795	0.938	0.8
Cruiser	1.003	0.898	0.977	0.876	1.1
Medora	1.047	0.899	0.967	0.980	0.0
Stirling	1.137	0.895	0.687	0.968	1.3
CDC Striker	1.007	0.943	0.892	0.897	0.1
PS01102958	0.979	0.986	0.903	0.921	1.0
PS9910140	0.981	0.952	0.887	0.911	2.5 [a]
PS0010836	0.881	0.902	0.925	0.946	1.5 [a]
Trial Means	1.009	0.917	0.881	0.931	1.0
$LSD_{0.05}$ (by t)	ns			ns	1.1
CV% (s/means)	16.3			14.9	80.0

[ns] - Denotes no statistical significance.

Table 8. 2009 Statewide Spring Lentil Variety Evaluations - Grain yield summary.
- Exp: 85. Montana State University - Montana Ag. Experiment Stations, Central Ag. Research

Cultivar	Havre	Sidney	Richland	Conrad	Huntley	Corvallis	Creston
	---------- lbs ac^{-1} ----------						
CDC Richlea	1546	1699 [a]	**1596**	2831 [a]	1603	**2552** [a]	2831 [a]
CDC Vantage	1628	1594 [a]	1453	1887	1283	1339	2397
CDC Meteor	**1950** [a]	1755 [a]	1429	2450	1150	1376	2449
Brewer	1173	1103	939	2272	494	940	2460
Crimson	1072	836	1308	1921	1294	1629	2082
CDC Redberry	1217	1332	1296	2234	1217	2411 [a]	2326
Merrit	1331	1407	1098	2183	947	1411	2829 [a]
Pennell	1493	1427	1134	2578	1310	1951	2487
Riveland	1368	1387	1013	2127	1814	1353	2478
Essex (2307E)	1654 [a]	**1768** [a]	1181	**3248** [a]	**2103** [ns]	2224 [a]	2395
LC01602062T	1038	885	917	2385	1508	1879	2465
LC01602245P	909	712	951	2627	1524	1904	2574 [a]
LC01602300R	1807 [a]	1653 [a]	1284	3113 [a]	1916	2495 [a]	**3016** [a]
Trial Means	1399	1351	1333	2451	1397	1805	2522
$LSD_{0.05}$ (by t)	302	260		559	ns	395	448
CV% (s/means)	15.1	11.4		13.5	43.0	15.2	12.4

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

[ns] - Denotes no statistical significance

Table 9. 2009 Statewide Spring Lentil Variety Evaluations - Test weight and kernel weight summary.
- Exp: 85. MSU-MAES, Central Ag. Research Center, Moccasin, MT

	Test Weight				Thousand Kernel Weight			
Cultivar	Havre	Sidney	Richland	Huntley	Havre	Sidney	Huntley	Creston
	---------- lb bu^{-1} ----------				---------- g 1,000-kernels^{-1} ----------			
CDC Richlea	62.2	61.0	60.1	61.3	56.7	54.3	50.5	54.4
CDC Vantage	63.0	61.3	59.3	62.3	55.4	53.7	50.4	52.1
CDC Meteor	62.8	61.7	59.2	61.7	55.8	57.7	49.9	49.7
Brewer	60.9	60.5	58.9	59.0	63.0	67.3	54.6	63.5
Crimson	64.0	63.0	**62.5** [a]	63.9 [a]	39.2	38.0	33.9	34.3
CDC Redberry	63.6	62.5	61.6 [a]	63.2	46.2	45.7	41.1	44.8
Merrit	60.7	59.5	58.5	58.9	66.8	73.7	61.6	70.0
Pennell	59.9	59.5	58.2	58.8	69.3	72.7	63.1	69.8
Riveland	59.6	59.0	55.7	58.3	**75.8** [a]	**80.3** [a]	**67.1** [a]	**79.8** [a]
Essex (2307E)	63.3	61.8	61.4 [a]	62.7	50.3	46.7	44.5	46.4
LC01602062T	63.8	62.8	60.0	63.4	45.7	50.7	45.3	48.1
LC01602245P	**64.8** [a]	**64.8** [a]	62.1 [a]	**64.6** [a]	42.5	44.3	37.1	44.4
LC01602300R	62.5	61.5	61.1 [a]	61.9	56.1	52.0	51.0	54.7
Trial Means	62.4	61.5	59.9	61.5	55.6	56.7	50.0	54.8
$LSD_{0.05}$ (by t)	0.6	0.4	1.7	1.2	4.4	3.0	2.1	1.9
CV% (s/means)	0.64	0.42	1.94	1.33	5.55	3.18	2.94	0.43

