

Dry Pea, Lentil, Chickpea and Winter Legume Breeding

2001 Progress Report



Prepared by

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Wyoming; University of Wyoming (Jim Krall)

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Personnel, Cooperators and Cooperating Growers

Personnel:

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Blaine Schatz, NDSU	Carrington, ND
Steve Zwinger, NDSU	Carrington, ND
Bob Henson, NDSU	Carrington, ND
Mark Halvorson, NDSU	Minot, ND
John Rickertsen, SDSU	Rapid City, SD
Leon Welty, MSU	Agronomist, Kalispell, MT
Louise Strang, MSU	Agriculture Extension, Kalispell, MT
Karnes Neill, MSU	Research Associate, Moccasin, MT
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Cooperating Growers:

Jim Evans	Genesee, ID
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Doug Bruce	Farmington, WA
Dennis Pottratz	Fairfield, WA
Brian Tiegs	Fairfield, WA
Rusty Lyons	Waitsburg WA

Spring Pea Yield Testing

Advanced breeding lines of green, yellow and marrowfat peas were compared in yield trials at Pullman, Fairfield and Walla Walla, WA, and at Genesee, ID (Tables 1, 6 and 11). Yields were above average in 2001 (Tables 3, 8 and 13). Trials at Fairfield, WA produced the highest yield overall followed by Pullman, Genesee and Walla Walla. Low yields at Walla Walla were due to early infestation of pea seed weevil despite chemical applications. Timely rains in the early part of July and relatively cool temperatures during bloom contributed to the high yield.

Green Pea Trial Results:

The advanced green pea yield trial contained 11 experimental lines from the USDA breeding program and 19 checks from the USDA and other breeding programs. Seed yield for 'Lifter', a recent release from the USDA program, was approximately equal to the trial mean. In past years, Lifter has had a 37% yield advantage compared to 'Columbian'. 'Joel', a variety released in 1997, yielded equally to Lifter and near the trial mean. Four experimental lines from the USDA program were ranked in the top seven entries for the trial. Among these was PS610152, a line showing excellent standing ability combined with high yield. We have begun producing Breeder seed, but plan to hold back its release for one additional year due to short vine length.

Physical appearance and cooking quality are a priority in the breeding program and were evaluated on entries in the advanced yield trials from Genesee and Pullman. Overall quality was good in 2001 with seed bleach at a low level and most of the entries holding their color during cooking (Table 4).

It has been an objective of the breeding program to develop upright plant types. All the green pea breeding lines have been selected for the semi-leafless (*afila*) leaf type which contributes to an upright growth habit. Due to the high seed yield at the Pullman site and high wind events during July, many of the accessions lodged with height indices between 0.40 and 0.80. Selection for improved stem properties will improve overall plant stature.

The preliminary yield trial for green pea contained five experimental lines and four checks and was planted at Pullman, WA (Table 5). Three lines, PS9910592, PS9910346 and PS9910484 out-yielded Joel, Lifter and Columbian and had excellent agronomic characteristics. PS9910346 remained most upright among the lines with a height index of 0.49 while yielding 2879 kg/ha (2562 lb/a).

Table 1. Location Yield Summary (kg/ha) for the Advanced Green Dry Pea Yield Trial, 2001 (0101)

Cultivar	Origin	Leaf Plant		Genesee	Fairfield	Walla Walla	Pullman	Mean Seed Yield
		Type	Type					
CEB 1171	-----	-	-	2854	4041	1824	3510	3059
Bluebird	-----	-	-	2678	3925	1827	3132	2893
Phantom	-----	-	-	2655	3613	1717	3144	2784
PS710048	X92P202	-	-	2528	3429	1667	2902	2634
PS810323	X95P122	-	-	2596	3468	1462	2986	2630
PS810191	X94P164	-	-	2595	2796	1699	3410	2627
PS610152	X93P022	-	-	2459	3160	1693	3181	2625
Toledo	-----	-	-	2226	3441	1645	2913	2559
Karita	-----	-	-	2316	3344	1569	2936	2544
Hero	-----	-	-	2551	3161	1516	2917	2538
PRO 98106	-----	-	-	2365	3411	1479	2873	2534
PS810240	X94P106	-	-	2551	3167	1623	2777	2532
CEB 1170	-----	-	-	2480	3045	1715	2872	2530
PS810162	X94P058	-	-	2533	2977	1557	3008	2521
Cruiser	-----	-	-	2267	3262	1580	2955	2518
Ariel	-----	-	-	2104	3411	1404	2920	2462
Verdi	-----	-	-	2441	3197	1484	2682	2453
Espace	-----	-	-	2174	3476	1211	2927	2449
PS710255	X94P035	-	-	2401	3097	1374	2803	2421
Montero	-----	-	-	2766	3411	1618	1820	2406
Alaska 81	X78G126	+	+	2162	3324	1489	2615	2400
Lifter	X93P045	+	-	2293	2675	1377	3171	2381
Joel	X84F172	+	+	1967	3207	1655	2662	2375
Columbian	-----	+	+	2029	2814	1471	3057	2345
PS710508	X94P026	-	-	2244	2687	1480	2934	2339
PS7101119	X94P116	-	-	2320	2598	1431	2406	2191
PS710416	X94P110	-	-	2224	2644	1444	2424	2186
Majoret	-----	-	-	2324	2065	1742	2540	2170
PS610324	X93P192	-	-	2224	2352	1564	2402	2138
Franklin	X93P046	+	-	1982	2396	1254	2556	2049
Grand Mean				2377	3120	1552	2848	2477
C.V. (%)				8	11	6	7	9
LSD ($\alpha=0.05$)				251	468	128	257	152
Planting Date				4/25/01	5/11/01	4/26/01	5/7/01	
Harvest Date				8/1/01	8/28/01	7/31/01	8/17/01	

Yield data are means of three replications at each location and over all four locations.

Table 2. Agronomic Data from the Advanced Green Dry Pea Yield Trial, 2001 (0101)

1 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Pod Ht (mature)</u> ..cm..	<u>Pod Ht Index</u>	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..
CEB 1171	-----	-	-	+	3	54	94	13	2	43	30	0.80	58	43	0.75	25.2
Bluebird	-----	-	-	+	3	53	91	15	2	43	51	1.00	59	61	1.00	24.4
Phantom	-----	-	-	+	3	52	92	14	2	44	35	0.82	48	56	1.00	26.8
PS710048	X92P202	-	-	-	3	56	90	17	2	61	0	0.00	74	26	0.38	24.1
PS810323	X95P122	-	-	+/-	3	55	92	15	2	49	0	0.00	66	22	0.29	20.1
PS810191	X94P164	-	-	+	3	56	92	20	2	64	0	0.00	71	32	0.43	20.9
PS610152	X93P022	-	-	+	3	50	92	14	2	43	0	0.00	61	30	0.43	22.1
Toledo	-----	-	-	+	3	52	90	16	2	60	53	0.81	74	79	1.00	27.0
Karita	-----	-	-	-	3	51	94	17	2	51	61	1.00	72	75	1.00	25.8
Hero	-----	-	-	-	3	54	92	16	2	53	32	0.49	68	43	0.64	23.5
PRO 98106	-----	-	-	-	3	47	88	13	2	41	22	0.50	61	41	0.63	20.9
PS810240	X94P106	-	-	+	3	56	92	19	2	75	0	0.00	82	34	0.46	22.5
CEB 1170	-----	-	-	+	3	54	93	16	2	70	51	0.80	83	62	0.82	28.3
PS810162	X94P058	-	-	+	4	47	93	12	2	36	33	0.94	62	53	0.80	23.4
Cruiser	-----	-	-	+	3	54	93	17	2	62	50	0.96	81	72	0.94	22.4
Ariel	-----	-	-	+	3	54	92	18	2	65	58	0.84	74	75	0.98	20.3
Verdi	-----	-	-	+/-	3	57	95	18	2	63	47	0.80	72	63	0.95	21.4
Espace	-----	-	-	+	3	54	90	18	2	53	56	1.00	64	78	1.00	23.7
PS710255	X94P035	-	-	+	3	55	96	13	2	37	0	0.00	68	26	0.40	19.5
Montero	-----	-	-	+/-	3	56	94	19	2	61	38	0.70	73	52	0.79	21.0
Alaska 81	X78G126	+	+	+	3	43	94	11	1	58	0	0.00	120	40	0.34	20.3
Lifter	X93P045	+	-	+	3	55	104	14	2	71	8	0.06	85	28	0.28	22.5
Joel	X84F172	+	+	+	2	46	91	13	2	84	0	0.00	131	42	0.34	24.1
Columbian	-----	+	+	+	3	42	96	8	1	35	0	0.00	110	35	0.35	21.1
PS710508	X94P026	-	-	+/-	3	46	93	12	2	40	0	0.00	69	28	0.34	20.9

Table 2. Agronomic Data from the Advanced Green Dry Pea Yield Trial, 2001 (0101) Continued

2 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Pod Ht (mature)</u> ..cm..	<u>Pod Ht Index</u>	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..
PS7101119	X94P116	-	-	+/-	3	58	94	18	2	58	17	0.18	65	31	0.40	21.7
PS710416	X94P110	-	-	+	3	54	93	18	2	57	0	0.00	75	29	0.43	23.3
Majoret	-----	-	-	-	3	54	92	19	2	73	65	0.95	76	81	1.00	24.3
PS610324	X93P192	-	-	+	3	54	95	19	2	63	33	0.50	75	47	0.58	28.0
Franklin	X93P046	+	-	+	3	56	90	15	2	49	0	0.00	56	20	0.34	21.4
Grand Mean						52	93	16		55	25	0.46	74	47	0.66	
C.V. (%)						2	2	8		8	29	....	9	13	....	
LSD ($\alpha=0.05$)						2	3	2		6	10	0.21	9	8	0.13	

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; + = tall plant type, - = short plant type.

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage and at harvest maturity.

Pod and plant height indices were determined by dividing the value at harvest maturity by the green pod stage value.

Table 3. Mean Yields (kg/ha) from the Advanced Green Dry Pea Yield Trial, 1997-2001.

Cultivar	Origin	Leaf Type	Plant Type	1997	1998	1999	2000	2001
CEB 1171	-----	-	-	....	....	....	....	3059
Bluebird	-----	-	-	....	....	2392	1891	2893
Phantom	-----	-	-	....	....	2135	1535	2784
PS710048	X92P202	-	-	....	....	....	1513	2634
PS810323	X95P122	-	-	....	....	....	2106	2630
PS810191	X94P164	-	-	....	....	....	....	2627
PS610152	X93P022	-	-	....	....	2209	1792	2625
Toledo	-----	-	-	1705	2384	1639	1623	2559
Karita	-----	-	-	....	....	....	1698	2544
Hero	-----	-	-	....	....	2108	1983	2538
PRO 98106	-----	-	-	....	....	....	....	2534
PS810240	X94P106	-	-	....	....	....	....	2532
CEB 1170	-----	-	-	....	....	2093	1504	2530
PS810162	X94P058	-	-	....	....	....	....	2521
Cruiser	-----	-	-	....	....	....	1527	2518
Ariel	-----	-	-	1622	2818	1859	1476	2462
Verdi	-----	-	-	....	....	....	....	2453
Espace	-----	-	-	1144	2786	2021	1789	2449
PS710255	X94P035	-	-	....	....	....	1735	2421
Montero	-----	-	-	....	....	....	....	2406
Alaska 81	X78G126	+	+	1358	2328	1839	1515	2400
Lifter	X93P045	+	-	2333	2844	2214	1983	2381
Joel	X84F172	+	+	1581	2443	2072	1650	2375
Columbian	-----	+	+	1312	2127	1869	1449	2345
PS710508	X94P026	-	-	....	....	....	1477	2339
PS7101119	X94P116	-	-	....	....	....	1631	2191
PS710416	X94P110	-	-	....	....	....	1477	2186
Majoret	-----	-	-	....	....	....	1609	2170
PS610324	X93P192	-	-	....	....	....	1531	2138
Franklin	X93P046	+	-	1028	2763	1988	1686	2049
Grand Mean				1314	2583	1937	1646	2477
LSD ($\alpha=0.05$)				409	238	177	152	152

Leaf type; + = normal leaf, - = *afila* or semileaf type.

Plant type; + = tall plant type, - = short plant type.

Yield data are means of three replications at each location, over all locations in each year.

Table 4. Post Harvest Quality Evaluations of Dry Pea Lines in the Advanced Green Dry Pea Yield Trial - 2001

1 of 2

Cultivar	Pullman						Genesee					
	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-% -	-% -	-us/g-	-minutes-		-g-	-% -	-% -	-us/g-	-minutes-	
CEB 1171	25.2	111.8	0.0	25.3	18	Fair/ Light	24.9	111.6	0.0	19.3	20	Good/Light
Bluebird	24.4	110.3	1.0	21.0	22	Good/ Light	22.3	115.1	1.7	18.4	19	Good/Light
Phantom	26.8	108.9	0.0	23.7	20	Fair/ Light	26.7	112.0	0.3	19.0	18	Fair/Light
PS710048	24.1	108.1	1.3	36.3	18	Good/ Dark	24.2	104.5	1.3	28.8	18	Good/Light
PS810323	20.1	118.5	6.0	20.0	17	Good/ Dark	18.8	112.5	5.7	19.8	16	Good/Dark
PS810191	20.9	115.1	1.0	19.0	17	Fair/ Light	20.5	109.9	1.3	15.8	18	Good/Dark
PS610152	22.1	106.0	0.0	21.3	18	Good/ Dark	21.1	108.7	2.0	17.1	17	Good/Dark
Toledo	27.0	109.9	1.0	30.3	16	Fair/ Light	25.6	115.2	0.0	22.8	16	Good/Dark
Karita	25.8	111.5	1.0	29.3	14	Fair/ Light	25.7	111.5	0.3	23.6	18	Good/Light
Hero	23.5	113.8	0.0	21.3	18	Good /Light	23.2	113.0	0.3	16.3	17	Good/Light
PRO 98106	20.9	111.4	0.0	23.7	18	Good /Light	20.0	122.4	0.3	18.4	17	Good/Dark
PS810240	22.5	111.3	9.7	20.3	17	Good/ Dark	21.1	106.9	26.7	17.1	19	Good/Light
CEB 1170	28.3	104.8	0.3	28.0	19	Fair/ Light	27.4	105.4	0.3	19.4	18	Good/Light
PS810162	23.4	116.9	1.7	15.7	17	Good /Light	21.9	117.0	1.3	13.0	18	Good/Dark
Cruiser	22.4	107.3	0.0	26.3	16	Good Light	20.2	110.6	0.3	17.8	17	Good/Dark
Ariel	20.3	107.0	0.0	29.3	16	Good/ Dark	17.5	112.4	0.3	20.6	16	Good/Dark
Verdi	21.4	105.1	0.0	22.0	19	Good/ Light	20.1	106.5	0.3	18.1	17	Good/Light
Espace	23.7	110.4	1.3	25.3	17	Fair/ Light	21.2	115.3	1.0	22.7	20	Good/Light
PS710255	19.5	112.0	2.7	22.3	16	Good/ Dark	18.0	109.2	8.7	18.1	16	Good/Very Dark
Montero	21.0	110.1	1.0	35.0	20	Good/ Light	21.0	107.6	0.7	26.6	18	Good/Light
Alaska 81	20.3	111.6	1.0	23.7	15	Good/ Dark	18.9	116.4	3.7	17.4	16	Good/Dark
Lifter	22.5	107.1	2.0	29.0	17	Good/ Dark	22.4	103.7	2.3	19.7	19	Good/Light
Joel	24.1	110.4	3.3	31.0	16	Good /Dark	22.3	112.8	4.0	19.4	20	Good/Dark
Columbian	21.1	110.5	0.3	20.3	16	Good/ Dark	20.2	114.3	7.3	18.8	16	Good/Dark
PS710508	20.9	115.6	0.3	19.3	16	Good /Light	20.4	107.9	2.7	13.7	21	Good/Dark

Table 4. Post Harvest Quality Evaluations of Dry Pea Lines in the Advanced Green Dry Pea Yield Trial - 2001

2 of 2

Cultivar	Pullman						Genesee					
	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-% -	-% -	-us/g-	-minutes-		-g-	-% -	-% -	-us/g-	-minutes-	
PS7101119	21.7	114.9	0.0	26.0	16	Good /Light	21.3	115.1	0.3	16.3	16	Good/Dark
PS710416	23.3	112.9	0.3	29.3	18	Good/ Dark	23.5	107.8	1.0	19.1	18	Good/Dark
Majoret	24.3	103.6	0.3	27.0	16	Fair/ Light	23.4	104.8	1.0	21.1	16	Good/Light
PS610324	28.0	91.5	0.3	16.0	18	Good/ Dark	23.5	108.1	1.7	14.9	20	Good/Very Dark
Franklin	21.4	107.2	1.3	23.3	16	Good /Very Dark	21.3	104.4	4.0	20.4	20	Good/Very Dark
Mean	23.0	109.9	1.2	24.7	17.0		22.0	110.8	2.7	19.1	18	
C.V. (%)	3.6	3.6	72.2	7.0	3.3		3.0	1.5	65.1	4.6	3	
LSD ($\alpha=0.05$)	0.9	4.2	0.9	1.8	0.6		0.7	1.8	1.9	0.9	1	

us/g = microsiemens per gram of seed.

Cooking test conducted on seeds soaked for 20 hours.

Table 5. Agronomic Data from the Preliminary Green Dry Pea Yield Trial, 2001 (0103)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Pod Ht (mature)</u> ..cm..	<u>Pod Ht Index</u>	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..	<u>Mean Seed Yield</u> ..kg/ha..
PS9910592	X95P122	-	-	+	3	54	94	13	2	38	0	0.00	66	25	0.38	21.5	3294
PS9910346	X93P123	-	-	+	3	46	92	13	2	41	0	0.00	83	39	0.49	21.5	2879
PS9910484	X94P081	-	-	+	3	55	94	16	2	69	0	0.00	79	31	0.39	18.9	2865
Columbian	-----	+	+	+	3	42	94	11	1	66	0	0.00	134	38	0.29	20.5	2857
Lifter	-----	+	+	+	3	56	100	15	2	73	0	0.00	90	27	0.31	22.1	2776
Joel	-----	+	+	+	2	46	91	11	2	64	0	0.00	131	39	0.30	23.0	2738
PS9910079	X95P118	+	-	+	3	46	94	12	2	51	0	0.00	95	32	0.35	22.4	2709
PS9910029	X94P164	-	-	+	3	53	94	16	2	94	0	0.00	105	34	0.33	23.6	1964
Grand Mean						50	94	13	2	62	0	0	98	33	0.35	21.7	2760
C.V. (%)						1.7	1.8	17	20	0.7	0	0	8.9	0.7	0.60	1.5	9.5
LSD ($\alpha=0.05$)						0.9	1.9	2.5	0.4	18	0	0	9	6	0.10	0.4	288

Date of planting: 5/7/01

Date of harvest: 8/17/01

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; + = tall plant type, - = short plant type.

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage and at harvest maturity.

Pod and plant height indices were determined by dividing the value at harvest maturity by the green pod stage value.

Marrowfat Pea Trial Results:

Development of marrowfat pea germplasm with large seed size and durable dark green color has been progressing rapidly. This past year, 12 experimental lines were compared to four commercial check lines, 'Maro', 'Guido', 'Supra' and CEB 2027 at Pullman, Fairfield and Walla Walla, WA and at Genesee, ID (Table 6). PS610509 and PS9102067 were the highest yielding breeding lines and yielded approximately equal to the checks. All breeding lines had excellent seed quality as well as moderately upright growth, despite a conventional leaf type. Seed size among the entries was significantly larger than previous years and ranged from 32.2 to 37.2 gm/100 seed for the checks and from 31.1 to 35.7 gm/100 seed for the experimental lines (Table 7).

Marrowfat seed quality is defined by large seed size as well as intensity and durability of seed color. These traits have steadily improved within the marrowfat germplasm in recent years. Seed quality evaluations showed quality among experimental lines to be very good while seed color was light and moderately bleached among the control varieties (Table 9).

Several experimental lines have been selected for advancement from early generation observation trials into the advanced yield trial for additional testing. These lines will be evaluated in replicated trials at the Washington State University Spillman Research Farm during the 2002 field season.

Early generation breeding material will continue to be advanced in the greenhouse and field. A greenhouse procedure similar to that used for the smooth green peas is used to select those lines with dark green seed, bleach resistance and exceptionally large seed. The selected lines will be planted in the field in 2002 to select for improved seed characteristics, upright plant type and multiple disease resistance.

Table 6. Location Yield Summary (kg/ha) for the Advanced Marrowfat Dry Pea Yield Trial, 2001 (0133)

Cultivar	Origin	Leaf Type	Plant Type	Genesee	Fairfield	Walla Walla	Pullman	Mean Seed Yield
Guido	-----	+	-	2063	2749	1299	2672	2192
CEB 2027	-----	-	-	2164	2735	1322	2380	2146
Maro	-----	+	-	2064	2483	1277	2497	2076
Supra	-----	-	-	1902	2492	1330	2587	2074
PS9102067	X950427	+	-	2075	2457	1645	2107	2067
PS610509	X93P165	+	-	2110	2242	1347	2545	2057
PS810513	X95P015	+	-	2039	2151	1423	2155	1938
PS810514	X95P015	+	-	1516	2478	1306	2023	1827
PS810446	X95P003	+	-	1822	2110	1176	2147	1810
PS9101380	X95P554	+	-	1807	2083	1235	1859	1742
PS810489	X95P014	+	-	1742	1933	1231	2033	1731
PS810639	X95P063	+	-	1664	2002	1231	1922	1701
PS710909	X95P017	+	-	1671	1597	1316	2186	1689
PS710904	X95P017	+	-	1567	1788	1178	1938	1614
PS9101365	X95P554	+	-	1626	1736	1249	1850	1611
PS710898	X95P017	+	-	1711	1525	1215	1775	1552
Grand Mean				1847	2160	1299	2167	1864
C.V. (%)				8	8	7	10	9
LSD ($\alpha=0.05$)				200	241	122	287	109
Planting Date				4/25/01	5/11/01	4/26/01	5/7/01	
Harvest Date				8/1/01	8/28/01	7/31/01	8/14/01	

Yield data are means of three replications at each location and over four locations.

Table 7. Agronomic Data from the Advanced Marrowfat Dry Pea Yield Trial, 2001 (0133)

Cultivar	Origin	Leaf Type	Plant Type	Disease Fw	Disease Aph	Days to Flower	Days to Maturity	Nodes to Fst Flwr	Pods/ Peduncle	Pod Ht (green) ..cm..	Pod Ht (mature) ..cm..	Pod Ht Index	Plant Ht (green) ..cm..	Plant Ht (mature) ..cm..	Plant Ht Index	Weight 100 Seed ..g..
Guido	-----	+	-	+	2	55	94	14	2	54	5	0.11	59	24	0.40	37.2
CEB 2027	-----	-	-	+	3	54	92	16	2	53	30	0.60	64	38	0.61	34.7
Maro	-----	+	-	+	3	54	94	14	2	54	5	0.11	61	27	0.42	32.2
Supra	-----	-	-	+	3	56	94	15	2	57	43	0.75	71	54	0.79	36.7
PS9102067	X950427	+	-	+/-	3	52	93	15	2	63	1	0.01	74	26	0.37	34.0
PS610509	X93P165	+	-	+	3	54	95	15	2	46	0	0.00	55	21	0.39	30.9
PS810513	X95P015	+	-	+	3	50	92	15	2	73	8	0.09	76	28	0.38	35.1
PS810514	X95P015	+	-	+	3	49	92	14	2	63	0	0.00	75	21	0.30	35.7
PS810446	X95P003	+	-	+	3	53	92	15	2	55	0	0.00	66	24	0.35	32.3
PS9101380	X95P554	+	-	+	3	51	93	15	2	57	0	0.00	72	25	0.35	32.0
PS810489	X95P014	+	-	+	3	51	92	14	2	61	0	0.00	67	19	0.29	32.4
PS810639	X95P063	+	-	+	3	49	92	14	2	53	0	0.00	69	27	0.39	34.3
PS710909	X95P017	+	-	+	3	53	93	14	2	46	0	0.00	51	23	0.40	34.0
PS710904	X95P017	+	-	+	3	53	95	15		52	0	0.00	61	22	0.35	31.1
PS9101365	X95P554	+	-	+/-	3	51	93	15	2	56	10	0.17	68	29	0.42	34.6
PS710898	X95P017	+	-	+	2	55	95	17	2	48	0	0.00	61	18	0.30	30.9
Grand Mean						53	93	15		56	8	0.14	66	27	0.41	
C.V. (%)						2	1	6		10	83	79	12	18	20	
LSD ($\alpha=0.05$)						2	2	1		7	9	0.15	11	7	0.11	

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant = plant type; + = tall plant type, - = short plant type.

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage and at harvest maturity.

Pod and plant height indices were determined by dividing the value at harvest maturity by the green pod stage value.

Table 8. Mean Yields (kg/ha) from the Advanced Marrowfat Dry Pea Yield Trial, 1997-2001.

Cultivar	Origin	Leaf Type	Plant Type	1997	1998	1999	2000	2001
Guido	-----	+	-	....	....	....	1358	2192
CEB 2027	-----	-	-	....	....	....	....	2146
Maro	-----	+	-	1442	2060	1982	1341	2076
Supra	-----	-	-	1328	2071	1808	1326	2074
PS9102067	X950427	+	-	....	....	....	....	2067
PS610509	X93P165	+	-	....	2589	1893	1656	2057
PS810513	X95P015	+	-	....	....	....	....	1938
PS810514	X95P015	+	-	....	....	....	....	1827
PS810446	X95P003	+	-	....	....	....	....	1810
PS9101380	X95P554	+	-	....	....	....	....	1742
PS810489	X95P014	+	-	....	....	....	....	1731
PS810639	X95P063	+	-	....	....	....	....	1701
PS710909	X95P017	+	-	....	....	....	1361	1689
PS710904	X95P017	+	-	....	....	....	1396	1614
PS9101365	X95P554	+	-	....	....	....	....	1611
PS710898	X95P017	+	-	....	....	....	1321	1552
Grand Mean				1384	2138	1858	1376	1864
LSD ($\alpha=0.05$)				310	179	172	111	109

Leaf type; + = normal leaf, - = *afila* or semileaf type.

