

Dry Pea, Lentil, Chickpea and Winter Legume Breeding

2011 Progress Report



Prepared by
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Kendrick, WA
Fairfield, WA

PROGRESS REPORT COOL SEASON FOOD LEGUME BREEDING

The 2011 Pacific Northwest growing season started with a very wet and cool spring. Precipitation from 1 October 2010 to 1 May 2011 was 46.41 cm, which is about 20% greater than normal. Our planting dates were delayed about 2-3 weeks and planting conditions were not ideal. Summer time temperatures were moderate and it was very dry. During the 2010-2011 winter, there was above average snow fall and snow cover was adequate. Soil moisture levels were above normal going into the spring. High soil moisture levels coupled with the cool wet spring, resulted in less than optimal planting conditions. Although planting was delayed, harvest was only slightly delayed and the average number of days to flower and reach harvest maturity was less than normal. The moderate summer temperatures allowed good pollination, seed set and pod fill. Overall, seed size tended to be larger than normal and yields were very good.

Prior to planting, all seeds were treated with Maxim 4FS (0.9 oz/cwt), Apron XL LS (.61oz/cwt), Mertec LSP (3.0oz/cwt), Molybdenum (as sodium molybdate) (16g/cwt) and Cruiser (30ml/cwt). Weed control in the spring planted fields was accomplished using Sencor (6 oz/acre) and Lorox (1.25lbs/acre) applied post-plant, pre-emergence. We usually follow this application with a post-emergence application of Assure II (10 oz/acre), however the extremely wet spring did not allow this application in a timely fashion. Consequently, hand weeding was employed as needed. Weed control in the autumn planted trials was accomplished with Sencor (6 oz/acre) and Lorox (1.25lbs/acre) applied post plant, pre-emergence. A post-emergence application of Assure II (10 oz/acre) was used to control volunteer winter small grains. An additional spring application of Assure II (10 oz/acre) further controlled the volunteer small grains. Insecticides, Mustang (4 oz/acre) and Dimethoate (1 pt/acre), were applied as required to control aphids, pea leaf weevils and pea seed weevils.

PEA BREEDING

SPRING PEA YIELD TRIALS

In 2011, 20 advanced breeding lines and four check varieties (Aragorn, Ariel, Banner and Columbian) of green peas were evaluated in the advanced yield trials. The identical trials were planted at the Washington State University Spillman Farm (Pullman, WA), Fairfield, WA, Genesee, ID and Garfield, WA. Peas were not planted at Kendrick, ID due to the extremely wet soils. The site at the Spillman Farm had not had legumes planted on it for many years (>20). Neither the peas nor lentils were inoculated and in hindsight probably should have been. Mean yields at the four locations were: Fairfield 1802kg/ha; Genesee 2300kg/ha; Garfield 2828kg/ha and Spillman 2149kg/ha. 2011 was at least the third year of testing for ten of the lines and the first year of evaluation for three of the top ten lines. All the lines out-yielded Columbian and three of the advanced lines out-yielded Aragorn (usually the highest yielding check) by 8-10%. Seed size of the check lines ranged from 17.4 g/100 seeds (Ariel) to 20.4 g/100 seeds (Columbian). Seed size of the advanced lines ranged from 19.2 – 23.2 g/100 seeds. The earliest check to flower, Columbian, flowered in 50.7 days; the earliest breeding line (PS05100632) flowered in 50 days. Ariel, the earliest check to reach harvest maturity, matured in 87.7 days; three advanced lines (PS07100474, PS05100632 and PS08100094) and Aragorn all reached harvest maturity in 88.3 days.

Nine breeding lines and four check varieties (Universal, DS Admiral, Delta and Carousel) of yellow peas were evaluated in the yellow pea advanced yield trials. Identical trials were planted at the Washington State University Spillman Farm (Pullman, WA), Fairfield, WA, Garfield, WA and Genesee, ID. The mean yield at the four locations was: Pullman: 1763 kg/ha; Fairfield: 1736 kg/ha; Genesee: 2281 kg/ha and

Garfield: 3365 kg/ha. 2011 was the first year for evaluating six of the nine breeding lines. Three of the lines, PS07100925, PS08101108 and PS08101004 out-yielded Delta by at least 15% and were in the Advanced Yield Trials for the first year. Yields of the advanced lines ranged from 1983 kg/ha to 2707 kg/ha, the average yields of the check cultivars ranged from 2033 kg/ha (DS Admiral) to 2571 kg/ha (Universal). Seed size of the check varieties ranged from 20.7 g/100 seeds (Delta) to 23.3 g/100 seeds. Seed size of the advanced lines ranged from 21.8-24.7 g/100 seeds. Universal and PS08101109 were the earliest retained entries to flower (57 days). Delta reached harvest maturity in 89.3 days, PS08101109 reached harvest maturity in 90.7 days.

The 2011 preliminary yield trials were planted at the Spillman Farm. There were 31 entries and three checks in the green trial. Although 22 lines had greater yield than Aragorn, only two lines, PS09100029 and PS09100123, were significantly higher in yield than Aragorn. There was a great deal of non-uniformity in this trial (CV=18) and the LSD was very high. Seed weight among the retained green breeding lines ranged from 18.6-24.4 g/100 seeds compared with Aragorn, 19.7g/100 seeds and Banner, 19.4g/100 seeds. Stirling was the earliest check to flower (53.3 days) and Aragorn was the latest (58.7 days). The retained breeding lines ranged from 51.3 - 60.7 days.

The yellow preliminary yield trials had 20 entries and two checks (Universal and Carousel). The highest yielding breeding lines yielded over 30% more than did the higher yielding check (Universal), however the differences were not significant at 5%. The LSD was very high for this trial. Seed weight among the retained breeding lines ranged from 21.2 to 25.7 g/100 seeds compared to 21.3 g/100 seeds for Universal and 22.6 g/100 seeds for Carousel.

The breeding lines were evaluated for resistance to Fusarium wilt, Race 1 in Pullman, Washington and for resistance to Fusarium wilt Race 2 near Walla Walla, Washington. The Aphanomyces root rot nursery that we intended to plant at Kendrick was not planted due to the very wet spring. The breeding lines are being screened in pure culture in the greenhouse.

Potential product quality of the green pea breeding lines was assessed visually. All entries in the green pea advanced and preliminary yield trials were subjected to a simulated high temperature, high humidity bleach test.

2010-2011 COUNTER-SEASON

In October 2010, a counter season nursery and seed increase were planted in New Zealand. The nursery consisted of 84 segregating F_2 families. F_2 's were sent as this is the generation of greatest genetic diversity and is a generation in which the families are typically very large. F_2 plants within families were selected based on leaf type, vine type, powdery mildew resistance, seed color and seed shape. Plants were harvested as single plant selections and the resulting F_3 families were planted in the Spillman 2011 nursery. We also sent seed for increase. Approximately 120 lines of pre-breeder seed of three potential varieties, PS03101445, PS05100840 and PS03101822, was sent. We averaged a 28 fold increase. We also sent seed for increase of 23 advanced lines that had been screened for tolerance to Aphanomyces root rot in pure culture and in the field in Athena, Oregon. These lines were selected as having the best partial resistance to Aphanomyces root rot. Most of the returned lines will be used in further crossing, several will be advanced in the testing program.

PEA GERMLASM RELEASE

In March 2011, we released eight lines from a recombinant inbred line population that have very high levels of partial resistance to *Aphanomyces* root rot. These lines, PI660729 – PI660736, were screened in ten infested field nurseries over four years and four locations in the USA and France and in controlled conditions. The lines have reasonable agronomic characteristics and will be useful to breeders as an advanced starting point for incorporating resistance to *Aphanomyces* root rot into elite lines.

POTENTIAL SPRING VARIETY RELEASES

PS03101445 was identified in 2008 as a potential variety release. It is a semi-leafless spring green breeding line that has been tested in 26 location/years of yield trials. The data in Table 1 provide comparisons of the performance of PS03101445 with Columbian, Aragorn and Banner.

Table 1. Comparison of the performance of PS03101445 with three commercial varieties in 26 location/years.

Entry	FW R1	PM	PEMV	Leaf	Days to Flr	Days to Mat	Vine Length (cm)	Plnt Ht (cm)	Sd Wt (g/100sd)	Yield (kg/ha)
PS03101445	R	S	S	af	59	75	66	51	18.7	2019
Columbian	R	S	S	Af	48	76	101	36	18.7	1604
Aragorn	R	S	S	af	57	74	70	58	19.2	1900
Banner	S?	S	S	af	56	74	75	53	17.7	1899

PS03101822 was identified in 2008 as a potential variety release. It is a semi-leafless spring yellow pea breeding line. It has been evaluated in 30 location/years of yield trials. The data in Table 2 provide comparisons of the performance of PS03101822 with Carousel, Universal, DS Admiral and Delta.

Table 2. Comparison of the performance of PS03101822 with four commercial varieties in 30 location/years.

Entry	FW R1	PM	PEMV	Leaf	Days to Flr	Days to Mat	Vine Length (cm)	Plnt Ht (cm)	Sd Wt (g/100sd)	Yield (kg/ha)
PS03101822	R	S	S	af	55	87	58	47	22.3	2225
Carousel	S	S	S	af	56	90	69	61	21.5	2053
Universal		R	S	af	55	87	67	60	20.5	2225
DS Admiral	S	S	S	af	59	88	71	65	21.0	1905
Delta	R	R	S	af	57	87	59	54	20.2	1940

WINTER PEA YIELD TRIALS

2010-2011 was a very good year for the winter pea variety trials. Weed control was optimized and winter survival was excellent. The cool spring and moderate summer helped us realize very high yields.

The winter pea advanced yield trials were planted at Garfield, Pullman and Dayton, Washington. The Garfield trial was lost due to excessive flooding. Pullman and Dayton were harvested. As no early-maturing lines survived in 2009-2010, none were planted in 2010-2011. The mean seed yield at Dayton was 3124 kg/ha and at Pullman it was 5777 kg/ha. In Pullman, three breeding lines (PS0017018W, PS03100848W and PS0230F210) had yields in excess of 6000 kg/ha. Specter had the highest yield at Pullman (7076 kg/ha). In Dayton, the highest yielding breeding line was PS05300234W (5240 kg/ha) and the highest yielding check was Specter (4810 kg/ha). We also evaluated two varieties from France: Dove HR and Isard. Although their yields were very low, we are interested in them as a source of daylength sensitive genes that may allow us to improve the cold tolerance of the autumn sown peas.

WINTER PEA GERMPLASM RELEASE

PS03101269W was released as germplasm in September 2011. This pea has green cotyledons, a clear seed coat and a clear hilum. It is a food quality green pea. However, we felt its seed size was a little too small to be widely grown. Releasing it as germplasm will afford other breeders the opportunity to incorporate it into their breeding programs.

Agronomic Data for the Advanced Green Pea Yield Trial (1101)

Name	FW 1	PM	PEMV	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight
								..cm..	..cm..		..cm..	..cm..			..g..
PS05100736	R	R	R	59.7	94.0	17.0	2.0	42.1	35.9	0.93	58.4	49.1	0.85	4.5	23.1
PS05100735	R	R	R	59.3	94.0	17.6	2.0	41.1	35.9	0.95	56.0	48.5	0.89	3.6	23.0
Pro 081-7144				56.0	88.3	17.9	2.0	48.4	43.6	0.91	59.9	52.3	0.88	2.4	20.3
PS04100462	R	R	R	59.7	94.0	18.6	2.0	39.3	35.4	0.94	53.4	47.3	0.90	3.2	23.0
PS05100120	R	R	R	58.0	94.0	17.6	2.0	44.6	38.3	0.91	61.7	53.0	0.88	3.8	20.8
Pro 091-7142				56.3	88.3	17.9	2.0	52.8	43.5	0.84	65.3	56.6	0.87	2.7	19.2
Aragorn	R	S	S	56.7	88.3	17.9	2.0	46.9	41.6	0.91	61.4	52.9	0.87	3.8	19.4
PS06100490	R	S	S	57.3	90.7	17.4	2.0	44.2	35.4	0.90	56.5	48.4	0.87	3.5	22.6
PS05100840	R	R	S	61.3	96.7	19.4	2.0	43.3	35.7	0.84	63.3	50.7	0.80	3.9	20.8
PS06100542	R	R	S	57.3	90.0	17.5	2.0	45.5	35.1	0.77	60.4	48.5	0.80	3.7	21.9
PS06100760	R	R	S	59.3	94.0	18.7	2.0	37.9	35.5	1.01	50.9	47.9	0.97	3.4	20.1
PS07100470	R	R	S	58.7	90.0	18.4	2.0	42.6	38.5	0.89	53.7	48.6	0.92	2.8	21.3
PS07100471	R	R	S	59.0	94.0	19.0	2.0	45.6	40.2	1.08	60.4	53.7	1.03	3.7	21.6
PS08100582	R	R	S	59.7	94.0	19.9	2.0	43.9	37.3	0.91	56.6	51.4	0.93	3.8	21.8
PS08100678	R	R	R	57.3	94.0	17.8	2.0	51.7	40.6	0.82	65.8	52.7	0.80	4.0	23.2
PS07100474	R	S	S	57.7	88.3	19.4	2.0	42.0	34.3	0.89	53.0	41.7	0.79	3.2	21.3
PS05100632	R	R	S	50.0	88.3	15.5	2.0	44.7	37.2	1.00	58.8	55.0	0.94	4.5	19.2
Ariel	R	S	S	58.0	87.7	18.2	2.0	41.3	38.0	0.92	57.1	50.1	0.88	3.4	17.4
PS03101445	R	R	S	57.7	90.7	17.0	1.0	35.7	29.2	0.90	48.8	44.1	0.92	3.6	20.0
PS07100056	R	S	S	50.7	88.3	14.9	2.0	35.8	29.5	0.85	55.3	45.9	0.89	3.5	20.7
Banner	S	S	S	56.0	90.7	16.9	2.0	48.4	37.6	0.88	61.1	51.3	0.89	2.3	19.6
PS08100556	R	S	S	56.3	92.3	18.9	2.0	54.6	45.4	0.84	66.9	59.6	0.91	2.7	21.9
PS08100094	R	R	R	59.3	88.3	16.2	2.0	33.0	28.6	0.93	43.2	38.8	0.94	2.9	22.3
PS07100262	R	R	R	57.7	89.0	16.3	2.0	32.6	29.4	1.00	42.3	38.5	0.93	2.7	22.4
PS08100133	R	R	R	60.3	94.0	17.3	2.0	48.1	38.7	0.81	68.2	54.7	0.81	4.2	19.7
Columbian L1	R	S	S	50.7	91.7	11.4	1.0	34.6	18.4	0.53	78.7	44.9	0.57	4.9	20.4
GRAND MEAN				57.3	91.2	17.4	1.9	43.1	36.1	0.89	58.3	49.4	0.87	3.4	21.0
CV				1.4	2.1	5.9	5.8	6.6	9.0	9.93	6.3	7.8	6.63	17.0	2.7
LSD				1.1	2.6	1.4	0.1	3.9	4.4	0.12	5.1	5.3	0.08	0.8	0.7

FW 1 = Fusarium Wilt Race 1; R = resistant; S = susceptible. PM = Powdery Mildew; R = resistant; S = susceptible. PEMV = Pea Enation Mosaic Virus; R = resistant; S = susceptible, Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage. Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage. Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 09/28/10 Harvest Date: 08/11/11

Location Yield Summary for the Green Pea Advanced Yield Trial (1101)

Name	Leaf Type	Vine Type	Fairfield Seed Yield kg/ha	Genesee Seed Yield kg/ha	Garfield Seed Yield kg/ha	Pullman Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Aragon
PS05100735	-	-	2057	2522	2858	2023	2438	110
PS05100736	-	-	1940	2778	2959	2101	2433	110
PS08100582	-	-	2063	2693	3225	1656	2380	107
PS06100760	-	-	2118	2481	3216	1739	2357	106
PS05100120	-	-	2037	2408	2989	1898	2301	104
PS08100133	-	-	1951	2490	3165	1358	2268	102
PS07100470	-	-	1864	2438	2661	1720	2237	101
Aragorn	-	-	1990	2427	2593	1818	2209	100
PS07100471	-	-	2067	2329	3004	1692	2193	99
PS03101445	-	-	2002	2327	2778	1591	2190	99
PS08100094	-	-	1513	1977	3342	1363	2183	98
Pro 081-7144			1758	2348	2905	1958	2182	98
PS07100474	-	-	1770	2163	3230	1622	2170	98
PS04100462	-	-	2112	2140	2904	1902	2155	97
PS05100840	-	-	1765	2386	2811	1801	2147	97
PS08100678	-	-	2084	2263	2743	1626	2144	97
PS06100490	-	-	1670	2312	2252	1813	2118	95
Banner	-	-	1962	2215	2660	1563	2096	94
Ariel	-	-	1893	2200	2847	1600	2072	93
PS05100632	-	-	1339	2206	2587	1610	2043	92
Pro 091-7142			1576	2158	2555	1869	2042	92
PS06100542	-	-	1639	2043	2904	1744	2039	92
PS08100556	-	-	1134	2631	2359	1371	2028	91
PS07100056	-	-	1458	2227	2857	1566	2021	91
PS07100262	-	-	1554	1913	2760	1361	1861	84
Columbian L1	+	+	1535	1702	2366	878	1544	69

Leaf Type: + = normal leaf; - = afila or semi-leafless.

Vine Type: + = tall vine; - = short vine.

Yield data are means of three replications at each location.

Mean Yields of the Dry Green Pea Advanced Yield Trial, 2007-2011

Name	Leaf Type	Vine Type	2011	2010	2009	2008	2007
			kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
PS05100735	-	-	2438	1669	2071	1860	
PS05100736	-	-	2433	1746	2148	2023	
PS08100582	-	-	2380				
PS06100760	-	-	2357	1668	2322		
PS05100120	-	-	2301	1753	2130	2098	
PS08100133	-	-	2268				
PS07100470	-	-	2237	1797			
Aragorn	-	-	2209	1416	2024	1849	1999
PS07100471	-	-	2193	1760			
PS03101445	-	-	2190	1627	2157	1986	2136
PS08100094	-	-	2183				
Pro 081-7144			2182				
PS07100474	-	-	2170	1708			
PS04100462	-	-	2155	1629	2164	1800	1991
PS05100840	-	-	2147	1626	2271	2015	
PS08100678	-	-	2144				
PS06100490	-	-	2118	1774	2224		
Banner	-	-	2096	1587	1883	1959	1971
Ariel	-	-	2072	1474	1964	2043	1957
PS05100632	-	-	2043	1937	2187	2016	
Pro 091-7142			2042				
PS06100542	-	-	2039	1676	2063		
PS08100556	-	-	2028				
PS07100056	-	-	2021				
PS07100262	-	-	1861				
Columbian L1	+	+	1544	1254	1611	1604	2006
C.V.			11.6	11.3	11.4	11.2	10.6
LSD			264.	210.	175.	148.	126.

Leaf Type: + = normal leaf, - = afila or semi-leafless type.

