

Request for Release of PS0877MT457 Green Pea

Date: January 8, 2018

Development Team: Kevin E. McPhee and Chengci Chen

Team Members/Agencies Cooperating in Development Work:

Montana State University

Identification:

Market Class: Smooth-seeded spring green pea

Selection Number: **PS0877MT457** (Cross number: X02BP051)

Proposed Name: undecided

Pedigree: 'STIRLING'/PS0010946

General Situation:

1. Unique cultivar characteristics

The unique characteristic of PS0877MT457 is its adaptation to Montana environments based on data from 2015-2017.

2. Need for cultivar

The US dry pea industry in 2017 produced an estimated 832,900 MT of peas on 1,057,000 acres in two major market classes, green and yellow cotyledon classes. In 2016 Montana producers accounted for 514,090 MT or 62% of the US production on 595,000 acres. Approximately 39% of the US production is green peas vs. yellow peas (61%). The market for green peas is largely the human consumption as split peas with a relatively small proportion entering the fractionation market. Current cultivars are sourced from the USDA-ARS and private breeding programs in Washington state, Canada or Europe. Release of a new green pea for spring production will fill this need and provide the US industry an opportunity to service this market.

3. Variety to supplant

'Majoret', 'Aragorn', 'Arcadia'

Performance Evaluations:

PS0877MT457 was evaluated in 18 nurseries from 2015 - 2017 (Tables 1-4). PS0877MT457 produced average seed yield of 2243 lb/a across all nurseries while Aragorn and Arcadia had yields of 2104 and 2096 lb/a, respectively. By way of further comparisons, Majoret produced an

average yield of 2148 lb/a and Hampton produced 2279 lb/a. PS0877MT457 produced greater seed yield (3664 lb/a) under irrigated conditions at Huntley and Sidney in 2016 and 2017 compared to Aragorn (3179 lb/a), Hampton (3399 lb/a) and Majoret (3480 lb/a) (Table 4).

PS0877MT457 had excellent agronomic performance in 2017. Overall, PS0877MT457 flowered at the same time as the checks and was one day earlier to flower than Hampton. Plant height was equal to the checks and lodging scores were slightly lower indicating a more upright canopy at harvest.

Other Agronomic Traits (Tables 5-9):

1. Flowering Date: PS0877MT457 flowered in 59 days from planting over 7 site-years, while Aragorn and Arcadia flowered in 59 and 59 days, respectively (Table 5).
2. Plant Height: PS0877MT457 reached an average height of 55 cm. Aragorn and Arcadia reached an average height of 52 and 58 cm, respectively (Table 6). Lodging scores on a scale of 0-9 across five locations for PS0877MT457 was 1.2 while Aragorn and Arcadia had scores of 1.4 and 1.7, respectively (Table 7).
3. Seed Size: 1000-seed weight averaged 222 g PS0877MT457 while 1000 seed weight for Aragorn and Arcadia was 195 and 186 g, respectively (Table 8).
4. End-use Quality: Physical seed appearance is considered adequate for the market. Protein content for PS0877MT457 across 8 trials in 2017 was 22.1% while Aragorn and Arcadia had 20.9 and 19.8%, respectively (Table 9).
5. Disease Resistance: PS0877MT457 is resistant to powdery mildew, caused by *Erysiphe pisi*, and *Fusarium oxysporum* f.sp. *pisii* Race 1. PS0877MT457 is similar to released cultivars in the susceptible reaction to *Sclerotinia sclerotiorum*, *Ascochyta* blight and bacterial blight.
6. Weaknesses: There are no apparent weaknesses of PS0877MT457 other than lack of disease resistances previously listed.

Seed source, Status and Availability:

One hundred sixty-nine single plants were harvested from 2017 field plots in Bozeman, MT for PS0877MT457. Seed harvested from these plants was sown in single rows in Brawley, CA in November 2017 as the initial increase of pre-breeder seed. Approximately 25 lb of seed is expected from this increase and will be sown in microplots in Bozeman, MT in 2018.