Plant type; + = tall plant type, - = short plant type.

Yield data are means of three replications at each location, over all locations in each year.

Table 9. Post Harvest Quality Evaluations of Dry Pea Lines in the Advanced Marrowfat Dry Pea Yield Trial - 2001

Cultivar	Pullman						Genesee					
	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-%-	-%-	-us/g-	-minutes-		-g-	-%-	-%-	-us/g-	-minutes-	
Guido	37.2	118.7	0.0	24.5	20	Poor/ Bleach	35.9	110.8	0.0	19.8	25	Fair/Light
CEB 2027	34.3	117.8	0.0	22.2	18	Poor/ Bleach	34.1	109.1	0.0	18.5	21	Fair/Light
Maro	32.2	121.9	0.0	26.0	19	Poor/ Bleach	32.4	113.1	1.0	19.2	22	Fair/Light
Supra	36.7	119.5	0.0	24.1	22	Poor/ Bleach	35.6	112.9	0.0	20.8	22	Fair/Light
PS9102067	34.0	118.2	0.0	40.4	20	Good/ Dark	33.7	112.3	0.0	30.2	21	Good/Dark
PS610509	30.9	112.1	2.7	25.2	20	Good/ Light	30.5	108.6	0.3	21.8	22	Good/Very Dark
PS810513	35.1	121.8	0.0	32.7	20	Fair/ Light	34.6	113.6	0.0	24.1	20	Fair/Light
PS810514	35.7	118.7	0.0	25.4	20	Fair/ Light	35.7	113.9	0.0	19.7	20	Fair/Light
PS810446	32.3	121.1	0.0	26.8	20	Good /Light	31.9	118.8	0.0	21.7	20	Good/Light
PS9101380	32.0	115.0	0.0	24.9	19	Good/ Dark	33.3	111.0	0.0	22.1	20	Good/Dark
PS810489	32.4	117.5	0.0	33.1	20	Good/ Dark	31.3	114.8	3.3	28.8	18	Good/Dark
PS810639	34.3	126.4	0.0	33.5	18	Poor /Light	34.0	119.8	0.0	28.8	20	Fair/Light
PS710909	34.0	116.6	0.0	27.3	21	Good/ Dark	31.6	113.1	0.0	19.6	21	Good/Very Dark
PS710904	31.1	115.7	0.0	33.6	20	Good/ Dark	30.8	110.5	0.0	21.8	21	Good/Very Dark
PS9101365	34.6	114.2	0.0	27.3	19	Good/ Dark	36.4	108.7	0.0	21.6	22	Good/Dark
PS710898	30.9	120.2	0.0	30.3	20	Good/ Dark	30.7	113.5	0.0	21.9	22	Good/Very Dark
Mean	33.6	118.5	0.2	28.6	19.8		33.3	112.8	0.3	22.5	21.0	
C.V. (%)	2.5	1.8	229.1	5.7	2.7		1.6	0.9	71.1	4.6	3.1	
LSD ($\alpha=0.05$)	0.9	2.2	0.4	1.7	0.6		0.6	1.0	0.2	1.1	0.7	

us/g = microsiemens per gram of seed.

Cooking test conducted on seeds soaked for 20 hours.

Table 10. Agronomic Data from the Preliminary Yellow and Marrowfat Dry Pea Yield Trial, 2001 (0104)

1 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Pod Ht (mature)</u> ..cm..	<u>Pod Ht Index</u>	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..	<u>Mean Seed Yield</u> ..kg/ha..
Yellow Cots.																	
PS9910134	X92P303	-	-	+	3	54	94	16	2	53	0	0.00	70	28	0.39	23.4	3549
PS9910140	X92P303	-	-	+	3	56	93	16	2	57	0	0.00	74	30	0.40	22.6	3448
PS9910188	X94P161	-	-	+	3	55	92	15	2	58	0	0.00	73	35	0.48	26.4	3390
PS9910135	X92P303	-	-	+	3	56	94	16	2	62	0	0.00	76	28	0.37	23.1	3364
Fallon	-----	-	+	+	3	50	91	16	2	57	0	0.00	75	28	0.39	25.9	3265
Umatilla	-----	+	+	+	2	47	92	15	2	87	0	0.00	127	31	0.24	23.4	2993
Shawnee	-----	+	+	+	2	46	91	14	2	80	0	0.00	118	34	0.29	22.4	2702
Sub Mean						52	92	15	2	65	0	0.00	88	31	0.37	23.9	3244
Marrowfats																	
Guido	-----	+	-	+	2	56	95	15	2	52	0	0.00	64	30	0.48	36.6	2746
Maro	-----	+	-	+	3	55	95	15	2	64	0	0.00	72	32	0.45	31.7	2707
Supra	-----	-	-	+	3	56	95	16	2	65	20	0.32	78	41	0.54	35.4	2693
PS99102068	X95P427	+	-	+	3	53	93	16	2	70	0	0.00	77	31	0.41	32.8	2644
PS99102075	X95P435	+	-	+	3	55	94	16	2	51	0	0.00	63	27	0.44	33.4	2568
PS99101385	X95P435	+	-	+	3	53	94	15	1	48	0	0.00	55	25	0.46	33.1	2520
PS99102076	X95P556	+	-	+	3	54	95	15	2	53	0	0.00	60	25	0.42	34.9	2472
PS99102072	X95P435	+	-	+	3	56	97	17	2	60	0	0.00	66	29	0.44	34.4	2350
PS99101960	X95P288	+	-	+	3	55	94	14	2	55	0	0.00	66	30	0.44	32.9	2336
PS99101384	X95P555	+	-	+	3	53	94	15	2	44	0	0.00	51	21	0.41	32.3	2317
PS99101362	X95P554	+	-	+	3	50	94	14	2	63	0	0.00	74	26	0.36	31.0	2238
PS99101866	X95P057	+	-	+	3	52	93	17	2	75	0	0.00	87	33	0.39	31.9	2190
PS99101429	X95P560	+	+	+	3	51	94	15	2	64	0	0.00	66	25	0.38	32.6	2088
PS99101364	X95P554	+	-	+	3	50	94	14	2	55	0	0.00	63	27	0.43	33.9	2032
PS99101381	X95P554	+	-	+	3	51	94	15	2	69	0	0.00	79	31	0.39	32.9	2024

Table 10. Agronomic Data from the Preliminary Yellow and Marrowfat Dry Pea Yield Trial, 2001 (0104) Continued

2 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Pod Ht (mature)</u> ..cm..	<u>Pod Ht Index</u>	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..	<u>Mean Seed Yield</u> ..kg/ha..
PS99101375	X95P554	+	-	+	3	51	93	14	2	56	0	0.00	71	28	0.40	32.8	1995
PS99101366	X95P554	+	-	+	3	51	93	15	2	60	0	0.00	72	30	0.41	32.3	1978
PS99102094	X95P441	+	-	+	3	54	94	15	2	58	0	0.00	66	30	0.46	29.6	1929
PS99101283	X95P063	+	-	+	2	53	95	15	2	53	0	0.00	63	19	0.30	32.8	1827
PS99101516	X95P471	+	-	+	3	52	94	15	1	64	0	0.00	75	32	0.43	31.7	1767
PS99101371	X95P554	+	-	+	3	49	94	14	2	68	0	0.00	80	28	0.35	32.4	1732
PS99101517	X95P585	+	-	...		53	94	5	2	62	5	0.08	82	37	0.45	31.3	1680
Sub Mean						53	94	15	2	60	1	0.02	70	29	0.42	32.9	2220
Grand Mean						53	94	15	2	61	0.85	0.01	74	29	0.41	30.7	2467
C.V. (%)						2.1	1.4	6.4	12.5	10.9	426.6	423.3	9.9	13.8	16.6	1.8	7.3
LSD ($\alpha=0.05$)						1	1	1	0.3	7	4	0.10	8	4	0.10	0.6	190

Date of planting: 5/7/01

Date of harvest: 8/17/01

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; + = tall plant type, - = short plant type.

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage and at harvest maturity.

Pod and plant height indices were determined by dividing the value at harvest maturity by the green pod stage value.

Yellow Pea Trial Results:

The advanced yellow pea yield trial was grown in replicated yield trials at Pullman, Fairfield and Walla Walla, WA, and at Genesee, ID (Table 11). The trial was comprised of four experimental lines and 18 checks. Average yield across all locations was greater than the previous four years (Table 13). Experimental line PS810765, produced the greatest amount of seed yield among the experimental lines and possesses the *afila* leaf trait. Due to the high seed yield, 2871 kg/ha (2555 lb/a), and high winds this line lodged at the Pullman site; height index = 0.31 (Table 12). Seed color was excellent among all entries, however only six entries retained their seed coats during cooking tests (Table 14).

We have accomplished the objective of converting the yellow pea breeding lines to the semi-leafless and semi-dwarf plant type, which has improved standing ability. Breeding lines exhibiting upright growth will be yield tested in 2002 field trials.

Table 11. Location Yield Summary (kg/ha) for the Advanced Yellow Dry Pea Yield Trial, 2001 (0102)

Cultivar	Origin	Leaf Plant		Genesee	Fairfield	Walla Walla	Pullman	Mean Seed Yield
		Type	Type					
CEB 1489	-----	-	-	2668	4514	1968	3498	3164
Badminton	-----	-	-	2713	4066	1876	3335	3000
Athos	-----	-	-	2484	4025	1747	3366	2908
CEB 1484	-----	-	-	2494	4018	1803	3296	2905
Mozart	-----	-	-	2353	4168	1764	3210	2876
Lumina	-----	-	-	2533	3976	1716	3265	2875
PS810765	X94P161	-	-	2582	3709	1913	3271	2871
Delta	-----	-	-	2140	4406	1695	3229	2870
Jasmine	-----	-	-	2406	3765	1748	3299	2807
Fallon	X87F061	-	-	2160	4228	1724	3104	2807
Swing	-----	-	-	2389	3859	1805	3095	2789
Eclipse	-----	-	-	2025	4039	1643	3273	2747
Rex	-----	+	-	2294	3804	1967	2886	2740
PS7101149	X92P226	+	-	2331	3632	1649	3241	2716
PS7101047	X92P176	+	-	2531	3268	1744	3284	2709
PS7101044	X87F061	+	-	2555	3240	1746	3159	2677
Handel	-----	-	-	2567	3820	1804	2409	2652
Integra	-----	-	-	2048	3772	1641	2936	2602
Rodeo	-----	-	-	2122	3081	1594	3239	2512
Shawnee	X84F259	+	+	2224	3195	1599	2924	2488
Umatilla	X75G027	+	+	1840	3386	1595	3037	2467
Minuet	-----	-	-	2503	2982	1672	2469	2409
Grand Mean				2362	3771	1746	3128	2754
C.V. (%)				12	9	7	7	10
LSD ($\alpha=0.05$)				403	473	160	293	179
Planting Date				4/25/01	5/11/01	4/26/01	5/7/01	
Harvest Date				8/1/01	8/28/01	7/31/01	8/17/01	

Yield data are means of three replications at each location and over four locations.

Table 12. Agronomic Data from the Advanced Yellow Dry Pea Yield Trial, 2001 (0102)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Pod Ht (mature)</u> ..cm..	<u>Pod Ht Index</u>	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..
CEB 1489	-----	-	-	+	3	54	91	14	2	52	0	0.00	69	28	0.46	24.1
Badminton	-----	-	-	+	3	53	92	14	2	51	41	0.80	63	57	0.87	22.6
Athos	-----	-	-	+	3	48	90	12	2	41	46	1.00	56	59	1.00	29.1
CEB 1484	-----	-	-	+	3	54	91	13	2	56	35	0.64	74	59	0.81	24.3
Mozart	-----	-	-	+	3	52	92	15	2	45	12	0.21	61	34	0.57	23.4
Lumina	-----	-	-	+	3	53	97	13	2	51	44	0.87	68	60	0.85	24.0
PS810765	X94P161	-	-	+	3	50	91	13	2	54	0	0.00	72	24	0.31	26.6
Delta	-----	-	-	+	3	56	92	17	2	64	46	0.72	76	64	0.80	24.1
Jasmine	-----	-	-	+	3	54	91	18	2	82	48	0.60	105	70	0.70	26.9
Fallon	X87F061	-	-	+	3	51	92	16	2	57	0	0.00	79	26	0.27	24.3
Swing	-----	-	-	+	3	51	89	16	2	63	48	0.77	77	67	0.91	23.5
Eclipse	-----	-	-	+	3	56	97	16	2	54	48	0.88	74	68	0.80	24.5
Rex	-----	+	-	+	3	53	90	16	2	64	0	0.00	79	29	0.38	23.3
PS7101149	X92P226	+	-	+	2	49	97	13	2	61	10	0.15	90	33	0.28	25.7
PS7101047	X92P176	+	-	+/-	3	53	97	17	2	66	0	0.02	75	26	0.42	29.2
PS7101044	X87F061	+	-	+/-	4	54	99	17	2	67	0	0.00	78	30	0.46	28.7
Handel	-----	-	-	+/-	2	52	92	17	2	59	38	0.66	72	50	0.70	18.4
Integra	-----	-	-	+	3	54	91	17	2	65	66	1.00	80	85	0.97	26.5
Rodeo	-----	-	-	+	4	52	91	16	2	53	8	0.15	65	36	0.62	27.2
Shawnee	X84F259	+	+	+	2	47	91	16	2	84	0	0.00	108	36	0.38	23.8
Umatilla	X75G027	+	+	+	3	48	91	15	2	83	0	0.00	122	35	0.26	24.6
Minuet	-----	-	-	+/-	3	54	94	19	2	66	30	0.48	74	47	0.70	18.3
Grand Mean						52	93	16	2	61	24	0.42	78	46	0.62	24.7
C.V. (%)						2	2	7		11	48	48.4	10	22	21.8	
LSD ($\alpha=0.05$)						1	3	2		9	16	0.28	11	14	0.19	

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; + = tall plant type, - = short plant type.

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage and at harvest maturity.

Pod and plant height indices were determined by dividing the value at harvest maturity by the green pod stage value.

Table 13. Mean Yields (kg/ha) from the Advanced Yellow Dry Pea Yield Trial, 1997-2001

Cultivar	Origin	Leaf	Plant	1997	1998	1999	2000	2001
		Type	Type					
CEB 1489	-----	-	-	....	....	....	....	3164
Badminton	-----	-	-	....	3084	2287	1694	3000
Athos	-----	-	-	1466	2926	2000	1623	2908
CEB 1484	-----	-	-	....	....	....	....	2905
Mozart	-----	-	-	....	....	....	1989	2876
Lumina	-----	-	-	....	....	....	3400	2875
PS810765	X94P161	-	-	....	....	....	....	2871
Delta	-----	-	-	....	2571	2181	1322	2870
Jasmine	-----	-	-	1068	2446	2022	1488	2807
Fallon	X87F061	-	-	1824	3058	2432	1758	2807
Swing	-----	-	-	1466	2534	1922	1529	2789
Eclipse	-----	-	-	....	....	2396	1666	2747
Rex	-----	+	-	1541	2508	2026	1487	2740
PS7101149	X92P226	+	-	....	....	....	1692	2716
PS7101047	X92P176	+	-	....	....	....	....	2709
PS7101044	X87F061	+	-	....	....	....	....	2677
Handel	-----	-	-	....	....	....	1753	2652
Integra	-----	-	-	1304	2432	1940	1372	2602
Rodeo	-----	-	-	....	....	....	....	2512
Shawnee	X84F259	+	+	1722	2462	2040	1538	2488
Umatilla	X75G027	+	+	1549	2452	2123	1411	2467
Minuet	-----	-	-	....	....	....	....	2409
Grand Mean				1360	2610	2142	1605	2754
LSD ($\alpha=0.05$)				282	206	203	159	179

Leaf type; + = normal leaf, - = *afila* or semileaf type.

Plant type; + = tall plant type, - = short plant type.

Yield data are means of three replications at each location, over all locations in each year.

Table 14. Post Harvest Quality Evaluations of Dry Pea Lines in the Advanced Yellow Dry Pea Yield Trial - 2001

Cultivar	Pullman						Genesee						Comments
	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color	
	-g-	-%-	-%-	-us/g-	-minutes-		-g-	-%-	-%-	-us/g-	-minutes-		
CEB 1489	24.1	108.3	0.3	33.0	21	Good	24.1	106.0	0.7	25.1	20	Good	Seedcoats sluffed
Badmitton	22.6	108.7	1.0	34.0	20	Good	24.9	88.1	1.7	27.8	17	Good	Seedcoats sluffed
Athos	29.1	107.7	1.3	32.7	19	Good	28.1	106.1	1.7	34.6	17	Good	Seedcoats sluffed
CEB 1484	24.3	109.7	1.3	27.7	20	Good	23.9	106.6	1.3	21.0	20	Good	
Mozart	23.4	101.3	2.7	27.3	22	Good	21.9	96.3	4.0	23.8	19	Good	Seedcoats sluffed
Lumina	24.0	110.3	0.3	25.3	18	Good	23.5	101.8	5.7	17.9	22	Good	Seedcoats sluffed
PS810765	26.6	105.7	0.7	36.7	22	Good	26.1	95.5	1.3	33.9	24	Good	Seedcoats sluffed
Delta	24.1	107.7	3.0	22.0	21	Good	22.2	107.0	2.3	16.6	18	Good	Seedcoats sluffed
Jasmine	26.9	110.0	0.0	38.0	21	Good	25.8	107.0	0.3	28.6	24	Good	Seedcoats sluffed
Fallon	24.3	107.7	0.7	34.0	20	Good	24.1	102.0	2.0	25.0	20	Good	Seedcoats sluffed
Swing	23.5	107.3	0.3	27.3	18	Good	21.9	103.4	0.3	23.5	20	Good	Seedcoats sluffed
Eclipse	24.5	106.0	0.0	29.3	21	Good	24.9	98.1	2.3	20.4	26	Good	Seedcoats sluffed
Rex	23.3	106.3	0.3	41.7	19	Good	25.2	101.0	1.3	33.5	22	Good	Seedcoats sluffed
PS7101149	25.7	105.3	0.3	31.3	20	Good	24.2	97.0	1.0	21.7	22	Good	Seedcoats sluffed
PS7101047	29.2	105.3	0.3	38.3	18	Good	28.3	97.5	0.0	31.4	22	Good	
PS7101044	28.7	107.0	0.3	36.7	18	Good	28.1	96.1	0.3	29.0	23	Good	
Handel	18.4	112.7	2.3	35.0	18	Good	19.5	108.3	0.7	24.6	18	Good	Seedcoats sluffed
Integra	26.5	107.7	0.0	27.3	20	Good	25.5	104.7	0.7	23.5	22	Good	Seedcoats sluffed
Rodeo	27.2	115.0	0.0	26.7	20	Good	28.3	101.9	0.0	22.0	21	Good	Seedcoats sluffed
Shawnee	23.8	103.7	5.7	31.3	20	Good	22.8	99.4	8.0	20.1	20	Good	
Umatilla	24.6	104.7	2.7	32.0	20	Good	22.8	99.2	4.3	19.5	21	Good	
Minuet	18.3	109.0	5.3	28.7	20	Good	18.9	100.0	1.3	24.3	21	Good	
Mean	24.7	107.6	1.4	31.7	20		24.3	101.0	1.9	24.9	21		
C.V. (%)	2.6	1.4	96.6	6.5	3.0		4.4	6.5	102.5	7.7	2.9		
LSD ($\alpha=0.05$)	0.7	1.6	1.4	2.2	0.6		1.1	6.9	2.0	2.0	0.6		

us/g = microsiemens per gram of seed.

Cooking test conducted on seeds soaked for 20 hours.

Table 15 Agronomic Data from the Preliminary Green, Yellow and Marrowfat Dry Pea Observation Trial, 2001 (0105)

1 of 4

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Pod Ht (mature) ..cm..</u>	<u>Pod Ht Index</u>	<u>Plant Ht (green) ..cm..</u>	<u>Plant Ht (mature) ..cm..</u>	<u>Plant Ht Index</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha..</u>
Green Cots.															
Lifter	-----	+	-	56	95	16	2	82	0	0.00	67	35	0.52	22.6	2827
PS0010864	SH95-26-10	+	-	56	93	16	2	57	0	0.00	46	18	0.39	24.5	2818
PS0010974	SH94-64-1-1-12	-	-	53	91	18	2	68	33	0.49	55	52	0.95	26.7	2625
PS0010792	BX94P26-1254	+	-	51	95	16	2	55	28	0.51	70	54	0.77	26.1	2588
PS0010835	SH95-6-1	+/-	-	56	91	15	2	56	0	0.00	40	22	0.55	25.4	2538
PS0010893	SH95-49-3	+	-	53	91	17	2	64	0	0.00	51	28	0.55	26.9	2527
PS0010973	SH94-64-1-1-12	-	-	53	93	18	2	63	39	0.62	51	58	1.00	27.6	2527
Columbian	-----	+	+	42	95	8	1	72	0	0.00	30	27	0.21	21.6	2473
PS0010972	SH94-64-1-1-2	-	-	53	95	18	2	68	45	0.66	56	71	1.00	26.2	2468
PS0010033	X94P035	+	-	51	93	15	2	48	0	0.00	69	31	0.45	21.8	2457
PS00101037	SH94-77-1-1-9	+	-	56	91	17	2	61	0	0.00	73	34	0.47	23.5	2455
PS0010999	SH94-80-2-2-2	+	-	53	91	13	2	67	0	0.00	45	26	0.58	23.7	2438
PS00101022	SH94-26-1-2-1	+	-	53	91	16	2	55	21	0.38	73	33	0.45	28.6	2432
PS0010998	SH94-80-2-2-2	+	-	56	91	17	2	72	0	0.00	57	23	0.40	24.9	2402
Joel	-----	+	+	46	93	13	2	130	0	0.00	73	35	0.48	24.1	2377
PS0010971	SH94-64-1-1-2	-	-	53	95	17	2	68	38	0.56	56	53	0.95	26.5	2333
PS0010128	X95P768	+	-	56	91	19	2	53	40	0.75	65	52	0.80	24.9	2323
PS00101023	SH94-26-1-2-1	+	-	53	91	16	2	61	0	0.00	81	38	0.47	26.7	2302
PS0010804	BX94P64-1132	-	-	56	88	19	2	60	35	0.58	54	49	0.91	25.5	2298
PS00101541	X95P116	-	+	46	91	14	2	78	0	0.00	115	36	0.31	23.8	2216
PS00101031	SH94-72-1-2-2	+	-	56	95	17	2	62	0	0.00	72	25	0.35	25.8	2208
PS00101032	SH94-72-1-1-2	+	-	56	93	19	2	73	0	0.00	82	29	0.35	23.8	2173
PS0010902	SH95-58-1	+	-	53	91	15	2	79	0	0.00	57	39	0.68	24.4	2171
PS0010803	BX94P64-1132	-	-	56	91	19	2	60	33	0.55	74	42	0.57	27.1	2157
PS0010038	X94P038	+	-	56	91	17	2	45	0	0.00	50	34	0.68	23.4	2089

Table 15. Agronomic Data from the Preliminary Green, Yellow and Marrowfat Dry Pea Observation Trial, 2001 (0105) Continued

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<u>Cultivar</u>	<u>Origin</u>	<u>Leaf</u> <u>Type</u>	<u>Plant</u> <u>Type</u>	<u>Days to</u> <u>Flower</u>	<u>Days to</u> <u>Maturity</u>	<u>Nodes to</u> <u>Fst Flwr</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pod Ht</u> <u>(green)</u> ..cm..	<u>Pod Ht</u> <u>(mature)</u> ..cm..	<u>Pod Ht</u> <u>Index</u>	<u>Plant Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(mature)</u> ..cm..	<u>Plant Ht</u> <u>Index</u>	<u>Weight</u> <u>100 Seed</u> ..g..	<u>Mean</u> <u>Seed Yield</u> ..kg/ha..
PS0010793	BX94P26-1254	+	-	53	91	16	2	58	0	0.00	71	25	0.35	25.2	2084
PS99102238	X95P768	+	-	59	93	20	2	72	53	0.74	79	81	1.00	22.2	2064
PS0010901	SH95-58-1	+	-	53	91	15	2	86	0	0.00	68	52	0.76	23.6	1881
PS00101215	SH91-1195-1-2	+	-	53	91	17	2	57	47	0.82	70	65	0.93	27.2	1872
PS0010011	X94P024	+	-	53	91	16	2	49	0	0.00	64	25	0.39	20.5	1856
PS0010899	SH95-56-10	+	+/-	56	91	15	2	62	0	0.00	47	17	0.36	23.8	1779
PS0010067	X94P081	+	-	42	91	10	2	35	0	0.00	66	33	0.50	21.0	1513
PS00101499	X93P192	-	+/-	53	93	16	2	57	0	0.00	70	45	0.64	23.7	1258
Sub Mean				53	92	16	2	65	12	0.20	64	39	0.60	24.6	2258
Marrowfats															
Supra	-----	-	-	56	95	17	2	52	47	0.90	68	64	0.94	35.2	2389
PS0010630	X96P098	+	-	53	95	15	2	45	0	0.00	62	32	0.52	35.5	2382
Maro	-----	+	-	53	95	15	2	46	0	0.00	62	28	0.45	32.0	2326
Guido	-----	+	-	56	95	16	2	49	0	0.00	64	33	0.52	34.9	2177
PS00101741	X96P082			49	93	14	2	52	17	0.33	76	43	0.57	38.0	2040
PS0010496	X95P473	+	-	53	95	14	2	45	0	0.00	57	25	0.44	32.4	1974
PS0010621	X96P096	+	-	51	93	16	2	56	0	0.00	75	27	0.36	31.5	1874
PS0010554	X95P590	+	-	51	93	14	2	44	0	0.00	68	27	0.40	34.9	1872
PS0010456	X95P333	+	-	53	93	14	2	45	0	0.00	64	27	0.42	38.9	1867
PS0010495	X95P473	+	-	53	95	14	2	43	32	0.74	59	42	0.71	34.0	1850
PS0010591	X96P092	+	-	51	95	14	2	49	0	0.00	67	33	0.49	36.0	1850
PS0010382	X95P034	+	-	56	95	16	2	50	0	0.00	61	24	0.39	35.9	1845
PS0010414	X95P288	+	-	53	95	14	2	62	0	0.00	79	37	0.47	32.2	1727
PS00101734	X96P109	+	-	46	93	12	2	37	0	0.00	57	25	0.44	34.3	1686
PS0010624	X96P097	+	-	53	95	14	1	39	0	0.00	51	23	0.45	31.9	1648