Plant Type: + = tall plant type, - = short plant type.

Yield data are means of three reps per location, 4 locations per year.

Agronomic Data for the Advanced Yellow Pea Yield Trial (1102)

Name	FW 1	PM	PEMV	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight
								..cm..	..cm..		..cm..	..cm..			..g..
PS07100925	R	R	S	57.3	94.0	16.4	2	36.2	33.5	0.99	48.5	41.5	0.96	2.3	23.5
PS08101004	R	R	S	58.3	94.0	17.4	2	42.0	36.4	0.90	55.8	48.7	0.93	3.2	23.6
PS08101022	S	R	S	56.3	89.0	16.1	2	37.9	31.4	0.90	50.4	42.2	0.86	3.2	22.9
Pro-Prl-415	S	R	S	61.0	94.0	20.0	2	49.5	39.9	0.88	63.9	56.6	0.90	4.0	20.9
Universal	R/S	S	S	57.0	90.7	17.4	2	42.4	37.6	0.93	55.5	48.0	0.94	3.3	21.1
PS08101108	R	R	S	57.0	90.7	16.4	2	36.4	31.0	0.93	46.4	39.3	0.96	2.7	23.5
PS06101338	R	S	S	58.0	94.0	18.1	2	50.7	46.5	0.98	66.5	58.8	0.93	4.8	24.5
Pro 127-2				58.0	94.0	18.9	2	46.6	40.0	0.94	64.4	55.6	1.03	4.1	22.2
PS08101109	R	R	S	55.7	90.7	13.4	2	33.5	29.4	1.06	45.9	40.6	0.96	3.6	24.7
PS07100680	R	R	S	58.7	94.0	16.9	2	33.6	24.3	0.82	43.2	34.4	0.80	2.6	25.2
PS03101822	R	R	S	57.3	94.0	17.8	2	41.6	32.5	0.90	54.8	47.1	0.91	3.5	21.8
CAROUSEL	R	S	S	57.7	94.0	17.9	2	46.6	37.7	0.87	59.9	53.5	0.96	2.9	23.3
PS04100710	R/S	R/S	S	57.7	95.3	16.1	2	33.9	27.3	0.81	51.3	41.4	0.82	4.4	23.7
DS ADMIRAL	R	R	S	59.0	94.0	18.6	2	47.0	42.3	0.91	62.7	56.6	0.91	5.1	22.0
Delta	R	S	S	57.7	89.3	18.4	2	39.6	33.5	0.95	51.3	45.6	0.89	3.4	20.7
GRAND MEAN				57.7	92.7	17.3	2	41.1	34.8	0.92	54.7	47.3	0.92	3.5	22.9
CV				1.3	1.9	5.4	2	8.0	8.9	10.92	6.5	7.5	8.40	20.6	2.9
LSD				1.1	2.5	1.3	2	4.6	4.3	0.14	5.0	4.9	0.11	1.0	0.9

FW 1 = Fusarium Wilt Race 1; R = resistant; S = susceptible. PM = Powdery Mildew; R = resistant; S = susceptible. PEMV = Pea Enation Mosaic Virus; R = resistant; S = susceptible. Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage. Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage. Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/15/2011

Location Yield Summary for the Yellow Pea Advanced Yield Trial (1102)

Name	Leaf Type	Vine Type	Fairfield Seed Yield	Genesee Seed Yield	Garfield Seed Yield	Pullman Seed Yield	Mean Seed Yield	% of Delta
			kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	
PS07100925	-	-	1767	2619	3809	2258	2707	127
PS08101108	-	-	1809	2544	3455	1876	2585	121
Universal	-	-	1674	2809	3405	1978	2571	120
PS08101004	-	-	1910	2309	4233	2054	2452	115
Pro-Prl-415			1766	2882	3197	2013	2409	113
Pro 127-2			1584	2469	2758	1803	2404	112
PS08101022	-	-	1971	1797	3513	2042	2318	108
CAROUSEL	-	-	1979	2392	3686	1571	2252	105
PS07100680	-	-	1785	1992	3175	1628	2232	104
Delta	-	-	1534	2410	3156	1218	2130	100
PS03101822	-	-	1450	2178	3145	1581	2104	98
PS04100710	-	-	1526	1831	3030	1498	2059	96
PS06101338	-	-	1485	1850	2701	1819	2044	95
DS ADMIRAL	-	-	2119	2231	3388	1310	2033	95
PS08101109	-	-	1671	1887	3818	1785	1983	93
GRAND MEAN			1735	2280	3364	1762	2285	
CV			14	10	6	9	11	
LSD			505	347	293	235	285	

Leaf Type: + = normal leaf; - = afila or semi-leafless.

Vine Type: + = tall vine; - = short vine.

Yield data are means of three replications at each location.

Mean Yields of the Dry Yellow Pea Advanced Yield Trial, 2007-2011

Name	Leaf Type	Vine Type	2011	2010	2009	2008	2007
			kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
PS07100925	-	-	2707				
PS08101108	-	-	2585				
Universal	-	-	2571	1942	2124	2376	2110
PS08101004	-	-	2452				
Pro-Prl-415			2409	1531			
Pro 127-2			2404				
PS08101022	-	-	2318				
CAROUSEL	-	-	2252	1629	2192	2276	1419
PS07100680	-	-	2232				
Delta	-	-	2130	1568	1781	2252	1971
PS03101822	-	-	2104	2074	2319	2424	2206
PS04100710	-	-	2059	2085	2273	2062	2012
PS06101338	-	-	2044	1704	2071		
DS ADMIRAL	-	-	2033	1765	2053	2012	1660
PS08101109	-	-	1983				
C.V.			11.6	10.9	10.6	10.1	10.4
LSD			285.	220.	175.	145.	131.

Leaf Type: + = normal leaf, - = afile or semi-leafless type.

Plant Type: + = tall plant type, - = short plant type

Yield data are means of three reps per location, 4 locations per year.

Agronomic and Yield Data for the Preliminary Green Dry Pea Yield Trial (1103)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS09100029	60.7	95.3	17.2	2.0	44.3	36.7	0.98	63.1	55.7	0.93	5.1	22.2	2324	148
PS09100123	60.7	95.3	14.9	2.0	40.6	35.6	0.98	58.4	50.8	0.96	4.3	21.8	2193	139
PS09100035	59.0	94.0	17.6	2.0	54.9	47.1	0.89	75.3	65.3	0.89	5.2	22.9	2143	136
PS09100006	60.0	94.0	17.1	2.0	36.9	30.5	0.91	51.7	43.8	0.88	3.9	24.1	2127	135
PS09100034	60.0	94.0	17.4	2.0	53.5	46.5	0.90	69.6	62.4	0.94	3.4	21.5	2085	132
PS08100218	60.7	96.0	15.6	2.0	43.1	38.3	0.96	59.5	53.4	0.93	4.3	22.9	2066	131
PS09100052	61.0	94.0	18.7	2.0	56.2	50.5	0.91	69.1	60.7	0.95	3.2	21.6	1977	125
PS09100114	58.7	92.3	16.6	2.0	43.3	34.5	0.89	57.5	49.8	0.91	2.5	19.7	1971	125
PS08100888	58.7	94.0	16.8	2.0	45.8	38.0	0.92	63.0	55.4	0.92	3.6	21.1	1934	123
PS08100885	57.3	94.0	15.8	2.0	42.6	35.8	0.92	55.6	50.0	0.89	3.5	20.1	1826	116
PS08100655	52.0	90.7	14.3	2.0	41.2	33.8	1.17	57.5	51.8	0.95	4.3	21.1	1805	115
PS09100008	60.7	98.0	15.9	2.0	49.7	33.2	0.69	70.8	50.3	0.69	4.9	23.3	1797	114
PS08100090	60.0	94.0	19.6	2.0	58.0	44.4	0.79	74.2	57.3	0.86	5.0	20.8	1775	113
PS08100747	51.3	94.0	17.1	2.0	57.4	48.4	0.95	70.8	62.8	0.92	2.7	18.8	1745	111
PS08100709	57.3	94.0	16.6	2.0	47.9	39.4	0.88	63.1	55.5	0.87	3.3	22.9	1734	110
PS08100630	59.3	94.0	17.5	2.0	48.3	42.1	0.92	60.2	53.9	0.89	2.3	19.7	1725	109
PS09100136	52.0	90.7	13.2	2.0	36.3	27.3	0.84	54.7	42.5	0.78	4.5	21.3	1708	108
PS09100001	52.7	89.0	13.3	2.0	41.9	33.5	1.03	59.1	49.1	0.99	3.2	21.2	1705	108
PS09100012	60.7	94.0	16.0	2.0	42.3	34.1	0.83	59.9	49.5	0.95	3.3	23.8	1659	105
PS07100192	57.3	90.7	16.3	2.0	44.3	37.4	0.89	59.6	51.5	0.97	3.1	18.6	1641	104
PS08100193	60.3	95.3	16.3	2.0	41.9	35.7	0.89	60.0	52.1	0.94	4.6	16.3	1619	103
Banner	57.3	89.0	16.9	2.0	49.2	42.8	0.89	64.3	56.0	0.94	2.3	19.4	1610	102
PS08100467	59.7	90.7	15.4	2.0	44.3	38.3	0.86	53.3	46.3	0.86	3.0	24.2	1570	100
Aragorn	58.7	92.3	17.8	2.0	44.5	35.4	0.85	61.0	50.9	0.87	3.9	19.7	1569	100
PS08100827	52.7	94.7	14.1	2.0	41.1	35.4	0.93	69.8	60.9	0.91	6.5	24.4	1540	98
PS08100088	60.0	95.3	20.0	2.0	47.6	41.5	0.87	64.1	54.5	0.87	3.9	20.0	1539	98
PS09100014	57.7	89.0	16.8	2.0	52.3	44.2	0.91	66.3	59.7	0.96	2.6	23.6	1538	97
PS08100872	59.7	94.0	15.8	2.0	44.0	36.1	0.91	60.1	50.4	0.97	3.0	21.9	1499	95
PS08100763	58.7	94.0	17.0	2.0	49.3	41.0	1.02	60.7	52.5	0.99	2.4	19.4	1450	92

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Preliminary Green Dry Pea Yield Trial (1103)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS08100772	60.0	94.0	17.5	2.0	46.0	45.1	1.00	61.9	56.4	0.92	3.5	19.8	1450	92
Stirling	53.3	90.7	13.2	2.0	31.6	25.6	0.85	46.9	40.7	0.97	3.4	19.9	1404	89
PS08100743	51.3	89.0	14.4	2.0	44.7	36.9	0.94	61.6	55.5	0.91	3.7	17.1	1308	83
PS08100585	57.7	90.7	17.0	2.0	44.8	38.3	0.98	54.8	48.5	0.96	3.5	13.5	1199	76
PS08100659	52.7	94.0	14.7	2.0	39.8	35.5	1.05	53.4	49.5	1.01	3.6	20.9	1148	73
GRAND MEAN	57.6	93.0	16.3	1.9	45.5	38.2	0.92	61.5	53.1	0.92	3.6	20.8	1717	
CV	2.2	1.6	4.8	8.4	7.0	10.6	13.35	6.2	7.1	9.48	21.4	10.7	18	
LSD	1.7	2.1	1.0	0.2	4.4	5.5	0.17	5.2	5.2	0.12	1.0	3.0	607	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the New Zealand Preliminary Green Dry Pea Yield Trial (1103NZ)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100144	59.3	98.0	16.0	2.0	49.4	37.2	0.76	72.7	55.7	0.77	4.6	21.7	2196	132
PS10100318	58.3	98.0	19.6	2.0	52.4	42.1	0.80	79.6	62.5	0.78	5.3	22.7	1970	119
PS10100155	54.0	92.3	15.0	2.0	41.7	31.0	0.74	56.7	48.5	0.85	4.1	20.4	1953	118
PS10100323	61.0	98.0	19.7	2.0	53.7	49.5	0.92	75.1	69.0	0.91	4.7	23.8	1941	117
PS10100037	61.0	96.7	16.8	2.0	39.1	35.2	0.89	56.0	50.0	0.89	3.5	20.3	1929	116
PS10100039	59.3	94.0	16.5	2.0	38.9	33.4	0.85	56.5	47.5	0.84	4.0	20.4	1921	116
PS10100041	60.3	94.0	16.3	2.0	39.3	35.4	0.89	55.5	47.5	0.86	3.7	20.0	1892	114
PS10100146	60.7	92.3	18.2	2.0	53.5	39.5	0.74	71.5	58.2	0.82	2.4	25.7	1873	113
PS10100123	59.3	**.*	18.2	2.0	56.5	38.4	0.68	82.9	63.7	0.77	5.3	23.5	1830	110
PS10100575	53.3	94.0	14.9	2.0	35.3	27.8	0.79	53.2	44.9	0.85	4.6	21.3	1819	109
PS10100535	54.7	92.3	14.9	2.0	37.4	31.7	0.84	53.6	45.8	0.85	4.1	20.1	1791	108
PS10100119	59.7	95.3	15.0	2.0	45.8	34.8	0.76	69.1	51.7	0.75	3.9	23.9	1763	106
PS10100142	61.0	98.0	16.0	2.0	45.9	40.1	0.87	69.9	55.2	0.79	4.5	21.9	1715	103
PS10100401	59.7	92.3	19.4	2.0	43.1	37.1	0.86	58.8	50.9	0.87	3.5	21.6	1702	102
PS10100438	61.0	98.0	18.2	2.0	58.8	52.4	0.89	78.0	65.2	0.84	4.5	23.2	1661	100
Aragorn	58.3	94.0	17.3	2.0	42.0	33.3	0.79	62.0	54.2	0.87	4.6	20.6	1655	100
PS10100052	50.0	87.7	10.9	2.0	31.2	24.5	0.79	51.8	43.3	0.84	4.3	24.2	1603	96
PS10100005	58.3	96.7	16.0	2.0	39.2	33.4	0.86	55.1	45.8	0.83	4.3	22.0	1581	95
PS10100064	50.0	87.7	10.6	1.0	23.4	18.1	0.77	50.4	35.4	0.70	4.9	18.5	1526	92
PS10100508	64.0	92.3	15.3	2.0	38.7	30.0	0.78	57.6	46.1	0.81	4.6	24.4	1486	89
PS10100003	57.0	90.7	15.9	2.0	41.3	29.4	0.71	56.9	45.1	0.79	2.9	21.5	1466	88
PS10100094	50.7	95.3	12.9	2.0	38.8	26.3	0.69	57.8	42.0	0.74	4.8	22.2	1452	87
PS10100038	53.3	89.0	13.9	2.0	31.1	23.9	0.77	44.1	33.4	0.76	4.1	20.2	1442	87
PS10100057	50.0	88.3	12.5	2.0	38.5	30.5	0.80	59.2	48.3	0.81	3.4	23.8	1343	81
GRAND MEAN	57.2	93.9	15.8	1.9	42.3	33.9	0.80	61.8	50.4	0.82	4.2	22.0	1730	
CV	4.4	1.9	6.7	13.7	10.1	10.2	8.56	7.9	7.7	7.35	22.9	3.9	11	
LSD	3.4	2.5	1.4	0.3	5.8	4.7	0.09	6.7	5.3	0.08	1.3	1.1	404	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Yellow Dry Pea Preliminary Yield Trial (1104)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Carousel
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS08100940	57.3	94.0	15.4	2.0	45.3	39.0	1.09	60.0	53.9	1.04	3.3	25.7	2383	147
PS09100173	60.3	98.0	15.5	2.0	45.9	35.1	0.86	62.3	53.1	0.89	3.4	24.7	2170	134
PS09100175	60.3	98.0	17.8	2.0	40.8	39.1	0.93	56.6	50.8	0.90	3.2	25.4	2151	132
PS08101192	57.7	94.0	15.4	2.0	44.4	39.4	1.09	61.4	53.6	1.03	4.1	21.2	2005	123
PS08100950	60.0	95.3	16.6	2.0	39.7	35.9	0.96	51.7	46.9	0.98	3.1	25.5	2003	123
PS08101085	57.0	94.0	16.2	2.0	46.1	41.1	0.97	58.7	54.2	0.93	3.7	25.0	1981	122
PS08101021	60.7	93.0	15.9	2.0	38.5	34.8	1.01	55.3	49.3	1.02	4.4	22.2	1972	121
PS08100933	57.0	92.3	14.9	2.0	42.5	38.7	1.05	56.3	51.2	0.98	4.0	25.0	1954	120
PS08101069	58.3	94.0	14.5	2.0	44.9	38.7	1.00	54.0	49.7	0.99	2.6	24.4	1939	119
PS09100081	59.3	96.7	16.5	2.0	47.8	37.1	0.81	69.9	56.4	0.82	4.8	21.8	1934	119
PS08101066	56.7	90.7	14.5	2.0	37.0	30.7	1.00	49.8	44.4	0.96	2.7	24.2	1914	118
PS09100174	61.3	95.3	14.8	2.0	44.5	35.6	0.97	58.8	51.2	0.90	3.0	24.9	1894	117
Universal	56.7	90.7	15.6	2.0	46.8	41.0	1.12	60.0	55.0	1.00	2.4	21.3	1885	116
PS08101245	50.0	94.0	12.9	1.0	36.6	28.7	1.14	63.0	52.5	1.03	5.8	23.2	1810	111
PS08101268	60.7	94.0	18.8	2.0	60.0	49.9	1.11	74.7	64.2	1.05	3.8	19.6	1786	110
PS08101038	57.0	92.3	15.1	2.0	33.6	30.7	1.05	44.9	38.5	1.05	2.9	23.3	1781	110
PS08100963	58.7	94.0	18.3	2.0	51.1	43.1	0.98	63.0	54.1	0.96	3.0	21.9	1750	108
PS08100347	60.7	96.7	15.9	2.0	44.2	36.4	0.96	61.4	52.7	0.86	5.0	21.9	1748	108
PS08101212	61.0	95.3	17.5	2.0	47.5	42.6	1.04	62.5	56.0	0.95	4.0	21.8	1742	107
PS08101002	57.3	94.0	17.9	2.0	53.0	49.0	1.03	63.3	57.7	1.00	2.6	22.0	1718	106
PS08100930	57.3	92.3	15.5	2.0	48.4	42.3	0.99	59.4	53.4	1.01	2.8	23.4	1652	102
CAROUSEL	58.7	95.3	16.1	2.0	45.3	41.0	1.05	60.5	52.0	0.96	3.2	22.6	1618	100
GRAND MEAN	58.3	94.2	15.9	1.9	44.7	38.6	1.01	59.4	52.3	0.97	3.5	23.2	1899	
CV	1.0	2.0	7.3	9.1	10.1	11.3	12.36	9.4	9.6	7.13	21.6	4.8	13	
LSD	0.8	2.7	1.6	0.2	6.2	6.0	0.17	7.7	6.9	0.09	1.0	1.5	520	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Green Dry Pea Observation Nursery (1105G)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100412	58.0	101.0	15.8	2.0	40.3	34.0	0.99	66.50	58.50	0.95	6.3	21.7	2200	224
PS10100031	63.0	97.0	15.8	2.0	30.8	27.3	0.90	48.80	33.50	0.69	4.5	22.0	2166	221
PS10100569	58.0	93.0	15.8	2.0	41.8	19.5	0.47	67.00	34.80	0.52	5.0	21.1	1991	203
PS10100530	58.0	95.0	15.0	2.0	41.0	34.8	1.17	57.80	49.30	1.08	3.0	22.7	1933	197
PS10100131	58.0	95.0	18.3	2.0	49.0	42.3	0.87	67.30	61.30	0.93	3.8	22.2	1901	194
PS10100085	58.0	95.0	17.0	2.0	40.8	21.0	0.51	58.80	37.80	0.64	5.0	24.4	1887	192
PS10100145	63.0	99.0	19.0	2.0	66.0	59.0	0.91	90.30	77.80	0.86	5.3	25.6	1884	192
PS10100089	58.0	91.0	16.3	2.0	48.5	27.5	0.57	55.30	40.00	0.72	2.8	23.6	1879	192
PS10100409	57.0	95.0	16.8	2.0	46.8	23.5	0.50	69.30	39.50	0.57	6.0	21.9	1861	190
PS10100004	63.0	98.0	17.3	2.0	41.0	36.0	0.97	51.90	47.50	0.95	2.8	21.9	1851	189
PS10100416	57.0	95.0	16.5	2.0	44.5	23.8	0.53	57.50	40.30	0.70	4.8	20.5	1849	189
PS10100406	54.0	84.0	17.3	1.0	53.3	45.5	1.12	81.80	70.30	1.10	5.8	19.5	1849	188
PS10100577	58.0	95.0	15.3	2.0	33.3	22.0	0.66	45.30	40.00	0.98	2.8	20.0	1834	187
PS10100380	58.0	95.0	17.5	2.0	52.5	27.8	0.53	72.50	48.80	0.67	6.5	27.9	1825	186
PS10100379	63.0	97.0	15.5	2.0	43.0	28.5	0.66	72.80	47.30	0.65	7.8	26.0	1822	186
PS10100071	58.0	91.0	16.8	2.0	55.0	30.3	0.55	67.50	41.00	0.61	2.5	24.3	1820	186
PS10100079	63.0	93.0	16.3	1.0	40.3	32.0	0.79	53.30	46.00	0.86	2.5	21.4	1820	185
PS10100171	58.0	93.0	18.3	2.0	47.3	36.8	0.79	58.50	46.50	0.79	3.5	19.8	1820	185
PS10100093	58.0	95.0	16.3	2.0	40.5	19.5	0.48	62.00	37.80	0.61	5.3	21.1	1819	185
PS10100563	58.0	97.0	17.0	2.0	38.8	31.3	1.19	56.00	44.50	1.07	4.0	23.5	1812	185
PS10100012	58.0	98.0	15.8	2.0	33.8	30.8	1.06	51.00	44.30	0.97	5.0	22.3	1808	184
PS10100343	63.0	97.0	18.0	2.0	52.5	42.5	0.81	79.30	60.50	0.76	6.3	21.2	1797	183
PS10100200	63.0	101.0	17.5	2.0	52.8	38.5	0.73	75.50	57.50	0.76	5.5	32.2	1789	182
PS10100178	57.0	91.0	16.0	2.0	42.8	35.3	0.84	60.80	48.80	0.80	3.8	22.1	1787	182
PS10100149	58.0	95.0	17.3	2.0	54.3	30.3	0.56	71.00	48.30	0.68	4.5	16.7	1780	181
PS10100515	57.0	91.0	15.3	2.0	35.3	30.3	1.06	47.50	43.00	1.09	2.5	23.5	1778	181
PS10100092	58.0	91.0	15.3	2.0	41.3	29.0	0.70	54.50	37.50	0.69	3.3	20.9	1775	181
PS10100360	58.0	95.0	15.8	2.0	44.5	19.0	0.43	63.30	38.30	0.61	5.5	20.4	1763	180