[a] - Denotes values equal to the largest value (in **bold**), based on protected $LSD_{0.05}$.
[ns] - Denotes no statistical significance

Table 10. 2009 Statewide Spring Lentil Variety Evaluations - Fowering date summary.
-Exp: 85. MSU-MAES, Central Ag. Research Center, Moccasin, MT

	Flowering Date					
Cultivar	Havre	Sidney	Conrad	Huntley	Corvallis	Creston
	---------- date ----------					
CDC Richlea	18-Jun	21-Jun	24-Jun	10-Jun	26-Jun	28-Jun
CDC Vantage	17-Jun	19-Jun	23-Jun	7-Jun	24-Jun	26-Jun
CDC Meteor	17-Jun	20-Jun	23-Jun	11-Jun	25-Jun	29-Jun
Brewer	**15-Jun** [a]	**18-Jun** [a]	22-Jun	3-Jun [a]	21-Jun [a]	**19-Jun** [a]
Crimson	18-Jun	20-Jun	23-Jun	10-Jun	25-Jun	29-Jun
CDC Redberry	20-Jun	21-Jun	23-Jun	10-Jun	26-Jun	29-Jun
Merrit	**15-Jun** [a]	18-Jun [a]	**21-Jun** [na]	3-Jun [a]	**21-Jun** [a]	**19-Jun** [a]
Pennell	17-Jun	19-Jun	22-Jun	4-Jun [a]	**21-Jun** [a]	20-Jun
Riveland	17-Jun	19-Jun	23-Jun	8-Jun	**21-Jun** [a]	22-Jun
Essex (2307E)	17-Jun	21-Jun	24-Jun	11-Jun	26-Jun	29-Jun
LC01602062T	17-Jun	**18-Jun** [a]	22-Jun	6-Jun	**21-Jun** [a]	21-Jun
LC01602245P	18-Jun	19-Jun	22-Jun	7-Jun	21-Jun [a]	22-Jun
LC01602300R	17-Jun	19-Jun	22-Jun	9-Jun	22-Jun [a]	24-Jun
Trial Means	17-Jun	19-Jun	22-Jun	8-Jun	23-Jun	24-Jun
$LSD_{0.05}$ (by t)	1	1		1	2	1
CV% (s/means)	0.5	0.9		0.4	0.7	0.5

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

[na] - Denotes no statistical analysis was performed

Table 11. 2009 Statewide Spring Lentil Variety Evaluations - Plant heights and shrinkage or lodging summary.
- Exp: 85. MSU-MAES, Central Ag. Research Center, Moccasin, MT