Table 15. Agronomic Data from the Preliminary Green, Yellow and Marrowfat Dry Pea Observation Trial, 2001 (0105) Continued

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<u>Cultivar</u>	<u>Origin</u>	<u>Leaf</u> <u>Type</u>	<u>Plant</u> <u>Type</u>	<u>Days to</u> <u>Flower</u>	<u>Days</u> <u>Maturity</u>	<u>Days to</u> <u>Fst Flwr</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pot Ht</u> <u>(green)</u> ..cm..	<u>(mature)</u> ..cm..	<u>Index</u>	<u>(green)</u> ..cm..	<u>(mature)</u> ..cm..	<u>Index</u>	<u>100 Seed</u> ..g..	<u>Seed Yield</u> ..kg/ha..
PS0010408	X95P272	+	-	49	93	15	2	56	0	0.00	73	31	0.42	35.8	1583
PS0010437	X95P315	+	-	49	93	14	2	49	0	0.00	71	34	0.48	35.8	1531
PS0010432	X95P310	+	-	56	95	16	2	60	0	0.60	73	23	0.32	34.2	1489
PS0010487	X95P458	+	-	51	93	16	2	70	0	0.00	94	26	0.28	30.4	1459
PS0010634	X96P099	+	-	53	93	14	2	53	0	0.00	69	19	0.28	37.6	1326
PS0010545	X95P554	+	-	51	95	15	2	51	28	0.55	76	34	0.45	35.9	1257
PS0010541	X95P554	+	-	49	93	15	2	50	19	0.38	71	32	0.45	33.6	1211
PS0010614	X96P167	+	-	51	95	17	1	69	21	0.30	107	40	0.37	34.9	996
Sub Mean				52	94	15	2	51	7	0.17	70	32	0.46	34.6	1837
Yellow Cots.															
PS0010836	SH95-6-1	-	-	56	93	14	2	45	32	0.71	66	64	0.97	26.1	2939
Fallon	-----	+	-	51	93	15	2	58	0	0.00	81	24	0.30	25.3	2809
PS0010993	SH94-77-2-4-4	-	-	56	93	19	2	49	51	1.00	63	63	1.00	25.5	2741
PS0010974	SH94-64-1-1-12	-	-	56	91	17	2	56	0	0.00	72	23	0.32	25.2	2704
Umatilla	-----	+	+	49	93	16	2	88	0	0.00	131	33	0.25	23.9	2655
PS0010897	SH95-54-5	+/-	-	53	91	19	2	64	0	0.00	87	23	0.26	23.0	2610
PS0010938	SH94-28-3-2-3	+	-	51	93	15	2	52	0	0.00	76	29	0.38	21.3	2488
PS0010946	SH94-37-2-6-4	-	-	53	93	17	2	64	34	0.53	97	59	0.61	24.4	2419
PS0010806	X94P81-2	-	-	53	95	14	2	38	0	0.00	63	31	0.49	26.4	2419
Shawnee	-----	+	+	46	93	16	2	82	0	0.00	118	26	0.22	23.0	2408
PS0010859	SH95-23-1	-	-	53	93	18	2	41	0	0.00	71	23	0.32	24.7	2390
PS0010817	X92P33-3	+	-	56	95	19	2	65	26	0.40	92	49	0.53	29.7	2338
PS0010805	X94P81-2	-	-	53	95	15	2	44	0	0.00	72	25	0.35	25.9	2334
PS0010907	SH95-61-1	+/-	-	53	93	17	2	44	21	0.48	62	33	0.53	26.0	2270
PS0010818	X92P33-3	+	-	56	95	19	2	65	16	0.25	88	30	0.34	29.2	2234

Table 15. Agronomic Data from the Preliminary Green, Yellow and Marrowfat Dry Pea Observation Trial, 2001 (0105) Continued

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<u>Cultivar</u>	<u>Origin</u>	<u>Leaf</u> <u>Type</u>	<u>Plant</u> <u>Type</u>	<u>Days to</u> <u>Flower</u>	<u>Days</u> <u>Maturity</u>	<u>Days to</u> <u>Fst Flwr</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pot Ht</u> <u>(green)</u> ..cm..	<u>(mature)</u> ..cm..	<u>Index</u>	<u>(green)</u> ..cm..	<u>(mature)</u> ..cm..	<u>Index</u>	<u>100 Seed</u> ..g..	<u>Seed Yield</u> ..kg/ha..
PS0010900	SH95-57-2	+	-	51	93	15	2	54	0	0.00	78	27	0.35	21.6	1858
Sub Mean				59	93	17	2	56	11	0.21	82	35	0.45	25.1	2476
Grand Mean				54	93	16	2	57	10	0.19	72	35	0.50	27.9	2190

Planting date was 5/7/01. Harvest date was 8/17/01.

Yield and agronomic data are from one plot of each line at Pullman, WA.

Pod and plant height were measured at the green pod stage.

Winter Pea Trial Results:

The white-flowered, clear-seeded winter pea yield trial included 14 selections and two checks and was conducted only at Spillman Farm. Seed yield of the lines in the trial were average compared to previous years, but lower than expected due to the dry summer conditions during seed fill and maturity (Tables 16 and 17). As in the spring peas the semi-leafless type is desired and has been selected in both tall and dwarf plant types. All the entries have yellow cotyledons with the exception of PS9530726, which has green cotyledons. PS9830S431 was the highest yielding breeding line in the trial and yielded 2525 kg/ha, approximately one-half its yield in 2000.

Quality evaluations for the clear-seeded winter peas are shown in Table 18. Most of the lines had relatively low percentages of hard seeds and good water uptake. All of the lines tended to be relatively small-seeded. However, the data indicate excellent potential for winter legumes in the region.

Three white-flowered edible type winter peas, PS9530726, PS9530645 and PS9430706, are currently being tested in reduced tillage systems and in cooperative trials at several locations. The lines were direct seeded this past fall into stubble at Rosalia, WA and Genesee, ID. Sowing was delayed until mid October due to dry conditions, but stands are expected to be relatively good.

Yield trials of Austrian winter pea selections were established at the WSU Spillman Farm near Pullman, WA. The advanced trial contained four selections and two checks. Due to the mild winter, there was very little winter killing in the nursery and less hardy lines could not be identified for discard; however, winter killing in previous seasons is expected to have eliminated less hardy lines. Yields averaged 2779 kg/ha (2473 lb/a) and were average compared to the previous four years (Tables 19 and 20). Of the selections, two were semi-leafless and one was a dwarf, semi-leafless type. One of the selections, PS9430119 was higher yielding when compared to 'Granger' over five seasons from 1997 to 2001. Granger has a long vine, however the semi-leafless trait provides good resistance to lodging along with increased air movement through the canopy and also provides a possible escape mechanism from foliar diseases such as Ascochyta blight and Sclerotinia white mold. Another high yielding line, PS9530174, is a semi-leafless dwarf type with good resistance to lodging. New selections have been made for the semi-leafless trait and also for resistance to powdery mildew, Fusarium wilt and Aphanomyces root rot. Selection of Austrian winter pea types has concentrated on combining the semi-leafless trait with a tall plant type for maximum biomass production. Post harvest quality evaluations are shown in Table 21.

Table 16. Agronomic Data from the Advanced Clear Seed Coat Winter Pea Yield Trial, 2001 (0122F)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Seed Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha..</u>
YellowCots:												
Melrose	-----	+	+	AWP	+/-	2	21	2	62	106	12.6	2636
PS9830S431	X95P679	+	+	CSC	+/-	3	15	2	53	94	12.8	2525
PS9830F010	X92P056	-	+	CSC	-	3	17	2	65	109	12.9	2396
PS9530726*	X91P241	-	-	CSC	+	3	17	2	24	51	15.5	2340
PS9830F009	X92P056	-	+	CSC	+	3	15	2	66	98	12.6	2332
PS9630448	X92P056	-	+	CSC	+	3	19	2	65	102	13.3	2314
PS9830S358	X93P060	-	-	CSC	+	3	19	2	33	48	15.3	2280
PS9830F035	X91P234	+	-	CSC	+	2	21	2	86	125	16.2	2244
PS9830F011	X92P056	-		CSC	+	3	16	2	26	43	14.8	2243
PS9830S316	X92P028	-	+	CSC	+	3	15	2	49	90	13.0	2153
Granger	-----	-	+	AWP	+	3	19	2	71	105	13.9	2128
PS9430706	X91P091	-	+	CSC	+/-	3	18	2	90	126	13.7	2126
PS9830S329	X92P056	-	+	CSC	+	3	17	2	58	94	12.5	2053
PS9830S523	X92P056	-	+	CSC	+	3	18	2	64	93	12.8	2025
PS9530645	X91P241	-	-	CSC	+	3	20	2	42	54	15.3	1941
PS9830S307	X92P028	-	+	CSC	+	3	19	2	80	121	14.8	1709
Grand Mean							18	2	58	91	13.9	2215
C.V. (%)							13		13	9		15
LSD ($\alpha=0.05$)							3		10	12		462
Planting Date												9/26/00
Harvest Date												7/25/01

Yield data are means of three replications at the Pullman, WA location.

* Green Cotyledon

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; + = tall plant type, - = short plant type.

AWP = Austrian Winter Pea Seed Type (purple flowered).

CSC = Clear Seed Coat Winter Pea (white flowered).

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage.

Table 17. Mean Yields (kg/ha) of Pea Lines in the Advanced Clear Seed Coat Winter Pea Yield Trial, 1997 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
Melrose	-----	+	+	3332	1382	1194	3458	2636
PS9830S431	X95P679	+	+	....	....	....	....	2525
PS9830F010	X92P056	-	+	....	....	....	....	2396
PS9530726*	X91P241	-	-	....	1228	612	2877	2340
PS9830F009	X92P056	-	+	....	....	....	4505	2332
PS9630448	X92P056	-	+	....	....	517	4347	2314
PS9830S358	X93P060	-	-	....	....	....	....	2280
PS9830F035	X91P234	+	-	....	....	....	....	2244
PS9830F011	X92P056	-	-	....	....	....	4124	2243
PS9830S316	X92P028	-	+	....	....	....	....	2153
Granger	-----	-	+	3235	1691	611	4965	2128
PS9430706	X91P091	-	+	....	....	....	2508	2126
PS9830S329	X92P056	-	+	....	....	....	....	2053
PS9830S523	X92P056	-	+	....	....	....	....	2025
PS9530645	X91P241	-	-	....	....	....	1899	1941
PS9830S307	X92P028	-	+	....	....	....	....	1709
Grand Mean				3065	1680	630	3787	2215
LSD ($\alpha=0.05$)				374	237	271	918	462

Leaf type; + = normal leaf, - = *afila* or semileafless type

Plant type; + = tall plant type, - = short plant type

Yield data are from Pullman, WA.

* Green Cotyledon – All others have Yellow Cotyledons.

Table 18. Post Harvest Quality Evaluations of Dry Pea Lines in the Advanced
Clear Seed Coat Winter Pea Yield Trial - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity
	-g-	-%-	-%-	-us/g-
PS9830F010	12.9	104.4	1.0	64.8
PS9530726	15.5	108.6	0.0	42.3
PS9830F009	12.6	103.7	0.0	83.4
PS9830S358	15.3	104.5	4.3	44.6
PS9830F035	16.2	112.1	0.0	54.6
PS9830F011	14.8	105.4	3.0	39.9
PS9830S316	13.0	103.4	2.0	72.8
PS9430706	13.7	109.8	1.0	49.6
PS9830S329	12.5	103.5	0.7	72.9
PS9830S523	12.8	103.2	2.0	63.1
PS9830S307	14.8	103.9	0.7	89.8
Mean	14.0	105.7	1.3	61.6
C.V. (%)	2.0	1.2	86.3	4.5
LSD ($\alpha=0.05$)	0.3	1.4	1.2	3.0

us/g = microsiemens per gram of seed.

Table 19. Agronomic Data from the Advanced Austrian Winter Pea Yield Trial, 2001 (0121F)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>Seed Type</u>	<u>Disease Fw</u>	<u>Disease Aph</u>	<u>Nodes to Fst Flwr</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha..</u>
YellowCots:												
PS9530174	X91P241	-	-	AWP	+	3	17	2	39	59	16.5	3158
PS9430119	X91P070	+	+	AWP	+/-	2	18	2	72	112	14.4	3037
Granger	....	-	+	AWP	+	3	23	2	82	128	13.9	3029
Melrose	....	+	+	AWP	+/-	3	21	2	76	110	12.6	2611
PS9630042	X91F263	-	+	AWP	-	3	19	2	84	121	14.5	2459
PS9630177	X92P024	+	+	AWP	-	3	20	2	85	121	12.2	2382
Grand Mean							19	2	73	108	14.0	2779
C.V. (%)							9		6	3		12.0
LSD ($\alpha=0.05$)							3		7	5		501
Planting Date												9/26/00
Harvest Date												7/25/01

Yield data are means of three replications at Pullman, WA.

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; + = tall plant type, - = short plant type.

AWP = Austrian Winter Pea Seed Type (purple flowered).

Fw = Fusarium wilt race 1; + = resistant, - = susceptible.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage.

Table 20. Mean Yields (kg/ha) of Pea Lines in Advanced Austrian Winter Pea Yield Trial, 1997 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Plant Type</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
PS9530174	X91P241	-	-	....	....	606	3894	3158
PS9430119	X91P070	+	+	3612	2722	730	3925	3037
Granger	....	-	+	3041	2502	388	4196	3029
Melrose	....	+	+	2356	2235	1013	3573	2611
PS9630042	X91F263	-	+	....	....	820	3735	2459
PS9630177	X92P024	+	+	....	....	760	2896	2382
Grand Mean				3026	2357	1858	3703	2779
LSD ($\alpha=0.05$)				436	123	172	990	501

Leaf type; + = normal leaf, - = *afila* or semileafless type.

Plant type; +=tall plant type, -=short plant type.

Yield data are from Pullman, WA.

Table 21. Post Harvest Quality Evaluations of Dry Pea Lines in the Advanced Austrian Winter Pea Yield Trial - Pullman - 2001

<u>Cultivar</u>	<u>Weight 100 Seeds</u>	<u>Water Uptake</u>	<u>Hard Seed</u>	<u>Conductivity</u>
	-g-	-%-	-%-	-us/g-
PS9430174	16.5	102.6	15.0	30.1
PS9430119	14.4	102.7	30.0	27.8
Granger	13.9	106.7	20.3	29.7
Melrose	12.6	96.3	27.0	21.8
PS9630042	14.5	98.7	32.3	31.1
PS9630177	12.2	103.8	33.7	25.8
Mean	14.0	101.8	26.4	27.7
C.V. (%)	2.4	5.2	23.5	3.4
LSD ($\alpha=0.05$)	0.4	6.0	7.0	1.1

us/g = microsiemens per gram of seed.

Lentil Trial Results:

Thirty-four entries and six check varieties ('Pennell', 'Meritt', 'Richlea', 'Mason', 'Palouse' and 'Brewer') were included in the advanced large yellow lentil yield trial in 2001 (Tables 22-24). The trials were planted at Pullman and Farmington, Washington, and Genesee, Idaho. Yields at Farmington were somewhat depressed because of the dry season, but yields at Pullman and Genesee were close to average. Two recently released varieties, Pennell and Meritt were included as additional checks in 2001. These two varieties were selected for improved yields and biomass production. Richlea continued to be the top yielder when averaged over the three locations. Overall, Pennell and Meritt were significantly higher yielding when compared to Brewer. The former is a large-seeded Laird type with good seed color, high biomass production and good standing ability. Meritt is intended as a Brewer replacement with larger seeds and higher yields and also has high biomass and good standing ability. Three other selections, LC860616L, LC760139L and LC460212L, also had significantly higher yields when compared to Brewer. LC860616L also has significantly larger seeds at 8.0 grams per 100 seeds as compared to 6.5 for Brewer and 7.6 for Pennell. A Castilian type, LC760209C, exhibited good yields and desirable agronomic traits. This line received favorable comment in Spanish markets. It will be proposed for preliminary increase in 2002 for future release.

The good standing ability of these selections and other selections in the trial will improve ease of harvest and reduce seed losses during the harvesting operation. Data collected on the 34 breeding lines indicated that progress is being made toward improving seed size and yields as well as standing ability. Future variety releases will stand more erect, ensuring greater ease of harvest, will be higher yielding and have larger seed size. Quality evaluations including cooking times are for these selections is presented in Table 25 and most of the selections scored as good for color.

Advanced yield trials of Turkish Red (Tables 26-29), Spanish Brown (Tables 34-37) and 'Eston' (Tables 30- 33) types were planted at the same three locations. These trials included 20 Turkish red selections, 19 Eston selection and 8 Spanish Brown selections, respectively. Progress was made in developing Turkish red type lines that are taller and with the desired seed characteristics. Introduced material from Turkey and the Middle East is generally too short for production in the Palouse region and it was necessary to cross the material to taller types. As a result taller types have been selected from the crosses. Several of the Turkish red lines performed similarly to 'Crimson'. One of the lines, LC8602303T or LC7601599T, could be candidates for release. Several Eston type selections have performed well and are being considered for release this coming year. These include LC7601106E, LC8601849E and LC7601086E. Of these lines, LC8601849E had significantly higher yields when compared to Eston. The other two selections had similar yields to Eston. 'Milestone', the most recent release from Canada and Athena was the top yielder. Several of the Spanish Brown type lines that had been selected for resistance to ascochyta blight were comparable to the 'Pardina' check for yield. Two of the selections were higher yielding when compared to Pardina and included LC99602427P and LC8601787P. The preliminary yield trial, planted only at Pullman, had

50 large yellow lentil, 8 zero-tannin, 20 Pardina type, 9 Eston type, and 15 Turkish red type selections (Table 38). The large yellow selections were Laird types that were selected for exceptionally large uniform seed size with no mottling and blunt seed edges. Lines in this preliminary trial were also selected for increased biomass and residue production and upright growth habit. The selections in this trial that have promise will be entered in the advanced trial at three locations in 2002.

Yellow and red zero-tannin lines were tested at Pullman and had very good yields (Tables 39-40). The preliminary screening nursery results are in Table 41. These are new selections that have been evaluated for the first time in the field. Those lines that show promise for yield, standing ability and quality will be advanced to the preliminary yield trial in 2002.

Biomass Production:

The recently completed lentil residue project indicated that it is possible to increase both residue production and seed yield in lentils. Accessions identified with good biomass production and seed yield have been crossed to good quality lines and the hybrids advanced for selection. The resulting populations are being selected for acceptable seed quality traits, improved biomass and residue production. The improved biomass and residue production is expected to result in increased seed yield.

Disease Screening:

We have established a pea enation mosaic virus screening trial at Corvallis, OR in cooperation with Jim Myers. We will use that nursery in 2002 to screen our advanced selections for resistance. In addition, we also test the advanced selections in our *Aphanomyces* root rot screening trial at Spillman Farm.

Variety Releases:

Two lines; LC460266B (Merrit) and LC460197L (Pennell) with high yields, improved plant height index, large seed size and good biomass production were released in 2001 and the seed supply was increased for planting in 2002. There is about 36,000 pounds of Foundation seed of Pennell and about 21,000 pounds of Foundation seed of Merrit available for allocation and planting in 2002.

A Castilian type lentil, LC760209C, is proposed for breeder seed increase in 2002. In 2001, 371 plant rows of pre-breeder seed were grown and harvested. Castilian type lentils have seed coat markings similar to Brewer and Merrit but the seed are much larger in size.

Table 22. Summary (kg/ha) of the Advanced Large Yellow Lentil Yield Trial over Locations, 2001 (0152)

<u>Cultivar</u>	<u>Origin</u>	<u>Genesee</u>	<u>Farmington</u>	<u>Pullman</u>	Mean <u>Seed Yield</u>
Richlea	-----	2308	1444	2154	1968
LC860616L	X95L073	1989	1403	2081	1824
LC760139L	HA84G12	1962	1498	1920	1793
LC460212L	X89L101	1896	1399	2067	1787
Pennell	X89L101	1866	1438	2000	1767
LC860359L	X93L035	1911	1510	1874	1764
Merrit	X90L010	1916	1277	2085	1759
LC7601080R	X89L039	1834	1360	2049	1747
LC7601075R	X89L039	1957	1298	1986	1746
LC460199L	X89L101	1915	1433	1876	1740
LC760209C	X89L007	1789	1395	1978	1720
LC760719L	X95L232	1974	1384	1798	1718
LC660273L	X89L080	1814	1352	1925	1696
LC860644L	X95L073	1891	1302	1878	1690
LC660829L	HA84G12	1817	1305	1902	1674
Mason	-----	1724	1268	2032	1674
LC760722L	X95L233	1850	1365	1793	1668
LC860443L	X93L011	1962	1248	1793	1667
LC660272L	X89L080	1638	1514	1808	1652
LC760739L	X95L235	1927	1284	1708	1639
LC8601021L	X95L093	1853	1071	1948	1623
LC860953L	X95L089	1628	1184	2029	1613
LC760504L	X93L038	1836	1212	1736	1594
Brewer	-----	1662	1172	1923	1585
LC860945L	X95L089	1725	1152	1850	1575
LC860088L	X89L018	1653	1189	1834	1558
LC860624L	X95L073	1704	1238	1717	1552
LC860242L	X89L092	1746	1138	1758	1546
Palouse	-----	1615	1210	1813	1545
LC8601384L	X95L233	1751	1327	1515	1530
LC000004L	-----	1820	1321	1448	1529
LC8601381L	X95L233	1754	1153	1653	1519
LC8601390L	X95L233	1749	1182	1580	1503
LC760789L	X95L245	1389	1239	1751	1459
LC860056L	X89L018	1450	1082	1665	1398
LC8601002L	X95L093	1480	1116	1551	1382
LC860871L	X95L085	1681	1170	1268	1372
LC8601562L	X95L245	1561	1077	1457	1364
LC860794L	X95L079	1142	962	1581	1228
LC760576L	X95L079	1120	876	1370	1121
Grand Mean		1756	1264	1804	1607
C.V. (%)		5	8	6	7
LSD ($\alpha=0.05$)		131	137	157	83
Planting Date		4/25/01	4/24/01	5/7/01	
Harvest Date		8/13/01	8/27/01	8/22/01	

Table 23. Agronomic Data for the Advanced Large Yellow Lentil Yield Trial, 2001 (0152)

1 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Disease</u> <u>Aph</u>	<u>Days to</u> <u>Flower</u>	<u>Days to</u> <u>Maturity</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pod Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(mature)</u> ..cm..	<u>Plant Ht</u> <u>Index</u>	<u>Weight</u> <u>100 Seed</u> ..g..
Richlea	-----	3	53	96	2	21	41	29	0.72	5.5
LC860616L	X95L073	3	54	97	2	33	43	31	0.60	8.0
LC760139L	HA84G12	3	53	96	2	31	44	30	0.62	6.7
LC460212L	X89L101	3	58	97	2	28	38	38	0.93	7.6
Pennell	X89L101	3	53	96	2	25	38	36	0.97	7.6
LC860359L	X93L035	3	54	97	2	41	43	22	0.60	7.4
Merrit	X90L010	3	50	94	2	13	37	36	0.96	7.2
LC7601080R	X89L039	3	54	96	2	29	40	41	1.00	5.9
LC7601075R	X89L039	3	55	96	2	29	38	44	1.00	5.9
LC460199L	X89L101	3	50	97	2	20	39	41	1.00	7.3
LC760209C	X89L007	3	53	96	2	22	35	31	0.81	7.7
LC760719L	X95L232	3	53	97	2	27	40	37	0.82	7.4
LC660273L	X89L080	3	52	97	2	34	39	27	0.50	8.3
LC860644L	X95L073	3	55	97	2	30	43	25	0.76	7.3
LC660829L	HA84G12	3	50	95	2	24	43	41	0.92	6.6
Mason	-----	3	49	95	2	25	39	30	0.87	7.5
LC760722L	X95L233	3	54	97	2	31	44	27	0.55	8.2
LC860443L	X93L011	3	58	97	2	31	47	25	0.64	8.6
LC660272L	X89L080	3	55	97	2	29	50	27	0.69	7.8
LC760739L	X95L235	3	55	97	2	21	40	33	0.84	7.7
LC8601021L	X95L093	3	54	97	2	21	42	34	0.72	7.6
LC860953L	X95L089	3	54	96	2	25	46	37	0.67	8.1
LC760504L	X93L038	3	53	97	2	20	47	26	0.56	7.7
Brewer	-----	3	50	95	2	21	36	41	1.00	6.5
LC860945L	X95L089	3	54	96	2	24	39	31	0.83	8.1
LC860088L	X89L018	3	52	94	2	31	42	40	0.95	7.2
LC860624L	X95L073	3	55	97	2	35	39	23	0.51	8.3
LC860242L	X89L092	3	53	97	2	31	42	38	0.93	7.0
Palouse	-----	3	51	95	2	22	32	26	0.91	7.5
LC8601384L	X95L233	3	57	97	2	30	44	28	0.63	8.0
LC000004L	-----	3	55	98	2	28	38	23	0.63	7.4
LC8601381L	X95L233	3	57	97	2	22	47	21	0.52	8.0
LC8601390L	X95L233	3	58	98	2	26	47	24	0.64	8.3
LC760789L	X95L245	3	54	96	2	24	41	34	1.00	8.7
LC860056L	X89L018	3	54	96	2	34	42	36	0.92	7.4

Table 23. Agronomic Data for the Advanced Large Yellow Lentil Yield Trial, 2001 (0152) Continued

2 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Plant Ht (mature) ..cm..</u>	<u>Plant Ht Index</u>	<u>Weight 100 Seed ..g..</u>
LC8601002L	X95L093	3	54	97	2	27	47	25	0.50	8.3
LC860871L	X95L085	3	57	99	2	20	38	27	0.78	7.9
LC8601562L	X95L245	3	53	97	2	26	43	24	0.59	8.5
LC860794L	X95L079	3	50	95	2	20	38	26	0.79	8.7
LC760576L	X95L079	3	55	96	2	16	32	25	0.69	10.1
Grand Mean			54	96	2	26	41	31	0.77	7.6
C.V. (%)			4	1		16	10	11	0.18	
LSD ($\alpha=0.05$)			3	1		6	6	5	0.95	

Agronomic data are means of three replications at Pullman, WA.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity.