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Green Dry Pea Observation Nursery (1105G)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100222	58.0	99.0	16.3	2.0	48.3	29.8	0.62	67.80	47.30	0.70	5.8	20.2	1761	179
PS10100498	58.0	99.0	17.8	2.0	37.8	34.3	0.96	60.50	54.00	0.92	4.0	21.5	1760	179
PS10100355	63.0	97.0	17.3	2.0	49.5	29.8	0.60	67.30	53.50	0.79	5.5	20.3	1751	178
PS10100362	58.0	93.0	16.3	2.0	50.0	30.0	0.60	63.00	46.00	0.73	3.0	18.6	1749	178
PS10100161	58.0	99.0	17.0	2.0	39.3	26.3	0.67	57.30	37.50	0.65	4.8	26.8	1745	178
PS10100558	59.0	95.0	15.8	2.0	44.5	33.3	0.98	67.00	55.30	0.83	5.0	21.2	1700	173
PS10100010	58.0	98.0	16.8	2.0	42.0	32.0	0.78	56.00	53.00	0.99	3.8	22.1	1694	173
PS10100377	58.0	95.0	16.5	2.0	45.5	41.5	0.98	60.50	53.00	0.96	3.0	22.1	1692	172
PS10100158	63.0	99.0	16.5	2.0	41.0	32.5	0.79	64.50	54.50	0.84	7.8	19.6	1684	172
PS10100270	56.0	97.0	14.8	1.0	32.8	21.0	0.64	57.30	42.30	0.74	6.8	21.8	1675	171
PS10100227	63.0	99.0	17.0	2.0	48.0	34.3	0.71	66.80	57.80	0.88	5.8	23.6	1657	169
PS10100143	63.0	97.0	19.8	2.0	53.3	48.0	0.94	67.00	60.00	0.90	5.5	21.0	1648	168
PS10100370	57.0	93.0	18.3	2.0	45.3	35.5	0.78	61.50	50.30	0.82	4.5	21.2	1634	166
PS10100040	57.0	91.0	17.0	2.0	38.3	35.3	0.97	47.00	41.30	0.89	2.5	20.6	1626	166
PS10100264	58.0	97.0	16.8	2.0	44.3	28.3	0.64	60.30	48.80	0.82	4.0	20.1	1609	164
PS10100055	63.0	91.0	16.8	1.0	47.8	38.3	1.21	51.80	43.50	1.19	1.5	19.5	1594	162
PS10100159	63.0	99.0	18.3	2.0	41.5	30.8	0.74	58.00	49.30	0.85	4.8	23.3	1587	162
PS10100522	56.0	93.0	16.0	2.0	39.0	24.3	0.62	53.80	35.50	0.66	3.0	23.3	1584	161
PS10100505	58.0	91.0	16.0	2.0	42.8	35.5	0.97	55.80	44.30	0.99	2.8	21.5	1580	161
PS10100007	58.0	98.0	14.8	2.0	31.8	26.8	0.97	40.40	39.50	1.16	2.3	21.2	1574	160
PS10100139	63.0	93.0	16.3	2.0	43.8	38.0	1.14	59.80	52.80	1.06	5.0	16.2	1573	160
PS10100121	58.0	91.0	17.8	2.0	40.8	26.5	0.65	51.30	37.50	0.73	2.8	19.1	1570	160
PS10100069	58.0	91.0	15.8	2.0	42.8	33.3	0.78	64.00	46.80	0.73	3.8	19.2	1568	160
PS10100016	58.0	97.0	14.5	2.0	33.0	20.3	0.62	51.00	34.30	0.67	5.3	22.4	1556	159
PS10100305	63.0	99.0	16.8	1.0	47.3	33.0	0.70	66.80	59.50	0.89	5.8	24.1	1542	157
PS10100148	63.0	97.0	16.0	2.0	39.0	36.7	0.97	57.50	53.50	1.03	4.5	23.3	1535	156
PS10100506	57.0	91.0	14.0	2.0	40.8	33.3	1.13	56.30	48.30	1.01	4.3	22.2	1526	155
PS10100032	58.0	97.0	16.3	2.0	34.5	20.3	0.59	44.50	39.50	0.91	2.8	20.5	1521	155

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Green Dry Pea Observation Nursery (1105G)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100125	55.0	95.0	14.5	2.0	37.8	25.5	0.67	64.00	46.80	0.73	5.5	23.5	1518	155
PS10100344	63.0	99.0	17.5	2.0	48.8	38.5	0.79	73.00	64.00	0.88	5.3	22.3	1512	154
PS10100184	58.0	93.0	17.0	2.0	41.5	30.3	0.73	55.30	44.50	0.85	3.3	21.0	1493	152
PS10100070	58.0	91.0	16.3	2.0	47.5	37.0	0.78	61.00	47.30	0.78	2.3	18.5	1491	152
PS10100035	63.0	99.0	16.0	2.0	41.0	35.8	0.92	51.30	45.80	0.95	3.3	19.9	1486	151
PS10100578	58.0	91.0	15.3	1.0	41.5	21.5	0.52	52.50	35.30	0.67	2.5	19.6	1482	151
PS10100507	57.0	86.0	14.3	2.0	31.5	26.8	1.18	40.00	33.50	1.19	2.0	21.3	1479	151
PS10100381	58.0	86.0	17.0	2.0	46.3	32.5	0.70	64.50	52.50	0.81	5.5	23.3	1478	151
PS10100099	58.0	93.0	15.0	2.0	41.5	25.0	0.60	54.80	43.80	0.80	3.0	23.0	1477	150
PS10100368	55.0	91.0	16.5	2.0	39.5	28.3	0.72	53.30	42.30	0.79	4.0	20.9	1474	150
PS10100319	58.0	95.0	17.5	2.0	45.5	42.3	0.98	74.00	64.30	1.02	5.8	17.7	1473	150
PS10100106	58.0	91.0	15.0	2.0	34.8	26.5	0.76	44.30	38.30	0.88	3.0	20.9	1472	150
PS10100187	58.0	95.0	18.3	2.0	47.5	39.8	0.84	63.80	52.50	0.89	3.5	23.8	1471	150
PS10100219	63.0	95.0	17.5	2.0	44.0	35.0	0.83	57.00	51.50	0.97	3.3	19.2	1469	150
PS10100051	57.0	91.0	14.5	2.0	32.8	30.8	0.95	43.80	36.80	0.86	2.3	23.3	1460	149
PS10100127	57.0	91.0	14.0	2.0	36.5	31.8	0.87	53.50	45.30	0.90	3.5	22.5	1456	148
PS10100135	58.0	99.0	17.0	1.0	47.3	30.8	0.65	68.30	50.30	0.74	5.3	24.0	1451	148
PS10100325	58.0	93.0	16.8	2.0	42.0	33.0	0.79	67.00	58.80	0.91	6.0	19.6	1446	147
PS10100263	63.0	97.0	16.5	2.0	42.0	33.8	0.88	61.30	47.80	0.91	5.0	18.3	1444	147
PS10100205	58.0	93.0	17.3	2.0	44.0	37.3	0.85	54.80	49.50	0.90	3.8	21.4	1429	146
PS10100280	58.0	93.0	17.0	2.0	36.8	28.0	0.76	55.30	44.00	0.87	3.5	21.3	1427	145
PS10100514	57.0	91.0	15.3	2.0	37.0	30.3	0.82	51.00	40.50	0.79	2.5	25.3	1420	145
PS10100081	58.0	95.0	15.8	1.0	38.3	18.0	0.40	47.50	27.80	0.59	3.5	25.1	1403	143
PS10100162	58.0	99.0	15.8	2.0	37.3	18.3	0.49	55.80	44.50	0.80	5.3	28.4	1400	143
PS10100307	63.0	95.0	18.3	2.0	50.3	26.0	0.52	66.80	49.30	0.74	4.8	22.2	1400	143
PS10100350	63.0	95.0	15.5	2.0	30.8	23.5	0.76	44.00	36.50	0.96	3.3	18.2	1386	141
PS10100036	63.0	91.0	14.8	2.0	36.3	31.8	1.06	45.30	37.80	1.06	2.5	21.1	1380	141
PS10100561	58.0	95.0	16.0	1.0	35.3	27.3	0.80	49.30	41.80	0.85	3.0	25.6	1376	140

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Green Dry Pea Observation Nursery (1105G)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100113	58.0	93.0	16.0	1.0	39.0	32.0	0.82	45.80	38.00	0.93	2.0	19.9	1352	138
PS10100192	58.0	93.0	17.3	2.0	42.8	33.0	0.83	53.00	47.80	0.90	3.5	20.5	1335	136
PS10100295	58.0	95.0	19.5	2.0	63.0	35.8	0.57	78.80	54.80	0.70	3.3	19.7	1330	135
PS10100194	58.0	91.0	16.5	2.0	37.3	29.8	0.80	51.30	45.30	1.05	2.8	20.0	1326	135
PS10100244	58.0	95.0	16.8	2.0	43.5	27.8	0.64	59.00	50.00	0.86	4.0	20.5	1295	132
PS10100191	58.0	91.0	18.0	2.0	39.8	30.8	0.77	48.80	42.00	0.93	2.3	21.7	1282	131
PS10100006	63.0	98.0	14.8	2.0	36.5	32.3	0.88	53.10	50.30	0.96	4.5	23.2	1268	129
PS10100288	58.0	97.0	17.3	1.0	43.5	30.0	0.71	55.00	42.30	0.80	3.5	22.1	1258	128
PS10100058	57.0	91.0	16.5	2.0	45.8	43.3	1.02	56.00	50.30	0.99	2.3	19.4	1241	126
PS10100015	57.0	100.0	17.5	2.0	63.3	19.5	0.31	**.**	45.50	0.41	6.3	26.5	1228	125
PS10100126	57.0	93.0	14.3	2.0	34.5	25.5	0.74	46.80	38.30	0.82	3.8	20.3	1219	124
PS10100483	58.0	99.0	16.3	2.0	33.0	29.8	1.04	55.50	45.30	1.00	4.8	30.6	1198	122
PS10100009	57.0	98.0	16.0	2.0	34.5	27.0	0.78	47.80	40.00	0.84	2.8	21.3	1170	119
PS10100387	54.0	82.0	13.5	2.0	29.3	23.8	0.88	38.30	30.50	1.02	1.8	18.4	1170	119
PS10100539	58.0	95.0	13.0	2.0	35.3	30.5	0.98	52.00	43.30	0.83	3.0	22.6	1152	117
PS10100553	58.0	95.0	14.8	1.0	41.5	32.0	0.77	56.00	41.50	0.74	2.8	21.9	1145	117
PS10100292	58.0	95.0	17.5	2.0	41.5	21.8	0.53	63.50	46.00	0.72	5.0	23.1	1129	115
PS10100269	63.0	99.0	15.8	2.0	48.3	29.8	0.62	66.50	46.00	0.69	4.0	25.4	1119	114
PS10100441	56.0	99.0	14.3	2.0	32.3	25.8	1.09	50.50	41.00	1.10	5.0	18.9	1118	114
PS10100300	58.0	99.0	19.5	2.0	58.5	28.3	0.48	96.30	54.00	0.56	5.3	20.2	1083	110
PS10100245	63.0	97.0	15.5	2.0	47.3	32.3	0.68	72.30	58.50	0.89	6.8	25.5	1078	110
PS10100198	63.0	95.0	18.0	2.0	50.0	34.5	0.69	60.80	47.80	0.79	3.3	22.3	1071	109
PS10100221	63.0	99.0	17.8	2.0	47.8	36.3	0.76	68.80	47.30	0.69	5.0	17.5	1071	109
PS10100047	49.0	86.0	14.3	2.0	30.0	26.3	0.88	37.30	32.00	0.91	1.8	23.1	1069	109
PS10100109	56.0	91.0	15.3	1.0	33.3	29.5	0.91	41.80	36.00	0.86	2.5	18.5	1063	108
PS10100562	58.0	97.0	14.8	1.0	41.5	25.0	0.60	56.00	40.80	0.59	2.8	26.6	1032	105
PS10100199	58.0	91.0	18.8	2.0	55.3	48.5	0.67	66.30	57.00	0.96	2.0	21.7	1015	103
PS10100549	57.0	93.0	15.8	2.0	38.5	19.8	0.38	55.00	38.80	0.71	2.5	32.0	982	100

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Green Dry Pea Observation Nursery (1105G)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Aragorn
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100571	58.0	91.0	16.0	2.0	43.0	21.8	0.44	55.00	32.50	0.59	1.5	18.1	980	100
Aragorn	56.0	86.0	16.3	2.0	40.0	36.0	0.90	43.80	43.80	1.00	2.0	17.9	978	100
PS10100314	58.0	91.0	17.5	2.0	40.5	40.0	1.00	54.50	46.80	0.86	4.0	19.2	925	94
PS10100294	57.0	93.0	17.0	2.0	46.0	37.5	0.74	52.00	47.80	0.92	2.8	22.7	900	92
PS10100570	58.0	97.0	14.8	2.0	33.3	19.5	0.59	52.30	33.50	0.64	5.0	23.2	881	90
PS10100111	58.0	91.0	15.5	1.0	29.0	27.0	1.02	36.00	33.00	0.96	2.0	19.7	845	86
PS10100398	63.0	95.0	15.8	2.0	53.0	16.8	0.37	61.80	27.30	0.44	5.0	21.2	842	86
PS10100552	58.0	95.0	16.0	1.0	32.3	24.8	0.77	49.30	36.50	0.74	3.5	30.8	840	85
PS10100311	58.0	91.0	18.5	2.0	45.8	29.0	0.63	60.80	50.80	0.84	4.5	16.9	833	85
PS10100045	55.0	91.0	15.0	2.0	25.0	17.0	0.83	35.30	31.30	0.94	3.5	16.9	809	82
PS10100116	51.0	86.0	11.3	2.0	22.3	17.5	0.78	33.80	31.00	0.99	3.3	20.0	551	56
GRAND MEAN	58.7	94.3	16.3	1.8	42.0	30.4	0.77	58.08	45.51	0.84	3.9	21.8	1469	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic and Yield Data for the Yellow Dry Pea Observation Nursery (1105Y)