	Phys. Mature Ht		Grain Mature Canopy Height							Shrink/Lodging	
Cultivar	Havre	Corvallis	Havre	Sidney	Richland	Conrad	Huntley	Corvallis	Creston	Havre	Creston
	----- in -----		---------- in ----------							Grain Ht/Phys Ht	
CDC Richlea	11.2	14.2 [a]	9.4	18.3	29.0 [a]	19.0	16.4	11.8	15.3	0.839	3.5
CDC Vantage	11.5	13.1	10.3 [a]	25.0 [a]	**29.3** [a]	20.0	17.9 [a]	10.8	15.5	0.888	6.5
CDC Meteor	13.4 [a]	11.6	9.9 [a]	24.3 [a]	26.5 [a]	18.0	**18.2** [a]	9.4	**17.3** [a]	0.742	**8.5** [a]
Brewer	11.1	10.9	8.9	21.0 [a]	24.3 [a]	19.0	16.1	9.9	15.3	0.805	6.8
Crimson	9.6	12.1	7.7	15.7	19.0	14.0	14.3	10.3	12.8	0.803	8.3 [a]
CDC Redberry	12.3 [a]	**16.6** [a]	9.4	22.3 [a]	24.0	16.0	16.2	**16.7** [a]	15.8	0.758	2.0
Merrit	11.1	11.4	9.9 [a]	20.7 [a]	26.5 [a]	16.0	17.0 [a]	10.0	14.5	0.895	5.0
Pennell	11.9	13.0	9.4 [a]	25.3 [a]	26.5 [a]	17.0	16.4	12.1	15.3	0.793	4.8
Riveland	**13.5** [a]	12.8	**10.7** [a]	**28.0** [a]	25.8 [a]	19.0	17.1 [a]	9.7	16.8 [a]	0.797	6.3
Essex (2307E)	11.4	14.4 [a]	10.4 [a]	22.7 [a]	27.5 [a]	21.0	17.5 [a]	11.2	15.5	**0.907** [na]	5.5
LC01602062T	10.6	12.7	7.7	21.0 [a]	18.3	18.0	15.5	11.3	13.8	0.732	5.5
LC01602245P	10.6	11.4	7.8	17.0	16.5	17.0	13.9	12.0	11.8	0.739	8.0 [a]
LC01602300R	12.6 [a]	15.3 [a]	10.5 [a]	24.0 [a]	27.3 [a]	**22.0** [na]	17.2 [a]	14.1 [a]	16.0	0.837	1.3
Trial Means	11.6	13.0	9.4	22.0	24.6	18.2	16.4	11.5	15.0	0.810	5.5
$LSD_{0.05}$ (by t)	1.4	3.0	1.3	7.699	5.1		1.3	3.8	1.2		1.4
CV% (s/means)	8.15	15.8	9.60	20.81	14.46		5.4	23.37	5.774		17.71

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

[na] - Denotes no statistical analysis was performed

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Table 12. 2009 Statewide Dry Pea Variety Evaluation Trial. Two-year dry pea grain yield summary.
-Exp. 80. Montana State University - Montana Ag. Experiment Stations, Central Ag. Research Center, Moccasin, MT

Entry	Moccasin		Havre		Sidney		Richland		Conrad		Huntley		Bozeman[1/]		Corvallis		Creston	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
	(lbs acre^{-1})																	
Delta	1052 *	1057 *	3701	2446 *	1420 *	1887	1633 *	2029 *	2177	3996 *	2043	2211	1882 *	2122	1686	3276	**3633** *	3590
DS Admiral	**1204** *	**1125** *	3922	2331 *	1078	1757	1536	1993 *	1966	3607	-----	2322	1846 *	2444 *	1803	2882	3398 *	3120
CDC Golden	-----	944	-----	2349 *	-----	2072	-----	**2522** *	-----	3400	-----	2050	-----	2232	-----	3125	-----	3397
SW Midas	-----	951 *	-----	2314 *	-----	1511	-----	1414	-----	3620	-----	2026	-----	1983	-----	2828	-----	3687
CDC Mozart	923	973 *	4116 *	**2554** *	**1489** *	**2386** *	**1932** ns	1982 *	**2033** ns	**4223** *	1841	**2592** *	1604	**2746** *	1727	**3457** ns	3207	**4051** ns
Majoret	789	978 *	3506	2352 *	1048	2080	1457	2238 *	1884	3345	1680	2176	1766	2180	2027	3278	3242 *	3625
Cruiser	786	970 *	3926 *	2254	1398 *	1806	1456	1820	1592	3154	-----	2193	1438	2209	1302	3046	2724	3175
Medora	912	1108 *	3464	2172	1277	1956	1549	2355 *	1887	2917	1822	1987	1697	2348	1723	3252	2885	3551
Stirling	1025 *	1115 *	4121 *	2327 *	1159	1658	1590	1620	1811	3932 *	2622 *	2291	**1994** *	1997	1617	3144	3281 *	2638
CDC Striker	-----	921	-----	2154	-----	1988	-----	2004 *	-----	3189	-----	2102	-----	2304	-----	3144	-----	3248
PS01102958	874	934	3427	1974	1187	1392	-----	1203	2287	3931 *	1612	2124	-----	1925	1506	2531	3162	3100
PS9910140	1017 *	929	**4288** *	2368 *	1081	2239 *	-----	1793	2203	3932 *	**2712** *	2273	-----	1736	**2904** ns	3072	3188	3332
PS0010836	1101 *	836	4260 *	2383 *	1309 *	1826	-----	1929 *	1877	3606	1287	2438 *	-----	2062	1652	3284	3473 *	3277
Trial Means	968	988	3873	2361	1245	1964	1677	1951	1836	3585	1937	2214	1747	2176	1794	3101	3219	3368
$LSD_{0.05}$(by t)	195	175	363	290	471	301	ns	594	ns	479	471	239	227	305	ns	ns	398	ns
CV% (s/means)	13.9	12.3	6.5	8.68	16.6	9.2	15.4	21.3		8.0	16.6	7.5	8.7	9.7	38.6	14.09	8.6	17.01