Plant height index was determined by dividing the canopy height at harvest maturity by the total plant height.

Table 24. Mean Yields (kg/ha) of Lentil Lines in the Advanced Large Yellow Lentil Yield Trial, 1997 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
Richlea	-----	....	1898	1790	1407	1968
LC860616L	X95L073	....	....	....	....	1824
LC760139L	HA84G12	....	....	....	1374	1793
LC460212L	X89L101	1558	1814	1573	1242	1787
Pennell	X89L101	1532	1757	1539	1100	1767
LC860359L	X93L035	....	....	....	....	1764
Merrit	X90L010	1751	1855	1599	1125	1759
LC7601080R	X89L039	....	....	....	1361	1747
LC7601075R	X89L039	....	....	....	1249	1746
LC460199L	X89L101	1515	1777	1528	1104	1740
LC760209C	X89L007	....	....	....	....	1720
LC760719L	X95L232	....	....	....	1249	1718
LC660273L	X89L080	....	....	1615	1142	1696
LC860644L	X95L073	....	....	....	....	1690
LC660829L	HA84G12	....	....	1619	1378	1674
Mason	-----	1109	1787	1413	1368	1674
LC760722L	X95L233	....	....	....	1257	1668
LC860443L	X93L011	....	....	....	....	1667
LC660272L	X89L080	....	....	1441	1185	1652
LC760739L	X95L235	....	....	....	1105	1639
LC8601021L	X95L093	....	....	....	....	1623
LC860953L	X95L089	....	....	....	....	1613
LC760504L	X93L038	....	....	....	1132	1594
Brewer	-----	1513	1739	1452	1264	1585
LC860945L	X95L089	....	....	....	....	1575
LC860088L	X89L018	....	....	....	....	1558
LC860624L	X95L073	....	....	....	....	1552
LC860242L	X89L092	....	....	....	....	1546
Palouse	-----	1059	1502	1362	1292	1545
LC8601384L	X95L233	....	....	....	....	1530
LC000004L	-----	....	....	....	....	1529
LC8601381L	X95L233	....	....	....	....	1519
LC8601390L	X95L233	....	....	....	....	1503
LC760789L	X95L245	....	....	....	1145	1459
LC860056L	X89L018	....	....	....	....	1398
LC8601002L	X95L093	....	....	....	....	1382
LC860871L	X95L085	....	....	....	....	1372
LC8601562L	X95L245	....	....	....	....	1364
LC860794L	X95L079	....	....	....	....	1228
LC760576L	X95L079	....	....	....	....	1121
Grand Mean		1429	1589	1484	1181	1607
LSD ($\alpha=0.05$)		168	194	150	163	83

Yield data are means of three replications at each location, over three locations in each year.

Table 25. Post Harvest Quality Evaluations of the Advanced Large Yellow Lentil Selections - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-% -	-% -	-us/g-	-minutes-	
Richlea	5.5	107.0	3.0	46.7	22	Good
LC860616L	8.0	110.7	0.3	60.3	22	Good
LC760139L	6.7	112.6	0.3	52.5	24	Good
LC460212L	7.6	109.8	3.7	41.1	22	Good
Pennel	7.6	111.4	1.7	41.6	20	Good
LC860359L	7.4	104.5	1.3	61.9	22	Good
Merrit	7.2	111.7	3.7	37.5	22	Good
LC7601080R	5.9	99.9	1.7	68.3	22	Good
LC7601075R	5.9	100.0	0.7	50.8	22	Good
LC460199L	7.3	110.3	1.0	45.8	22	Good
LC760209C	7.7	112.3	1.7	46.2	22	Good
LC760719L	7.4	113.9	0.3	67.3	22	Good
LC660273L	8.3	107.6	1.0	38.6	22	Good
LC860644L	7.3	113.1	1.0	60.7	22	Good
LC660829L	6.6	112.2	0.0	48.7	24	Good
Mason	7.5	108.2	0.7	50.7	22	Good
LC760722L	8.2	110.8	2.3	51.9	22	Good
LC860443L	8.6	108.6	0.3	54.6	22	Fair/Dark
LC660272L	7.8	106.3	1.3	37.6	22	Good
LC760739L	7.7	113.4	0.0	70.1	20	Good
LC8601021L	7.6	114.1	0.0	51.5	22	Good
LC860953L	8.1	110.1	0.0	57.0	22	Good
LC760504L	7.7	102.0	3.3	42.8	22	Good
Brewer	6.5	111.3	1.7	42.9	20	Good
LC860945L	8.1	114.7	0.3	61.4	24	Good
LC860088L	7.2	106.0	3.3	42.5	22	Good
LC860624L	8.3	110.1	1.0	59.3	22	Good
LC860242L	7.0	108.8	0.3	49.8	22	Good
Palouse	7.5	110.3	2.3	52.2	22	Good
LC8601384L	8.0	111.0	1.3	61.7	24	Good
LC000004L	7.4	104.3	0.7	52.5	20	Good
LC8601381L	8.0	112.7	1.3	60.2	25	Good
LC8601390L	8.3	115.9	0.0	63.6	22	Good
LC760789L	8.7	114.5	0.0	49.5	22	Good
LC860056L	7.4	107.3	2.0	51.6	22	Good
LC8601002L	8.3	113.5	0.0	63.9	26	Good
LC860871L	7.9	120.2	0.7	67.8	22	Good
LC8601562L	8.5	116.9	1.0	45.6	22	Fair/Dark
LC860794L	8.7	119.4	1.0	53.3	22	Good
LC760576L	10.1	124.4	0.3	51.2	22	Good
Mean	7.6	110.8	1.2	52.8	22.0	
C.V. (%)	1.6	1.6	84.3	9.7	0.8	
LSD ($\alpha=0.05$)	0.1	1.8	1.0	5.4	0.2	

us/g = microsiemens per gram of seed

Table 26. Summary (kg/ha) of the Advanced Turkish Red Type Lentil Yield Trial over Locations, 2001 (0151T)

<u>Cultivar</u>	<u>Origin</u>	<u>Genesee</u>	<u>Farmington</u>	<u>Pullman</u>	<u>Mean Seed Yield</u>
LC8602303T	X95L035	1599	1020	1836	1489
LC99602972T	X95L071	1639	914	1876	1480
LC8602354T	X95L041	1750	988	1598	1449
LC99602712T	X95L041	1754	746	1801	1437
LC7601599T	X95L032	1870	1020	1407	1436
LC000008T	-----	1339	950	1959	1420
LC99602724T	X95L041	1712	668	1865	1419
LC99602702T	X95L036	1646	616	1930	1401
Crimson	-----	1643	834	1712	1400
LC000009T	-----	1311	793	2010	1375
LC99602626T	X93L013	1694	906	1424	1345
Robin	-----	1389	985	1544	1309
LC000012T	-----	1400	644	1870	1308
LC99603263T	X95L284	1274	1081	1528	1298
LC99603197T	X95L283	1394	678	1538	1207
LC8602419T	X95L051	1344	822	1400	1193
LC99603202T	X95L283	1297	876	1321	1168
LC99602824T	X95L060	1244	661	1484	1133
LC99603149T	X95L278	831	674	1532	1016
LC99603200T	X95L283	1021	839	1166	1012
LC99603003T	X95L256	1101	559	1189	953
LC99603193T	X95L282	817	434	791	684
Grand Mean		1412	805	1581	1270
C.V. (%)		6	16	7	9
LSD ($\alpha=0.05$)		123	175	157	86
Planting Date		4/25/01	4/24/01	5/7/01	
Harvest Date		8/14/01	8/27/01	8/20/01	

Table 27. Agronomic Data for the Advanced Turkish Red Type Lentil Yield Trial, 2001 (0151T)

<u>Cultivar</u>	<u>Origin</u>	<u>Disease</u> <u>Aph</u>	<u>Days to</u> <u>Flower</u>	<u>Days to</u> <u>Maturity</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pod Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(mature)</u> ..cm..	<u>Plant Ht</u> <u>Index</u>	<u>Weight</u> <u>100 Seed</u> ..g..
LC8602303T	X95L035	3	53	97	2	23	40	29	0.74	3.9
LC99602972T	X95L071	3	53	94	2	21	33	35	1.00	4.6
LC8602354T	X95L041	3	53	96	2	28	39	26	0.68	5.2
LC99602712T	X95L041	3	52	94	2	21	35	29	0.80	4.7
LC7601599T	X95L032	3	57	96	2	21	40	21	0.51	4.5
LC000008T	-----	3	52	94	2	21	35	34	1.00	3.9
LC99602724T	X95L041	3	50	94	2	16	34	34	0.93	4.6
LC99602702T	X95L036	3	49	94	2	12	32	33	1.00	4.5
Crimson	-----	3	57	94	2	19	34	21	0.67	4.0
LC000009T	-----	3	50	94	2	12	34	37	1.00	3.8
LC99602626T	X93L013	3	56	96	2	15	33	34	1.00	3.8
Robin	-----	3	53	95	2	19	36	36	1.00	3.3
LC000012T	-----	3	59	94	2	20	38	36	0.94	4.0
LC99603263T	X95L284	3	59	97	2	21	36	24	0.74	4.6
LC99603197T	X95L283	3	52	96	2	29	41	36	0.86	4.7
LC8602419T	X95L051	3	54	96	2	22	41	47	1.00	4.4
LC99603202T	X95L283	3	55	97	2	24	42	41	1.00	4.6
LC99602824T	X95L060	3	52	95	2	19	34	35	1.00	4.6
LC99603149T	X95L278	3	53	94	2	21	42	27	0.62	4.4
LC99603200T	X95L283	3	55	94	2	26	37	42	1.00	4.4
LC99603003T	X95L256	3	56	95	2	21	36	42	1.00	4.7
LC99603193T	X95L282	3	56	96	2	30	44	26	0.52	4.4
Grand Mean			54	95	2	21	37	33	0.91	4.3
C.V. (%)			4	1		19	11	12	18	
LSD ($\alpha=0.05$)			3	1		5	5	5	0.22	

Agronomic data are means of three replications at Pullman, WA.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity.

Plant height index was determined by dividing the canopy height at harvest maturity by the total plant height.

Table 28. Mean Yields (kg/ha) of Lentil Lines in the Advanced Turkish Red Type Lentil Yield Trial, 1998 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
LC8602303T	X95L035	....	....	1318	1489
LC99602972T	X95L071	....	....	....	1480
LC8602354T	X95L041	....	....	1381	1449
LC99602712T	X95L041	....	....	....	1437
LC7601599T	X95L032	....	1597	1397	1436
LC000008T	-----	....	....	....	1420
LC99602724T	X95L041	....	....	....	1419
LC99602702T	X95L036	....	....	....	1401
Crimson	-----	1719	1605	1462	1400
LC000009T	-----	....	....	....	1375
LC99602626T	X93L013	....	....	....	1345
Robin	-----	....	....	985	1309
LC000012T	-----	....	....	....	1308
LC99603263T	X95L284	....	....	....	1298
LC99603197T	X95L283	....	....	....	1207
LC8602419T	X95L051	....	....	1146	1193
LC99603202T	X95L283	....	....	....	1168
LC99602824T	X95L060	....	....	....	1133
LC99603149T	X95L278	....	....	....	1016
LC99603200T	X95L283	....	....	....	1012
LC99603003T	X95L256	....	....	....	953
LC99603193T	X95L282	....	....	....	684
Grand Mean		1615	1410	1152	1270
LSD _($\alpha=0.05$)		162	149	223	86

Yield data are means of three replications at each location, over three locations in each year.

Table 29. Post Harvest Quality Evaluations of the Advanced Turkish Red Type Lentil Selections - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-%-	-%-	-us/g-	-minutes-	
LC8602303T	3.6	98.1	11.3	32.3	24	Good
LC99602972T	4.1	98.5	6.7	48.3	22	Good
LC8602354T	4.7	102.9	1.7	45.1	22	Good
LC99602712T	4.3	96.9	1.0	54.4	20	Good
LC7601599T	4.1	101.9	6.3	42.6	20	Good
LC000008T	3.6	96.6	4.7	32.7	22	Good
LC99602724T	4.2	96.8	2.0	58.3	18	Good
LC99602702T	4.0	99.7	2.0	34.3	21	Good
Crimson	3.7	10.4	1.7	34.1	24	Good
LC000009T	3.6	96.9	3.7	35.5	19	Good
LC99602626T	3.5	107.3	3.7	40.5	21	Good
Robin	2.9	101.7	5.0	33.5	24	Good
LC000012T	3.6	104.9	3.3	39.5	22	Good
LC99603263T	4.0	113.7	5.7	44.6	20	Good
LC99603197T	4.2	106.2	0.0	50.2	20	Good
LC8602419T	4.1	101.2	5.0	41.4	19	Good
LC99603202T	4.2	103.7	0.3	44.4	18	Good
LC99602824T	4.2	103.2	4.3	53.6	18	Good
LC99603149T	4.1	104.1	1.7	52.1	20	Good
LC99603200T	4.0	107.3	0.3	45.1	20	Good
LC99603003T	4.4	105.1	2.3	54.1	18	Good
LC99603193T	4.1	104.8	1.3	53.9	18	Good
Mean	4.0	102.5	3.4	44.1	20.4	
C.V. (%)	2.5	1.5	58.6	4.0	2.1	
LSD ($\alpha=0.05$)	0.1	1.7	2.1	1.8	0.4	

us/g = microsiemens per gram of seed

Table 30. Summary (kg/ha) of the Advanced Eston Type Lentil Yield Trial over Locations, 2001 (0151E)

<u>Cultivar</u>	<u>Origin</u>	<u>Genesee</u>	<u>Farmington</u>	<u>Pullman</u>	<u>Mean Seed Yield</u>
Athena	-----	1964	1223	2057	1748
Milestone	-----	2145	1162	1925	1744
LC99602477E	X93L035	1889	1046	2145	1694
LC8601847E	X93L035	1833	1022	2086	1647
LC8601849E	X93L035	1831	1036	2062	1643
Eston	-----	1833	1088	1829	1583
LC7601106E	X93L042	1622	1098	2028	1583
LC7601086E	X93L035	1583	1010	2110	1568
LC99602479E	X93L035	1759	1044	1699	1501
LC760963E	-----	1616	1065	1714	1465
LC99602487E	X93L035	1492	891	2001	1461
LC760960E	-----	1579	973	1801	1451
LC99602534E	X95L005	1388	802	1813	1334
LC760990E	-----	1214	754	1211	1060
Grand Mean		1696	1015	1891	1534
C.V. (%)		7	11	5	7
LSD ($\alpha=0.05$)		158	162	138	86
Planting Date		4/25/01	4/24/01	5/7/01	
Harvest Date		8/14/01	8/27/01	8/22/01	

Table 31. Agronomic Data for the Advanced Eston Type Lentil Yield Trial, 2001 (0151E)

<u>Cultivar</u>	<u>Origin</u>	<u>Disease</u> <u>Aph</u>	<u>Days to</u> <u>Flower</u>	<u>Days to</u> <u>Maturity</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pod Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(mature)</u> ..cm..	<u>Plant Ht</u> <u>Index</u>	<u>Weight</u> <u>100 Seed</u> ..g..
Athena	-----	3	58	96	2	25	32	29	0.88	5.5
Milestone	-----	3	58	96	2	29	41	38	0.94	4.2
LC99602477E	X93L035	3	59	96	2	23	40	38	0.98	4.8
LC8601847E	X93L035	3	57	94	2	30	37	36	1.00	4.8
LC8601849E	X93L035	3	57	95	2	25	41	36	0.86	4.5
Eston	-----	3	58	97	2	20	44	39	0.92	4.0
LC7601106E	X93L042	3	53	95	2	19	42	39	0.94	5.1
LC7601086E	X93L035	3	58	95	2	11	39	39	0.97	5.0
LC99602479E	X93L035	3	60	96	2	25	40	40	1.00	4.4
LC760963E	-----	3	59	95	2	16	37	40	1.00	5.1
LC99602487E	X93L035	3	58	95	2	28	43	40	0.90	4.9
LC760960E	-----	3	59	94	2	27	43	41	0.89	4.6
LC99602534E	X95L005	3	57	95	2	22	33	36	1.00	5.6
LC760990E	-----	3	58	95	2	15	38	32	0.87	4.4
Grand Mean			58	95	2	23	39	37	0.96	4.8
C.V. (%)			3	1		24	9	7	12	
LSD ($\alpha=0.05$)			2	1		8	5	4	0.16	

Agronomic data are means of three replications at Pullman, WA.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity.

Plant height index was determined by dividing the canopy height at harvest maturity by the total plant height.

Table 32. Mean Yields (kg/ha) of Lentil Lines in the Advanced Eston Type Lentil Yield Trial, 1998 - 2001

Cultivar	Origin	1999	2000	2001
Athena	-----	....	....	1748
Milestone	-----	....	1173	1744
LC99602477E	X93L035	....	....	1694
LC8601847E	X93L035	....	1277	1647
LC8601849E	X93L035	....	1358	1643
Eston	-----	1583	1081	1583
LC7601106E	X93L042	1679	1485	1583
LC7601086E	X93L035	1828	1339	1568
LC99602479E	X93L035	....	....	1501
LC760963E	-----	1415	1156	1465
LC99602487E	X93L035	....	....	1461
LC760960E	-----	1403	1149	1451
LC99602534E	X95L005	....	....	1334
LC760990E	-----	1214	1083	1060
Grand Mean		1381	1090	1534
LSD ($\alpha=0.05$)		147	134	86

Yield data are means of three replications at each location, over three locations in each year.

Table 33. Post Harvest Quality Evaluations of the Advanced Eston Type Lentil Selections - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-%-	-%-	-us/g-	-minutes-	
Athena	5.1	98.7	2.0	32.5	25	Good
Milestone	4.0	90.7	5.7	42.3	21	Good
LC99602477E	4.4	104.7	0.3	46.0	22	Good
LC8601847E	4.4	102.7	2.0	45.8	20	Good
LC8601849E	4.3	103.7	1.3	49.2	22	Good
Eston	3.6	103.9	2.7	39.8	20	Good
LC7601106E	4.7	105.6	4.3	30.9	22	Good
LC7601086E	4.6	104.7	1.7	46.3	22	Good
LC99602479E	4.2	99.4	2.7	33.1	22	Good
LC760963E	4.7	107.9	5.7	47.8	20	Good
LC99602487E	4.5	105.5	1.7	46.0	23	Good
LC760960E	4.3	109.1	4.0	42.1	20	Good
LC99602534E	5.2	111.6	2.0	36.3	22	Good
LC760990E	4.0	106.9	12.7	40.9	22	Good
Mean	4.2	103.9	3.5	41.4	21.7	
C.V. (%)	3.1	5.9	52.0	3.6	2.3	
LSD ($\alpha=0.05$)	0.1	6.6	1.9	1.6	0.5	

us/g = microsiemens per gram of seed

Table 34. Summary (kg/ha) of the Advanced Pardina Type Lentil Yield Trial over Locations, 2001 (0151P)

<u>Cultivar</u>	<u>Origin</u>	<u>Genesee</u>	<u>Farmington</u>	<u>Pullman</u>	<u>Mean Seed Yield</u>
LC99602427P	X93L018	2048	1397	2231	1892
LC8601787P	X93L018	1958	1328	2227	1837
Pardina	....	1797	1242	2289	1776
LC8601817P	X93L021	1881	1144	2011	1679
LC000010D	....	1605	1473	1830	1636
LC99602454P	X93L021	1773	1091	2031	1632
LC99602408P	X93L010	1510	1107	1849	1489
LC99602411P	X93L010	1180	1074	1734	1329
Grand Mean		1719	1232	2025	1659
C.V. (%)		8.6	12.0	6.3	8.2
LSD ($\alpha=0.05$)		212	212	184	112
Planting Date		4/25/01	4/24/01	5/7/01	
Harvest Date		8/14/01	8/27/01	8/22/01	

Table 35. Agronomic Data for the Advanced Pardina Type Lentil Yield Trial, 2001 (0151P)

<u>Cultivar</u>	<u>Origin</u>	<u>Disease Aph</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Plant Ht (mature) ..cm..</u>	<u>Plant Ht Index</u>	<u>Weight 100 Seed ..g..</u>
LC99602427P	X93L018	2	53	95	2	18	38	35	0.91	5.6
LC8601787P	X93L018	3	53	94	2	20	37	33	0.90	4.9
Pardina	....	3	52	94	2	18	38	31	0.82	4.6
LC8601817P	X93L021	3	52	93	2	18	39	30	0.78	5.1
LC000010D	....	3	57	94	3	31	39	30	0.76	3.9
LC99602454P	X93L021	2	49	94	2	16	38	36	0.95	5.5
LC99602408P	X93L010	2	52	95	2	21	38	34	0.88	4.8
LC99602411P	X93L010	2	53	94	2	19	37	34	0.92	5.3
Grand Mean			53	94	2	20	38	33	0.86	5.0
C.V. (%)			3.7	0.6		33.0	9.0	8.5	9.5	
LSD ($\alpha=0.05$)			2.8	0.9		9.5	4.9	4.0	0.12	

Agronomic data are means of three replications at the Pullman, WA.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity.

Plant height index was determined by dividing the canopy height at harvest maturity by the total plant height.

Table 36. Mean Yields (kg/ha) of Lentil Lines in the Advanced PardinaType Lentil Yield Trial, 1998 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
LC99602427P	X93L018	....	....	....	1892
LC8601787P	X93L018	....	....	1725	1837
Pardina	....	2389	1770	1765	1776
LC8601817P	X93L021	....	....	1647	1679
LC000010D	....	....	....	....	1636
LC99602454P	X93L021	....	....	....	1632
LC99602408P	X93L010	....	....	....	1489
LC99602411P	X93L010	....	....	....	1329
Grand Mean		1823	1565	1511	1659
LSD ($\alpha=0.05$)		118	181	204	112

Yield data are means of three replications at each location, over three locations in each year.

Table 37. Post Harvest Quality Evaluations of the Advanced Pardina Type Lentil Selections - Pullman - 2001

<u>Cultivar</u>	<u>Weight 100 Seeds</u>	<u>Water Uptake</u>	<u>Hard Seed</u>	<u>Conductivity</u>	<u>Cooking Time</u>	<u>Color</u>
	-g-	-% -	-% -	-us/g-	-minutes-	
LC99602427P	5.1	101.9	7.7	35.0	22	Good
LC8601787P	4.5	110.7	6.3	44.4	24	Good
Pardina	4.1	100.4	12.0	38.4	23	Good
LC8601817P	4.7	102.9	12.0	31.8	22	Good
LC000010D	3.5	106.7	3.3	42.7	20	Good
LC99602454P	5.1	103.2	11.7	34.3	22	Good
LC99602408P	4.5	105.5	6.3	38.7	22	Good
LC99602411P	4.6	108.3	4.0	39.3	18	Good
Mean	4.5	104.9	7.9	38.1	21.7	
C.V. (%)	1.2	1.9	37.4	3.7	1.9	
LSD ($\alpha=0.05$)	0.1	2.2	3.3	1.5	0.4	

us/g = microsiemens per gram of seed

Table 38. Agronomic Data for the Preliminary Large Yellow Lentil Yield Trial, 2001 (0154)

1 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Plant Ht (mature) ..cm..</u>	<u>Plant Ht Index</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha...</u>
Brewer	-----	49	94	2	21	37	34	0.91	6.6	2105
LC000005B	-----	56	99	2	28	42	29	0.70	8.2	2078
LC99600153L	X93L008	59	98	2	25	43	31	0.74	7.3	2073
Richlea	-----	55	98	2	29	44	31	0.72	5.6	2067
LC99600345L	X93L027	53	96	2	28	47	28	0.61	7.1	2064
LC99601761L	X95L245	52	97	2	24	42	21	0.49	8.2	2044
Mason	-----	52	96	2	23	36	27	0.73	7.7	2018
LC99602075L	X96L092	55	98	2	31	46	25	0.53	8.6	1996
LC99600058L	X93L035	54	99	2	23	41	32	0.77	7.6	1994
LC99601165L	X95L090	57	99	2	35	47	28	0.55	8.0	1985
LC99602351L	X96L109	51	96	2	24	31	38	1.00	7.3	1983
LC99602173L	X96L096	54	99	2	31	42	34	0.81	7.7	1977
LC99600060L	X93L035	59	98	2	26	42	20	0.50	7.3	1963
LC99600087L	X93L035	60	98	2	32	44	29	0.66	7.4	1935
LC99600300L	X93L026	60	99	2	30	44	25	0.56	7.7	1931
LC99600090L	X93L035	58	98	2	34	48	24	0.50	7.4	1922
LC99601934L	X96L077	55	99	2	15	39	37	0.99	10.1	1916
LC99600420L	X93L035	59	98	2	41	49	27	0.56	7.0	1891
LC99600747L	X95L078	54	98	2	22	47	30	0.63	7.6	1891
LC99602150L	X96L095	54	98	2	22	37	27	0.74	8.4	1888
LC99602333L	X96L108	53	97	2	24	40	26	0.65	7.5	1886
Sovereign	-----	59	99	2	27	41	34	0.83	7.0	1865
LC99600008L	X93L034	61	98	2	22	43	29	0.69	5.8	1864
LC99601015L	X95L085	53	98	2	17	35	37	1.00	9.3	1860
LC99602221L	X96L099	54	98	2	24	43	22	0.51	8.6	1858
LC99602379L	X96L111	55	98	2	30	39	27	0.70	8.6	1850
LC99600537L	X95L073	58	99	2	33	46	24	0.52	7.1	1830
LC99602146L	X96L095	57	97	2	28	44	26	0.60	8.1	1825
LC99601315L	X95L093	54	98	2	24	42	23	0.53	8.1	1822
LC99601658L	X95L240	53	97	2	34	38	21	0.56	7.7	1808
LC99600273L	X93L025	59	99	2	31	41	25	0.62	7.6	1807
LC99600121L	X93L036	60	98	2	27	47	27	0.59	7.7	1804
LC99601579L	X95L235	52	98	2	29	42	24	0.56	8.1	1791
LC99602358L	X96L110	55	97	2	25	36	20	0.55	9.0	1780
LC99601592L	X95L235	56	98	2	32	43	20	0.48	8.2	1778
LC99600142L	X93L036	58	98	2	28	45	34	0.76	7.2	1764
LC99602045L	X96L091	55	98	2	25	42	36	0.84	8.1	1747
LC99602047L	X96L091	58	99	2	25	41	33	0.80	8.1	1744
Grandora	-----	57	98	2	35	43	26	0.61	7.5	1730
LC99600389L	X93L035	63	98	2	26	49	26	0.53	7.5	1729

Table 38. Agronomic Data for the Preliminary Large Yellow Lentil Yield Trial, 2001 (0154)

2 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green)</u> ..cm..	<u>Plant Ht (green)</u> ..cm..	<u>Plant Ht (mature)</u> ..cm..	<u>Plant Ht Index</u>	<u>Weight 100 Seed</u> ..g..	<u>Mean Seed Yield</u> ..kg/ha...
LC99601577L	X95L235	58	99	2	24	44	17	0.39	8.4	1701
LC99600257L	X93L025	58	98	2	32	42	22	0.53	8.5	1691
LC99600946L	X95L084	53	98	2	22	39	24	0.66	8.5	1688
LC99602101L	X96L093	56	98	2	31	43	27	0.65	7.1	1673
LC99600954L	X95L084	55	99	2	31	42	39	0.95	9.7	1656
LC99600176L	X93L008	54	98	2	29	44	26	0.61	7.7	1654
LC99602296L	X96L106	53	98	2	24	39	34	0.92	8.4	1635
LC99600128L	X93L036	58	98	2	28	46	31	0.69	7.1	1613
LC99601497L	X95L226	56	98	2	29	40	26	0.66	8.6	1604
LC99601325L	X95L093	53	97	2	27	41	24	0.60	8.2	1587
LC99602252L	X96L103	58	99	2	22	39	35	0.93	9.3	1488
LC99600226L	X93L011	56	99	2	31	44	35	0.78	8.7	1209
Grand Mean		56	98	2	27	42	28	0.68	7.9	1828
C.V. (%)		3	1		17	8	13	17		7
LSD ($\alpha=0.05$)		2	1		6	4	5	0.16		174

Planting date was 5/7/01. Harvest date was 8/24/01.