Name	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Carousel
					..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS10100567	66.0	98.0	17.0	2.0	35.0	30.3	0.89	52.0	43.3	0.89	3.0	19.0	1868	233
PS10100503	60.0	102.0	14.8	1.0	28.8	24.5	1.03	44.3	35.8	1.24	2.8	22.8	1663	208
PS10100430	61.0	96.0	16.8	2.0	35.8	30.3	1.02	55.8	42.3	0.76	3.3	19.9	1573	197
PS10100474	58.0	98.0	19.0	2.0	75.5	46.0	0.61	97.5	68.3	0.70	4.3	26.2	1573	196
PS10100510	59.0	94.0	15.8	2.0	32.5	25.0	0.77	45.8	34.3	0.80	2.3	24.0	1571	196
PS10100329	66.0	98.0	17.3	2.0	40.3	30.5	0.58	56.5	43.8	0.64	3.5	18.1	1550	194
PS10100207	61.0	96.0	17.5	2.0	39.8	34.3	1.04	62.0	45.8	1.00	5.0	24.5	1496	187
PS10100538	66.0	96.0	17.8	2.0	35.3	28.3	0.83	56.8	42.3	0.74	3.0	20.5	1335	167
PS10100513	57.0	96.0	14.8	1.0	32.5	25.8	0.61	41.5	38.5	0.93	2.8	21.4	1304	163
PS10100504	60.0	91.0	14.8	2.0	27.5	24.8	0.81	38.5	35.0	1.10	2.5	19.1	1298	162
PS10100363	66.0	100.0	17.5	2.0	45.5	30.3	0.50	70.0	39.8	0.57	4.8	17.1	1151	144
PS10100576	60.0	96.0	13.3	2.0	31.5	27.5	0.87	46.0	43.3	0.97	2.8	25.1	1123	140
PS10100509	60.0	94.0	13.3	1.0	29.8	25.3	0.95	46.0	35.5	1.14	2.8	22.8	1049	131
PS10100512	59.0	94.0	13.8	2.0	32.8	25.3	0.77	41.3	36.5	0.88	2.5	23.6	1018	127
PS10100502	60.0	89.0	15.8	1.0	30.5	25.0	0.83	44.0	33.0	0.75	2.5	22.0	995	124
PS10100427	58.0	98.0	14.8	2.0	40.5	27.3	0.67	58.5	42.8	0.73	5.3	20.4	860	107
CAROUSEL	60.0	94.0	16.0	1.0	30.5	24.5	1.12	42.3	33.5	1.23	3.3	20.9	798	100
PS10100516	58.0	94.0	13.3	2.0	27.8	21.5	0.86	38.8	30.5	0.87	3.5	22.7	345	43
GRAND MEAN	60.8	95.7	15.7	1.7	36.2	28.1	0.82	52.0	40.2	0.89	3.3	21.6	1254	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/19/2011

Agronomic Data for the Advanced Winter Pea Yield Trial (1122)

Name	FW 1	PM	PEMV	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight
								..cm..	..cm..		..cm..	..cm..			..g..
Specter	R	S	S	255	309.0	16.9	2.0	87.1	21.9	0.26	181.9	73.8	0.41	9.7	14.2
PS0017018W	R	S	S	251	313.0	18.4	2.0	113.9	14.6	0.14	213.9	54.8	0.27	10.1	14.1
PS0230F210	R	S	S	254	315.0	16.9	2.0	81.3	16.0	0.21	175.4	53.3	0.31	9.4	16.1
Windham	R	S	S	254	307.0	15.4	2.0	48.5	18.6	0.38	87.4	57.0	0.66	8.4	15.5
PS03100848W	R	S	R/S	252	315.0	17.2	2.0	112.1	15.9	0.14	196.7	50.3	0.26	8.4	16.9
Granger	R	S	S	252	308.3	16.3	2.0	98.3	16.7	0.17	178.8	55.4	0.31	8.9	15.1
PS05300234W	R	S	S	248	312.3	13.0	2.0	36.4	22.7	0.63	83.9	58.1	0.70	8.2	18.6
PS06300048W				257	313.0	18.1	2.0	92.9	16.0	0.17	169.4	64.3	0.38	9.7	13.5
PS03101269W	R	S	S	260	313.0	18.6	2.0	115.5	20.3	0.18	201.4	67.7	0.34	9.3	17.0
PS03101160W	R	S	S	253	310.3	15.2	2.0	42.8	14.5	0.35	95.3	41.1	0.43	8.2	15.6
PS06300008W				259	315.0	18.2	2.0	105.4	17.9	0.18	199.7	65.0	0.33	10.3	14.8
PS05300180W	R	S	S	256	315.0	15.9	2.0	42.6	19.5	0.46	98.4	61.2	0.62	9.5	16.0
PS0230F092	R	S	S	254	313.0	17.5	2.0	41.3	23.2	0.57	82.8	56.0	0.69	8.8	14.9
PS06300064W				258	315.0	19.1	2.0	94.2	21.8	0.24	175.2	70.2	0.40	9.8	13.4
DOVE HR				245	293.0	14.3	2.0	34.4	19.1	0.55	85.9	69.9	0.82	8.7	
ISARD				245	291.0	11.2	2.0	23.2	13.6	0.53	52.5	50.0	0.96	6.9	
GRAND MEAN				253	309.8	16.3	1.9	73.1	18.2	0.32	142.4	59.2	0.49	9.0	15.4
CV				1	0.7	9.7	15.4	21.9	25.9	28.19	12.7	17.4	18.76	14.0	3.7
LSD				4	3.2	2.2	0.4	22.2	6.5	0.13	25.2	14.3	0.13	1.7	0.9

FW 1 = Fusarium Wilt Race 1; R = resistant; S = susceptible. PM = Powdery Mildew; R = resistant; S = susceptible. PEMV = Pea Enation Mosaic Virus; R = resistant; S = susceptible, Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage. Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage. Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 09/28/2011 Harvest Date: 08/15/2011

Location Yield Summary for the Winter Pea Advanced Yield Trial (1122)

Name	Dayton Seed Yield	Pullman Seed Yield	Mean Seed Yield	% of Windham
	kg/ha	kg/ha	kg/ha	
Specter	4810	7076	5943	116
PS05300234W	5240	5877	5559	108
Windham	3897	6324	5111	100
PS0017018W	3338	6750	5044	98
PS03100848W	3363	6280	4822	94
PS05300180W	4333	5141	4737	92
Granger	3377	6071	4724	92
PS0230F210	2564	6414	4489	87
PS06300048W	2768	5727	4247	83
PS06300008W	3000	5334	4167	81
PS03101269W	2553	5694	4124	80
PS03101160W	2299	5506	3902	76
PS0230F092	2579	4540	3559	69
PS06300064W	2792	4145	3469	67
DOVE HR	1687	----	1687	33
ISARD	1384	----	1384	27
GRAND MEAN	3124	5777	4089	
CV	32	16	23	
LSD	1706	1569	945	

Yield data are means of three replications at each location.

Agronomic and Yield Data for the Winter Dry Pea Preliminary Yield Trial (1123)

Name	Leaf Type	Vine Type	FW 1	PM	PEMV	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	# Repr Nodes	100 Seed Weight	Seed Yield	% of Windham
										..cm..	..cm..		..cm..	..cm..			..g..	kg/ha	
PS07300169W	+/-	+				254.7	313.7	17.1	2.0	77.4	4.9	0.0	175.7	15.5	0.1	11.6	13.5	8863	129
Windham	-	-	R	S	S	256.7	307.7	17.1	2.0	41.0	6.3	0.1	96.5	21.0	0.2	10.1	14.6	6832	100
Specter	-	+	R	S	S	254.7	309.0	18.3	2.0	93.2	9.8	0.1	185.7	29.1	0.1	11.8	12.6	6786	99
PS07300150W	-	+				258.0	311.7	18.5	2.0	83.7	12.8	0.1	174.3	54.6	0.3	9.8	14.8	6168	90
PS07300047W	-	-		R	S	258.7	319.7	17.7	2.0	45.0			110.8			14.0	13.6	5821	85
Melrose	+	+	S	S	S	261.3	313.0	20.4	2.0	103.4	5.8	0.0	197.9	17.4	0.0	12.4	10.8	5565	81
PS07300054W	-	-				260.0	315.0	18.1	2.0	54.3			115.1			10.8	15.9	5319	77
PS07300045W	-	-		R	S	254.3	317.3	16.3	4.0	36.3			83.1			10.7	14.0	4707	68
PS07300178W	-	-		R	S	255.7	315.0	16.1	2.0	37.8			90.3			11.4	15.0	3835	56
PS07300028W	-	+				264.7	315.0	19.4	2.0	75.3			157.9			10.5	11.6	1666	24
GRAND MEAN						257.8	313.7	17.9	2.1	64.7	3.9	0.0	138.7	13.7	0.0	11.3	13.6	5556	
CV						1.0	0.8	7.2	44.5	12.9	193.5	210.1	8.2	184.0	196.0	12.8	10.6	12	
LSD						4.5	4.5	2.2	1.6	14.3	13.1	0.2	19.7	43.4	0.3	2.4	2.4	963	

Leaf Type: + = normal leaf; - = afila or semi-leafless. Vine Type: + = tall vine; - = short vine.

FW 1 = Fusarium Wilt Race 1; R = resistant; S = susceptible. PM = Powdery Mildew; R = resistant; S = susceptible. PEMV = Pea Enation Mosaic Virus; R = resistant; S = susceptible.

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 09/28/2010 Harvest Date: 08/16/2011

Agronomic and Yield Data for the Winter Dry Pea Observation Nursery (1125)

Name	Leaf Type	Vine Type	FW 1	PM	PEMV	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	# Repr Nodes	100 Seed Weight ..g..	Seed Yield kg/ha	% of Windham
PS07300092W	-	-				258.0	307.0	19.3	2.0	79.3	32.0	0.40	147.3	50.0	0.30	8.3	16.9	5647	152
PS07300059W	-	-				258.0	309.0	18.5	2.0	87.8	16.3	0.20	147.3	63.3	0.40	8.5	15.2	5345	144
PS09300004W						256.0	307.0	17.8	1.0	49.3	17.3	0.40	97.5	45.5	0.50	7.0	14.8	5154	139
PS07300058W	-	-			R	258.0	315.0	21.5	2.0	100.5			186.8			10.5	16.0	5121	138
PS10300129W						253.0	309.0	15.5	2.0	67.8			148.5			8.5	14.8	5054	136
PS07300047W	-	-			R	255.0	307.0	17.8	2.0	45.0	26.5	0.60	88.3	53.3	0.60	7.5	15.3	4910	133
PS09300067W						260.0	309.0	19.5	2.0	85.8	12.3	0.10	170.0	30.8	0.20	12.0	17.0	4835	130
PS10300004W						255.0	309.0	16.8	2.0	76.3			169.8			9.8	14.6	4713	127
PS07300076W	-	-				255.0	309.0	19.3	2.0	117.8	13.8	0.10	207.3	61.3	0.30	10.8	14.6	4698	127
PS09300120W						251.0	307.0	18.3	2.0	84.8	14.0	0.20	143.5	60.0	0.40	7.8	17.8	4555	123
PS09300095W						248.0	307.0	17.3	2.0	76.0	23.8	0.30	138.5	77.8	0.60	7.0	16.2	4546	123
PS09300097W						255.0	305.0	17.3	2.0	59.3	22.8	0.40	131.5	69.0	0.50	8.0	13.3	4499	121
PS09300123W						258.0	309.0	16.0	2.0	68.5			135.5			15.0	15.8	4472	121
PS10300127W						258.0	309.0	20.3	2.0	121.3			179.5			7.8	13.8	4417	119
PS09300129W						253.0	309.0	21.5	2.0	82.5			150.3			11.3	12.2	4415	119
PS09300128W						256.0	309.0	20.0	2.0	99.0			188.3			11.5	12.2	4360	118
PS07300116W	-	+				253.0	307.0	16.5	2.0	90.5	21.8	0.20	181.5	69.5	0.40	9.5	16.8	4227	114
PS10300117W						256.0	307.0	19.3	2.0	107.0	21.0	0.20	158.5	59.8	0.40	6.5	14.1	4149	112
PS09300073W						260.0	315.0	21.8	2.0	61.5			184.5			16.0	16.1	4106	111
PS09300104W						258.0	307.0	16.3	2.0	45.5			84.3			6.8	17.0	4087	110
PS09300122W						258.0	309.0	19.8	2.0	68.8	15.0	0.20	144.8	39.8	0.30	9.5	15.7	4075	110
PS07300124W	-	-			R	256.0	293.0	16.5	2.0	58.8	18.0	0.30	97.0	48.0	0.50	3.8	13.1	4063	110
PS10300094W						258.0	309.0	17.5	2.0	73.0			157.5			10.3	12.6	3954	107
PS10300031W						256.0	307.0	16.5	2.0	96.0	19.0	0.20	163.5	53.0	0.30	7.0	15.7	3931	106
PS10300135W						262.0	302.0	18.3	2.0	51.5	11.8	0.20	77.3	40.3	0.50	4.3	14.2	3891	105
PS06300024W	-	-				246.0	293.0	14.3	2.0	44.3	17.3	0.40	81.0	56.5	0.70	8.0	18.1	3798	102
Windham	-	-			S	253.0	293.0	13.5	2.0	44.0	23.3	0.50	75.5	59.0	0.80	8.5	15.7	3691	100

Leaf Type: + = normal leaf; - = afile or semi-leafless. Vine Type: + = tall vine; - = short vine.

FW 1 = Fusarium Wilt Race 1: R = resistant; S = susceptible; PM = Powdery Mildew: R = resistant; S = susceptible; PEMV = Pea Enation Mosaic Virus: R = resistant; S = susceptible.

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Planting Date: 09/28/2010 Harvest Date: 08/10/2011

Agronomic and Yield Data for the Winter Dry Pea Observation Nursery (1125)

Name	Leaf Type	Vine Type	FW 1	PM	PEMV	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	# Repr Nodes	100 Seed Weight ..g..	Seed Yield kg/ha	% of Windham
PS09300121W						258.0	309.0	17.0	2.0	66.8			154.3			9.8	15.3	3605	97
PS10300014W						262.0	309.0	17.5	2.0	52.5			75.0			6.8	16.5	3590	97
PS09300077W						258.0	307.0	19.8	2.0	83.8	18.5	0.20	158.0	48.3	0.30	7.8	13.1	3459	93
PS09300098W						251.0	307.0	19.3	2.0	85.8	25.0	0.30	162.8	66.0	0.40	11.0	15.7	3440	93
PS10300102W						260.0	309.0	21.8	2.0	110.8			163.5			8.8	13.6	3308	89
PS10300028W						256.0	307.0	17.8	2.0	105.5	16.8	0.20	153.8	41.0	0.30	4.5	16.8	3275	88
PS09300003W						255.0	309.0	20.0	2.0	99.5	16.0	0.20	159.3	43.8	0.30	7.0	16.6	3268	88
PS09300107W						251.0	309.0	14.0	2.0	59.8			126.8			10.0	14.6	3255	88
PS09300090W						256.0	309.0	18.0	2.0	76.3			160.8			10.0	12.4	3176	86
PS09300127W						246.0	309.0	16.8	2.0	98.5			173.3			8.8	14.3	3054	82
PS07300042W	-	-				252.0	302.0	18.3	2.0	46.3	22.8	0.50	116.3	68.5	0.60	7.0	15.1	3018	81
PS10300025W						255.0	307.0	15.8	2.0	35.5	29.3	0.80	68.8	60.8	0.90	9.3	16.3	3003	81
Specter	-	+		S		258.0	293.0	17.5	2.0	80.3	21.5	0.30	159.8	66.5	0.40	9.0	12.9	2766	74
PS10300067W						255.0	309.0	17.0	2.0	64.8			132.5			9.3	16.2	2693	72
PS06300132W	-	-				246.0	309.0	16.5	2.0	28.5	15.8	0.60	72.5	59.5	0.80	7.5	18.0	2679	72
PS07300125W	-	-				255.0	295.0	16.0	2.0	40.5	20.8	0.50	73.8	59.0	0.80	5.0	16.6	2579	69
PS06300028W	-	-				256.0	315.0	17.5	2.0	43.0			98.8			11.0	20.8	2250	60
PS07300136W	-	-				260.0	307.0	18.0	2.0	39.0	32.5	0.80	68.5	59.5	0.90	6.5	18.6	1772	48
PS06300060W	-	-				253.0	309.0	15.3	2.0	26.0	10.5	0.40	91.8	29.3	0.30	10.3	21.0	1059	28
GRAND MEAN						255.3	306.7	17.8	1.8	71.4	12.1	0.20	134.9	33.5	0.30	8.7	15.5	3825	

Leaf Type: + = normal leaf; - = afile or semi-leafless. Vine Type: + = tall vine; - = short vine.

FW 1 = Fusarium Wilt Race 1: R = resistant; S = susceptible; PM = Powdery Mildew: R = resistant; S = susceptible; PEMV = Pea Enation Mosaic Virus: R = resistant; S = susceptible.

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Repr Nodes = average number of reproductive nodes on a plant. Planting Date: 09/28/2010 Harvest Date: 08/10/2011

LENTIL BREEDING

SPRING LENTIL YIELD TRIALS

In 2011, identical advanced lentil yield trials were planted at Pullman, WA, Garfield, WA and Fairfield, WA. Due to the extremely late, wet spring, only the Pardina and Laird Advanced Yield Trials were planted at Kendrick, ID. Yields were very low at Kendrick. The green seed coat, yellow cotyledon market classes were divided into three groups: Eston Types: smallest seed size (mean seed size = 3.9g/100 seeds); Richlea Types: medium seed size (mean seed size = 6.0g/100 seeds); and Laird Types: large seed size (Mean seed size = 7.3g/100 seeds. Pardina Types have small seeds (mean seed size = 4.5g/100 seeds) with yellow cotyledons and brown seed coats. The Turkish Red Types have small seeds (mean seed size = 4.0g/100 seeds) with red/orange cotyledons and brown seed coats. The Zero Tannin Types have medium-large seeds (mean seed size = 5.3g/100 seeds) with any color cotyledon and clear seed coats.

The 2011 Eston Type advanced yield trial had eight entries and two checks, Essex and Eston. The mean yield at Pullman was 1244kg/ha, the mean yield at Garfield was 1462kg/ha and the mean yield at Fairfield was 1405kg/ha. Essex was overall the highest yielding entry. However, there was no significant difference between Essex and the three highest yielding breeding lines (LC08600005E, LC09600054E and LC01602273E). At Garfield, there were no significant differences between the yields of any entry. LC0860005E and LC01605573E were also the best performers in the 2010 trials. The seed size of LCX0860005E and LC0160557E, 4.9 and 3.4 g/100 seeds, respectively, compares with that of Essex (4.4 g/100 seeds) and Eston (3.3 g/100 seeds). The plant height, lodging and maturity of these two breeding lines are similar to Essex and Eston.

The Richlea advanced yield trial had six entries and three checks, Richlea, Brewer and Merrit. The average yield at Pullman was 1459kg/ha, at Garfield mean yield was 1486kg/ha and at Fairfield average yield was 1655kg/ha. The breeding line LC01602300R had the highest yield (1804kg/ha) across all locations in 2011. This was 9% greater than Richlea. LC01602300R has performed well in previous years and performed very well in the Washington and Idaho state wide trials. It is slightly taller (38.7cm) than Richlea (37.4cm) at harvest and had similar days to maturity. Its seed size is 5.9g/100 seeds, compared to Richlea's 5.3g/100 seeds. Pre-breeder seed has been made of LC01602300R.

