PROJECT TITLE: Statewide evaluation of lentil variety performance (Montana Statewide Lentil Performance Trial).

EXPERIMENT NO: #8507

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(This Report Summarizes the Moccasin Testing Site Only)

OBJECTIVES:
To evaluate the performance of lentil varieties under different climatic and cropping conditions across Montana.

METHODS:
The 2002 Montana Statewide Lentil Variety Performance Trial (SLPT) included ten lentil varieties, established at five dryland sites (Sidney, Moccasin, Huntley, Conrad, and Denton) and at two irrigated sites (Corvallis and Creston). Lentil entries ranged in seed kernel size, maturity and color (**Tables 6**). The trial was seeded on April 15th, into no-tillage, re-cropped barley and harvested during the first week of August (**Table 7**). Other important production methods for each testing site are summarized in **Table 7**.

RESULTS:
Drought-like conditions persisted into the 2002 cropping year across much of Montana. At the Moccasin site, crop-year precipitation (April through July) was 86% of normal, which received 1.14 inches below the normal growing season precipitation.

Lentil Grain Yields: The lentil grain production at Moccasin, averaged 1,631 pounds per acre (27.2 bu/acre **Table 8**). The Crop Development Centre's (CDC) entry Vantage green lentil was the top lentil producer at Moccasin in 2002 (1,848 lbs/acre), but was only significantly higher (based on $LSD_{(0.05)}$) than Red Chief, Pardina and Crimson lentils.

Seed Kernel Weights: CDC Glamis, a Laird-type, large green lentil, had the largest 1,000 kernel weight, averaging 70 grams. The trial averaged 52.8 grams per 1,000 seeds (**Table 8**). Pardina brown and Crimson small red lentils had the highest test weights, averaging 63.6 and 63.5 pounds per bushel, respectively. The had an average test weight of 60.8 pounds per bushel.

Plant Heights: Plant canopy heights were measured at physiological and grain maturity (**Table 8**). At physiological maturity, Laird and CDC Vantage were the tallest (12.0 inches for both), but were not significantly taller (based on $LSD_{(0.05)}$) than CDC Glamis, CDC Richlea and Red Chief. Larid was the tallest entry at grain maturity, with a canopy height of 12.4 inches, but was not significantly taller (based on $LSD_{(0.05)}$) than CDC Glamis and CDC Vantage. Although not significant, Crimson red lentil had the best standability index, with a grain mature plant height to vine length ratio of 0.925 (**Table 8**).

Growth Stages: Although unreplicated, Crimson small red lentil had the earliest lentil for both days to flower and grain maturity, reaching first flower 69 and grain maturity 108 days from seeding (**Table 9**). Overall, flowering occurred 71 days from seeding. Pod formation occurred 8 days from flowering and began to fill 6 days later. Twenty-five days from flowering (11 days from pod fill), the lentils reached physiological maturity and became grain ripe 16 days later.

SLPT Multi-year (1998 - 2002) Summary: Selected lentil entries' grain yields, which were involved in the Statewide Lentil Performance Trial for three or more years since 1998, were summarized (**Table 10**). Since 1998, CDC Milestone, a small green lentil (Eston-type), had the most lentil grain production, with an average of 1,431 pounds per acre (23.9 bu/acre), but was only significantly greater than Laird, French Green, Crimson and Indianhead lentils. Overall, lentil yields at Moccasin have averaged just over 1,200 pounds per acre (20 bu/acre), between 1998 and 2002. When yields were compared with Laird large green lentil (an industry standard), only CDC Milestone had consistently better yields than Laird (125% of Laird, which is greater than the $LSD_{(0.05)}$ of 20%).

FUTURE RESEARCH:
Variety trials may continue on a statewide basis to evaluate lentil varieties for adaptation in different Montana climates and to provide a more comprehensive statewide lentil grain database.

Table 6. 2002 Montana Statewide Lentil Performance Trial - Lentil variety characteristic summary.
- Exp. 850002. Central Agricultural Research Center, Moccasin, MT **{File: 850702:Character}**

			Color		Size	
Variety	Seed Source	Usage	Seedcoat	Cotyledon	Class[1/]	Maturity
Laird	Columbia Grain	Food	Green	Yellow	Large	Late
CDC Glamis	CDC - U of Sask.	Food	Green	Yellow	Large	Medium
Brewer	USDA-ARS	Food	Green	Yellow	Medium	Early
CDC Richlea	CARC	Food	Green	Yellow	Medium	Medium
CDC Vantage	CDC - U of Sask.	Food	Green	Yellow	Medium	Medium
Eston	Spokane Seeds	Food	Green	Yellow	Small	Medium
CDC Milestone	CDC - U of Sask.	Food	Green	Yellow	Small	Medium
Crimson	CARC	Food/Specialty	Red	Red	Small	Medium
Red Chief	CARC	Food/Specialty	Red	Red	Medium	Early
Pardina	Spokane Seeds	Food/Specialty	Brown	Yellow	Small	Medium

[1/] - Size Classes (g/1000 seeds): Large: >60-65; Medium: 40-60; Small: <40

Table 7. Statewide Dry Pea Perforamance Trial - Moccasin trial management summary.
- Exp. 800702. Central Agricultural Research Center, Moccasin, MT. **{File: 800702:Manage}**

Field Summary			
	Environment:	Dryland	
	Tillage History:	No-Till	Previous Crop: Barley
Trial Management			
	Seeding Date:	4/15	Plot Dimensions: 5-rows x 11" spacing x 16'
	Fertilizer: (lbs/ac)	None	
	Pesticides:(rates)	Sonalan (8 bs/acre) - Pre-Plant Incorporated (10/14/01)	
		Assure II (10 oz/ac) - Post Emergence (5/29/02)	
	Harvest Dates:	8/2-8/6	Timing: At grain maturity
			-Using a 5' plot harvestor
	Precipitation:	7.12"	- Crop-year (4/15 - 7/20 {Phys. Maturity})
	Elevation:	4300'	