Yield data and agronomic data are means of three replications at Pullman, WA.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity.

Plant height index was determined by dividing the canopy height at harvest maturity by the total plant height.

Table 39. Agronomic Data for the Zero Tannin Lentil Yield Trial, 2001 (0163)

Cultivar	Origin	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Ht (green) ..cm..	Plant Ht (green) ..cm..	Plant Ht (mature) ..cm..	Plant Ht Index	Weight 100 Seed ..g..	Mean Seed Yield ..kg/ha...
LC7601114Z	X93L001	51	98	2	28	42	35	0.86	6.4	2267
LC99602585Z	X95L004	54	97	2	23	32	32	0.89	4.4	2190
LC99602614Z	X95L005	52	96	2	28	38	31	0.84	5.0	2168
LC8601910Z	X93L001	51	99	2	22	43	40	0.99	6.6	2083
LC99602586Z	X95L004	53	97	2	16	34	34	0.92	4.3	2076
Brewer	-----	51	96	2	20	40	35	0.91	6.6	2060
LC99602553Z	X93L004	55	99	2	22	44	43	0.99	7.2	2033
LC3601365Z	X89L096	54	99	2	26	37	34	0.89	6.4	2007
LC99602560Z	X93L006	54	98	2	32	43	32	0.78	7.0	1984
LC8601942Z	X93L004	56	99	2	24	42	38	0.99	7.0	1558
LC99602580Z	X93L033	54	100	2	27	47	35	0.77	5.9	1461
LC8601994Z	X93L006	55	99	2	31	44	39	0.84	6.9	1415
Grand Mean		53	98	2	25	40	36	0.89	6.1	1942
C.V. (%)		3	1		20	7	12	15		12
LSD ($\alpha=0.05$)		2	1		7	4	6	0.18		318

Planting date was 5/7/01. Harvest date was 8/24/01.

Yield data and agronomic data are means of three replications at Pullman, WA.

Pod height was measured at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity.

Plant height index was determined by dividing the canopy height at harvest maturity by the total plant height.

Table 40. Post Harvest Quality Evaluations of the Zero Tannin Type Lentil Selections - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-%-	-%-	-us/g-	-minutes-	
LC7601114Z	6.3	107.3	1.3	64.3	26	Good
LC99602585Z	4.3	100.9	2.3	85.0	27	Good
LC99602614Z	4.8	102.6	2.0	75.2	26	Good
LC8601910Z	6.4	103.1	1.0	68.0	28	Good
LC99602586Z	4.2	98.6	5.7	61.0	28	Good
Brewer	6.6	113.9	4.7	45.1	22	Good
LC99602553Z	7.0	108.4	2.3	66.0	28	Good
LC3601365Z	6.2	105.2	9.7	51.2	25	Good
LC99602560Z	6.7	105.5	5.0	65.5	26	Good
LC8601942Z	6.6	109.3	1.3	98.5	26	Good
LC99602580Z	5.5	111.2	0.0	82.5	26	Good
LC8601994Z	6.7	105.4	0.3	83.0	24	Good
Mean	6.0	105.9	3.0	69.7	26.1	
C.V. (%)	1.2	1.4	69.3	5.0	1.7	
LSD ($\alpha=0.05$)	0.1	1.6	2.2	3.8	0.5	

us/g = microsiemens per gram of seed

Table 41. Agronomic Data for the Preliminary Lentil Screening Nursery, 2001 (0155)

1 of 5

<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha...</u>
Large Yellow Cot, Laird Type:								
LC0060774L	X97L052	55	95	2	30	42	7.1	2196
LC0060512L	X97L018	48	94	2	29	44	8.6	2134
LC0060560L	X97L028	52	93	2	27	36	7.4	2095
LC0060554L	X97L028	55	93	2	24	36	7.3	2093
LC0060525L	X97L023	52	93	2	27	36	7.2	2091
LC00601166e	-----	48	95	2	20	43	4.9	2058
LC0060474L	X97L007	52	92	2	29	50	6.2	2040
LC0060596L	X97L035	52	95	2	22	38	7.3	2027
LC0060430L	X97L001	50	92	1	21	38	7.0	2013
LC0060587L	X97L031	55	96	2	30	46	8.3	2013
LC0060451L	X97L003	52	94	2	30	37	6.9	1997
LC0060217L	X96L095	55	95	2	30	46	8.6	1989
LC0060470L	X97L005	58	95	2	24	33	7.1	1987
LC0060738c	X97L048	52	95	2	27	40	7.8	1971
LC0060427L	X97L001	48	91	2	10	30	7.1	1969
LC0060746L	X97L050	55	96	2	32	46	7.1	1966
LC0060594L	X97L035	48	93	2	20	32	6.8	1956
LC00601215L	-----	52	95	2	22	43	7.0	1901
LC0060482L	X97L007	52	93	3	24	33	6.1	1881
LC0060558L	X97L028	52	94	1	25	38	7.4	1876
LC0060768L	X97L051	55	95	2	25	37	7.9	1856
LC0060769L	X97L051	55	95	2	16	38	7.8	1841
LC0060157L	X95L245	55	95	2	19	38	9.6	1811
LC0060477L	X97L007	52	92	3	30	42	6.3	1807
LC0060670L	X97L040	52	93	3	39	43	6.4	1804
LC0060476L	X97L007	52	92	2	25	46	6.3	1793
LC0060187L	X96L091	55	94	2	30	38	8.4	1783
LC0060233L	X96L095	55	95	2	27	41	8.3	1780
LC0060572L	X97L029	52	95	2	23	38	8.1	1775
LC0060295L	X96L100	52	96	2	20	43	10.4	1758
LC0060051L	X93L026	55	93	2	31	44	7.1	1756
LC0060296L	X96L100	52	94	2	25	40	10.0	1755
LC0060747L	X97L050	52	96	2	25	42	7.6	1755
LC0060144L	X95L230	52	94	2	16	32	7.6	1751
LC0060256L	X96L096	55	93	2	27	43	8.4	1749
LC0060663L	X97L040	52	94	2	26	41	7.3	1740
LC0060764L	X97L051	55	96	2	13	29	7.9	1719
LC0060562L	X97L028	52	94	1	21	40	7.9	1712
LC0060461L	X97L005	48	93	2	21	35	7.6	1709
LC0060455L	X97L003	48	94	2	26	47	7.3	1688

Table 41. Agronomic Data for the Preliminary Lentil Screening Nursery, 2001 (0155) Continued

2 of 5

<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha...</u>
LC0060018L	X93L036	58	93	2	33	48	7.4	1683
LC0060465L	X97L005	50	93	2	24	40	7.8	1662
LC0060530L	X97L023	52	92	2	21	39	6.8	1662
LC0060086L	X93L036	58	95	2	25	43	7.5	1644
LC0060392L	X96L111	52	93	2	25	44	8.5	1637
LC0060139L	X95L220	55	95	3	38	39	7.1	1632
LC0060698L	X97L042	52	96	2	28	46	8.3	1620
LC0060067L	X93L027	58	94	2	31	46	8.1	1616
LC0060200L	X96L093	55	96	2	23	40	8.0	1614
LC0060242L	X96L096	55	94	2	23	42	8.1	1611
LC0060010L	X93L035	58	93	3	31	49	7.3	1607
LC0060546L	X97L026	52	94	2	23	37	8.5	1599
LC0060454L	X97L003	48	95	2	26	40	7.9	1588
LC0060394L	X96L111	55	94	2	28	45	8.4	1578
LC0060626L	X97L038	55	96	2	27	33	7.1	1569
LC0060807L	X97L012	55	95	2	19	39	6.9	1558
LC0060207L	X96L093	55	93	3	32	38	8.1	1549
LC0060787L	X97L053	52	96	2	34	40	7.9	1537
LC0060128L	X95L093	58	94	2	24	46	8.6	1536
LC0060656L	X97L039	58	95	2	32	39	7.9	1526
LC0060548L	X97L026	50	94	2	16	28	8.4	1512
LC0060644L	X97L039	55	94	2	16	37	8.0	1510
LC0060786L	X97L053	52	95	2	13	29	8.5	1508
LC0060510L	X97L017	52	95	2	22	46	9.0	1498
LC00601222L	-----	52	96	2	30	56	6.2	1490
LC0060037L	X93L011	52	95	2	22	48	8.2	1485
LC0060212L	X96L095	55	95	2	25	41	8.0	1482
LC0060208L	X96L093	52	97	2	21	39	7.8	1481
LC0060303L	X96L101	55	95	2	21	35	8.4	1474
LC0060305L	X96L101	55	96	3	16	25	8.2	1456
LC0060346L	X96L107	55	96	2	22	40	8.1	1427
LC0060306L	X96L101	52	97	2	25	34	8.2	1419
LC0060545L	X97L026	52	94	1	20	33	7.4	1406
LC0060683L	X97L042	73	97	2	28	45	8.2	1405
LC0060423L	X96L118	55	96	2	25	30	7.9	1397
LC0060788L	X97L053	52	98	3	32	41	7.4	1392
LC0060660L	X97L040	52	96	2	17	39	7.3	1391
LC00601231L	-----	55	96	2	24	37	8.0	1387
LC0060313L	X96L101	52	97	2	26	39	8.2	1386
LC0060310L	X96L101	58	96	3	16	33	8.0	1378

Table 41. Agronomic Data for the Preliminary Lentil Screening Nursery, 2001 (0155) Continued

3 of 5

<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha...</u>
LC0060602L	X97L035	48	95	2	24	37	7.0	1376
LC0060578L	X97L031	52	96	2	25	39	8.5	1365
LC0060622L	X97L036	50	93	1	19	34	6.6	1365
LC0060211L	X96L093	55	97	2	26	43	8.0	1358
LC0060222L	X96L095	55	95	2	26	44	8.2	1350
LC0060365L	X96L110	55	98	2	35	38	8.9	1347
LC0060230L	X96L095	52	93	1	23	35	8.5	1343
LC0060610L	X97L036	52	95	2	21	34	6.8	1327
LC0060441L	X97L002	50	93	1	24	35	8.4	1326
LC0060664L	X97L040	52	95	2	23	42	7.4	1326
LC0060219L	X96L095	55	96	2	29	37	7.7	1320
LC0060206L	X96L093	52	94	2	22	38	7.7	1291
LC0060044L	X93L025	58	97	2	30	39	8.4	1289
LC0060374L	X96L111	50	93	2	12	41	9.0	1281
LC0060145L	X95L230	52	96	2	22	37	8.8	1271
LC0060097L	X95L078	48	94	2	26	36	8.5	1268
LC0060288L	X96L100	58	96	2	24	41	8.2	1263
LC0060225L	X96L095	55	94	2	19	34	8.3	1261
LC0060268L	X96L099	52	94	2	23	37	8.6	1233
LC0060196L	X96L092	52	96	2	22	33	7.8	1152
LC0060252L	X96L096	55	96	3	20	32	8.0	1138
LC0060262L	X96L099	52	96	2	24	40	8.8	1126
LC0060146L	X95L236	52	94	2	19	38	8.7	1118
LC0060119L	X95L089	52	97	2	20	31	8.4	1100
LC0060166L	X95L251	55	97	2	23	42	8.6	1080
LC0060805L	X97L006	52	95	2	22	40	6.8	1023
LC0060134L	X95L094	52	96	2	15	37	8.5	1009
LC0060301L	X96L101	58	96	3	21	32	8.2	1002
LC0060544L	X97L026	52	94	1	23	35	8.1	999
LC0060150L	X95L241	55	97	3	28	33	9.4	965
LC0060276L	X96L099	55	97	3	26	37	8.5	814
LC0060168L	X95L251	55	96	2	24	42	8.3	806
Sub Mean - Lg Yell Cot, Laird Type		53	95	2	24	39	7.8	1561
Large Yellow Cot, Zero Tannin Type:								
LC0060862	X93L001	55	96	2	19	42	5.7	1998
LC0060861	X93L001	55	97	2	30	46	6.3	1945
Sub Mean - Lg Yell Cot, ZT Type		55	97	2	25	44	6.0	1972
Large Green Cot, Zero Tannin Type:								
LC00601219	-----	52	96	2	27	44	5.6	1644
LC00601220	-----	52	95	2	17	43	5.6	1526
Sub Mean - Lg Green Cot, ZT Type		52	96	2	22	44	5.6	1585

Table 41. Agronomic Data for the Preliminary Lentil Screening Nursery, 2001 (0155) Continued

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<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha...</u>
Small Red Cot, Zero Tannin Type:								
LC0060917	X95L005	52	95	2	19	40	4.8	1825
LC0060903	X95L004	52	103	2	23	34	3.8	1814
LC0060899	X95L004	50	95	2	18	44	4.6	1709
LC0060892	X95L004	52	95	2	18	39	4.3	1452
LC0060901	X95L004	52	96	2	17	29	4.4	1422
LC0060891	X95L004	52	96	2	25	35	4.3	1286
Sub Mean - Sm Red Cot, ZT Type		52	97	2	20	37	4.4	1585
Small Yellow Cot, Pardina Type:								
LC0060813	X93L018	52	95	2	20	31	4.2	3219
LC0060812	X93L010	52	96	2	20	34	4.8	2720
LC0060822	X93L021	50	92	2	15	29	4.2	2433
LC0060820	X93L018	52	93	2	17	36	4.0	2385
LC0060815	X93L018	50	95	2	25	37	4.1	2353
LC0060818	X93L018	55	94	2	18	38	4.0	2340
LC0060952	X93L017	55	95	2	25	35	3.4	1933
LC0060827	X93L017	52	94	2	24	34	3.4	1922
LC0060954	X93L017	55	95	2	27	37	3.9	1880
LC0060810	X93L010	50	91	2	25	38	4.1	1815
LC0060949	X93L017	55	95	2	26	37	3.6	1734
LC0060811	X93L010	55	96	2	17	37	4.4	1722
LC0060948	X93L017	52	95	2	19	34	4.1	1705
LC0060940	X93L017	52	97	2	25	37	3.8	1684
LC0060932	X93L013	52	96	2	22	30	4.2	1515
LC0060942	X93L017	55	98	2	20	35	3.6	1433
LC0060929	X93L013	58	95	2	27	40	3.9	1258
LC0060928	X93L013	55	95	2	20	37	3.9	732
LC00601228	-----	52	92	2	23	34	2.9	436
LC00601227	-----	52	93	2	19	33	3.0	418
Sub Mean - Pardina Type		53	95	2	22	35	3.9	1782
Small Yellow Cot, Eston Type:								
LC0060854	X97L025	55	98	2	24	37	4.1	2458
LC0060831	X93L035	52	94	2	23	29	4.2	2231
LC0060843	X93L035	55	95	2	19	40	4.4	2187
LC0060830	X93L035	55	93	2	34	43	4.2	2069
LC0060839	X93L035	52	95	2	27	43	4.3	2032
LC0060844	X93L035	55	96	2	29	42	4.2	2003
LC0060838	X93L035	55	93	2	19	40	4.4	1665
LC0060829	X93L035	55	95	2	21	38	4.0	1508
LC0060832	X93L035	55	94	2	30	38	4.3	1471
Sub Mean - Eston Type		54	95	2	25	39	4.2	1958

Table 41. Agronomic Data for the Preliminary Lentil Screening Nursery, 2001 (0155) Continued

5 of 5

<u>Cultivar</u>	<u>Origin</u>	<u>Days to Flower</u>	<u>Days to Maturity</u>	<u>Pods/ Peduncle</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Mean Seed Yield ..kg/ha...</u>
Small Red Cot, Turkish Red Type:								
LC0060970	X95L032	52	94	2	26	41	4.6	2462
LC0060981	X95L034	52	93	2	30	42	4.4	2399
LC0060987	X95L035	52	95	2	23	39	3.6	2300
LC00601006	X95L041	50	94	2	15	33	4.4	2066
LC00601003	X95L041	50	96	2	20	41	4.5	2013
LC00601034	X95L051	52	92	2	14	36	3.9	1893
LC00601002	X95L041	50	96	2	17	31	4.4	1875
LC0060977	X95L033	52	95	2	24	27	4.5	1815
LC00601020	X95L049	52	93	2	26	39	4.1	1802
LC00601044	X95L056	52	92	2	26	41	3.9	1788
LC0060979	X95L033	52	94	2	26	35	4.5	1666
LC00601038	X95L056	55	92	2	18	46	3.8	1603
LC00601135	-----	52	91	2	26	40	3.6	1567
LC0060993	X95L036	50	95	2	23	30	3.9	1488
LC00601071	X95L278	55	94	2	27	35	4.5	1168
Sub Mean - Turkish Red Type		52	94	2	23	37	4.2	1860
Grand Mean		53	95	2	24	38	6.7	1642

Planting date was 5/8/01. Harvest date was 8/24/01.

Yield and agronomic data are from one plot of each line at Pullman, WA.

Pod and plant height were measured at the green pod stage.

Winter Lentil Trial Results:

Twenty-three selections and one check line were included in the Red Cotyledon Winter Lentil Yield Trial in the winter of 2000-2001 (Tables 42-44). The nursery was planted in the fall of 2000 at Spillman Farm. Winter hardy lentil lines are being targeted for direct seeding in standing wheat or barley stubble in order to aid in control of soil erosion. This practice may have other benefits besides improved lentil yields.

Due to the mild winter, survival was excellent and yields averaged 2223 kg/ha and ranged from 1537 to 3089 kg/ha. Relative yields were about double that from the spring sown nurseries. Two lines appear to be candidates for release as a small red cotyledon Turkish type. These selections, LC9979016 and LC9979010 have been in the trial for two years and are currently being tested at three locations in the winter of 2001-2002. A proposal will be made to begin the preliminary increase of Breeder seed in anticipation of releasing the line in the near future. The origin of the lines in the trial was the cooperative project we have had with the ICARDA program in Aleppo, Syria and material developed in our breeding program. Most of the lines in the trial are selections that have undergone winter hardiness testing over the past four years at Pullman and in Turkey. Most of the lines have been in the trial for two years and have shown excellent yields when compared to spring sown varieties. The material has been selected for improved seed quality traits and also for plant height and earliness. Most of the lines are relatively small seeded and similar to a Turkish red type. Quality evaluations (Tables 44) indicate good cooking times and color. We are proposing LC9979010, a red cotyledon Turkish type, for preliminary increase in 2002. We anticipate future release of this line.

Nineteen selections and one check were included in the Yellow Cotyledon Winter Lentil Yield trial sown at Spillman Farm in the fall of 2000 (Tables 45-46). Yields averaged 2385 kg/ha and ranged from 1902 to 2951 kg/ha. Yields averaged significantly higher when compared to spring sown varieties. Most of the selections have been in the trial for two years and have shown excellent yields when compared to the check and spring sown types. The origin of the lines in our breeding program and the cooperative research project we have had with the ICARDA program located at Aleppo, Syria. Selection has been made for improved seed quality traits including size, shape and seedcoat coloration. Quality evaluations (Table 47) indicate similar cooking times to spring sown varieties and also good color after cooking.

Additional years of testing of the lines in direct seed systems at more than one location is needed to determine broad adaptation and potential for production of winter lentils and winter peas in the region. An agronomic study is underway at locations in Washington, Idaho and Montana to determine adaptation and productivity of winter legumes in direct seed systems.

Table 42. Mean Yields (kg/ha) of Lines in the Advanced Large and Small Red Cotyledon Winter Lentil Yield Trial, 1998 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
LC9979065	X92L043	....	....	3361	3089
LC9979016	X92L043	....	....	4244	2710
LC9979010	X92L043	....	....	4118	2646
LC9440074	X92L001	1516	560	3592	2598
LC9978081	X92L040	....	....	3333	2592
LC9440072	X92L001	1516	727	2812	2391
LC9979062	X92L043	....	....	3636	2321
LC9978028	X92L040	....	....	3733	2315
LC9978114	X92L040	....	....	4126	2309
LC9978094	X92L040	....	....	2509	2282
LC9979120	X92L043	....	....	3996	2260
LC9440070	X92L001	1890	488	2756	2246
LC9978051	X92L041	....	....	3173	2175
LC9976088	X92L035	....	....	2825	2132
LC9976067	X92L035	....	....	3171	2126
LC9978031	X92L040	....	....	2896	2118
LC9978121	X92L041	....	....	3428	2033
LC9978016	X92L041	....	....	1986	2024
LC9978057	X92L040	....	....	3277	1983
LC9978044	X92L040	....	....	3724	1981
LC9976061	X92L035	....	....	1887	1949
WA8649041	-----	1036	2027	2000	1777
LC9976079	X92L035	....	....	3232	1751
LC9976026	X92L035	....	....	2589	1537
Grand Mean		1321	559	3063	2223
LSD ($\alpha=0.05$)		244	339	651	467

Yield data are means of three replications at Pullman, WA.

Table 43. Agronomic Data for the Advanced Large and Small Red Cotyledon Winter Lentil Yield Trial, 2001 (0141F)

<u>Cultivar</u>	<u>Origin</u>	<u>Disease</u> <u>Aph</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pod Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(green)</u> ..cm..	<u>Weight</u> <u>100 Seed</u> ..g..	<u>Seed</u> <u>Yield</u> ..kg/ha..
LC9979065	X92L043	3	2	18	32	2.9	3089
LC9979016	X92L043	3	2	23	37	2.8	2710
LC9979010	X92L043	3	2	17	36	3.0	2646
LC9440074	X92L001	3	2	18	37	4.2	2598
LC9978081	X92L040	3	2	17	33	3.2	2592
LC9440072	X92L001	3	2	17	36	4.8	2391
LC9979062	X92L043	3	2	15	30	3.2	2321
LC9978028	X92L040	3	2	18	32	2.8	2315
LC9978114	X92L040	3	2	20	38	3.1	2309
LC9978094	X92L040	3	2	24	43	2.9	2282
LC9979120	X92L043	3	2	18	31	2.6	2260
LC9440070	X92L001	3	2	18	32	5.1	2246
LC9978051	X92L041	3	2	21	38	2.7	2175
LC9976088	X92L035	3	2	20	36	3.0	2132
LC9976067	X92L035	3	2	22	35	3.2	2126
LC9978031	X92L040	3	2	12	28	2.6	2118
LC9978121	X92L041	3	2	17	31	2.8	2033
LC9978016	X92L041	3	2	28	44	3.0	2024
LC9978057	X92L040	3	2	13	30	3.2	1983
LC9978044	X92L040	3	2	15	33	2.4	1981
LC9976061	X92L035	3	2	20	35	3.1	1949
WA8649041	-----	3	2	20	43	2.8	1777
LC9976079	X92L035	3	2	20	39	3.3	1751
LC9976026	X92L035	3	2	14	29	2.8	1537
Grand Mean			2	19	35	3.1	2223
C.V. (%)				12	12		15.3
LSD ($\alpha=0.05$)				3	6		467
Planting Date							9/26/00
Harvest Date							7/26/01

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage.

Aph = Aphanomyces; 1 = no symptoms, 2 = some symptoms, 3 = moderate symptoms, 4 = severe symptoms, 5 = dead.