The Laird advanced yield trial had 16 entries and four checks, Pennell, Merrit, Riveland and Brewer. One entry, LC07600233e, was persistent green: when it dried down, the foliage remained green and the seeds were a very bright green color. This trial was planted at Kendrick. The average yields were: Pullman: 1364kg/ha; Garfield: 1311kg/ha; Fairfield: 1407kg/ha and Kendrick: 636kg/ha. The yield of most of the breeding lines was greater than Pennell, the highest yielding check. Three breeding lines, LC07600376L, LC07600536L and LC07600541L had yields that were significantly greater ($P=.05$) than Pennell. They yielded 24-37% more than Pennell. The three lines had seed size (7.0-7.2g/100 seeds) significantly greater than Pennell (6.7g/100 seeds). They were also taller at harvest (34.6cm to 35.9cm) than Pennell (32.5cm) and had plant height index equivalent to Pennell. The breeding objectives of this class of lentils include improving seed shape to minimize seed damage during harvest and processing.

The Pardina class of lentils was also planted at Kendrick in 2011. Seed yields at Kendrick were very low. Mean yield at Pullman was 1479kg/ha, 1389kg/ha at Garfield, 1560kg/ha at Fairfield and 483kg/ha at Kendrick. Three sister lines, LC08600116P, LC08600113P and CL0860115P, were the top yielders in

2011. They also were very high yielding in 2010. LC08600113P had an average yield of 1455kg/ha and LC08600116P had an average yield of 1435 kg/ha. This is 20% and 18%, respectively, greater than Pardina. The plant height of the two lines (30.7cm and 35.9cm, respectively) is also greater than Pardina (28.3cm) and not significantly different from Morena (31.7cm). Seed sizes are: LC08600113P is 4.6g/100 seeds and LC08600116P is 5.1g/100 seeds. Morena has seed size 4.0g/100 seeds and Pardina has seed size 4.2g/100 seeds. Pre breeder seed was made in 2011 of LC08600116P and LC08600113P. Breeding objectives of this class of lentils continues to include improved height and standability and increased yield.

The Turkish Red advanced yield trials contained 16 entries and one check, Crimson. The average seed yields were: Pullman: 1333kg/ha; Garfield: 1523kg/ha; and Fairfield: 1205kg/ha. There was considerable variation in the Turkish Red trials. The CV's were high (16-21%) and the LSDs high. Although most of the breeding lines out-yielded Crimson, none were significantly better. All the retained breeding lines had seed size (3.7-5.0g/100 seeds) significantly greater than Crimson (3.4g/100 seeds). Additionally, they were taller at harvest (28.5-33.0cm) than Crimson (27.6cm) and had similar standability scores (>0.92). We will continue to make improvements in yield and maintain taller, erect plant architecture.

The 2011 Zero Tannin advanced yield trials had six entries and two checks, Shasta and Cedar. One entry, LC99602585RZ has red cotyledons, the other five have yellow cotyledons. Average yields were Pullman: 1475kg/ha; Garfield: 1416kg/ha and Fairfield: 1724kg/ha. Across all locations, LC06600939YZ had the highest yield, 1735kg/ha, which was 19% greater than Cedar. The zero tannin lentils have relatively large seed size (average = 5.3g/100 seeds in 2011). The 2011 seed size of LC06600939YZ was 5.2g/100 seeds, compared to 5.6g/100 seeds for Shasta (the yellow check variety). The zero tannin lentils tend to be tall (average height at maturity was 34cm) and have good lodging tolerance. They tend to be late maturing (average days to harvest = 104.2) and the pods tend to drop and shatter more readily than other lentil classes. Consequently, the primary breeding objectives for this class is to make them earlier maturing and to decrease the tendency for pod drop and shatter.

Potential Variety Releases

LC01602300R has been a top performer in the medium seeded green lentil advanced trials for four years. It has a seed size similar to Richlea (approximately 5g/100 seeds) and has yielded an average of 1320 kg/ha over 13 location years of advanced trials. This represents a yield increase of approximately 10% over Richlea (Table 3.). Pre-breeder seed was made in 2010 and increased in 2011. We will propose this breeding line for release.

Entry	Canopy Ht (cm)	Days to Mat	Plant Ht Index	Seed Size (g/100 sds)	Yield (kg/ha)
LC01602300R	34.4	97.5	0.95	4.9	1319
Richlea	33.4	96.5	0.91	5.2	1197

WINTER LENTIL YIELD TRIALS

Advanced yield trials for the fall-sown, winter-hardy lentils included seven lines and the check variety Morton. All breeding lines and Morton are Turkish Red types. The trials were planted in Pullman, Garfield and Dayton. Garfield was lost due to excessive standing water. Yields were high at both harvested locations. Average seed yield in Dayton was 1807kg/ha and 4714kg/ha in Pullman. Morton was the highest yielding entry in Pullman (5823kg/ha) and LC05600004WT was the highest yielding in Dayton (2170kg/ha). Across both locations, LC03600232WT was the highest yielding breeding line. Its yield (2558kg/ha) was not significantly different from Morton (3842kg/ha). LC03600232WT has been evaluated for 12 locations and it has consistently yielded 90-92% of Morton. It has an oval shape that is characteristic of Turkish Red lentils compared to the flattened seed shape of Morton. It has a larger seed size (3.5g/100 seeds) than does Morton (3.2g/100 seeds). These seed shape and size characteristics of LC03600232WT may make it an acceptable lentil for decorticating and polishing prior to marketing.

The breeding objectives for the autumn-sown lentils include improved winter hardiness, increased yield and especially development of additional market classes. We have identified lines with seed characteristics that would place them in the Eston and Richlea market classes. They will be in the preliminary yield trials 2011-2012.

Agronomic Data for the Eston Lentil Type Advanced Yield Trial (1151E)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight
				..cm..	..cm..		..cm..	..cm..		..g..
Essex	55.7	101.0	2.0	17.7	13.4	0.79	38.8	34.4	0.9	4.4
LC08600005E	57.7	101.0	2.0	17.4	12.7	0.71	37.3	30.6	0.9	4.9
LC01602273E	58.0	98.0	2.0	14.3	10.9	0.97	34.1	29.6	0.9	3.4
LC09600066E	52.0	101.0	2.0	15.4	11.4	0.87	32.2	27.6	1.0	3.5
LC09600020E	50.7	98.0	2.0	13.8	10.4	0.83	31.9	26.5	1.0	3.6
LC09600054E	54.7	99.0	2.0	14.8	11.3	0.77	31.8	27.9	0.9	3.8
LC09600021E	52.0	101.0	2.0	13.7	11.0	0.93	30.0	26.5	1.0	3.9
LC09600018E	52.0	100.0	2.0	14.9	10.2	0.75	31.4	27.9	0.9	4.3
Eston	56.0	101.0	2.0	14.2	10.5	0.72	32.1	28.1	0.9	3.3
LC09600065E	52.0	97.0	2.0	15.3	11.4	0.86	32.5	28.6	1.0	4.3
GRAND MEAN	54.0	99.7	1.9	15.1	11.3	0.82	33.2	28.7	0.9	3.9
CV	4.9	2.1	9.2	11.3	12.7	21.62	5.9	5.3	8.9	6.9
LSD	5.6	4.4	0.3	3.5	2.9	0.37	4.0	3.2	0.1	0.5

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/22/2011

Location Yield Summary for the Eston Type Lentil Advanced Yield Trial (1151E)

Name	Pullman Seed Yield kg/ha	Garfield Seed Yield kg/ha	Fairfield Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Eston kg/ha
Essex	1512	1494	1956		1654	128
LC08600005E	1400	1478	1845		1574	121
LC09600054E	1232	1601	1518		1450	112
LC01602273E	1320	1474	1492		1429	110
LC09600066E	1314	1450	1387		1384	107
LC09600020E	1266	1420	1319		1335	103
Eston	1100	1460	1314		1291	100
LC09600018E	1158	1289	1424		1290	99
LC09600021E	1195	1350	1263		1269	98
LC09600065E	945	1603	531		1027	79
GRAND MEAN	1244	1462	1405		1370	
CV	10	20	10		14	
LSD	271	621	305		257	

Kendrick was not planted for 2011.
Yield data are means of three replications at each location.

Mean Yields of the Eston Type Lentil Advanced Yield Trial, 2007-2011

Name	2011	2010	2009	2008	2007
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
Essex	1654	1554		1160	1515
LC08600005E	1574	1622			
LC09600054E	1450				
LC01602273E	1429	1676	1271	999.	1629
LC09600066E	1384				
LC09600020E	1335				
Eston	1291	1350	1143	954.	1348
LC09600018E	1290				
LC09600021E	1269				
LC09600065E	1027				
C.V.	14.9	11.1	10.9	10.5	10.4
LSD	257.	152.	119.	95.1	85.4

Agronomic Data for the Pardina Type Advanced Yield Trial (1151P)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..
Pardina	51.3	96.0	2.0	14.5			28.3			4.2
LC08600116P	56.0	101.0	2.0	20.3			35.9			5.1
LC09600507P	55.3	97.0	2.0	15.0			29.3			4.5
LC08600114P	48.7	97.0	2.0	13.1			31.4			5.4
Morena	54.3	101.0	2.0	12.5			31.7			4.0
LC08600113P	52.7	99.0	2.0	16.7			30.7			4.6
LC08600115P	54.7	101.0	2.0	15.9			33.3			4.8
LC09600014P	50.7	97.0	2.0	14.9			28.4			4.1
LC08600109P	51.3	96.0	2.0	13.1			30.9			4.5
LC09600508P	49.3	97.0	2.0	14.4			29.2			5.2
LC09600003P	55.3	97.0	2.0	10.5			26.7			4.0
GRAND MEAN	52.7	98.1	1.9	14.6			30.5			4.5
CV	3.4	1.5	8.8	16.7			9.9			6.0
LSD	2.5	2.1	0.3	3.4			4.2			0.3

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Agronomic data are means of three replications at Pullman, WA.
Planting Date: 04/20/2010. Harvest Date: 8/21/2011.
Data not collected for canopy height and pod height maturity. Plant height index and pod height index cannot be calculated.

Location Yield Summary for the Pardina Type Lentil Advanced Yield Trial (1151P)

Name	Pullman Seed Yield kg/ha	Garfield Seed Yield kg/ha	Fairfield Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Pardina kg/ha
LC08600116P	1695	1748	1672	624	1435	118
LC08600113P	1532	1667	1660	637	1374	113
LC08600115P	1520	1489	1880	604	1373	113
LC09600507P	1573	1423	1707	575	1319	108
LC08600109P	1341	1476	1540	536	1223	100
LC08600114P	1536	1370	1572	407	1221	100
Pardina	1721	1237	1519	378	1214	100
Morena	1534	1295	1457	497	1196	98
LC09600508P	1249	1406	1546	400	1150	94
LC09600014P	1377	1140	1352	409	1069	88
LC09600003P	1189	1029	1261	249	932	76
GRAND MEAN	1479	1389	1560	483	1228	
CV	10	10	15	18	13	
LSD	311	293	485	187	175	

Farmington was not planted for 2011.
Yield data are means of three replications at each location.
Check variety = Pardina

Mean Yields of the Pardina Type Lentil Advanced Yield Trial, 2007-2011

Name	2011	2010	2009	2008	2007
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
LC08600116P	1435	1494			
LC08600113P	1374	1721			
LC08600115P	1373	1455			
LC09600507P	1319				
LC08600109P	1223	1542			
LC08600114P	1221	1598			
Pardina	1214	1399	1443	943.	1370
Morena	1196	1477	1507	1146	1439
LC09600508P	1150				
LC09600014P	1069				
LC09600003P	932.				
C.V.	13.3	13.1	12.3	12.1	11.9
LSD	175.	168.	129.	108.	96.0

Agronomic Data for the Turkish Red Type Advanced Yield Trial (1151T)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight
				..cm..	..cm..		..cm..	..cm..		..g..
LC09600037T	56.0	100.0	2.0	14.2	11.0	1.01	36.1	31.3	1.01	4.3
LC09600532T	50.7	100.0	2.0	14.2	10.4	0.98	31.6	28.5	0.98	4.6
LC09600142T	53.3	99.0	2.0	13.3	9.5	0.91	33.7	29.5	0.91	4.6
LC09600545T	52.7	100.0	2.0	11.9	7.9	1.00	32.0	28.4	1.00	3.7
LC08600132T	52.0	99.0	2.0	14.0	9.4	0.96	31.5	28.6	0.96	4.3
LC05600043T	52.7	99.0	2.0	16.6	10.6	0.89	36.4	31.5	0.89	4.6
LC09600148T	56.7	101.0	2.0	14.3	10.5	0.98	36.6	33.0	0.98	4.1
LC08600185T	53.3	100.0	2.0	13.7	9.3	0.99	33.2	30.0	0.99	4.4
LC01602062T	51.3	101.0	2.0	12.7	8.4	0.95	35.1	31.9	0.95	5.0
LC0860B098T	50.7	100.0	2.0	12.4	9.2	0.92	33.4	29.8	0.92	3.8
Crimson	58.3	100.0	2.0	13.3	10.9	0.92	32.0	27.6	0.92	3.4
LC09600598T	54.0	101.0	2.0	10.1	7.5	1.02	33.8	30.8	1.02	4.1
LC09600033T	55.3	99.0	2.0	13.9	10.5	1.03	36.9	32.0	1.03	4.0
LC0860B085T	50.7	99.0	2.0	11.9	10.2	1.05	33.4	29.6	1.05	4.9
LC09600113T	53.3	101.0	2.0	12.0	9.2	0.98	30.7	28.5	0.98	4.0
LC09600095T	56.0	101.0	2.0	9.7	7.7	1.11	32.8	29.0	1.11	2.8
LC09600093T	56.7	102.0	2.0	12.2	10.4	1.05	34.1	31.3	1.05	2.8
GRAND MEAN	53.7	100.1	1.9	12.9	9.5	0.98	33.7	30.0	0.98	4.0
CV	2.9	1.6	7.0	12.1	17.0	7.47	4.7	6.0	7.47	4.6
LSD	2.1	2.3	0.1	2.1	2.2	0.10	2.1	2.5	0.10	0.2

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/21/2011

Location Yield Summary for the Turkish Red Type Lentil Advanced Yield Trial (1151T)

Name	Pullman Seed Yield kg/ha	Garfield Seed Yield kg/ha	Fairfield Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Crimson kg/ha
LC08600132T	1520	1732	1377		1543	116
LC05600043T	1399	1892	1330		1540	115
LC09600037T	1775	1556	1278		1536	115
LC09600532T	1681	1598	1318		1532	115
LC09600545T	1546	1690	1293		1510	113
LC09600142T	1567	1538	1087		1397	105
LC0860B098T	1304	1547	1304		1385	104
LC0860B085T	1204	1512	1438		1384	104
LC08600185T	1360	1500	1284		1381	103
LC01602062T	1307	1503	1257		1355	101
LC09600033T	1254	1847	949		1350	101
LC09600148T	1360	1520	1158		1346	101
Crimson	1291	1461	1238		1330	100
LC09600113T	1130	1241	1274		1215	91
LC09600095T	1034	1227	1099		1120	84
LC09600598T	1271	1346	699		1105	83
LC09600093T	657	1178	1107		981	73
GRAND MEAN	1333	1523	1205		1354	
CV	16	17	21		18	
LSD	445	518	516		306	

Kendrick was not planted for 2011.

Yield data are means of three replications at each location.

Mean Yields of the Turkish Red Type Lentil Advanced Yield Trial, 2007-2011

Name	2011	2010	2009	2008	2007
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
LC08600132T	1543	1165			
LC05600043T	1540	1271	1199	693.	1343
LC09600037T	1536				
LC09600532T	1532				
LC09600545T	1510				
LC09600142T	1397				
LC0860B098T	1385	1283			
LC0860B085T	1384	1159			
LC08600185T	1381	1098			
LC01602062T	1355	1312	1328	934.	1789
LC09600033T	1350				
LC09600148T	1346				
Crimson	1330	1214	1099	613.	1046
LC09600113T	1215				
LC09600095T	1120				
LC09600598T	1105				
LC09600093T	981.				
C.V.	18.2	21.8	19.8	18.5	18.5
LSD	306.	274.	200.	155.	140.

Agronomic Data for the Laird Type Lentil Advanced Yield Trial (1152L)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight
				..cm..	..cm..		..cm..	..cm..		..g..
LC07600376L	60.3	102.0	2.0	25.2	19.7	0.83	39.8	34.6	0.93	7.1
LC07600536L	57.3	102.0	2.0	20.2	16.0	0.87	39.3	35.2	1.03	7.2
Pennell	59.3	100.0	2.0	21.1	17.9	0.89	36.1	32.5	0.95	6.7
LC07600541L	57.7	101.0	2.0	22.6	18.3	0.83	41.8	35.9	0.95	7.0
LC07600545L	55.3	100.0	2.0	18.1	15.0	0.95	38.9	34.1	1.00	7.6
LC0860B130L	54.7	101.0	2.0	18.1	13.8	0.89	39.9	36.8	0.99	7.6
LC0860B123L	58.0	102.0	2.0	22.3	18.2	0.88	40.7	36.6	1.07	9.6
LC06600517L	56.0	98.0	2.0	22.4	18.5	0.85	40.4	38.1	0.97	6.6
Riveland	54.0	101.0	2.0	19.7	16.4	0.86	42.3	38.0	0.98	7.7
LC07600524L	56.3	102.0	2.0	18.5	14.9	0.87	37.2	34.5	1.00	7.3
LC0860B132L	54.7	102.0	2.0	19.1	14.2	0.81	42.8	38.5	0.94	7.5
LC06601388L	54.0	101.0	2.0	21.9	14.8	0.68	40.7	35.3	0.96	7.3
LC07600559L	55.3	102.0	2.0	20.6	15.0	0.90	43.0	38.6	0.97	7.5
LC06601734L	56.7	101.0	2.0	20.6	12.8	0.62	41.9	37.6	0.96	7.6
Merrit	50.0	99.0	2.0	18.9	14.3	0.82	39.4	34.2	0.91	6.7
LC0860B133L	53.3	102.0	2.0	18.5	14.9	0.95	41.3	38.4	1.02	7.4
LC07600517L	53.3	99.0	2.0	18.2	14.4	0.84	36.8	33.3	0.99	6.7
LC07600233e	54.7	101.0	2.0	19.1	14.6	0.84	42.4	38.8	1.04	6.4
LC06600839L	56.0	102.0	2.0	18.0	14.2	0.85	39.6	35.2	1.02	8.2
Brewer	49.3	97.0	2.0	19.0	13.3	0.72	34.4	31.8	0.95	6.5
GRAND MEAN	55.3	100.8	1.9	20.1	15.5	0.84	39.9	35.9	0.98	7.3
CV	2.3	0.7	6.5	9.8	11.8	13.49	3.8	4.2	7.83	3.6
LSD	1.8	1.1	0.1	2.7	2.5	0.16	2.1	2.0	0.11	0.3

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/21/2011

Location Yield Summary for the Laird Type Lentil Advanced Yield Trial (1152L)

Name	Pullman Seed Yield kg/ha	Garfield Seed Yield kg/ha	Fairfield Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Merrit kg/ha
LC07600376L	1609	1744	1953	611	1479	135
LC07600536L	1591	1646	1597	736	1392	127
LC07600541L	1522	1438	1715	770	1361	124
LC07600545L	1449	1238	1781	643	1278	117
LC07600559L	1327	1277	1645	725	1244	113
LC06601734L	1325	1536	1532	500	1223	112
LC07600524L	1375	1382	1482	654	1223	112
LC07600517L	1233	1341	1497	716	1197	109
LC0860B130L	1444	1262	1394	673	1193	109
LC06600517L	1419	1391	1297	659	1191	109
Pennell	1543	1346	1176	631	1174	107
LC0860B123L	1432	1253	1226	765	1169	107
LC0860B132L	1374	1236	1250	774	1158	106
LC06601388L	1340	1161	1406	699	1152	105
LC0860B133L	1288	1307	1452	533	1145	104
Merrit	1318	1216	1131	699	1091	100
Riveland	1392	1090	1227	470	1045	95
LC06600839L	1101	1204	1388	380	1018	93
LC07600233e	1141	1040	934	634	937	85
Brewer	1058	1123	1066	446	923	84
GRAND MEAN	1364	1311	1407	636	1180	
CV	9	12	13	23	13	
LSD	247	327	381	298	170	

Yield data are means of three replications at each location.