Table 8. Statewide Lentil Performance Trial - Moccasin yield, weights and heights summary.
- Exp. 850702. Central Ag. Research Center, Moccasin, MT **{File: 850702:Yields}**

	Lentil Grain Summary				Canopy Heights		Stand
Variety	Yield	Size	Weight	Moisture	Phys. [1/]	Mature	Index [2/]
	(lbs/acre)	(g/1000)	(lbs/bu)	(%)	(inches)		(ht_{mat} / ln_{vine})
CDC Vantage	**1,848** [a]	58.0	61.2	16.3	**12.0** [a]	11.4 [a]	0.840
CDC Richlea	1,812 [a]	57.4	59.9	16.0	10.8 [a]	10.9	0.831
CDC Milestone	1,764 [a]	39.3	62.7	15.4	9.8	9.7	0.864
Laird	1,739 [a]	67.6	58.6	16.5	**12.0** [a]	**12.4** [a]	0.908
CDC Glamis	1,691 [a]	**70.0** [a]	58.0	**17.5** [a]	11.8 [a]	12.3 [a]	0.855
Eston	1,661 [a]	35.9	62.9	15.9	10.0	9.6	0.825
Brewer	1,644 [a]	61.7	58.8	16.1	10.0	10.0	0.813
Red Chief	1,563	57.8	58.7	16.2	10.3 [a]	9.9	0.839
Pardina	1,555	42.7	**63.6** [a]	16.3	8.0	8.6	0.899
Crimson	1,029	38.0	63.5 [a]	15.5	8.5	8.6	**0.925** [ns]
Means (n = 40)	1,631	52.8	60.8	16.2	10.3	10.3	0.860
LSD (0.05 by t)	208	2.2	0.6	0.9	1.8	1.0	NS
C.V.% (s / means)	8.8	2.9	0.7	3.8	7.9	6.93	6.6
F-Value (9,26 df)	10.6 [**]	282.5 [**]	124.85 [**]	3.81 [**]	5.7 [**]	14.1 [**]	0.91 [ns]

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

** - Indicates statistical significance at 0.05 level.

[1/] - Plot canopy height at physiological maturity.

[2/] - Stand Index (standability) measured as ratio of grain mature height (ht_{mat}) to vine length (ln_{vine}).

Table 9. Statewide Lentil Performance Trial - Summary of plant growth stages at Moccasin.[1/]
- Exp. 850702. Central Agriculutral Research Center, Moccasin, MT. **{File: 850702:Stages}**

Variety	Flower	Pod Form		Pod Fill		Physiological Mat.		Grain Maturity	
days from:	----- (seeding) -----		flow er	seeding	pod form	seeding	pod fill	seeding	phys. mat.
Laird	72	81	9	87	6	97	10	115	18
CDC Glamis	74	82	8	88	6	99	11	113	14
Brewer	70	**78**	8	84	6	**94**	10	109	15
CDC Richlea	72	79	7	86	7	97	11	112	15
CDC Vantage	70	79	9	85	6	**94**	9	111	17
Eston	73	**78**	5	85	7	95	10	111	16
CDC Milestone	72	**78**	6	85	7	96	11	110	14
Crimson	72	**78**	6	**83**	5	95	12	**108**	13
Red Chief	**69**	**78**	9	**83**	5	**94**	11	111	17
Pardina	70	**78**	8	84	6	96	12	113	17
Means	71	79	8	85	6	96	11	111	16

[1/] - Dates collected from one replication only, summary is unreplicated.

Table 10. Statewide Lentil Trial - Multi-year (1998-2002) dry pea grain yield summary at Moccasin.[1/]
- Exp. 850702. Central Agricultural Research Center, Moccasin, MT. **{File: 850702:Multi-Year}**

		Year					Average	% of
Variety		1998	1999	2000	2001	2002	Yield[3/]	Laird
CDC Milestone[2/]	Small Green		1,035		1,463	1,764	**1,431** [a]	**125%** [a]
CDC Vantage[2/]	Medium Green		841		1,405	1,848	1,375 [a]	118% [a]
CDC Richlea	Medium Green	1,374	875	1,490	1,237	1,812	1,358 [a]	119% [a]
Red Chief	Medium Red	1,226	1,061	1,412	1,324	1,563	1,317 [a]	117% [a]
CDC Glamis[2/]	Large Green		772		1,425	1,691	1,306 [a]	113% [a]
Brewer	Medium Green		883	1,438	1,234	1,644	1,281 [a]	112% [a]
Eston	Small Green		686	1,511	1,151	1,661	1,234 [a]	107% [a]
Pardina	Small Brown	1,362	766	1,360	1,013	1,555	1,211 [a]	108% [a]
Laird	Large Green	833	885	1,178	1,211	1,739	1,169	100%
French Green	Small Green	1,229	785	1,224	1,053		1,162	102%
Crimson	Small Red		714	1,355	1,153	1,029	1,044	95%
Indianhead	Small Black	746	813	738	1,309		991	84%
Means		1,128	843	1,301	1,248	1,631	1,240	108%
LSD							222	20%
CV							13.89	14.37
F-value							2.95 **	2.80 **
Trial Means		1,128	806	1,301	1,137	1,631	1,201	

** - Indicates statistical significance at 0.05 level.

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

[1/] - Summary includes those varieties involved in 3 or more years of testing only.

[2/] - CDC Milestone, Vantage and Glamis 2001 yields were from a separate trial, adjacent to Statewide trial.

[3/] - Averages are estimates, which account for missing years' data.