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

ns - Denotes no statistical significance based on protected $LSD_{0.05}$.

1/ - Bozeman site in 2008 was on producer's field near Amsterdam, MT, aprox. 20 miles west of Bozeman

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Table 13. 2009 Statewide Spring Lentil Variety Evaluations - Two-year grain yield summary.
- Exp: 85. Montana State University - Montana Ag. Experiment Stations, Central Ag. Research

Cultivar	Moccasin		Havre		Sidney		Richland		Conrad		Huntley		Corvallis		Creston	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
	---------- lbs ac^{-1} ----------															
CDC Richlea	-----	Abandoned due to severe chemical damage	-----	1546	Abandoned due to poor stand establishment	1699 *	-----	**1596** *	-----	2831 [a]	-----	1603	-----	**2552** *	-----	2831 *
CDC Vantage	1751 *		1434	1628		1594 *	**1254** *	1453 *	398	1887	964	1283	964	1339	2089	2397
CDC Meteor	-----		-----	**1950** *		1755 *	-----	1429 *	-----	2450	-----	1150	-----	1376	-----	2449
Brewer	1395		1371	1173		1103	992	939	357	2272	950	494	738	940	1844	2460
Crimson	1655 *		1277	1072		836	1247 *	1308 *	403	1921	1597	1294	1262	1629	2309	2082
CDC Redberry	-----		-----	1217		1332	-----	1296	-----	2234	-----	1217	-----	2411 *	-----	2326
Merrit	1501		**1892** *	1331		1407	1105 *	1098	510 *	2183	1210	947	1192	1411	2445 *	2829 *
Pennell	1614		1755 *	1493		1427	1077 *	1134	543 *	2578	1380	1310	1221	1951	2256	2487
Riveland	1572		1686 *	1368		1387	910	1013	433 *	2127	957	1814	798	1353	2046	2478
Essex (2307E)	1743 *		1680 *	1654 *		**1768** *	-----	1181	512 *	**3248** [a]	1586	**2103** [ns]	**1688** *	2224 *	2670 *	2395
LC01602062T	1599		1421	1038		885	-----	917	453 *	2385	1515	1508	973	1879	2310	2465
LC01602245P	1733 *		1619 *	909		712	-----	951	332	2627	**1836** *	1524	948	1904	2477 *	2574 *
LC01602300R	**1800** *		1844 *	1807 *		1653 *	-----	1284	559 *	3113 [a]	1457	1916	1338 *	2495 *	**2676** *	**3016** *
Trial Means	1636		1598	1399		1351	1108	1200	450	2451	1336	1397	1112	1805	2312	2522
$LSD_{0.05}$ (by t)	176		325	302		260	230	288	142	559	224	ns	386	395	270	448
CV% (s/means)	7.4		14.0	15.1		11.4	12.1	16.8	21.7	13.5	8.6	43.0	23.9	15.2	8.1	12.4

* - Denotes values equal to the largest value (in **bold**), based on protected $LSD_{0.05}$.

[ns] - Denotes no statistical significance

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