Mean Yields of the Large Yellow Type Lentil Advanced Yield Trial, 2007-2011

Name	2011	2010	2009	2008	2007
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
LC07600376L	1479	1712			
LC07600536L	1392	1643			
LC07600541L	1361				
LC07600545L	1278	1607			
LC07600559L	1243	1741			
LC06601734L	1223	1905	1457		
LC07600524L	1223	1682			
LC07600517L	1197	1644			
LC0860B130L	1193				
LC06600517L	1191	1790	1484		
Pennell	1174				1422
LC0860B123L	1169				
LC0860B132L	1158				
LC06601388L	1152	1630	1455		
LC0860B133L	1145				
Merrit	1091	1757	1432	991.	1542
Riveland	1045	1717	1261	1078	1725
LC06600839L	1018	1793	1365		
LC07600233e	937.				
Brewer	923.	1586	1291		1554
C.V.	13.5	16.0	15.0	13.8	13.0
LSD	170.	211.	162.	127.	109.

Agronomic Data for the Richlea Type Lentil Advanced Yield Trial (1152R)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..
LC07600151R	55.7	101.0			15.8			37.3		5.9
LC01602300R	57.0	99.0			13.6			38.7		4.9
LC06601616R	56.3	103.0			14.7			41.4		6.4
Richlea	57.0	100.0			14.7			37.4		5.3
LC07600586R	57.3	103.0			17.7			38.2		6.3
LC07600553R	56.7	101.0			13.8			33.0		5.9
Brewer	50.7	98.0			13.2			33.4		6.3
LC07600591R	54.7	101.0			11.3			35.0		6.1
Merrit	52.0	100.0			13.8			35.2		6.9
GRAND MEAN	55.2	100.7			14.2			36.6		5.9
CV	2.0	1.1			11.2			4.7		3.1
LSD	1.5	1.6			2.3			2.4		0.2

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the green plant height at the green pod stage.

Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/21/2011

Data was not collected for vine length, pod height and pods per peduncle. Plant height index and pod height cannot be calculated.

Location Yield Summary for the Richlea Type Lentil Advanced Yield Trial (1152R)

Name	Pullman Seed Yield kg/ha	Garfield Seed Yield kg/ha	Fairfield Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Richlea kg/ha
LC01602300R	1726	1537	2151		1804	109
LC07600151R	1840	1568	1855		1754	106
Richlea	1506	1616	1802		1642	100
LC06601616R	1603	1464	1829		1632	99
LC07600553R	1378	1500	1583		1487	90
LC07600586R	1399	1497	1558		1485	90
LC07600591R	1247	1600	1434		1427	86
Brewer	1251	1178	1468		1299	79
Merrit	1183	1412	1217		1271	77
GRAND MEAN	1459	1486	1655		1533	
CV	12	14	13		13	
LSD	388	440	465		258	

Kendrick was not planted for 2011.

Yield data are means of three replications at each location.

Mean Yields of the Richlea Type Lentil Advanced Yield Trial, 2007-2011

Name	2011	2010	2009	2008	2007
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
LC01602300R	1804	1700	1562	1199	1715
LC07600151R	1754	1749			
Richlea	1641	1734	1501	1127	1646
LC06601616R	1632	1696	1482		
LC07600553R	1487	1773			
LC07600586R	1485	1560			
LC07600591R	1427	1820			
Brewer	1299	1586	1291		1554
Merrit	1271	1757	1432	991.	1542
C.V.	13.3	14.7	13.9	13.0	12.3
LSD	258.	228.	172.	134.	114.

Agronomic Data for the Zero Tannin Type Lentil Advanced Yield Trial (1161)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight
				..cm..	..cm..		..cm..	..cm..		..g..
LC06600939YZ	53.3	105.0	2.0	17.8	14.1	0.87	42.6	35.3	1.05	5.2
LC06600930YZ	54.0	105.0	2.0	15.9	13.6	0.95	39.5	36.4	0.99	5.3
LC99602585RZ	55.3	103.0	2.0	14.4	11.2	0.78	34.3	31.2	0.95	4.0
LC04600415YZ	53.3	105.0	2.0	18.2	13.1	0.75	39.4	35.0	0.96	6.0
Shasta	51.3	103.0	2.0	16.3	11.8	1.04	40.5	34.9	0.99	5.6
Cedar	54.7	104.0	2.0	15.3	10.8	0.72	36.6	31.7	1.13	4.8
LC07600224YZ	50.0	105.0	2.0	17.6	13.4	0.84	39.0	33.5	1.04	6.2
LC04600389YZ	52.7	104.0	2.0	20.9	13.9	0.69	39.5	34.6	0.89	5.8
GRAND MEAN	53.0	104.2	1.9	17.0	12.7	0.83	38.9	34.0	1.00	5.3
CV	2.3	1.1	10.4	9.3	8.9	10.23	4.2	4.7	8.99	4.9
LSD	1.7	1.7	0.2	2.2	1.6	0.12	2.3	2.3	0.13	0.3

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/25/2011

Location Yield Summary for the Zero Tannin Type Lentil Advanced Yield Trial (1161)

Name	Pullman Seed Yield kg/ha	Garfield Seed Yield kg/ha	Fairfield Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Cedar kg/ha
LC06600939YZ	1698	1576	1930		1735	119
LC06600930YZ	1567	1496	1869		1644	113
Shasta	1455	1525	1893		1624	111
LC07600224YZ	1358	1328	1892		1526	105
LC04600415YZ	1455	1364	1558		1459	100
LC99602585RZ	1499	1272	1591		1454	100
Cedar	1416	1394	1544		1452	100
LC04600389YZ	1355	1374	1516		1415	97
GRAND MEAN	1475	1416	1724		1539	
CV	10	10	12		11	
LSD	319	325	466		222	

Kendrick was not planted for 2011.

Yield data are means of three replications at each location.

Mean Yields of the Zero Tannin Type Lentil Advanced Yield Trial, 2007-2011

Name	2011	2010	2009	2008	2007
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
LC06600939YZ	1735	1151	1220	1007	
LC06600930YZ	1644	886.	1270	962.	
Shasta	1624	1014	1416	1038	
LC07600224YZ	1526	942.	1475		
LC04600415YZ	1459	914.	1198	911.	
LC99602585RZ	1454	1113	1333	714.	
Cedar	1452	1194	1365	638.	
LC04600389YZ	1415	888.	1211	890.	
C.V.	11.4	13.5	13.7	13.8	
LSD	222.	166.	137.	111.	

Agronomic and Yield Data for the Large Yellow Type Lentil Preliminary Yield Trail (1154)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight	Seed Yield	% of Merit
				..cm..	..cm..		..cm..	..cm..		..g..	kg/ha	
LC07600378L	58.7	103.0	2.0	22.3			39.7			7.6	1802	135
Richlea	57.0	101.0	2.0	18.5			36.1			5.5	1759	132
LC0860B113L	58.3	97.0	2.0	22.2			37.8			7.2	1674	125
LC07600247L	56.0	100.0	2.0	19.8			37.3			7.7	1667	125
LC09600180L	57.3	97.0	2.0	23.1			37.8			7.2	1632	122
LC09600381R	58.3	104.0	2.0	20.2			39.9			7.3	1609	120
LC09600414L	55.7	101.0	2.0	16.5			36.4			7.7	1552	116
LC09600228R	57.0	102.0	2.0	15.1			37.3			6.7	1548	116
Riveland	55.0	102.0	2.0	17.3			38.0			7.7	1503	112
LC09600410L	56.3	100.0	2.0	17.6			34.8			7.8	1490	111
LC07600556L	56.3	102.0	2.0	17.7			40.4			6.3	1434	107
LC09600221R	57.3	103.0	2.0	16.9			33.6			6.0	1407	105
LC09600284L	55.0	103.0	2.0	16.2			35.9			7.7	1399	105
LC09600282L	57.0	101.0	2.0	16.2			33.9			7.5	1359	102
LC09600226R	57.3	101.0	2.0	16.3			33.6			6.2	1354	101
Merrit	53.3	99.0	2.0	16.0			34.0			7.1	1331	100
LC07600570L	56.0	103.0	2.0	16.5			35.4			7.1	1309	98
LC09600246L	54.7	101.0	2.0	17.5			36.2			7.8	1308	98
LC09600429L	57.3	103.0	2.0	17.9			33.5			7.2	1293	97
LC09600235R	56.0	103.0	2.0	15.5			35.4			6.9	1270	95
LC09600425L	51.3	101.0	2.0	15.0			33.4			8.0	1199	90
GRAND MEAN	56.2	101.2	1.9	17.8			36.2			7.1	1471	
CV	2.0	1.4	6.3	10.1			5.7			3.4	10	
LSD	1.6	2.0	0.1	2.4			2.8			0.3	214	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the green plant height at the green pod stage.

Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/25/2011

Data was not collected for vine length and pod height. Plant height index and pod height index cannot be calculated.

Agronomic and Yield Data for the Preliminary Pardina Type Lentil Yield Trial (1154P)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..	Seed Yield kg/ha	% of Pardina
LC10600712P	60.7	102.0	2.0	21.1	15.3	0.73	39.4	36.1	0.96	4.1	2066	177
LC10600625P	60.3	102.0	3.0	19.4	15.2	0.94	37.3	33.7	0.94	4.6	2050	176
LC10600411P	60.3	103.0	2.0	19.0	14.0	0.80	38.4	34.6	0.92	3.7	1952	167
LC10600732P	60.3	101.0	2.0	20.9	13.9	0.70	40.3	36.6	0.91	4.8	1859	159
LC10600018P	59.7	100.0	2.0	17.8	13.3	0.75	35.8	32.5	0.94	4.6	1833	157
LC10600620P	59.7	99.0	2.0	15.4	8.6	0.56	36.8	30.9	0.98	5.0	1821	156
LC10600397P	61.0	103.0	2.0	20.4	14.5	0.72	37.9	32.0	0.87	4.2	1796	154
LC10600221P	59.3	99.0	2.0	14.1	11.2	0.77	33.3	30.6	0.95	4.2	1787	153
LC10600260P	60.7	101.0	2.0	17.5	13.0	0.91	38.1	32.8	1.11	3.9	1772	152
LC10600398P	61.3	103.0	2.0	19.8	13.9	0.70	37.3	33.7	0.95	4.0	1745	149
LC10600675P	58.7	101.0	2.0	18.8	11.4	0.59	37.8	33.6	0.94	4.7	1735	149
LC10600265P	60.0	102.0	2.0	17.5	12.9	0.75	37.7	32.5	0.99	3.7	1691	145
LC10600745P	59.3	101.0	2.0	16.4	11.2	0.69	36.9	33.8	0.93	4.7	1661	142
LC10600231P	59.7	100.0	2.0	14.3	9.6	0.73	35.9	31.9	0.91	4.6	1653	142
LC10600349P	59.7	101.0	2.0	16.0	9.4	0.59	34.7	31.1	0.94	4.4	1646	141
LC10600640P	59.7	101.0	2.0	13.7	10.3	0.93	32.7	29.9	1.06	4.7	1621	139
LC10600249P	60.7	101.0	2.0	19.1	13.4	0.77	37.2	34.1	1.03	4.1	1599	137
LC10600626P	59.0	98.0	2.0	14.5	10.9	0.75	34.4	30.5	0.91	4.6	1597	137
LC10600589P	59.3	100.0	2.0	14.1	9.5	0.71	34.7	29.9	0.98	3.0	1523	130
LC10600719P	60.0	100.0	2.0	15.1	11.0	0.84	35.9	30.9	0.92	4.9	1500	128
LC10600207P	59.3	101.0	2.0	15.9	10.8	0.63	35.3	30.5	0.89	4.1	1491	128
LC10600371P	59.3	103.0	2.0	15.4	10.4	0.68	36.7	32.5	0.90	4.5	1462	125
LC10600238P	59.7	99.0	2.0	14.6	9.9	0.69	34.9	31.9	0.98	3.9	1441	123
LC10600011P	59.7	101.0	2.0	17.0	11.2	0.72	36.0	31.5	0.93	4.5	1370	117
LC10600123P	55.7	101.0	2.0	14.5	9.0	0.63	32.3	27.1	0.83	4.2	1366	117
LC10600176P	59.3	101.0	2.0	16.0	7.8	0.51	36.1	30.1	0.88	3.9	1342	115
LC10600073P	56.3	99.0	2.0	13.3	11.2	0.80	34.0	28.7	0.86	5.1	1294	111
LC10600103P	54.0	99.0	2.0	14.7	10.8	0.64	32.0	28.3	0.94	4.6	1272	109

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Agronomic Data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/26/2011

Agronomic and Yield Data for the Preliminary Pardina Type Lentil Yield Trial (1154P)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight	Seed Yield	% of Pardina
				..cm..	..cm..		..cm..	..cm..		..g..	kg/ha	
LC10600134P	60.0	100.0	2.0	16.8	11.0	0.74	31.9	28.0	0.88	3.5	1255	107
LC10600113P	54.0	99.0	2.0	12.6	9.9	0.82	30.7	27.3	0.99	3.6	1203	103
Pardina	58.7	100.0	2.0	14.5	8.4	0.58	33.3	28.4	0.93	3.6	1164	100
Morena	59.3	103.0	1.0	16.1	10.2	0.40	38.5	32.6	0.63	2.6	1000	85
GRAND MEAN	59.2	100.7	2.0	16.4	11.3	0.71	35.7	31.5	0.93	4.2	1580	0
CV	2.8	1.4	15.3	14.0	14.0	21.16	6.6	5.2	13.57	13.1	15	0
LSD	2.2	2.0	0.4	3.1	2.1	0.21	3.2	2.2	0.17	0.7	484	0

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Agronomic Data are means of three replications at Pullman, WA. Planting Date: 05/06/2011 Harvest Date: 08/26/2011

Agronomic and Yield Data for the Laird Type Lentil Observation Nursery (1155L)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight	Seed Yield
				..cm..	..cm..		..cm..	..cm..		..g..	kg/ha
LC09600476L	56.0	100.0	2.0	20.0	12.5	0.63	36.5	32.3	1.01	6.9	1719
Merrit	57.0	96.0	1.0	17.8	15.8	0.89	36.3	32.5	0.95	6.4	1671
LC09600408L	58.0	100.0	2.0	19.8	14.0	0.93	38.3	34.8	1.06	7.0	1635
LC09600361L	58.0	102.0	2.0	22.8	18.0	0.83	39.0	32.3	0.86	7.3	1610
LC09600308L	60.0	102.0	2.0	21.3	17.5	0.82	38.8	34.3	0.93	8.8	1545
LC09600500L	57.0	102.0	2.0	21.8	14.8	0.68	38.8	36.5	1.02	7.7	1439
Riveland	56.0	102.0	2.0	19.8	15.8	0.76	38.8	33.5	0.96	7.3	1424
LC09600366L	57.0	98.0	2.0	20.3	13.3	0.74	34.5	29.5	0.98	6.7	1353
LC09600432L	56.0	100.0	2.0	19.3	16.0	0.98	29.5	28.0	1.02	6.4	1332
LC09600307L	59.0	100.0	2.0	20.5	14.8	0.72	39.0	33.5	1.06	9.0	1241
LC09600481L	60.0	102.0	2.0	21.5	19.8	0.94	41.5	32.3	1.28	6.6	1239
LC09600173L	57.0	98.0	2.0	19.8	17.0	0.89	37.0	34.0	0.95	7.0	1074
GRAND MEAN	57.5	100.1	1.9	20.3	15.7	0.82	37.3	32.7	1.01	7.2	1440

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Planting Date: 05/11/2011 Harvest Date: 08/26/2011

Agronomic and Yield Data for the Pardina Type Lentil Observation Nursery (1155P)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..	Seed Yield kg/ha
LC10600704P	63.0	102.0	2.0	16.8	15.3	1.03	36.3	31.8	1.09	4.9	2165.
LC10600649P	62.0	102.0	2.0	20.0	13.0	0.74	33.8	31.0	0.92	5.2	2056.
LC10600180P	60.0	104.0	2.0	20.0	14.3	0.72	34.8	30.3	0.87	4.1	1992.
LC10600185P	63.0	104.0	2.0	25.8	13.5	0.52	37.0	30.5	0.82	3.9	1893.
LC10600494P	58.0	102.0	2.0	18.5	15.0	0.86	37.5	34.0	0.97	4.2	1825.
LC10600075P	57.0	98.0	2.0	16.8	13.8	0.82	34.8	26.5	1.13	5.1	1776.
LC10600096P	56.0	98.0	2.0	21.5	16.5	0.77	31.8	29.8	0.97	4.4	1761.
LC10600616P	58.0	98.0	2.0	16.3	13.8	1.14	38.0	34.5	1.06	3.5	1760.
LC10600702P	62.0	102.0	2.0	23.5	12.8	0.54	35.5	31.0	0.87	5.1	1755.
LC10600232P	57.0	100.0	2.0	14.3	9.8	0.69	31.5	27.5	0.87	4.3	1754.
LC10600476P	56.0	96.0	2.0	18.3	12.5	0.68	33.0	32.0	0.98	3.7	1744.
LC10600753P	62.0	100.0	2.0	22.0	14.0	0.64	37.0	34.8	0.99	4.8	1727.
LC10600111P	56.0	98.0	2.0	14.8	8.3	0.56	33.5	29.5	1.10	3.9	1710.
LC10600247P	57.0	100.0	2.0	14.3	10.0	0.70	31.5	29.0	0.92	4.8	1702.
LC10600624P	62.0	100.0	2.0	20.8	14.8	0.71	33.3	32.0	0.96	4.2	1682.
LC10600027P	54.0	100.0	1.0	13.8	9.3	0.67	36.0	29.8	1.17	5.0	1671.
LC10600246P	60.0	102.0	2.0	19.0	15.8	0.88	39.0	32.5	0.83	4.3	1654.
LC10600241P	56.0	98.0	2.0	13.5	10.3	0.98	34.3	31.5	0.92	4.4	1641.
LC10600759P	61.0	102.0	2.0	19.3	16.0	0.88	36.0	33.5	1.03	4.9	1639.
LC10600588P	62.0	100.0	2.0	24.3	17.0	0.70	38.5	35.8	0.97	3.6	1630.
LC10600577P	58.0	98.0	2.0	17.5	9.8	0.56	36.3	30.3	0.83	4.1	1616.
LC10600478P	60.0	102.0	2.0	21.5	13.5	0.63	38.5	36.3	1.05	4.0	1605.
LC10600623P	58.0	98.0	2.0	12.0	11.0	0.96	33.5	30.5	0.98	5.0	1550.
LC10600709P	61.0	100.0	2.0	20.5	17.8	0.96	35.5	29.5	1.20	4.4	1518.
LC10600491P	57.0	102.0	2.0	16.3	11.5	0.85	35.0	31.8	0.91	5.0	1517.
LC10600414P	57.0	100.0	2.0	22.3	13.3	0.60	41.3	32.0	0.77	4.5	1489.
LC10600462P	60.0	102.0	2.0	21.8	14.0	0.64	36.8	32.3	1.08	4.5	1480.
LC10600699P	57.0	102.0	2.0	12.3	10.0	0.94	34.5	29.0	0.95	5.3	1473.