Table 44. Post Harvest Quality Evaluations of Advanced Large and Small Red Winter Lentils - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-% -	-% -	-us/g-	-minutes-	
LC9979065	3.0	103.0	0.7	36.3	24	Good
LC9979016	3.3	81.0	9.7	21.4	22	Good
LC9979010	3.2	103.1	0.3	38.1	22	Good
LC9440074	4.6	112.6	2.3	50.5	25	Good
LC9978081	3.3	103.0	2.3	29.6	23	Good
LC9440072	4.9	118.0	0.7	54.0	24	Good
LC9979062	3.3	101.9	2.3	33.1	24	Good
LC9978028	3.0	103.3	4.3	29.9	24	Good
LC9978114	3.2	104.0	2.3	31.6	24	Good
LC9978094	3.1	105.3	1.3	29.4	23	Good
LC9979120	2.7	95.6	6.3	22.8	22	Good
LC9440070	5.0	120.0	1.0	49.0	26	Good
LC9978051	2.9	105.2	2.3	28.3	24	Good
LC9976088	2.9	101.9	17.3	33.8	22	Good
LC9976067	3.1	105.8	7.3	29.9	22	Good
LC9978031	2.8	104.9	4.3	32.1	22	Good
LC9978121	2.9	106.8	6.0	30.0	22	Good
LC9978016	3.0	99.6	15.3	30.5	22	Good
LC9978057	3.2	107.5	3.3	32.7	22	Good
LC9978044	2.5	106.6	1.7	29.2	22	Good
LC9976061	3.3	104.0	2.3	28.5	23	Good
WA8649041	2.8	107.3	7.0	40.1	22	Good
LC9976079	3.5	99.7	2.0	42.7	24	Good
LC9976026	2.9	102.6	6.0	33.0	22	Good
Mean	3.3	104.3	4.5	34.0	23.0	
C.V. (%)	4.8	6.3	26.1	5.9	2.0	
LSD ($\alpha=0.05$)	0.2	7.0	1.3	2.1	0.5	

us/g = microsiemens per gram of seed

Table 45. Mean Yields (kg/ha) of Lentil Lines in the Advanced Large and Small Yellow Winter Lentil Yield Trial, 1998 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
LC9977116	X92L039	....	....	4101	2951
WA8649090	-----	2566	851	3908	2926
LC9977019	X92L039	....	....	4129	2878
LC9977078	X92L039	....	....	3728	2790
LC9977113	X92L039	....	....	3594	2770
LC9978025	X92L040	....	....	3356	2523
LC9979025	X92L043	....	....	3249	2517
LC9440176	X92L003	1520	443	2987	2510
LC9977077	X92L039	....	....	3295	2331
LC9978081	X92L040	....	....	3118	2331
LC9977006	X92L039	....	....	3172	2281
LC9978003	X92L041	....	....	2957	2281
LC9979004	X92L043	....	....	3260	2251
LC9979031	X92L043	....	....	3275	2180
LC9979014	X92L043	....	....	3019	2155
LC9978036	X92L041	....	....	2988	2112
LC9978013	X92L041	....	....	3489	2101
LC9978026	X92L040	....	....	2811	2000
LC9548009	X92L003	1595	430	3074	1911
LC9843095	-----	....	....	3187	1902
Grand Mean		1227	834	2957	2385
LSD ($\alpha=0.05$)		308	420	350	387

Yield data are means of three replications at Pullman, WA.

Table 46. Agronomic Data for the Advanced Large and Small Yellow Winter Lentil Yield Trial, 2001 (0142F)

<u>Cultivar</u>	<u>Origin</u>	<u>Disease</u> <u>Aph</u>	<u>Pods/</u> <u>Peduncle</u>	<u>Pod Ht</u> <u>(green)</u> ..cm..	<u>Plant Ht</u> <u>(green)</u> ..cm..	<u>Weight</u> <u>100 Seed</u> ..g..	<u>Seed</u> <u>Yield</u> ..kg/ha..
LC9977116	X92L039	3	2	16	28	3.6	2951
WA8649090	-----	3	2	14	29	2.9	2926
LC9977019	X92L039	3	2	20	34	4.2	2878
LC9977078	X92L039	3	2	14	33	3.3	2790
LC9977113	X92L039	3	2	16	32	3.2	2770
LC9978025	X92L040	3	2	19	35	3.1	2523
LC9979025	X92L043	3	2	20	39	2.6	2517
LC9440176	X92L003	3	2	17	35	4.2	2510
LC9977077	X92L039	3	2	15	32	3.9	2331
LC9978081	X92L040	3	2	18	40	3.6	2331
LC9977006	X92L039	3	2	16	34	4.3	2281
LC9978003	X92L041	3	2	18	36	3.2	2281
LC9979004	X92L043	3	2	16	34	2.7	2251
LC9979031	X92L043	3	2	16	29	3.3	2180
LC9979014	X92L043	3	2	17	30	3.5	2155
LC9978036	X92L041	3	2	15	32	3.6	2112
LC9978013	X92L041	3	2	15	32	4.5	2101
LC9978026	X92L040	3	2	14	30	3.6	2000
LC9548009	X92L003	3	2	16	36	4.3	1911
LC9843095	-----	3	2	18	35	4.2	1902
Grand Mean			2	16	33	3.6	2385
C.V. (%)				18	11		11.8
LSD ($\alpha=0.05$)				4	5		387
Planting Date							9/26/00
Harvest Date							7/26/01

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage.

Table 47. Post Harvest Quality Evaluations of Advanced Large and Small Yellow Winter Lentils - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color
	-g-	-% -	-% -	-us/g-	-minutes-	
LC9977116	3.5	100.7	4.7	33.5	25	Good
WA8649090	2.9	100.1	1.3	38.7	23	Good
LC9977019	4.4	106.1	3.0	41.3	22	Good
LC9977078	3.4	98.5	3.3	35.1	24	Good
LC9977113	3.2	102.1	2.3	37.2	22	Good
LC9978025	3.4	101.5	3.3	39.2	22	Good
LC9979025	2.6	104.8	0.7	35.4	22	Good
LC9440176	4.0	105.2	1.3	38.1	22	Good
LC9977077	3.9	101.3	9.0	37.0	22	Good
LC9978081	3.2	104.6	1.7	34.2	23	Good
LC9977006	4.4	103.4	11.0	37.3	22	Good
LC9978003	3.3	101.6	9.3	33.0	23	Good
LC9979004	2.7	103.5	6.3	36.2	22	Good
LC9979031	3.2	100.1	7.3	29.5	24	Good
LC9979014	3.4	102.4	1.3	35.7	23	Good
LC9978036	3.8	102.6	2.7	42.7	25	Good
LC9978013	4.6	102.3	6.7	40.9	25	Good
LC9978026	3.7	105.6	11.3	39.7	22	Good
LC9548009	4.3	103.3	4.7	40.5	22	Good
LC9843095	4.4	109.1	1.7	39.3	24	Good
Mean	3.6	102.9	4.7	37.2	23.0	
C.V. (%)	2.6	2.0	55.5	5.5	2.8	
LSD ($\alpha=0.05$)	0.1	2.2	2.8	2.2	0.7	

us/g = microsiemens per gram of seed

Chickpea Trial Results:

Twenty-four selections and four check varieties were included in the advanced large kabuli chickpea yield trials conducted at Genesee, ID, Pullman, WA and Walla-Walla, WA in 2001 (Tables 48-50). Check varieties included the newly released Sierra as well as Dwelley, Sanford and Evans. Yields at Genesee and Pullman were above normal; however yields at Walla-Walla were somewhat depressed. The reduced yields at Walla-Walla were likely caused by the dry season. The yields at Walla Walla should be observed as relative values and not as indications of yield potential. Sixteen of the entries were Spanish White types and each had large and white seeds (up to 64.3 g/100 seed). Leaf type of the Spanish White selections was compound (fern) and most had yields that were equal to or better than the checks. Four of the selections had what appeared to be good resistance to Ascochyta blight. One of the selections (CA9890233W) was increased at Yuma in the winter of 2000-2001 and in the field this past summer and we now have sufficient seed to possibly make a proposal for a variety release. Blight scores have been similar to Dwelley and the seed size is about 10% larger than Dwelley. If quality factors are satisfactory, we will make a proposal for a preliminary increase of Breeder seed at the Variety Release Committee Meeting in February 2002. Quality evaluations (Table 51) indicate that all the selections had good color after cooking; however, two selections lost seedcoats and will be discarded. Cooking times were similar for all the selections. Nearly all the selections had larger seeds when compared to Dwelley.

The 2001 preliminary yield trial for large kabuli chickpeas contained 17 entries and 2 check lines at the Pullman, WA location (Table 52). Check lines included Dwelley and Sanford. Spanish White selections in the Preliminary trial have large seeds (up to 64 grams per 100 seeds) and good resistance to blight. Two of the selections (CA9990I826W and CA9990I604W) are Spanish White types that were increased in the field at Pullman this past summer and will be considered for preliminary release for the purpose of increasing the supply of seed.

The preliminary screening nursery (Table 53) had 49 entries of both Spanish White and Café types that were evaluated for the first time. The 49 lines were evaluated for plant type, habit, leaf type, and earliness to flower, resistance to Ascochyta blight and days to maturity. The 17 Spanish white selections and the 32 Café type selections in the preliminary screening nursery were evaluated for yield potential and seed quality traits as well as resistance to Ascochyta blight. The most promising selections will be advanced to the preliminary yield trial in spring of 2002.

Disease screening:

The Ascochyta blight nursery established annually at Spillman Farm continues to be an excellent method of screening for resistance. More than 1800 lines and selections from the breeding program and other sources were screened for resistance in 2001. Infected chickpea debris is gathered each fall from infected plants in the nursery for use in the following season to inoculate the nursery. The infected debris is spread among the newly

emerging plants in the nursery each spring. Irrigation water is applied to the nursery at regular intervals to ensure good spread of the disease and to promote the pod infection phase. Scores for infection are made weekly for seven weeks and evaluated. Chickpea lines with low scores, indicating resistance, are retained for further evaluations while those with scores exceeding the checks are discarded.

Also, we evaluate germplasm from several sources including ICARDA in Syria, ICRISAT in India, Turkey, and Mexico and from other collaborators throughout the world. Germplasm receiving low blight scores indicating good resistance are used as parents in the crossing program.

Selection criteria:

Crosses and backcrosses are made in the field and in the greenhouse to transfer *Ascochyta* blight resistance to large seeded Spanish White types and to the large seeded Café types. The resulting hybrids are then increased in the greenhouse and selected for size, shape and color of the seeds. Advanced single plant selections in the F_4 , F_5 , and F_6 are grown and harvested in the greenhouse for testing in the blight nursery the following spring and summer. The primary criteria in the selection process are large seeds of each type as well as earliness to flower and mature. In addition to the crossing and selection program, Spanish White and Café types are being selected from existing breeding populations. Those selections are screened in the blight nursery and evaluated in the preliminary screening nursery in the following season.

Early flowering and early maturity:

In addition to the work on resistance to blight, we have identified earlier flowering and earlier maturing germplasm lines. These lines have been crossed and intercrossed to our blight resistant material. The delayed maturity of most of the chickpea varieties appears to be related to late flowering and a high degree of abortion of the first flowers on the plants. This seems related to cold temperature sensitivity in varieties where pod setting is observed to begin only when the mean daily temperature is above a critical point. It also appears that pod setting ceases when mean daily temperatures rise above a critical high temperature point. To alleviate this problem, we are in the process of widening this temperature range of adaptation.

Potential Variety Releases:

We expect to propose a Spanish White type selection CA9890233W or CA99901604W for preliminary release for the purpose of increasing the seed in the summer of 2002. A decision as to which of the selections to be released as a variety will be made in the winter of 2003. Seed of this release could be available to growers in limited amounts in the spring of 2003.

Table 48. Mean Yields (kg/ha) of the Advanced Large Kabuli Chickpea Yield Trial over Locations, 2001 (0181)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf</u> <u>Type</u>	<u>Seed</u> <u>Type</u>	<u>Genesee</u>	<u>Walla Walla</u>	<u>Pullman</u>	<u>Mean</u> <u>Seed Yield</u>
CA9892061W	X94C080	C	W	2222	1389	2681	2090
CA9890328C	X96C128	C	C	2058	1248	2840	2042
CA9892050W	X94C080	C	W	1973	1342	2737	2010
CA9890147W	X94C005	C	W	1882	1439	2678	1993
CA9892106W	X94C080	C	W	1981	1419	2582	1987
CA9892181W	X94C080	C	W	1691	1519	2754	1981
CA9890154W	X94C005	C	W	2021	1359	2516	1958
CA9885394W	X94C080	C	W	2026	1245	2524	1925
CA9783163C	X92C017	C	C	1854	1305	2425	1855
CA9890234W	X94C005	C	W	1614	1251	2579	1807
CA9890124W	X94C005	C	W	1715	1552	2164	1803
CA9890108W	X94C005	C	W	1806	1466	2144	1799
CA9890235W	X94C005	C	W	1677	1298	2423	1792
CA9885473W	X94C080	C	W	1772	1253	2365	1789
CA9890233W	X94C005	C	W	1720	1176	2489	1788
CA9890363C	X95C012	S	C	2096	1154	2069	1766
CA9783153C	X92C016	S	C	1926	1197	2160	1754
CA9783165C	X92C017	C	C	1897	970	2390	1745
CA9890239W	X94C005	C	W	1921	1038	2280	1739
Sierra	X92C016	S	C	1822	1300	2091	1731
CA9885475W	X94C080	C	W	1744	1154	2142	1673
CA9890169W	X94C005	C	W	1625	1057	2279	1647
Evans	X88C003	S	C	1468	1391	2070	1636
Dwelley	X88C003	S	C	1791	944	2070	1595
CA9783069C	X92C016	S	C	1582	1196	1944	1567
CA9783180C	X92C019	C	C	1666	916	2104	1555
Sanford	X88C003	S	C	1663	890	2102	1545
CA9783170W	X92C017	C	W	1666	992	1548	1395
Grand Mean				1817	1231	2327	1784
C.V. (%)				9	12	9	10
LSD ($\alpha=0.05$)				233	200	284	140
Planting Date				4/25/01	4/26/01	5/7/01	
Harvest Date				8/31/01	8/30/01	9/10/01	

Leaf type; C = compound leaf, S = simple leaf type

Seed type; W = white seed type, C = café seed type

Yield data are means of three replications at each location.

Table 49. Agronomic Data for the Advanced Large Kabuli Chickpea Yield Trial, 2001 (0181)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Seed Type</u>	<u>Days to Flower</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Ascochyta Blight</u>
CA9892061W	X94C080	C	W	57	30	48	59.4	9
CA9890328C	X96C128	C	C	58	31	49	51.6	7
CA9892050W	X94C080	C	W	56	27	48	53.2	8
CA9890147W	X94C005	C	W	58	32	53	56.6	8
CA9892106W	X94C080	C	W	56	37	52	59.6	7
CA9892181W	X94C080	C	W	58	28	49	57.6	8
CA9890154W	X94C005	C	W	59	30	52	48.4	7
CA9885394W	X94C080	C	W	55	29	46	58.3	9
CA9783163C	X92C017	C	C	59	31	52	52.9	5
CA9890234W	X94C005	C	W	59	32	52	61.1	5
CA9890124W	X94C005	C	W	56	33	50	60.6	8
CA9890108W	X94C005	C	W	58	26	52	62.5	9
CA9890235W	X94C005	C	W	59	33	50	59.5	6
CA9885473W	X94C080	C	W	57	27	44	60.9	8
CA9890233W	X94C005	C	W	59	34	51	57.6	6
CA9890363C	X95C012	S	C	63	37	55	49.6	6
CA9783153C	X92C016	S	C	58	33	52	55.9	5
CA9783165C	X92C017	C	C	56	33	53	55.1	6
CA9890239W	X94C005	C	W	59	27	48	59.2	5
Sierra	X92C016	S	C	57	32	51	55.5	4
CA9885475W	X94C080	C	W	58	27	45	64.3	8
CA9890169W	X94C005	C	W	58	32	46	55.1	6
Evans	X88C003	S	C	59	33	65	44.6	6
Dwellely	X88C003	S	C	60	36	55	50.4	7
CA9783069C	X92C016	S	C	59	34	51	60.4	6
CA9783180C	X92C019	C	C	61	30	52	59.4	5
Sanford	X88C003	S	C	61	34	59	45.9	7
CA9783170W	X92C017	C	W	57	34	52	58.7	7
Grand Mean				58	32	51	56.2	7
C.V. (%)				2	12	5		16.4
LSD ($\alpha=0.05$)				2	5	4		1.5

Leaf type; C = compound leaf, S = simple leaf type.

Seed type; W = white seed type, C = café seed type.

Agronomic data are means of three replications at Pullman, WA.

Pod and plant height were measured at the green pod stage.

Ascochyta Blight Resistance Scores: 1 = Highly Resistant, 3 = Resistant, 5 = Tolerant, 7 = Susceptible and 9 = Highly Susceptible

Table 50. Mean Yields (kg/ha) of Chickpea Lines in the Advanced Large Kabuli Chickpea Yield Trial, 1999 - 2001

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Seed Type</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
CA9892061W	X94C080	C	W	....	....	2090
CA9890328C	X96C128	C	C	....	....	2042
CA9892050W	X94C080	C	W	....	....	2010
CA9890147W	X94C005	C	W	....	....	1993
CA9892106W	X94C080	C	W	....	....	1987
CA9892181W	X94C080	C	W	....	....	1981
CA9890154W	X94C005	C	W	....	....	1958
CA9885394W	X94C080	C	W	....	....	1925
CA9783163C	X92C017	C	C	....	1875	1855
CA9890234W	X94C005	C	W	....	....	1807
CA9890124W	X94C005	C	W	....	....	1803
CA9890108W	X94C005	C	W	....	....	1799
CA9890235W	X94C005	C	W	....	....	1792
CA9885473W	X94C080	C	W	....	....	1789
CA9890233W	X94C005	C	W	....	....	1788
CA9890363C	X95C012	S	C	....	....	1766
CA9783153C	X92C016	S	C	1082	1781	1754
CA9783165C	X92C017	C	C	1061	1782	1745
CA9890239W	X94C005	C	W	....	....	1739
Sierra	X92C016	S	C	1167	1761	1731
CA9885475W	X94C080	C	W	....	....	1673
CA9890169W	X94C005	C	W	....	....	1647
Evans	X88C003	S	C	956	1467	1636
Dwelley	X88C003	S	C	1053	1701	1595
CA9783069C	X92C016	S	C	908	1464	1567
CA9783180C	X92C019	C	C	....	1649	1555
Sanford	X88C003	S	C	957	1503	1545
CA9783170W	X92C017	C	W	832	1432	1395
Grand Mean				978	1555	1784
LSD ($\alpha=0.05$)				137	176	140

Leaf type; C = compound leaf, S = simple leaf type.

Seed type; W = white seed type, C = café seed type.

2001 Yield data are means of three replications at each location, over three locations

2000 Yield data are means of three replications at each location, over three locations

1999 Yield data are means of three replications at each location, over two locations.

Table 51. Post Harvest Quality Evaluations of Advanced Kabuli Chickpea Yield Trial - Pullman - 2001

Cultivar	Weight 100 Seeds	Water Uptake	Hard Seed	Conductivity	Cooking Time	Color	Sediment Rating	Canning Color
	-g-	-%-	-%-	-us/g-	-minutes-			
CA9892061W	59.4	112.4	0	31.3	25	Good	5	2
CA9890328C	51.6	115.6	0	30.0	24	Good	3	3
CA9892050W	53.2	115.8	0	30.6	* 24	Good	4	2
CA9890147W	56.6	125.5	0	32.6	26	Good	5	2
CA9892106W	59.6	113.8	0	30.6	26	Good	5	3
CA9892181W	57.6	114.9	0	26.7	24	Good	4	3
CA9890154W	48.7	119.8	0	39.5	24	Good	4	3
CA9885394W	59.2	112.8	0	29.5	26	Good	5	3
CA9783163C	52.9	114.4	0	31.7	22	Good	5	3
CA9890234W	61.1	120.1	0	32.2	24	Good	2	2
CA9890124W	60.6	118.3	0	45.0	24	Good	5	2
CA9890108W	62.2	117.9	0	39.2	24	Good	5	3
CA9890235W	59.5	120.0	0	32.8	25	Good	4	2
CA9885473W	60.9	115.5	0	34.8	26	Good	3	2
CA9890233W	57.6	125.5	0	31.9	24	Good	5	2
CA9890363C	49.6	110.3	0	44.5	24	Good	5	3
CA9783153C	55.9	103.5	0	46.2	25	Good	4	2
CA9783165C	55.1	115.4	0	31.6	* 24	Good	4	2
CA9890239W	59.2	122.4	0	29.2	25	Good	3	2
Sierra	55.5	103.5	0	46.6	27	Good	6	2
CA9885475W	64.3	114.0	0	32.8	26	Good	4	3
CA9890169W	55.1	121.2	0	34.1	26	Good	4	2
Evans	44.6	109.3	0	38.4	24	Good	4	3
Dwellely	50.4	109.7	0	44.1	25	Good	5	3
CA9783069C	60.4	109.2	0	48.0	27	Good	5	2
CA9783180C	59.4	115.5	0	30.3	24	Good	4	2
Sanford	45.9	108.7	0	47.9	24	Good	4	3
CA9783170W	58.7	115.4	0	36.7	24	Good	4	3
Mean	56.2	115.0	0.0	36.0	24.7		4	2
C.V. %	1.9	1.0	0.0	4.9	2.2			
LSD (0.05)	1.1	1.2	0.0	1.9	0.6			

* Lost Some Seedcoats

us/g = microsiemens per gram of seed

Seeds soaked for 18 hours before cooking

Sediment rating: 1 = no sediment in jar, 7 = thick layer of sediment on bottom of jar.

Canning color: 1 = very light seed color, 5 = very dark color.

Table 52. Agronomic Data for the Preliminary Large Kabuli Chickpea Yield Trial, 2001 (0183)

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Seed Type</u>	<u>Days to Flower</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Ascochyta Blight</u>	<u>Mean Seed Yield ..kg/ha..</u>
CA9990I875W	X94C005	C	W	59	36	54	64.0	6	2723
CA9990I604W	X94C080	C	W	56	35	52	56.9	6	2650
CA9990I827W	X94C005	C	W	58	37	53	53.4	6	2594
CA9990B1897C	X94C003	C	C	59	40	59	43.0	4	2556
CA9990B1895C	X94C003	C	C	58	46	64	41.6	3	2544
CA9990I869W	X94C005	C	W	58	37	55	56.8	5	2540
CA9990I861W	X94C005	C	W	59	42	55	50.0	5	2441
CA9990I826W	X94C005	C	W	58	31	51	61.1	7	2388
CA9990B1887C	X94C003	C	C	60	40	67	42.6	3	2365
CA9990B1514W	X92C016	S	W	58	46	58	58.1	6	2345
CA9990B1579C	X92C016	S	C	58	48	63	57.9	6	2330
CA9990I836W	X94C005	C	W	58	43	56	62.3	8	2306
CA9990B1578C	X92C016	S	C	57	41	57	55.9	6	2165
Dwelley	X88C003	S	C	59	47	62	49.6	4	2058
CA9990B2114C	X96C128	S	C	59	54	70	44.6	3	2035
CA9990B2132C	X96C128	S	C	59	39	61	50.8	4	2006
CA9990B2093C	X96C128	S	C	59	50	62	51.1	6	1967
Sanford	X88C003	S	C	59	49	64	43.9	6	1936
CA9990B2468W	X97C002	C	W	56	42	62	53.4	4	1746
Grand Mean				58	42	59	52.5	5	2300
C.V. (%)				2	16	8		21	9
LSD ($\alpha=0.05$)				2	9	6		2	279
Planting Date:									5/7/01
Harvest Date:									9/12/01

Yield data and agronomic data are means over three replications.

Leaf type; C = compound leaf, S = simple leaf type.

Seed type; W = white seed type, C = café seed type.

Pod and plant height were measured at the green pod stage.

Ascochyta Blight Resistance Scores: 1 = Highly Resistant, 3 = Resistant, 5 = Tolerant, 7 = Susceptible and 9 = Highly Susceptible.

Table 53. Agronomic Data for the Preliminary Large White Kabuli Chickpea Screening Nursery, 2001 (0185)

1 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Seed Type</u>	<u>Days to Flower</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Ascochyta Blight</u>	<u>Mean Seed Yield ..kg/ha..</u>
CA0090B202W	X98C024	S	W	56	59	72	37.5	3	2300
CA0090B093W	X98C010	S	W	56	45	78	37.9	3	2178
CA0090B084W	X98C010	S	W	59	52	66	31.2	3	2127
CA0090B003W	X94C005	C	W	59	31	52	46.7	4	2046
CA0090B138W	X98C013	S	W	56	63	78	37.2	3	2023
CA0090B007W	X94C005	C	W	56	27	42	46.5	5	1981
CA0090B082W	X98C010	S	W	59	40	80	34.0	4	1917
CA0090B879W	X98C013	C	W	56	50	64	28.4	3	1906
CA0090B088W	X98C010	S	W	56	51	68	39.3	4	1900
CA0090B882W	X98C013	S	W	59	30	58	40.4	4	1702
CA0090B105W	X98C010	S	W	56	58	71	37.8	3	1544
CA0090B109W	X98C010	S	W	59	57	68	37.1	4	1518
CA0090B015W	X94C005	C	W	59	40	52	50.1	4	1482
CA0090B892W	X98C020	C	W	59	46	61	36.4	4	1465
CA0090B039W	X96C140	C	W	59	35	48	51.5	4	1242
CA0090B045W	X96C142	C	W	53	45	54	48.3	5	1055
CA0090B135W	X98C012	S	W	63	31	48	45.3	5	432
Sub Mean - White Seed Type				58	45	62	40.3	4	1695
CA0090B347C	X96C004	C	C	56	32	65	44.0	3	2659
CA0090B344C	X96C004	S	C	56	52	67	50.3	3	2544
CA0090B300C	X95C012	S	C	59	55	72	48.9	4	2544
CA0090B304C	X95C012	S	C	63	64	76	48.0	3	2427
CA0090B374C	X96C019	C	C	56	31	63	37.6	3	2411
CA0090B397C	X96C019	S	C	59	30	61	40.3	3	2313
CA0090B380C	X96C019	S	C	56	45	58	39.2	3	2299
CA0090B643C	X96C023	S	C	59	33	58	49.0	5	2269
CA0090B817C	X96C020	S	C	56	44	52	39.0	3	2253
CA0090B632C	X96C020	C	C	56	48	62	38.6	3	2144
CA0090B450C	X96C128	S	C	59	49	60	46.4	4	2135
CA0090B309C	X95C012	S	C	63	30	64	56.3	4	2128
CA0090B454C	X96C128	S	C	59	38	56	48.4	4	2120
CA0090B445C	X96C128	C	C	56	45	61	46.3	4	2117
CA0090B398C	X96C019	S	C	56	38	60	42.1	5	2068
CA0090B383C	X96C019	S	C	56	25	52	39.4	3	2018
CA0090B665C	X96C026	C	C	56	44	52	33.7	3	2005
CA0090B404C	X96C022	S	C	56	45	60	37.7	4	1997
CA0090B442C	X96C128	S	C	59	44	65	49.9	4	1982
CA0090B392C	X96C019	S	C	56	50	72	45.7	4	1981

Table 53. Agronomic Data for the Preliminary Large White Kabuli Chickpea Screening Nursery, 2001 (0185) Continued 2 of 2

<u>Cultivar</u>	<u>Origin</u>	<u>Leaf Type</u>	<u>Seed Type</u>	<u>Days to Flower</u>	<u>Pod Ht (green) ..cm..</u>	<u>Plant Ht (green) ..cm..</u>	<u>Weight 100 Seed ..g..</u>	<u>Ascochyta Blight</u>	<u>Mean Seed Yield ..kg/ha..</u>
CA0090B395C	X96C019	S	C	56	46	63	42.0	3	1970
CA0090B640C	X96C023	S	C	56	50	65	51.2	5	1913
CA0090B659C	X96C026	S	C	59	35	57	32.0	3	1888
CA0090B298C	X95C012	S	C	63	30	62	51.0	4	1887
CA0090B634C	X96C022	S	C	56	55	67	42.1	4	1803
CA0090B457C	X96C128	S	C	63	52	77	56.5	4	1780
CA0090B449C	X96C128	S	C	59	47	73	44.3	4	1754
CA0090B703C	X96C036	S	C	59	41	68	41.8	3	1744
CA0090B550C	X96C012	S	C	59	35	58	44.3	4	1728
CA0090B292C	X95C012	S	C	59	56	68	51.5	6	1720
CA0090B307C	X95C012	S	C	63	35	70	51.7	4	1373
CA0090B620C	X96C018	S	C	59	19	59	37.0	4	1307
Sub Mean -Cafe Seed Type				58	42	63	44.6	4	2040
Grand Mean				58	43	63	43.1	4	1920

Planting Date:

5/7/01

Harvest Date:

9/12/01

Yield data and agronomic data are from one replication.

Leaf type; C = compound leaf, S = simple leaf type.

Seed type; W = white seed type, C = café seed type.

Pod and plant height were measured at the green pod stage.

Ascochyta Blight Resistance Scores: 1 = Highly Resistant, 3 = Resistant, 5 = Tolerant, 7 = Susceptible and 9 = Highly Susceptible.

Lupin Evaluations:

The variety evaluation for lupin included 12 lines (Table 54). One of the lines (Tiffwhite') did not flower and no seed yield could be recorded. The cultivar 'Ultra' developed a pod malady which may have been bacterial blight. Insects were attracted to the pod secretions and consumed all seed that 'Ultra' produced.

The variety 'Tallerack' was the highest yielding line in this trial. Available soil moisture appeared to limit all lines from producing high yields. Lupin may have promise as a feed legume crop for the drier areas of the Pacific Northwest. Available soil moisture will limit where the lupin can be grown as an economically viable crop.

Table 54. Agronomic Data for the Advanced Lupin Yield Trial, 2001 (0193)

<u>Cultivar</u>	<u>Days to Maturity</u>	<u>Plant Ht Maturity</u> ..cm..	<u>Weight 100 Seed</u> ..g..	<u>Mean Seed Yield</u> ..kg/ha...
Tallerack	98	42	13.3	774
Belara	96	32	11.0	591
Yorrel	98	34	12.6	548
Quilinock	97	35	12.4	528
Danja	97	39	14.4	422
Gungurru	97	28	12.0	405
Tanjil	97	28	11.0	316
Kalya	97	31	10.7	300
Myallie	97	39	12.7	268
Merrit	98	21	11.6	130
Grand Mean	97	33	12.2	428
C.V. (%)	1.0	17		45
LSD ($\alpha=0.05$)	1.4	8.1		271

Planting date 5/07/01.

Harvest date 9/12/01.

Yield data are means of three replications at Pullman, WA.

Western Regional
Dry Pea, Lentil and Chickpea Yield Trials

Table 55. Combined green pea performance data for Nezperce and Moscow, 2001.

Data from Ying Wu and Stephen Guy, University of Idaho.

Variety or Selection	Seed Yield			Seed Weight			Vine	Canopy
	Nezperce	Moscow	Average	Nezperce	Moscow	Average	Length	Height
	-----lb/acre-----			-----g/100-----			inches	inches
Ariel	1742	2837	2290	12.5	19.5	16.0	27	26
Bluebird	3063	3452	3258	20.4	23.0	21.7	22	22
Columbia	2185	2679	2432	15.7	20.3	18.0	45	20
Cruiser	2015	2916	2466	14.9	21.8	18.4	28	28
Franklin	1153	2537	1845	13.5	19.9	16.7	23	11
Hero	1196	2732	1964	17.5	21.9	19.7	21	21
Joel	1955	2930	2443	15.3	22.3	18.8	47	18
Journey	1716	2743	2230	12.9	16.2	14.6	41	19
Karita	2437	2923	2680	20.1	25.5	22.8	27	27
Lifter	1092	2665	1879	14.5	22.2	18.4	29	15
Majoret	941	2923	1932	15.2	25.8	20.5	28	27
Supra	2148	2600	2374	27.5	35.3	31.4	24	24
Toledo	2155	3239	2697	18.6	25.3	22.0	27	27
Pro 98106	1902	3130	2516	16.2	20.8	18.5	21	21
PS 610512	2030	3027	2529	15.4	21.0	18.2	23	22
PS 610324	2193	2466	2330	16.8	23.1	20.0	26	26
PS 710909	1418	2195	1807	22.0	29.7	25.9	22	11
Pro 98128	1448	2911	2180	14.5	20.5	17.5	23	16
Ceb 1170	1678	3112	2395	18.0	27.0	22.5	28	28
Ceb 1171	2591	3382	2987	18.5	24.7	21.6	23	21
Cpb 90-7	1981	2960	2471	23.3	28.0	25.7	24	22
Average	1630	2575	2102	15.7	21.5	18.6	25	19
LSD (0.10)	319	165	171	1.6	1.1	1.0	2	2
CV (%)	14	5	--	7.7	3.8	--	--	--

Table 56. Combined yellow pea performance data for Nezperce and Moscow, 2001.

Data from Ying Wu and Stephen Guy, University of Idaho.

Variety or Selection	Seed Yield			Seed Weight			Vine	Canopy
	Nezperce	Moscow	Average	Nezperce	Moscow	Average	Length	Height
	-----lb/acre-----			-----g/100-----			inches	inches
Athos	2249	3162	2706	21.3	28.2	24.8	18	18
Badminton	1856	3275	2566	16.5	22.9	19.7	21	21
Delta	2100	3153	2627	16.7	23.1	19.9	26	26
Eclipse	2275	3191	2733	17.0	24.0	20.5	25	25
Fallon	1643	2984	2314	17.4	24.9	21.2	24	22
Jasmin	1975	2977	2476	19.3	24.5	21.9	30	30
Lumina	2327	3557	2942	19.3	23.4	21.4	23	23
Rex	2194	3470	2832	18.6	25.8	22.2	29	18
Rodeo	1799	3405	2602	19.7	27.6	23.7	21	21
Shawnee	2244	2957	2601	16.1	22.5	19.3	44	16
Swing	1931	3342	2637	18.0	23.1	20.6	27	26
Pro 98330	1440	3301	2371	15.8	25.5	20.7	23	23
PS 7101149	2327	3292	2810	16.8	23.9	20.4	30	16
Ceb 1484	2125	3607	2866	18.7	23.9	21.3	24	23
Ceb 1489	2228	3607	2918	17.5	22.0	19.8	23	23
Average	2048	3285	2666	17.9	24.4	21.1	26	22
LSD (0.10)	319	165	171	1.6	1.1	1.0	2	2
CV (%)	14	5	--	7.7	3.8	--	--	--

Table 57. Seed yield averages for green and yellow peas tested for three years in northern Idaho.
Data from Ying Wu and Stephen Guy, University of Idaho.

Variety or Selection	1999	2000	2001	Average
-----lb/acre-----				
<u>Green pea</u>				
Ariel	1959	1863	2290	2037
Columbia	1809	1638	2432	1960
Joel	1881	2078	2443	2134
Karita	1923	2259	2680	2287
Lifter	1537	2168	1879	1861
Majoret	1835	1957	1932	1908
Supra	1636	1785	2374	1932
Toledo	1601	1830	2697	2043
CPB 90-7	2017	1858	2471	2115
Average	1582	1730	2101	1804
LSD (0.10)	145	114	171	--
<u>Yellow pea</u>				
Athos	1898	2340	2706	2315
Badminton	2087	2070	2566	2241
Delta	2076	2139	2627	2281
Fallon	2266	1810	2314	2130
Jasmin	1900	1964	2476	2113
Rex	2140	1960	2832	2311
Shawnee	1915	2613	2601	2376
Swing	2011	2295	2637	2314
Average	2037	2149	2595	2260
LSD (0.10)	145	114	171	--

Table 58. Spring lentil performance data for Nezperce and Moscow, 2001.
Data from Ying Wu and Stephen Guy, University of Idaho.

Variety or Selection	Seed Yield			Seed Weight			Plant Height		
	Nezperce	Moscow	Average	Nezperce	Moscow	Average	Nezperce	Moscow	Average
	-----lb/acre-----			-----g/100-----			-----inches-----		
Brewer	1920	2828	2374	6.1	6.7	6.4	17	17	17
Crimson	1265	2577	1921	3.3	4.2	3.8	15	16	16
Eston	1827	2691	2259	3.3	3.4	3.4	19	15	17
Mason	1170	2830	2000	7.3	7.7	7.5	16	15	16
Merrit	2086	2850	2468	6.7	7.1	6.9	17	16	17
Palouse	969	2522	1746	6.8	7.9	7.4	17	15	16
Pardina	1606	2991	2299	3.7	4.1	3.9	17	14	16
Pennel	1335	2694	2015	6.5	7.9	7.2	17	16	17
Redchief	1571	2718	2145	4.8	5.7	5.3	17	16	17
Richlea	1626	2975	2301	4.9	5.8	5.4	19	17	18
LC 460212L	1374	2865	2120	6.6	7.3	7.0	16	16	16
LC 7601086E	1788	2847	2318	3.8	4.6	4.2	17	16	17
LC 7601599T	809	2592	1701	3.5	4.0	3.8	17	16	17
LC 8602354T	1574	2696	2135	4.1	4.6	4.4	17	16	17
Average	1494	2763	2129	5.1	5.8	5.5	17	16	17
LSD (0.10)	190	148	120	0.9	0.5	0.5	1	1	1
CV (%)	11	5	--	14.4	7.7	--	7	7	--

Table 59. Seed yield for lentil and chickpea varieties tested for three years in northern Idaho.
Data from Ying Wu and Stephen Guy, University of Idaho

Variety or Selection	1999	2000	2001	Average
-----lb/acre-----				
<u>Lentil</u>				
Brewer	1431	1859	2374	1888
Crimson	1572	1493	1921	1662
Eston	1645	1434	2259	1779
Mason	1515	1773	2000	1763
Merrit	1445	1891	2468	1935
Palouse	1451	1779	1746	1659
Pardina	1473	1834	2299	1869
Redchief	1401	1684	2145	1743
Richlea	1549	1580	2301	1810
LC 460212	1424	1676	2119	1740
Average	1491	1700	2163	1785
LSD (0.10)	100	81	120	--
<u>Chickpea</u>				
Dwelley	800	1092	2094	1329
Evans	817	1125	2173	1372
Myles	854	1206	2517	1526
Sanford	846	1162	2225	1411
Sarah	696	978	2600	1425
Spanish White	746	999	2184	1310
UC 27	817	995	2710	1507
Average	797	1080	2358	1411
LSD (0.10)	85	166	195	--

Table 60. 2001 Western Regional Dry Pea Trial - Moccasin dry pea grain yield and seed weights summary.
- Exp. 810701. Central Agricultural Research Center, Moccasin, Montana.

{File: 810701-YldWts}

Selection	Type	Stand	Grain Yield					-- Seed Weights --	
			Harvest		Moisture ^{1/}	13% Moisture ^{2/}		Kernel	Test
			(%)	(lbs/acre)	(bu/a)	(%)	(lbs/acre)	(bu/acre)	(g/1000)	(lbs/bu)
PS610152	Green	90.0 ^a	1,930 ^a	32.17	15.5	1,863 ^a	31.05	192.9	66.67
Majoret	Green	87.1 ^a	2,002 ^a	33.37	20.8 ^a	1,800 ^a	30.00	223.2	67.77 ^a
PS7101149	Yellow	79.5 ^a	1,841 ^a	30.68	17.4 ^a	1,736 ^a	28.93	234.4	66.37
Franklin	Green	66.0	1,839 ^a	30.65	17.6 ^a	1,724 ^a	28.73	208.3	66.90
PS610324	Green	86.4 ^a	1,745	29.08	14.9	1,699	28.32	234.8	66.63
PS710909	Marrowfat	79.8 ^a	1,673	27.88	14.0	1,647	27.45	290.4 ^a	64.47
Lifter	Green	56.5	1,509	25.15	14.7	1,472	24.53	205.4	65.77
Means (<i>n</i> = 21) ^{2/}		77.9	1,791	29.85	16.4	1,706	28.43	227.1	66.37
LSD (0.05 by t)		17.9	171	2.85	3.9	144	2.40	19.1	0.82
C.V. % (s / means)		12.94	5.37		13.34	4.74		3.43	0.69
F-Value (for Sel; df = 6)		4.46 **	8.86 **		3.46 **	7.13 **		33.71 **	15.12 **

^{ns} - Indicates no statistical significance at 0.10 level.

^{*} - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level.

^a - Denotes values equal to highest value (in **bold**) based on LSD_(0.05).

^{1/} - Grain moisture at harvest.

^{2/} - Yields converted to 13% moisture conditions for comparison.

Data from Karnes Neil and David Wichman, Montana State University.

Table 61. 2001 Western Regional Dry Pea Trial - Moccasin dry pea development and plant height summary.
- Exp. 810701. Central Agricultural Research Center, Moccasin, Montana.

{File: 810701-DtsHts}

Selection	1 st Flower	----- Pod ----- Form	Fill	--- Maturity --- Phys.	Grain	Plant Height		Vine Length	Stand- ability ^{1/}
						Fill	Grain		
			(days from seeding)				(inches)		(ht _g / v _i)
PS610152	63 ^a	69	77 ^a	86	100	16.3	15.3	17.2	0.892 ^a
Majoret	68	73	79	87	101	20.9 ^a	20.1 ^a	22.0 ^a	0.917 ^a
PS7101149	62 ^a	66 ^a	76 ^a	83 ^a	98 ^a	17.5 ^a	15.7	19.8	0.790
Franklin	68	74	79	87	101	13.8	13.7	17.1	0.770
PS610324	68	73	78	87	99	18.4 ^a	17.7 ^a	19.7	0.896 ^a
PS710909	68	73	79	90	103	14.4	12.8	17.8	0.725
Lifter	70	75	81	89	106	18.2 ^a	11.3	23.7 ^a	0.482
Means (<i>n</i> = 21)	67	72	78	87	101	17.0	15.2	19.6	0.782
LSD (0.05 by t)	1	<1	1	1	1	3.8	2.6	2.9	0.095
C.V. % (s / means)	0.96	0.50	0.75	0.68	0.72	12.35	9.63	8.39	6.80
F-Value (Sel.; df = 6)	61.2 ^{**}	230.8 ^{**}	23.4 ^{**}	44.4 ^{**}	42.7 ^{**}	4.12 ^{**}	13.1 ^{**}	6.92 ^{**}	24.20 ^{**}

^{ns} - Indicates no statistical significance at 0.10 level.

^{*} - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level.

^a - Denotes values equal to lowest/highest value (in **bold**) based on LSD_(0.05).

^{1/} - Standability (ease of harvest) calculated as ratio of plant height at grain maturity (ht_g) to vine length (v_i).

Data from Karnes Neil and David Wichman, Montana State University.

Table 62. 2001 Western Regional Dry Pea Yield Trial - Huntley, Montana, dry pea grain trial summary.
 - Exp 810801. Prepared by Central Ag. Research Center, Moccasin, MT

{File: 810801-WRDP}

Selection	---- Yield ----		Grain Moist	Seed Weights		Flower	Fill	Plot Heights	
	(lbs/acre)	(kg/ha)		Test	Kernel			Fill	Mature
			(%)	(lbs/bu)	(g/1000)	(days from seeding)		----- (cm) -----	
PS7101149	1,889 ^a	2,116	12.4	62.78 ^a	224.5	51	66	48.0 ^a	43.5
Majoret	1,839 ^a	2,060	12.9	64.00 ^a	211.5	56	68	37.8	51.0 ^a
PS610324	1,770 ^a	1,982	12.5	62.78 ^a	231.5	55	66	48.5 ^a	51.3 ^a
PS610152	1,471	1,647	12.4	63.48 ^a	197.5	48 ^a	65 ^a	36.3	38.3
Lifter	1,446	1,620	12.5	63.18 ^a	168.8	58	70	37.0	36.3
Franklin	1,298	1,454	12.3	62.95 ^a	198.8	54	66	41.3 ^a	40.0
PS710909	1,289	1,444	12.4	61.73	309.8 ^a	52	66	29.5	35.0
Means (<i>n</i> = 28)	1,572	1,760	12.5	62.98	220.3	53	67	39.8	42.2
LSD (0.05 by t)	323	361	0.5	1.27	7.5	0.8	0.7	7.5	6.6
C.V. % (s / means)	13.82	13.82	2.81	1.36	2.28	0.35	0.26	12.77	10.46
F-Value (df = 6)	3.92 ^{**}	3.92 ^{**}	1.08 ^{ns}	2.34 [*]	208.5 ^{**}	96.7 ^{**}	30.5 ^{**}	4.93 ^{**}	6.97 ^{**}

^{ns} - Indicates no statistical significance at 0.10 level.

^{*} - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level.

^a - Denotes values equal to lowest/highest value (in **bold**) based on LSD_(0.05).

Data from Karnes Neil and David Wichman, Montana State University.

Table 63. 2001 Western Regional Lentil Trial - Moccasin lentil grain yield and seed weights summary.
- Exp. 860701. Central Agricultural Research Center, Moccasin, MT.

{File: 860701-YieldWts}

Selection	Grain Yields					-- Seed Weights --	
	Harvest		Moisture ^{1/}	--- 13% Moisture ^{2/} ---		Kernel	Test
	(lbs/acre)	(bu/acre)	(%)	(lbs/acre)	(bu/acre)	(g/1000)	(lbs/bu)
LC460266B	1,670 ^a	27.83	17.67	1,575 ^a	26.25	71.2	58.33
LC7601086E	1,458 ^a	24.30	12.90	1,460 ^a	24.33	46.1	63.50
LC8601817P	1,393 ^a	23.22	16.10	1,343 ^a	22.38	44.0	63.80
Laird	1,374	22.90	15.67	1,334 ^a	22.23	70.8	59.27
LC460197L	1,373	22.88	17.07	1,310 ^a	21.83	76.1 ^a	58.33
Brewer	1,378	22.97	17.37	1,307	21.78	61.7	60.03
LC660829L	1,327	22.12	14.83	1,302	21.70	66.9	59.53
LC8601787P	1,351	22.52	16.63	1,292	21.53	48.4	63.50
LC460212L	1,403 ^a	23.38	21.13 ^a	1,266	21.10	75.4 ^a	58.70
LC7601106E	1,264	21.07	15.27	1,230	20.50	47.3	61.93
LC7601080R	1,164	19.40	13.37	1,162	19.37	57.1	61.23
LC7601599T	1,094	18.23	15.87	1,055	17.58	43.1	65.83 ^a
LC8602354T	1,035	17.25	16.60	985	16.42	49.0	65.33 ^a
Means (<i>n</i> = 39)	1,330	22.17	16.19	1,279	21.32	58.2	61.49
LSD (0.05 by t)	282	4.70	3.05	267	4.45	2.3	0.80
C.V.% (s/means)	12.60		11.18	12.40		3.66	0.77
F-Value (df = 12)	2.87 ^{**}		3.89 ^{**}	2.82 ^{**}		69.88 ^{**}	95.02 ^{**}

^{ns} - Indicates no statistical significance at 0.10 level. * - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level. ^a - Denotes values statistically equal to highest value (in **bold**) based on LSD_(0.05).

^{1/} - Grain moisture at harvest. ^{2/} - Yields converted to 13% moisture conditions for comparison.

Data from Karnes Neil and David Wichman, Montana State University.

Table 64. 2001 Western Regional Lentil Trial - Moccasin lentil development and plant height summary.
- Exp. 860701. Central Agricultural Research Center, Moccasin, MT.

{File: 860701 - DateHts}

Selection	1 st	----- Pod -----		----- Maturity -----		----- Plant Height -----	
	Flower	Form	Fill	Phys.	Grain	Phys. ^{1/}	Harvest
	(days) ^{2/}	----- (days from first flower) -----				----- (inches) -----	
Laird	70	7 ^a	12 ^a	18 ^a	41	11.8 ^a	13.3 ^a
Brewer	64	7 ^a	13	25	43	10.5	10.9
LC460197L	67	9	14	23	42	10.6	10.9
LC460212L	70	7 ^a	11 ^a	19 ^a	37 ^a	10.5	10.7
LC660829L	64	7 ^a	13	23	43	10.3	11.4 ^a
LC460266B	64	7 ^a	13	26	44	10.7	11.0
LC7601080R	68	8 ^a	13	22	44	11.1 ^a	11.8 ^a
LC7601086E	66	7 ^a	12 ^a	24	42	9.9	10.3
LC7601106E	63 ^a	7 ^a	14	27	46	10.7	11.5 ^a
LC8601787P	67	8 ^a	13	23	41	9.8	10.3
LC8601817P	64 ^a	7 ^a	13	23	42	10.2	11.2
LC7601599T	70	7 ^a	11 ^a	19 ^a	37 ^a	9.3	10.2
LC8602354T	65	7 ^a	12 ^a	23	41	9.7	10.5
Means (<i>n</i> = 39)	66	7	13	23	42	10.4	11.1
LSD (0.05 by t)	1	1	1	2	2	0.9	2.0
C.V.% (s/means)	0.91	10.66	6.02	5.53	2.18	5.32	8.10
F-Value (df = 12)	52.74 ^{**}	1.63 ^{ns}	4.11 ^{**}	13.20 ^{**}	23.76 ^{**}	4.17 ^{**}	1.72 ^{ns}

^{ns} - Indicates no statistical significance at 0.10 level. * - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level. ^a - Denotes values statistically equal to lowest/highest value (in **bold**) based on LSD_(0.05).

^{1/} - Physiological maturity; identified as start of plant dry down. ^{2/} - Days from seeding date.

Data from Karnes Neil and David Wichman, Montana State University.

Table 65. 2001 Western Regional Lentil Trial - Huntley, Montana, lentil grain trial summary.
 - Exp 860801. Prepared by Central Agricultural Research Center, Moccasin, MT

{File: 860801-WRTL}

Selection	Yield		Grain Moist	Seed Weights		Flower	Fill	Plot Heights	
	(lbs/acre)	(kg/h)		Kernel	Test			Fill	Mature
			(%)	(g/1000)	(lbs/bu)	(days from seeding)		(cm)	
LC7601086E	991.1 ^a	1,110.0 ^a	7.3 ^a	34.3	63.28 ^a	59	73	31.5	30.0 ^a
LC7601106E	973.9 ^a	1,090.7 ^a	7.1	46.8	63.00 ^a	53 ^a	72	32.3	28.0 ^a
LC8602354T	910.6 ^a	1,019.9 ^a	7.1	47.5	62.58	59	73	28.5	29.5 ^a
LC7601080R	859.9 ^a	963.1 ^a	7.4 ^a	44.0	61.70	62	74	32.8 ^{ns}	29.3 ^a
LC460266B	837.8 ^a	938.3 ^a	6.8	49.0	60.28	52 ^a	71 ^a	30.3	26.8 ^a
LC660829L	757.7	848.6	6.9	49.8	59.03	52 ^a	72	30.8	29.0 ^a
LC8601787P	754.3	844.8	7.5 ^a	36.0	62.58	58	73	29.3	29.0 ^a
LC8601817P	744.4	833.7	7.0	37.8	62.78 ^a	53 ^a	71 ^a	28.0	26.3
LC460197L	724.8	811.8	7.1	56.5 ^a	57.93	61	72	32.0	31.0 ^a
Laird	695.5	779.0	7.4 ^a	61.3 ^a	59.40	66	71 ^a	30.5	30.8 ^a
Brewer	653.1	731.4	7.3 ^a	48.0	59.25	52 ^a	70 ^a	31.0	24.5
LC460212L	639.3	715.0	7.4 ^a	51.5 ^a	56.88	64	75	30.8	30.5 ^a
LC7601599T	580.9	650.6	6.8	34.3	64.85 ^a	66	75	28.5	30.0 ^a
Means (n = 52)	778.7	872.1	7.1	45.9	61.04	58	72	30.5	28.8
LSD (0.05 by t)	165.2	185.0	0.3	11.1	2.12	1.5	1	5.2	4.4
C.V.% (s/means)	14.79	14.79	3.21	16.85	2.42	0.61	0.40	11.90	10.69
F-Value (df = 12)	4.12 ^{**}	4.12 ^{**}	4.14 ^{**}	3.98 ^{**}	8.80 ^{**}	86.06 ^{**}	13.25 ^{**}	0.75 ^{ns}	2.23 ^{**}

^{ns} - Indicates no statistical significance at 0.10 level.

* - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level.

^a - Denotes values statistically equal to highest/lowest values (in **bold**) based on LSD_(0.05).

Data from Karnes Neil and David Wichman, Montana State University.

Table 66. 2001 Western Regional Chickpea Trial - Moccasin chickpea grain yield and seed weight summary.
- Exp. 890701. Central Agricultural Research Center, Moccasin, Montana.