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Planting Date: 05/06/2011 Harvest Date: 08/26/2011

Agronomic and Yield Data for the Pardina Type Lentil Observation Nursery (1155P)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight	Seed Yield
				..cm..	..cm..		..cm..	..cm..		..g..	kg/ha
LC10600470P	60.0	100.0	2.0	22.5	20.0	0.84	40.3	34.3	0.95	4.2	1461.
LC10600631P	57.0	100.0	2.0	16.3	9.3	0.57	34.5	29.5	0.98	4.0	1440.
LC10600742P	56.0	100.0	2.0	17.5	13.0	0.77	35.0	30.5	0.87	4.3	1415.
LC10600645P	56.0	100.0	2.0	15.0	11.3	0.75	33.5	29.8	0.89	5.3	1403.
LC10600502P	60.0	102.0	2.0	22.0	17.0	0.77	38.8	36.8	1.00	4.3	1389.
LC10600725P	56.0	100.0	2.0	16.0	13.5	0.84	32.8	29.8	1.02	4.5	1372.
Morena	57.0	100.0	2.0	13.8	11.5	0.65	32.5	28.5	1.07	3.8	1371.
LC10600571P	58.0	100.0	2.0	16.8	12.5	0.74	36.8	30.8	1.19	3.5	1341.
LC10600639P	61.0	100.0	3.0	20.8	17.0	0.82	40.5	29.8	0.74	4.7	1335.
LC10600557P	58.0	102.0	2.0	13.3	10.8	0.92	33.3	28.8	0.95	4.1	1309.
LC10600590P	62.0	100.0	2.0	20.0	18.3	0.92	35.8	34.3	0.97	3.3	1307.
LC10600617P	62.0	98.0	2.0	23.3	18.0	0.77	40.0	36.5	0.97	4.1	1273.
LC10600155P	57.0	96.0	2.0	15.5	11.0	0.66	31.3	24.5	0.78	4.4	1269.
LC10600153P	57.0	96.0	2.0	13.8	10.0	0.72	29.8	26.5	0.98	4.2	1250.
LC10600406P	60.0	102.0	2.0	21.5	14.5	0.67	35.8	31.8	0.89	3.6	1247.
LC10600049P	58.0	98.0	2.0	13.8	10.8	0.96	29.5	28.5	1.04	4.1	1184.
LC10600028P	54.0	98.0	2.0	15.3	10.8	0.73	35.3	30.5	1.16	5.3	1182.
LC10600513P	63.0	102.0	2.0	22.5	18.5	0.82	39.0	36.0	0.99	4.2	1168.
Pardina	57.0	98.0	2.0	15.5	10.3	0.66	29.8	24.5	0.82	4.2	1166.
LC10600533P	57.0	102.0	2.0	16.0	11.3	0.73	32.3	28.5	0.99	4.1	1093.
LC10600157P	57.0	96.0	2.0	16.5	11.0	0.67	30.5	27.3	0.90	4.3	1087.
LC10600255P	58.0	102.0	2.0	17.8	11.3	0.71	34.5	30.3	1.06	5.2	1027.
LC10600549P	62.0	104.0	2.0	18.0	13.8	0.79	35.0	28.3	0.81	3.1	991.9
LC10600540P	60.0	102.0	2.0	18.5	15.0	1.09	39.8	31.5	1.26	3.4	989.9
LC10600531P	58.0	100.0	2.0	17.8	13.0	1.28	38.8	32.3	1.00	4.5	928.9
LC10600527P	58.0	102.0	2.0	15.5	11.8	0.82	31.0	26.8	1.10	3.9	864.8
LC10600576P	57.0	98.0	2.0	16.0	12.3	1.05	33.0	28.5	1.14	4.0	805.8
GRAND MEAN	58.6	100.1	2.0	17.9	13.1	0.78	35.1	30.8	0.98	4.3	1463.

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Planting Date: 05/06/2011 Harvest Date: 08/26/2011

Agronomic and Yield Data for the Richlea Type Lentil Observation Nursery (1155R)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight	Seed Yield
				..cm..	..cm..		..cm..	..cm..		..g..	kg/ha
Richlea	60.0	104.0	2.00	23.5	15.3	0.65	40.8	37.8	0.93	5.7	2149
LC09600392R	61.0	104.0	1.00	28.8	21.3	0.77	50.0	42.0	0.84	6.5	1997
LC09600183R	60.0	100.0	3.00	19.3	12.8	0.75	35.8	34.5	0.96	6.4	1861
LC09600450R	58.0	100.0	2.00	17.0	15.0	0.94	36.3	30.3	0.83	6.3	1498
Merrit	57.0	104.0	2.00	17.3	14.0	0.81	35.8	32.5	0.91	6.5	1390
GRAND MEAN	59.2	102.4	2.00	21.1	15.6	0.78	39.7	35.4	0.89	6.2	1779

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Planting Date: 05/06/2011 Harvest Date: 08/26/2011

Agronomic Data for the Winter Lentil Advanced Yield Trial (1141)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight
				..cm..	..cm..		..cm..	..cm..		..g..
Morton_	252.3	304.0	3.0	24.1	9.8	0.40	59.5	32.9	0.60	3.2
LC03600232WT	260.7	312.0	3.0	28.0	2.9	0.10	68.6	8.3	0.10	3.1
LC05600512WT	245.3	309.0	2.0	18.3	9.6	0.60	60.9	31.1	0.50	3.4
LC02601276WT	249.7	305.0	3.0	24.1	10.7	0.50	61.0	33.1	0.60	3.2
LC05600004WT	245.0	311.0	3.0	21.6	5.0	0.30	64.7	19.6	0.30	4.5
LC03600230WT	249.7	308.0	3.0	27.6	2.6	0.10	68.4	9.5	0.10	3.1
LC06600768WT	245.3	311.0	2.0	18.2	8.6	0.50	56.9	25.9	0.50	3.3
LC06600789WT	262.7	315.0	3.0	31.1			73.1			2.5
GRAND MEAN	251.3	309.3	2.7	24.1	6.2	0.30	64.1	20.1	0.30	3.3
CV	1.0	2.0	11.7	11.6	78.0	88.00	4.3	67.8	67.20	7.0
LSD	4.6	11.0	0.6	4.9	8.4	0.50	4.9	23.8	0.40	0.4

Pod height was measured at the green pod stage and at harvest maturity. Pod height index was determined by dividing pod height at harvest maturity by the green pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Planting Date: 09/28/2010 Harvest Date: 08/01/2011

Agronomic and Yield Data for the Winter Lentil Observation Nursery (1145)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height	Pod Ht Maturity	Pod Ht Index	Vine Length	Canopy Height	Plant Ht Index	100 Seed Weight	Seed Yield	% of Morton
				..cm..	..cm..		..cm..	..cm..		..g..	kg/ha	
LC1060F0007W	245.0	307.0	2.0	18.5	13.0	0.70	49.3	25.0	0.50	4.6	4028	194
LC1060F0003W	245.0	311.0	2.0	14.8	7.8	0.50	52.3	21.5	0.40	4.6	3933	189
LC1060F0006W	246.0	309.0	2.0	15.3	11.0	0.70	49.0	26.8	0.60	3.7	3382	163
LC1060F0005W	246.0	315.0	2.0	17.0			55.8			4.3	2922	140
LC1060F0004W	245.0	311.0	2.0	15.8			44.0			3.5	2898	139
LC1060F0010W	246.0	307.0	2.0	14.8	10.3	0.70	38.5	31.8	0.80	4.0	2800	135
LC1060F0008W	245.0	307.0	2.0	12.3	13.5	1.10	37.8	39.0	1.00	5.7	2749	132
LC08600327WT	245.0	307.0	2.0	16.0	6.5	0.40	40.0	36.0	0.90	3.2	2651	127
LC1060F0011W	253.0	305.0	2.0	18.5	10.3	0.60	32.5	29.8	0.90	3.5	2371	114
LC1060F0009W	245.0	315.0	2.0	10.0	7.8	0.80	35.5	34.0	1.00	4.9	2299	110
LC07600058WT	246.0	295.0	2.0	25.3	11.5	0.50	47.3	38.8	0.80	3.8	2139	103
Morton_	256.0	295.0	3.0	24.5	17.5	0.70	45.3	38.3	0.90	2.8	2073	100
LC06601530WT	246.0	295.0	2.0	18.8	13.3	0.70	39.3	38.3	1.00	3.1	1990	96
GRAND MEAN	246.8	306.1	2.1	17.0	9.4	0.60	43.6	27.6	0.70	4.0	2787	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index was determined by dividing pod height at harvest maturity by the green pod height.
Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.
Planting Date: 09/28/2010 Harvest Date: 08/01/2011

2011 Kabuli Chickpea Advanced Yield Trials

In 2011, 19 café kabuli chickpea breeding lines and six check varieties were included in the Advanced Chickpea Yield Trials. The six check varieties included four café kabuli types (Sawyer, Sierra, Dwelley and CDC-Frontier), the Spanish White variety Dylan and PNW 1, a small round café. Trials were planted at Genesee, ID on May 5, 2011, at Pullman, WA on May 6, 2011, and at Kendrick, ID on May 21, 2011. Prior to planting all seeds received a seed treatment applied at a rate of 30 ml/ kg seed. The seed treatment solution consisted of the following fungicides: Apron XL LS (0.61oz/cwt), Maxim 4FS (0.9oz/cwt), Mertec LSP (3.0oz/cwt); systemic insecticide: Cruiser (30ml/cwt); and mineral nutrient: Sodium Molybdate (16g/cwt). *Mesorhizobium ciceri* inoculant was added to each seed lot prior to planting. Three replicated plots (1.5 m x 6.1 m) were planted at a density of 44 seeds/m² for each entry at each location. A post plant/pre-emergence application of metribuzin (Sencor; 6 oz/acre) and linuron (Lorox; 1.25 lb/acre) was applied at Genesee and Kendrick for weed control, while weeds were controlled at Pullman by a single post plant/pre-emergence application of Lorox at 1.25 lb/acre. Approximately 14 d before harvest each location received a single application of gramoxone (2 pints/acre) to promote desiccation prior to harvest.

The grand mean of all entries over all locations was 2324 kg/ha (2068 lb/acre). The highest yielding location was the Washington State University Spillman Farm in Pullman, WA, which was harvested on September 4, 2011 with a mean yield of 2770 kg/ha (2465 lb/acre). The mean yield at Genesee, which was harvested on September 3, 2011, was 2296 kg/ha (2043 lb/acre) and the mean yield at Kendrick, which was harvested on September 5, 2011, was 1901 kg/ha (1696 lb/acre). Advanced yield trials that tested the majority of the entries included in 2011 were previously conducted at all three locations in 2010. This approach afforded us the opportunity to compare performance of breeding lines within locations across both years. The grand mean of all entries at Pullman in 2011 was 300% the yield observed in 2010. Similarly, the grand mean of entries at Genesee was 301% the mean yield observed in 2010, while the grand mean at Kendrick in 2011 was 132% of the mean yield observed in 2010. Seed size of entries was only determined for the Pullman, WA location, where the grand mean of 100 seed weight was 132% the mean observed in 2010. The considerable differences in yield and seed size observed between years are likely due to the cumulative effects of many sources of variance. These effects include soil temperature and moisture along with disease and weed pressure. These observations emphasize the critical importance of evaluating advanced breeding lines and varieties for multiple years in specific growing regions to accurately estimate yield stability.

The advanced breeding line CA0790B0043C was the highest yielding entry over all locations, averaging over 2618 kg/ha. The six entries with the highest mean yield across all locations were advanced kabuli café chickpea lines from the ARS breeding program. The top four yielding entries, CA0790B0043C, CA0790B0549C, CA0390B007C, and CA0790B0733C demonstrated promising yield stability, being ranked in the top 10 performing entries at each location. Eight ARS breeding lines had mean yields that were at least 15% greater than the mean yield of Dwelley across all locations. The highest yielding variety was PNW 1 (2473 kg/ha), followed in descending order by the small café kabuli variety Sawyer, the Spanish White variety Dylan, the small café kabuli variety CDC-Frontier and finally, the widely cultivated larger café kabuli varieties Sierra and Dwelley.

The breeding line CA04900843C had the highest yield (3245 kg/ha) at Pullman, WA, which was a 41% increase over the yield of Dwelley (2295 kg/ha). The advanced breeding lines ranged in yield from 1694-3245 kg/ha, while the yields of the six check cultivars ranged from 2295 (Dwelley) to 2847 kg/ha (PNW 1). The top 10 yielding entries at Pullman, WA were all USDA-ARS café kabuli breeding lines. The small

café kabuli chickpea Sawyer yielded 23% more than Dwelley, while the yield of Sierra exceeded that of Dwelley by 6%. The Spanish White chickpea variety Dylan had a yield of 2643 kg/ha, which was 9 and 15% greater than the respective yields of Sierra and Dwelley.

At the trials conducted in Kendrick, ID, the breeding line CA0790B0043C had the highest yield (2179 kg/ha), which was a 24% increase over the yield of Dwelley (1756 kg/ha). The advanced breeding lines ranged in yield from 1702-2179 kg/ha, while the yields of the six check cultivars ranged from 1756 (Dwelley) to 2017 kg/ha (Sawyer). Of the top 10 yielding entries, nine were USDA-ARS café kabuli breeding lines. The small café kabuli chickpea Sawyer yielded 15% more than Dwelley, while the yield of Sierra exceeded that of Dwelley by 3%. The Spanish White chickpea variety Dylan had a yield of 1910 kg/ha, which was 5 and 9% greater than the respective yields of Sierra and Dwelley.

At the trials conducted in Genesee, ID, the breeding line CA0790B0733C had the highest yield (2754 kg/ha), which was a 25% increase over the yield of Dwelley (2198 kg/ha). The advanced breeding lines ranged in yield from 1700-2754 kg/ha, while the yields of the six check cultivars ranged from 2024 (Sierra) to 2627 kg/ha (PNW 1). Of the top 10 yielding entries, eight were USDA-ARS café kabuli breeding lines. The small café kabuli chickpea Sawyer yielded 4% more than Dwelley, while the yield of Sierra was 8% less than Dwelley. The Spanish White chickpea variety Dylan had a yield of 2349 kg/ha, which was 16 and 7% greater than the respective yields of Sierra and Dwelley.

At the Pullman, WA trial all entries were also evaluated for other important traits including days to maturity, canopy height, plant height index, and 100 seed weight. Plant height index is the ratio of the total length of the vine of the plant/canopy height, and accordingly can range in value from 0-1. The plant height index is considered to be a measure of tolerance to lodging, with more tolerant lines having higher plant height index scores. All breeding lines and check varieties had PHI > 0.85, which suggests the entries were very tolerant to lodging under the field conditions encountered during the trial. Significant differences were observed among entries for days required until maturity. The entries matured within a range of 103-112 days. The ten highest yielding lines matured in 109-111 days. The maturity of the check varieties ranged from 104 days (Sawyer) to 111 days for CDC-Frontier. Sawyer was significantly earlier than Dylan and CDC-Frontier but was not significantly different in maturity from PNW 1, Sierra, or Dwelley. The earliest maturing entry, CA04900851C (103 days) was both high yielding and produced large seed.

The seed size of breeding lines ranged from 39.9-67.4 g/100 seeds. The seed size of the check varieties ranged from 30.9 (PNW 1)-57.9 (Dylan). As might be expected based on previous yield trial results, the seed sizes of Sierra (54.1 g) and Dwelley (53.9 g) were very similar. Dwelley and Sierra seed were significantly larger than seed of Sawyer (44.5 g). The Spanish White variety Dylan produced significantly larger seed than any other check variety. CDC-Frontier seed (38.1 g) was significantly larger than PNW 1 (30.9 g) but significantly smaller than all other entries except CA0469C025C (39.9 g). PNW 1 seed was significantly smaller than any other entry. The ten highest yielding breeding lines had seed sizes ranging from 49.5-67.4 g. Six of these top ten breeding lines produced seed that was significantly larger than Sierra or Dwelley. CA04900843C produced significantly larger seed (67.4 g) than all other entries and was also the highest yielding entry in the trial.

2011 Preliminary Chickpea Yield Trial

Recently selected chickpea breeding lines were evaluated in a preliminary yield trial conducted at the Washington State University Spillman Farm in Pullman, WA. A total of 34 entries were evaluated including 20 café kabuli breeding lines, 12 Spanish White breeding lines, and four check varieties; café kabuli varieties Sawyer, Sierra, and Dwelley and the Spanish White variety Dylan and PNW 1, a small round café. Trials were planted on May 6, 2011 and harvested on September 5, 2011. Three replicated plots (1.5 m x 6.1 m) were planted for each entry at a density of 44 seeds/m². Pre-plant seed treatment and herbicide applications were done as described above for the Advanced Yield Trial conducted at Pullman, WA.

The mean yield for all entries was 2569 kg/ha. The preliminary breeding lines ranged in yield from 1785-3033 kg/ha, while the yields of the four check cultivars ranged from 2281 (Dwelley) to 2860 kg/ha (Dylan). The top 10 yielding entries included six USDA-ARS café kabuli breeding lines, three USDA-ARS Spanish White breeding lines, and the Spanish White variety Dylan. These 10 entries on average had yields that were 25% larger than Dwelley. A total of 14 lines including five Spanish White and nine café kabuli, had yields that were at least 15% greater than Dwelley.

All entries were also evaluated for other important traits including days to maturity, canopy height, plant height index, and 100 seed weight. The plant height index was greater than 0.85 for all but one entry, indicating that all breeding lines and varieties exhibited excellent tolerance to lodging. Significant differences were observed among entries for days required until maturity. The entries matured within a range of 103-114 days. Similar to results observed for the Advanced Chickpea Yield Trial, the ten highest yielding lines matured in 109-111 days. The maturity of the check varieties ranged from 105 days (Sawyer) to 110 days for Dwelley and Dylan. The earliest maturing entry, CA0890B0496C (103 days) was both high yielding and produced large seed.