{File: 890701-YieldWts}

Selection	Type ^{1/}	Stand ^{2/} (%)	Grain Yield (lbs/acre)	Moisture ^{3/} (%)	Kernel Wt (g/1000)	Test Wt (lbs/bu)
CDC Desiray	Desi	85.5 ^a	1,520^a	8.9^a	230.5	60.3 ^a
CDC Anna	Desi	84.1 ^a	1,500 ^a	8.9 ^a	240.3	61.0^a
Myles	Desi	102.3 ^a	1,417 ^a	8.6	285.0	57.2
CDC Chico	Small Kabuli	106.4^a	1,368 ^a	8.8 ^a	277.8	59.2
CDC Nika	Small Kabuli	74.6	1,364 ^a	8.4	369.3	57.9
Amit	Small Kabuli	91.8 ^a	1,026	8.8 ^a	294.0	60.1 ^a
CDC Xena	Kabuli	100.9 ^a	1,149 ^a	8.6	505.5^a	57.4
Evans	Kabuli	95.0 ^a	898	8.5	441.8	58.0
Sanford	Kabuli	90.0 ^a	784	8.5	440.8	57.7
CA9783153C	Kabuli	88.6 ^a	777	8.2	471.8 ^a	57.6
CDC Yuma	Kabuli	101.4 ^a	742	8.7 ^a	413.0	58.2
Dwelley	Kabuli	86.4 ^a	677	8.4	430.0	57.5
CA9783165C	Kabuli	93.9 ^a	125	7.9	456.7	50.9
Means (<i>n</i> = 52)		92.4	1,027	8.5	373.6	57.9
LSD (0.05 by t)		22.9	335	0.3	47.4	1.0
C.V.% (s / means)		17.29	22.71	2.09	8.83	1.17
F-Value (for Selection; df = 12)		1.24 ^{ns}	12.38 ^{**}	10.05 ^{**}	33.51 ^{**}	51.48 ^{**}

^{ns} - Indicates no statistical significance at 0.10 level.^{*} - Indicates statistical significance at 0.10 level.^{**} - Indicates statistical significance at 0.05 level.^a - Denotes values equal to highest value (in **bold**) based on LSD_(0.05).^{1/} - Small Kabuli: Seed size intermediate (Kabuli > x > Desi); fern-like leaves and white flowers^{2/} - Stand as percentage of target seeding rate (4 plants per square foot)^{3/} - Grain moisture content at time of grain yield, test weight, and kernel weight analysis.

Data from Karnes Neil and David Wichman, Montana State University.

Table 67. 2001 Western Regional Chickpea Trial - Moccasin chickpea development and height summary.
- Exp. 890701. Central Agricultural Research Center, Moccasin, Montana.

{File: 890701-DtsHts}

Selection	----- Maturity -----				----- Plant Height -----	
	Flower	Pod	Phys. ^{1/}	Grain	Phys.	Grain
	----- (days from seeding date) -----				----- (inches) -----	
CDC Desiray	47	55	75 ^a	95 ^a	13.6	13.5
CDC Anna	49	57	77	98	15.0 ^a	15.0 ^a
Myles	48	56	75^a	95 ^a	14.7 ^a	14.8 ^a
CDC Chico	46	54 ^a	75^a	95 ^a	14.6 ^a	14.5 ^a
Amit	50	57	78	98	14.8 ^a	14.3 ^a
CDC Nika	44^a	54^a	75 ^a	94^a	14.7 ^a	14.3 ^a
Sanford	54	60	80	101	15.1 ^a	15.0 ^a
CDC Yuma	52	58	80	100	13.4	13.3
Evans	49	57	80	101	13.5	13.5
Dwelley	54	60	81	101	13.4	13.0
CDC Xena	51	57	79	99	15.5^a	15.50^a
CA9783153C	53	59	82	101	13.7	13.8 ^a
CA9783165C	55	61	83	103	14.5 ^a	13.8 ^a
Means (<i>n</i> = 52)	50	57	78	98	14.3	14.2
LSD (0.05 by t)	1	<1	1	1	1.6	1.8
C.V.% (s / means)	1.79	0.83	0.99	0.65	7.76	8.88
F-Value (df = 12)	56.35 ^{**}	89.84 ^{**}	59.18 ^{**}	86.28 ^{**}	1.71 ^{ns}	1.49 ^{ns}

^{ns} - Indicates no statistical significance at 0.10 level.^{*} - Indicates statistical significance at 0.10 level.^{**} - Indicates statistical significance at 0.05 level. ^a - Denotes values equal to lowest/highest values (in **bold**) based on LSD_(0.05).^{1/} - Physiological maturity, determined by onset of plant dry-down.

Data from Karnes Neil and David Wichman, Montana State University.

Table 68. 2001 Western Regional Chickpea Trial - Huntley, Montana, chickpea grain trial summary.
- Exp. 890701. Prepared by Central Ag. Research Center, Moccasin, MT.

{File: 890801-WRCP}

Selection	Type ^{1/}	Yield (lbs/acre)	Grain Moist (%)	Seed Weights		Flower (days from seeding)	Pod Fill	Plant Heights	
				Kernel (g/1000)	Test (lbs/bu)			Pod Fill (inches)	Maturity
CDC Anna	Desi	1,838.5 ^a	7.8 ^a	159.5	63.60 ^a	52	65	12.2	13.5
Myles	Desi	1,838.3 ^a	7.0	164.3	59.63	50	62 ^a	10.1	13.5
CDC Chico	Sm. Kabuli	1,710.8 ^a	7.8 ^a	196.0	63.73 ^a	49 ^a	62 ^a	11.5	16.0 ^a
CDC Desiray	Desi	1,549.3	7.3	166.0	61.20	50	62 ^a	9.2	11.5
Amit	Sm. Kabuli	1,486.8	7.7 ^a	194.0	64.83 ^a	57	68	13.4 ^a	15.5
CDC Nika	Sm. Kabuli	1,447.8	7.0	276.8	61.18	49 ^a	61 ^a	10.2	15.2
CDC Xena	Kabuli	1,305.8	7.2	381.0 ^a	63.18	53	65	11.4	13.7
Sanford	Kabuli	1,235.3	7.6 ^a	330.0	63.05	59	69	14.9 ^a	17.1 ^a
Evans	Kabuli	1,153.0	7.6 ^a	335.3	62.58	55	66	14.1 ^a	17.4 ^a
CDC Yuma	Kabuli	1,053.8	7.2	318.8	62.60	52	67	12.8	17.4 ^a
Dwelley	Kabuli	1,037.0	7.6 ^a	330.0	62.63	60	68	13.8 ^a	17.3 ^a
CA9783165C	Kabuli	888.8	7.3	362.8	59.65	60	70	12.1	15.6 ^a
CA9783153C	Kabuli	876.3	7.3	357.3	61.93	60	68	12.8	16.0 ^a
Means (<i>n</i> = 52)		1,340.1	7.4	274.7	62.29	54	65	12.2	15.4
LSD (0.05 by t)		221.4	0.4	13.4	1.12	1	1.5	1.8	2.0
C.V. % (s / means)		11.52	3.64	3.39	1.26	0.45	0.56	10.51	8.87
F-Value (df = 12)		18.88 ^{**}	4.13 ^{**}	336.5 ^{**}	15.43 ^{**}	143.8 ^{**}	33.32 ^{**}	6.84 ^{**}	7.38 ^{**}

^{ns} - Indicates no statistical significance at 0.10 level.

^{*} - Indicates statistical significance at 0.10 level.

^{**} - Indicates statistical significance at 0.05 level.

^a - Denotes values equal to highest value (in **bold**) based on LSD (_{0.05}).

^{1/} - Small Kabuli: seed size intermediate (Kabuli > x > Desi); have fern-like leaves and white flowers.

Data from Karnes Neil and David Wichman, Montana State University.

Table 69. Western Regional Lentil Yield Trial
Kalispell, Montana 2001

<u>Cultivar</u>	<u>Stand</u>	<u>First bloom</u>	<u>Maturity</u>	<u>Yield</u>	<u>Seed Size</u>
	%	days*	days*	lbs/a	#/lb
LC460197L	84	58.5	98.5	753	7994
LC460212L	76	59.0	97.2	721	7490
LC660829L	82	55.9	93.1	732	8737
LC460266B	88	56.0	93.9	883	7323
LC7601080R	80	59.0	98.5	728	8174
LC7601086E	90	58.9	97.7	888	10160
LC7601106E	84	57.7	97.9	811	10330
LC8601787P	85	58.0	94.5	770	10570
LC8601817P	88	56.0	94.2	1023	9650
LC7601599T	66	56.3	97.3	869	11380
LC8602354T	89	57.0	96.5	991	9732
Laird	81	59.3	98.2	896	8523
Crimson	89	59.8	97.0	1232	11340
mean	83	58	96	869	9339
LSD(0.05)	NS	NS	3.1	NS	1577
CV(s/mean)%	13.3	5.1	2.2	28.4	11.75

*Days since planting

Data from Louise Strang and Leon Welty, Montana State University

Table 70 2001 Sidney NE Irrigated Grain Peas

Data From Glen Frickel and David Baltensperger, University of Nebraska.

	Yield	Flwr Initiation	Stand	No. Seeds
	Lbs/A	June	10=100%	/Lb
2 Cruiser	3800	22	8	2192
7 PS610152	3770	21	8	2128
11 Salute	3450	21	9	1999
3 Franklin	3370	21	7	1975
6 Majorette	3340	24	8	1863
8 PS610324	3190	21	8	1962
5 Lifter	3130	22	8	2197
12 Toledo	3030	21	8	1881
9 PS7101149	2980	21	9	1961
10 PS710909	2860	21	7	1376
4 Intrega	2820	22	7	1828
1 Carneval	2760	23	7	2262
13 Wirrega	2040	23	7	2869
14 WyoDunn	1770	22	8	2629
AVERAGE	3022	22	8	927
L.S.D. (.05)	780	1	1	148

Table 71. 2001 Box Butte Co, NE Dryland Grain Peas

Data From Glen Frickel and David Baltensperger, University of Nebraska.

	Yield
	Lbs/A
13 Wirrega	780
14 WyoDunn	670
5 Lifter	660
11 Salute	650
6 Majorette	620
2 Cruiser	590
7 PS610152	580
4 Intrega	520
9 PS7101149	520
12 Toledo	480
10 PS710909	460
1 Carneval	440
3 Franklin	420
8 PS610324	370
AVERAGE	554
L.S.D. (.05)	231

Table 72. 2001 Sidney NE Irrigated Lentils

Data From Glen Frickel and David Baltensperger, University of Nebraska

	Yield	Flwr Initiation	Stand	No. Seeds
	Lbs/A	June	10=100%	/Lb
7 LC7601086E	2550	25	7	11599
8 LC7601106E	2320	21	7	11258
11 LC8601817P	2290	21	7	11283
12 LC8602354T	1960	25	7	11895
1 CDC Richlea	1890	25	8	9755
3 LC460212L	1880	24	8	7514
10 LC8601787P	1780	25	7	11707
4 LC460266B	1780	23	7	10521
5 LC660829L	1740	21	8	8607
6 LC7601080R	1710	25	7	9565
2 LC460197L	1700	26	7	7629
9 LC7601599T	1040	27	6	12794
AVERAGE	1890	24	7	10344
L.S.D. (.05)	380	1	1	1800

Table 73. 2001 Box Butte Co, NE Dryland Lentils

Data From Glen Frickel and David Baltensperger, University of Nebraska

	Yield
	Lbs/A
10 LC8601787P	910
6 LC7601080R	770
3 LC460212L	770
11 LC8601817P	740
1 CDC Richlea	700
9 LC7601599T	700
8 LC7601106E	680
5 LC660829L	670
12 LC8602354T	660
2 LC460197L	590
7 LC7601086E	590
4 LC460266B	530
AVERAGE	693
L.S.D. (.05)	N.S.

Table 74. 2002 Sidney NE Irrigated Chickpeas
Data From Glen Frickel and David Baltensperger, University of Nebraska

Entry #	Entry	Grain Yield Lbs/A	# Seed /lb	flower initiation June	Stand Rating
7	WY D202	2855	2223	21	6
6	WY D201	2604	2199	22	7
5	SANFORD	2156	1060	25	7
4	EVANS	2100	1040	25	6
1	CA9783152C	2062	991	27	7
8	WY K203	1777	1102	25	3
3	DWELLEY	1640	927	25	6
2	CA9783165C	1366	1058	28	7
	mean	2070	1325	25	6
	LSD (.05)	580	101	2	1

Table 75. 2001 Box Butte Co Nebraska Dryland Chickpeas
Data From Glen Frickel and David Baltensperger, University of Nebraska

Entry #	Entry	Grain Yield Lbs/A	# Seed / Lb
8	WY K203	2298	1300
6	WY D201	2254	2026
7	WY D202	2132	2108
5	SANFORD	1905	1164
1	CA9783152C	1887	1014
4	EVANS	1777	1093
3	DWELLEY	1546	1069
2	CA9783165C	1448	1116
		1906	1361
		NS	220

Table 76. Chickpea Varieties - North Central Research Extension Center - Minot, North Dakota

						Seed Yield				
Variety	Type*	Days	Plant Height in	Seed Count g/1000	Test Weight lb/bu					
		To Flower				1999	2000	2001	2 Year	3Year
						-----lb/A-----				
B-90	SK	62	23	270	61.1	907	1715	2578	2146	1733
CA 9783152c	K	63	23	447	60.0		1344	1883	1614	
CA 9783165c	K	62	20	424	60.0		881	1728	1304	
CDC Verano	K	57	18	200	57.0	--	--	1102	--	--
CDC Desiray	D	53	16	190	59.8	--	1111	2343	1727	--
CDC Yuma	K	62	24	374	62.4	1791	1271	1977	1624	1680
CDC Anna	D	55	21	209	59.5	--	--	3010	--	--
CDC Xena	K	53	21	428	62.1	1814	1572	2187	1879	1858
CDC Chico	SK	56	20	223	62.3	951	993	2670	1831	1538
CDC Nika	D	53	22	338	59.3	--	--	2541	--	--
Dwelley	K	63	22	387	55.7	1386	768	1538	1153	1231
Dwelley 0.5X	K	63	23	395	61.0			1127		
Dwelley 0.75X	K	64	22	409	61.2			1237		
Evans	K	68	25	350	62.2	--	--	1535	--	--
Myles	D	58	20	178	59.1	1720	935	2467	1701	1707
Sanford	K	64	25	357	62.1	1363	893	1865	1379	1374
Mean	--	60	22	285	60.3	1370	1207	1987	--	--
C.V. %	--	7.8	8.9	--	5.0	--	--	15.7	--	--
LSD 5%	--	7	3	--	4.3	--	--	445	--	--

Two applications of Quadris were applied to lower ascochyta blight incidences

* Type: K = Kabuli; SK = Small Kabuli; D = Desi

Planting Date: May 9, 2001

Harvest Date: September 20, 2001

Data from Mark Halvorson, North Dakota State University

Table 77. Chickpea Variety Trials, 2001 – North Dakota

Variety	Seed Yield (lb/acre)							Average*	
	Erie	Hett	Dick	Location Minot	Will	Carr	Wish	2001	2 yr
<i>Kabuli</i>									
CDC Verano	--	167	--	1102	171	1106	--	--	--
CDC Yuma	--	1387	1847	1977	793	983	465	--	1132
CDC Xena	--	200	--	2187	84	1264	--	--	930
CA 9783152C	287	187	1283	1883	168	597	--	734	753
CA 9783165C	--	60	--	1728	89	363	--	--	607
Sanford	574	113	843	1865	115	1080	155	765	725
Dwellely	99	80	998	1538	46	934	160	616	619
Evans	--	80	--	1535	81	1218	--	--	--
<i>Small Kabuli</i>									
B-90	77	2400	1894	2578	2069	1066	271	1681	1948
CDC Chico	1293	1313	--	2670	1271	1848	--	--	1409
<i>Desi</i>									
CDC Anna	1532	2507	--	3010	1696	2136	--	--	--
CDC Nika	978	2040	--	2541	2167	1361	--	--	--
CDC Desiray	--	1773	--	2343	1966	1242	471	--	--
Myles 1200	1860	2368	2467	1983	1777	445	1943	1866	--
Mean	770	1011	1539	1987	907	1212	328	--	--
LSD 5%	91	255	NS	445	197	474	176	--	--

*2001 average yield = Erie, Hettinger, Dickinson, Minot, Williston, and Carrington.

2 year average yield = 2000 and 2001 from Hettinger, Minot, Williston, and Carrington.

Low yield at specific locations primarily due to ascochyta infection.

Locations where fungicides were used to control ascochyta = Erie, Dickinson, Minot, and Carrington.

Hettinger sustained moderate hail damage on June 18.

Erie: Planting date = May 29, Harvest date = September 28.

Hettinger: Planting date = April 25, Harvest date = September 6.

Dickinson: Planting date = April 25, Harvest date = September 24.

Minot: Planting date = May 9, Harvest date = September 20.

Williston: Planting date = May 29, Harvest date = September 18.

Carrington: Planting date = May 14, Harvest date = October 22.

Wishek: Planting date = May 16, Harvest date = October 4.

All trials were planted at 4 plants per square foot PLS

Data from Steve Zwinger, North Dakota State University.

Table 78. NDSU: Carrington Research Extension Center, 2001 – Regional Field Pea Nursery

Variety	Days to Bloom	Bloom Duration	Seeds per Pound	Test Weight	Seed Protein	Seed Yield
				lbs/bu	%	bu/ac
Franklin	46.8	15.8	2193	63.7	23.7	38.6
Lifter	49.3	19.0	2756	63.3	27.7	27.7
PS610152	43.5	22.0	2477	63.1	23.6	39.5
PS610324	50.0	14.3	2101	64.0	22.1	45.2
PS7101149	41.5	22.8	2022	63.0	25.0	35.9
PS710909	46.5	18.0	1543	62.3	23.7	26.8
Mean	46.3	18.6	2182	63.2	24.3	35.8
C.V.%	1.2	4.1	4.0	1.0	2.1	22.3
LSD.05	0.8	1.2	133	1.0	0.8	11.9
LSD.01	1.2	1.6	184	NS	1.1	NS
#Reps	4	4	4	4	4	4

Planting date = May 14; Harvest date = August 10; Previous crop = Spring Wheat

Data from Steve Zwinger, North Dakota State University.

Table 79. Dry Pea Yield Trial – Wall, South Dakota – 2001

Character Rated	Height	Lodging	Test Wt	Yeild	SeedSize
Rating Unit	inches	1-9	Lb/Bu	Bu/A	Seeds/Lb
Rating Date	Aug-01-01	Aug-01-01	Aug-02-01	Aug-02-01	
ARM Action Codes			T1	TY2	
# Subsamples, Dec.			1	1	
Trt Treatment					
No. Name					
1 40-10 Magda	45.5	9.0	62.7	25.7	3039.0
2 Arvika	47.0	9.0	62.5	24.4	2926.0
3 Grande	24.5	2.0	63.5	24.5	2096.0
4 Badminton	21.5	2.0	62.6	31.9	1828.0
5 Carneval	24.5	1.0	62.1	30.3	2159.0
6 Crusader	25.3	1.0	61.2	27.6	2345.0
7 Delta	23.0	1.0	63.1	33.5	2014.0
8 Highlight	20.8	2.8	62.9	27.1	2359.0
9 Integra	25.0	1.5	61.7	27.1	1905.0
10 Salute	24.5	1.0	61.5	31.7	1892.0
11 Profi	22.8	1.8	62.8	28.2	1905.0
12 Atomic	20.5	1.0	62.2	23.6	1905.0
13 Cruiser	25.3	2.0	62.5	25.2	2322.0
14 Franklin	19.3	3.8	62.3	18.1	1946.0
15 Journey	37.5	6.5	61.6	27.0	2395.0
16 Lifter	22.3	4.8	62.7	18.8	2019.0
17 Majoret	26.5	1.3	63.6	24.8	1624.0
18 Toledo	25.3	1.0	61.1	29.2	1955.0
19 CEB 1475	22.3	1.0	62.6	32.7	1905.0
20 PS710149	22.3	3.0	62.2	17.3	1946.0
21 CEB 1158	20.3	1.0	62.3	32.2	1846.0
22 PS610152	19.5	1.5	62.7	28.2	2341.0
23 PS610324	22.0	1.0	61.9	24.1	2055.0
24 Carneval/Grande	25.8	1.0	63.5	29.0	1950.0
LSD (P=.05)	3.76	1.81	0.93	4.36	.
Standard Deviation	2.66	1.28	0.66	3.08	.
CV	10.4	50.59	1.05	11.51	.
Grand Mean	25.53	2.53	62.4	26.76	2111.54
Replicate F	1.915	0.735	2.122	4.309	
Replicate Prob(F)	0.1352	0.5348	0.1054	0.0076	
Treatment F	30.441	14.297	4.397	8.295	
Treatment Prob(F)	0.0001	0.0001	0.0001	0.0001	

Data from John Rickertsen, South Dakota State University

Table 80. Chickpea Yield Trial – Wall, South Dakota - 2001

Character Rated	Height	Lodging	Test Wt	Yield	Seed Size
Rating Unit	inches	1-9	Lb/Bu	Lb/A	seeds/oz
Rating Date	Aug-29-01		Aug-29-01	Aug-29-01	
ARM Action Codes			T1	TY2	
# Subsamples, Dec.			1	1	
Trt Treatment					
No. Name					
1 Dwelly	16.0	1.0	59.4	1081.0	55.0
2 Evans	15.5	1.0	60.0	839.7	67.0
3 Sanford	16.0	1.0	60.1	782.5	69.0
4 Xena	14.5	1.0	60.8	828.2	65.0
5 CA9783153C	15.0	1.0	59.2	725.2	60.0
6 CA9783165C	14.5	1.0	58.4	1273.0	57.0
7 B-90	14.5	1.0	62.3	1079.0	110.0
8 Chico	13.0	1.0	60.2	920.0	127.0
9 Myles	12.0	1.0	59.0	854.3	166.0
LSD (P=.05)	2.82	0.00	1.29	165.31	.
Standard Deviation	1.22	0.00	0.88	113.27	.
CV	8.41	0.0	1.47	12.16	.
Grand Mean	14.56	1.0	59.95	931.44	86.22
Replicate F	1.333	0.000	1.296	1.813	
Replicate Prob(F)	0.2815	1.0000	0.2987	0.1716	
Treatment F	2.370	0.000	6.687	9.769	
Treatment Prob(F)	0.1218	1.0000	0.0001	0.0001	

Planted: April 12

Harvested: August 29

Herbicide: Spartan, Poast

Note: The trial at Wall suffered from Ally + 2,4-D drift which totally wiped out the field peas next to it.

The chickpeas, after about a month, started growing again.

The injury certainly did reduce the yields. A neighboring farmer with B-90 chickpeas had 2000 Lb yields.

Data from John Rickertsen, South Dakota State University

Table 81. Chickpea Yield Trial – Oelrichs, South Dakota - 2001

Character Rated	Height	Lodging	Test Wt	Yield	Seed Size
Rating Unit	inches	1-9	Lb/Bu	Lb/A	seeds/oz
Rating Date	Aug-28-01	Aug-28-01	Aug-28-01	Aug-28-01	Nov-06-01
PRM Data Type			T1	TY2	
# Subsamples, Dec.			1	1	
Trt Treatment					
No. Name					
01 Dwelly	19.3	1.0	58.9	1508.5	59.0
02 Evans	20.7	1.0	58.8	1745.5	69.0
03 Sanford	20.3	1.0	60.5	1620.7	69.0
04 Xena	16.7	1.0	59.6	1742.8	63.0
05 B-90	18.3	1.0	57.8	1618.0	117.0
06 Chico	19.3	1.0	57.7	1956.4	.
LSD (P=.05)	2.04	0.00	1.89	130.01	.
Standard Deviation	1.12	0.00	1.25	86.28	.
CV	5.86	0.0	2.13	5.08	.
Grand Mean	19.11	1.0	58.88	1698.65	75.4
Replicate F	2.965	0.000	1.884	26.309	
Replicate Prob(F)	0.0975	1.0000	0.1757	0.0001	
Treatment F	5.062	0.000	2.909	12.823	
Treatment Prob(F)	0.0143	1.0000	0.0496	0.0001	

Planted: May 2

Harvested: August 28

Herbicide: Treflan

Data from John Rickertsen, South Dakota State University

Table 82. Grain yield, bushel weight, final bloom date and height of irrigated pea varieties at the U-W Research and Extension Center at Torrington, WY in 2001.

Variety	Yield lbs/A	Weight lbs/bu	<u>Days from planting till final bloom</u>	Harvest height in
PS610152	3760	63.5	79	15
Lifter	3610	63.8	83	19
PS7101149	3530	63.3	80	17
Salute	3490	63.0	81	21
Toledo	3480	58.5	81	20
Wirrega	3420	63.7	82	22
Wyodun	3390	63.7	85	26
Intrega	3360	64.0	81	21
Franklin	3280	61.9	78	15
Majorette	3260	64.1	80	19
Carneval	3160	64.0	82	20
Cruiser	2990	61.7	80	21
PS610324	2960	61.4	80	18
PS710909	2760	63.8	79	14
mean	3240	62.9	81	19
DRS 0.05	810	---	2	3

Data from Jim Krall, University of Wyoming.

Table 83. Grain yield of irrigated lentil varieties at the U-W Research and Extension Center at Torrington, WY in 2001.

Variety	Yield lbs/A
LC7601106E	2120
LC8602354T	2080
CDC Richlea	1980
LC7601086E	1910
LC8601817P	1810
LC7601080R	1790
LC460197L	1520
LC460212L	1510
LC8601787P	1370
LC460266B	1350
LC660829L	1040
LC7601599T	930
Mean	1620
DRS 0.05	480

Data from Jim Krall, University of Wyoming.

Table 84. Grain yield, seeds per oz and percent brown pods at harvest of irrigated chickpea varieties at the U-W Research and Extension Center at Torrington, WY in 2001.

Entry	Type	Yield lbs/A	Seeds per oz	% brown pods at harvest*
WY K203	Kabuli	3670	63	75
WY D202	Desi	3570	140	92
Sanford	Kabuli	3280	64	92
CA9783152C	Kabuli	3270	53	83
WY D201	Desi	3180	140	95
Dwelley	Kabuli	3070	59	94
Evans	Kabuli	3040	62	81
CA9783165C	Kabuli	3030	53	84
Mean		3260	79	87
DRS 0.05		NS	8	14

*used as an indicator of maturity.

Data from Jim Krall, University of Wyoming.