The seed size of breeding lines ranged from 48.8-69.0 g/100 seeds, with the exception of CA0890B0286C, which was exceptionally small (17.8 g). The seed size of the check varieties ranged from 43.8 (Sawyer)-58.1 (Sierra). The ten highest yielding lines had seed sizes ranging from 54.2-62.2 g. CA0890B0085W, a Spanish White breeding line, had the largest seed (69.0 g) of all entries. Unfortunately, this line was relatively low yielding (93% of Dwelley) and was also the latest maturing of all entries (114 days).

Preliminary Desi Chickpea Yield Trial

Although desi chickpeas are not currently grown on any significant acreage within the US, there has been interest expressed recently in examining how different desi materials perform in the Pacific Northwest. In 2011 we evaluated seven desi breeding lines and the desi variety Myles in a preliminary yield trial conducted at the Washington State University Spillman Farm in Pullman, WA. . Trials were planted on May 6, 2011 and harvested on September 5, 2011. Three replicated plots (1.5 m x 6.1 m) were planted for each entry at a density of 44 seeds/m². Pre-plant seed treatment and herbicide applications were done as described above for the Advanced Yield Trial conducted at Pullman, WA.

The mean yield for all entries was 2168 kg/ha, with breeding lines ranging in yield from 1638-2825 kg/ha. Myles yielded 1886 kg/ha and was nearly 40 cm tall at harvest. All entries had plant height index values > 0.85, suggesting they were quite tolerant to lodging. There were clear associations between

yield, seed size and maturity. The highest yielding lines tended to exhibit late maturity and had large seeds. CA0890B0526D, the highest yielding line (2825 kg/ha), was the latest (112 days) line and also had the largest seed of all entries. Conversely, the lowest yielding entry CA0890B0555D (1638 kg/ha) had the smallest seed size (15.1 g) and was in the earliest maturity group (102 days).

Promising Advanced Café Kabuli Breeding Lines

Results of Advanced Chickpea Yield Trials conducted in 2010 and 2011 suggest that there are several promising advanced breeding lines that could possibly serve as replacements for Sierra and Dwelley or Sawyer. Each of these lines has been evaluated in a total of six locations in WA and ID over the past two years. At the end of the 2012 field season these breeding lines may be considered for release as either improved germplasm or new varieties. Although these breeding lines appear to exhibit exceptional agronomic performance relative to commercial varieties, ultimate decisions regarding avenues of technology transfer will also depend on other factors including potential market share and consumer acceptance that have not yet been determined. A summary of yield and agronomic performance of several promising advanced breeding lines is presented below. Data for the varieties Dwelley, Sierra and Sawyer collected from the same trials is included for comparative purposes.

Performance of Elite USDA-ARS Chickpea Breeding Lines in Yield Trials in WA and ID (2010 and 2011; N = six locations over 2 years).

Line	Days to Mature	100 seed weight (g)	Mean Yield (% Dwelley)
CA0790B0042C	112	45.3	1752 (123)
CA0790B0549C	115	46.9	1741 (122)
CA0790B0733C	113	47.8	1714 (120)
CA0490B0843C	112	59.9	1707 (120)
CA0790B0043C	113	55.7	1670 (117)
CA0690B0250C	114	53.9	1644 (115)
CA0790B0034C	114	56.1	1617 (113)
Dwelley	112	51.4	1428 (100)
Sierra	110	51.7	1430 (100)
Sawyer	108	44	1645 (115)

Agronomic and Yield Data for the Large Kabuli Chickpea Advanced Yield Trial (1181)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..	Seed Yield kg/ha	% of Dwelley
CA04900843C	57.0	109.0	1.00	27.5	22.6	0.88	53.2	45.9	0.89	67.4	3245	141
CA0790B0043C	57.3	111.0	1.00	31.0	24.6	0.83	57.3	50.9	1.03	62.3	3193	139
CA0790B0549C	58.0	111.0	1.00	29.2	24.7	1.01	51.5	49.1	1.08	49.6	3152	137
CA0690B0250C	57.3	112.0	1.00	28.7	24.9	0.92	62.1	57.8	0.95	55.8	3138	136
CA04900851C	58.0	103.0	1.00	33.0	26.5	0.89	55.8	48.9	0.97	58.1	3126	136
CA0790B0034C	57.0	111.0	1.00	31.0	27.5	0.98	53.0	49.4	0.95	60.9	3077	134
CA0690B0427C	57.7	111.0	1.00	26.9	22.2	0.90	51.5	43.0	0.92	53.8	3075	134
CA0790B0042C	57.0	110.0	1.00	27.6	23.0	0.95	58.0	51.8	0.90	49.5	3006	131
CA0790B0054C	57.0	111.0	1.00	32.4	27.2	0.92	56.9	50.2	0.90	57.6	2932	127
CA0390B007C	56.7	109.0	1.00	29.1	25.5	0.95	51.8	45.9	0.89	56.6	2883	125
PNW 1	57.3	107.0	1.00	28.8	25.4	0.94	60.6	53.0	1.10	30.9	2847	124
Sawyer	56.7	104.0	1.00	28.3	23.7	0.93	54.2	47.6	0.86	44.5	2832	123
CA0790B0733C	56.7	111.0	1.00	25.3	21.7	0.95	49.1	43.5	0.98	51.9	2809	122
CA0790B0155C	57.3	106.0	1.00	28.3	23.6	1.05	48.9	45.0	0.97	58.1	2786	121
CA0790B0053C	57.3	111.0	1.00	31.7	27.3	0.93	64.8	56.4	1.02	62.9	2778	121
CA0469C025C	55.3	105.0	1.00	23.7	20.4	0.94	51.7	45.8	1.00	39.9	2645	115
Dylan	56.3	109.0	1.00	22.5	20.0	1.04	45.3	39.4	0.90	57.9	2642	115
CA04900421C	54.7	109.0	1.00	26.3	20.4	1.04	48.4	43.8	1.10	51.8	2633	114
CA04900608C	57.0	109.0	1.10	29.0	25.4	0.97	53.9	46.1	0.86	62.3	2633	114
CA0790B0753C	56.7	109.0	1.00	26.3	21.6	0.92	53.3	46.0	1.06	46.9	2594	113
CA04900808C	57.7	106.0	1.00	30.5	24.4	0.84	52.8	47.7	0.98	58.6	2480	108
Sierra	57.3	107.0	1.00	29.1	25.0	1.15	50.2	45.4	0.93	54.1	2432	106
CDC-FRONTIER	57.3	111.0	1.00	26.0	22.5	0.98	49.1	44.1	1.04	38.1	2321	101
Dwelley	56.3	107.0	1.00	32.6	26.4	0.94	49.3	46.4	0.98	53.9	2294	100
CA0690B0409C	57.3	107.0	1.00	31.4	25.2	0.91	50.4	45.0	0.95	55.2	1693	73
GRAND MEAN	56.9	108.6	1.00	28.6	24.0	0.95	53.3	47.5	0.97	53.5	2770	
CV	1.2	3.0	3.45	7.4	8.3	13.05	5.7	6.2	8.49	3.2	9	
LSD	0.9	4.5	0.05	2.9	2.7	0.17	4.2	4.0	0.11	2.3	507	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Rep Nodes = average number of reproducing nodes to a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date: 05/08/2011 Harvest Date: 09/05/2011

Location Yield Summary for the Large Kabuli Chickpea Advanced Yield Trial (1181)

Name	Leaf Type	Seed Type	Pullman Seed Yield kg/ha	Kendrick Seed Yield kg/ha	Genesee Seed Yield kg/ha	Mean Seed Yield kg/ha	% of Dwelley
CA0790B0043C	C	C	3193	2178	2484	2618	125
CA0790B0549C	C	C	3152	2089	2601	2614	125
CA0390B007C	C	C	2883	2025	2651	2520	121
CA0790B0042C	C	C	3006	1964	2589	2520	121
CA0790B0733C	C	C	2809	1897	2754	2486	119
CA0690B0250C	C	C	3138	1918	2376	2478	119
PNW 1	.NULL.	.NULL.	2847	1946	2626	2473	118
CA04900843C	C	C	3245	1939	2118	2434	116
CA0469C025C	C	C	2645	2134	2421	2400	115
Sawyer	S	C	2832	2016	2292	2380	114
CA0790B0054C	C	C	2932	1825	2277	2345	112
CA0690B0427C	C	C	3075	1738	2159	2324	111
CA0790B0034C	C	C	3077	1862	2017	2319	111
CA04900421C	C	C	2633	1944	2339	2306	110
Dylan	C	W	2642	1909	2348	2300	110
CA04900851C	S	C	3126	1955	1699	2260	108
CA0790B0053C	C	C	2778	1836	2112	2242	107
CA0790B0753C	C	C	2594	1789	2266	2216	106
CA0790B0155C	S	C	2786	1702	2161	2216	106
CDC-FRONTIER	C	C	2321	1842	2486	2216	106
CA04900808C	S	C	2480	1774	2283	2179	104
CA04900608C	S	C	2633	1814	2035	2161	103
Sierra	S	C	2432	1815	2023	2090	100
Dwelley	S	C	2294	1755	2198	2082	100
CA0690B0409C	S	C	1693	1963	2083	1913	91

Leaf Type: C = compound leaf, S = simple leaf type. Seed type; W = white seed type, C = cafe seed type
Yield data are means of three replications at each location.

Mean Yields of the Large Kabuli Advanced Yield Trial, 2007-2011

Name	Leaf Type	Seed Type	2011	2010	2009	2008	2007
			kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
CA0790B0043C	C	C	2618	721.			
CA0790B0549C	C	C	2614	866.			
CA0390B007C	C	C	2520	851.	1531	1325	1552
CA0790B0042C	C	C	2520	984.			
CA0790B0733C	C	C	2486	940.			
CA0690B0250C	C	C	2478	808.	1644		
PNW 1			2473				
CA04900843C	C	C	2434	978.	1602	1382	
CA0469C025C	C	C	2400	917.	1621	1501	1525
Sawyer	S	C	2380	908.	1508	1483	1450
CA0790B0054C	C	C	2345	747.			
CA0690B0427C	C	C	2324	693.	1435		
CA0790B0034C	C	C	2319	914.			
CA04900421C	C	C	2306	913.	1368	1458	1415
Dylan	C	W	2300	851.	1338	1122	1302
CA04900851C	S	C	2260	838.	1415	1491	1479
CA0790B0053C	C	C	2242	651.			
CA0790B0753C	C	C	2216	920.			
CDC-FRONTIER	C	C	2216				
CA0790B0155C	S	C	2216	923.			
CA04900808C	S	C	2179	816.	1495	1407	
CA04900608C	S	C	2161	689.	1345	1384	
Sierra	S	C	2090	767.	1288	1223	1252
Dwelley	S	C	2082	772.	1430	1144	1241
CA0690B0409C	S	C	1913	930.	1537		
C.V.			11.1	12.3	12.6	13.5	12.7
LSD			319.	189.	155.	140.	117.

Leaf Type: C = Compound leaf, S = Simple leaf

Seed Type: C = Cafe seed type, W = White seed type

Yield data are means of three reps per location, 4 locations per year.

Agronomic and Yield Data for the Large Kabuli Chickpea Preliminary Yield Trial (1183)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..	Seed Yield kg/ha	% of Dwelley
CA0790B0547C	57.0	111.0	2	28.4	24.0	0.84	51.0	45.8	0.90	55.6	3033	132
CA0790B0642C	57.3	110.0	2	26.8	22.0	0.82	46.3	44.4	0.96	61.0	3029	132
CA0890B0427C	57.3	109.0	2	27.1	23.8	0.88	52.9	48.2	0.91	53.5	2901	127
CA0890B0551C	57.3	111.0	2	28.0	21.3	0.76	46.1	41.4	0.90	62.2	2898	127
CA0790B0804W	58.0	110.0	2	26.1	23.3	0.89	47.1	43.0	0.92	59.3	2873	125
Dylan	56.3	110.0	2	22.5	19.7	0.88	45.6	42.0	0.92	58.1	2860	125
CA0890B0130C	57.7	110.0	2	25.5	22.1	0.87	45.7	42.0	0.92	54.2	2827	123
CA0890B0434C	57.3	109.0	2	26.9	23.4	0.87	52.3	46.5	0.89	56.4	2768	121
CA0890B0356W	57.0	109.0	2	26.4	22.6	0.86	50.1	44.5	0.89	59.9	2722	119
CA0790B0808W	57.7	109.0	2	26.9	23.8	0.89	45.7	43.5	0.95	58.4	2717	119
CA0890B0437W	58.0	111.0	2	30.4	24.9	0.83	50.3	47.9	0.95	53.4	2717	119
CA0890B0074C	57.0	111.0	2	29.3	25.4	0.87	48.7	45.7	0.94	58.1	2690	117
CA0890B0429C	57.3	111.0	2	27.9	22.5	0.81	51.4	46.8	0.91	60.9	2668	116
CA0890B0531C	57.0	107.0	2	25.5	22.8	0.89	50.5	45.0	0.89	56.2	2664	116
CA0890B0101W	58.0	112.0	2	30.0	26.4	0.88	53.4	48.7	0.91	60.2	2628	115
CA0790B0099C	57.7	110.0	2	30.5	25.1	0.82	51.9	48.0	0.93	63.4	2605	114
Sierra	57.7	109.0	2	32.4	27.7	0.86	54.6	48.8	0.89	58.2	2596	113
CA0890B0581C	57.3	106.0	2	24.6	20.9	0.85	48.3	44.3	0.92	48.8	2560	112
CA0890B0103W	58.0	113.0	2	30.2	26.5	0.88	52.4	49.5	0.95	61.2	2557	112
CA0890B0435C	58.0	109.0	2	40.1	34.9	0.87	69.1	63.4	0.92	62.9	2553	111
CA0890B0489C	58.0	112.0	2	37.7	30.3	0.80	61.4	51.7	0.84	54.6	2552	111
CA0890B0648W	57.7	110.0	2	25.7	21.8	0.85	48.8	42.8	0.88	59.9	2551	111
CA0890B0496C	57.7	103.0	2	27.2	23.8	0.88	47.5	43.4	0.92	60.2	2546	111
CA0890B0116W	58.0	112.0	2	26.8	24.2	0.91	48.5	44.0	0.91	56.0	2514	110
CA0890B0628W	57.7	109.0	2	24.8	20.6	0.83	45.0	42.2	0.94	59.0	2512	110
CA0890B0523C	58.0	112.0	2	31.9	26.8	0.84	57.3	53.9	0.94	54.2	2509	109
Sawyer	57.7	105.0	2	31.7	26.5	0.84	52.9	48.7	0.92	43.8	2500	109
CA0890B0438W	58.0	111.0	2	32.2	27.2	0.85	56.6	50.9	0.90	53.5	2471	108

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Rep Nodes = average number of reproducing nodes to a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date 05/08/2011 Harvest Date: 09/05/2011

Agronomic and Yield Data for the Large Kabuli Chickpea Preliminary Yield Trial (1183)

Name	Days to Flower	Days to Maturity	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	100 Seed Weight ..g..	Seed Yield kg/ha	% of Dwelley
CA0890B0589C	58.3	110.0	2	24.4	22.3	0.92	44.9	40.9	0.91	55.2	2436	106
CA0890B0561C	57.3	111.0	2	24.7	21.9	0.88	48.5	43.9	0.91	57.4	2413	105
CA0890B0657W	58.0	109.0	2	28.1	24.1	0.86	49.8	46.1	0.93	53.1	2366	103
Dwelley	58.0	110.0	2	31.1	26.9	0.87	53.1	50.1	0.94	57.7	2281	100
CA0890B0575C	57.3	109.0	2	31.1	27.3	0.88	52.9	48.4	0.91	53.2	2252	98
CA0890B0085W	58.0	114.0	2	31.3	28.4	0.91	53.0	48.4	0.92	69.0	2127	93
CA0890B0286C	53.7	104.0	2	17.9	16.0	0.90	48.2	42.5	0.88	17.8	1815	79
CA0890B0498C	58.3	112.0	2	29.6	24.1	0.82	53.9	46.4	0.86	57.4	1785	78
GRAND MEAN	57.5	109.7	2	28.3	24.3	0.86	50.9	46.5	0.91	56.2	2569	
CV	1.5	1.5	2	7.7	8.4	7.32	5.5	5.2	3.87	3.1	8	
LSD	1.4	2.6	2	3.4	3.2	0.10	4.3	3.7	0.06	2.8	370	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index = pod height at harvest maturity divided by the pod height at the green pod stage.

Plant height was measured at the green pod stage and at harvest maturity. Plant height index = plant height at harvest maturity divided by the plant height at the green pod stage.

Rep Nodes = average number of reproducing nodes to a plant. Agronomic data are means of three replications at Pullman, WA. Planting Date 05/08/2011 Harvest Date: 09/05/2011

Agronomic and Yield Data for the Chickpea Preliminary Yield Trial (1184)

Name	Blight	Days to Flower	Days to Maturity	Flower Node	Pods/ Peduncle	Pod Height ..cm..	Pod Ht Maturity ..cm..	Pod Ht Index	Vine Length ..cm..	Canopy Height ..cm..	Plant Ht Index	# Repr Nodes	100 Seed Weight ..g..	Seed Yield kg/ha	% of Myles kg/ha
CA0890B0526D		58.7	112.0			25.3	21.4	0.85	50.0	46.4	0.93		31.5	2825	149
CA0490B0223D		55.7	108.0			20.1	17.2	0.86	43.6	38.4	0.88		29.7	2588	137
CA0490B0214D		55.7	105.0			18.8	16.3	0.88	41.9	36.7	0.87		25.5	2167	114
CA0490B0221D		56.0	110.0			18.1	13.5	0.75	36.6	33.9	0.92		26.3	2119	112
CA0490B0224D		54.7	110.0			16.0	14.6	0.91	45.2	38.6	0.86		30.8	2095	111
CA0890B0556D		55.7	102.0			19.9	15.2	0.77	46.0	42.4	0.92		19.5	2024	107
Myles		56.0	102.0			19.0	15.4	0.81	43.9	39.2	0.90		19.4	1886	100
CA0890B0555D		55.3	102.0			15.4	12.9	0.84	32.7	29.4	0.90		15.1	1638	86
GRAND MEAN		55.9	106.4			19.0	15.8	0.83	42.4	38.1	0.90		24.7	2168	
CV		1.5	1.2			10.1	6.3	9.23	3.1	3.9	3.76		2.8	6	
LSD		1.5	2.3			3.3	1.7	0.13	2.3	2.6	0.06		1.2	258	

Pod height was measured at the green pod stage and at harvest maturity. Pod height index was determined by dividing pod height at harvest maturity by the green pod height. Plant height was measured at the green pod stage and at harvest maturity. Plant height index was determined by dividing pod height at harvest maturity by the green pod height. Agronomic data are means of three replications at Pullman, WA. Planting Date 05/08/2011. Harvest Date 09/04/11.