Probable date for release:

2019

Provisions for PVP:

Plant Variety Protection will be sought and data to support the applications will be collected during the 2018 and 2019 seasons.

Table 1. 2015 Yield summary across research sites in Montana conducting the Montana statewide dry pea yield trial.

Green Pea Varieties	Bozeman	Broadview	Corvallis (Irri)	Creston	Havre	Huntley (Dry)	Huntley (Irri)	Moccasin	Richland	Sidney (Irri)
	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a
Aragorn	1322	1163	2771	1241	1579	1699	2649	2142	1731	3459
Arcadia	1101	1247	2499	1155	1782	1617	3964	2333	2273	4749
Hampton	1549		2225		1882	1729		2420	1857	4806
Majoret	1110	1095	2136	1243	1822	1307	3876	2867	1873	5828
PS0877MT457					1914			2758	1744	
<i>Mean</i>	1370	1241	2327	1142	1806	1581	3052	2505	1907	4202
<i>P-value</i>	0.0582	0.0003	0.8943	0.8654	0.0057	0.0106	0.0425	0.0023	0.1273	0.0136
<i>LSD (0.05)</i>	NS	183	NS	NS	283	249	352	401	NS	370
<i>CV (%)</i>	17.07	10.18	43.55	21.19	11	9.36	29.2	11.25	15.28	21.84

Table 2. 2016 Yield summary across research sites in Montana conducting the Montana statewide dry pea yield trial.

Green Pea Varieties	Bozeman	Broadview	Creston	Huntley (Dry)	Huntley (Irri.)	Moccasin	Richland	Sidney (Dry)	Sidney (Irri.)
	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a
Aragorn	1948		4404			1204	5036	2966	3507
Arcadia	2029	604		541	1691	1186	5865	3783	5277
Hampton	2407	669	5083	773	1884	1444	4023	3630	4103
Majoret	2067	282	5024	693	1300	1265	4897	3819	4406
PS0877MT457	2325	536	4952	747	1395	1416	5330	3275	4470
<i>Mean</i>	2162	562	4717	667	1579	1303	5166	3571	3917
<i>P-value</i>	0.0211	0.0007	0.0621	0.0454	<0.0001	0.0008	<0.0001	0.4467	<0.0001
<i>LSD (0.05)</i>	275	167	Ns	217	234	184	603	Ns	562
<i>CV (%)</i>	9.02	21.11	13.21	23.02	10.49	10.01	8.14	12.22	10.13

Table 3. 2017 Yield summary across research sites in Montana conducting the Montana statewide dry pea yield trial.

Green Pea Varieties	Bozeman	Broadview	Conrad	Creston	Havre	Huntley (Dry)	Huntley (Irri.)	Moccasin	Richland	Sidney (Dry)	Sidney (Irri.)
	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a	lb/a
Aragorn	1860	784	2180	5249	1358	1561	3013	786	782	199	3017
Arcadia	2078	907	2257	5935	1174	1663	2911	876	669	280	3118
Hampton	2297	920	2665	5365	1532	1433	3113	636	1062	242	2982
Majoret	2048	673	2065	5185	1220	1324	3042	839	744	236	2992
PS0877MT457	1984	814	2471	5056	1172	1898	3116	1098	1099	318	3405
<i>Mean</i>	2080	865	2425	5135	1288	1524	2930	863	935	264	2762
<i>P-value</i>	0.0011	0.1806	0.4019	<0.0001	<0.0001	0.0002	0.6102	0.0065	0.0001	0.0023	<0.0001
<i>LSD (0.05)</i>	173	NS	NS	432	163	215	NS	259	245	87	574
<i>CV (%)</i>	5.75	18.14	18.13	5.95	8.92	9.69	15.86	20.84	18.47	19.69	12.33

Table 4. Mean yield performance of four dry pea varieties across four irrigated sites in 2016 and 2017.

Green Pea Varieties	Huntley 2016	Sidney 2016	Huntley 2017	Sidney 2017	Mean across 3 locations	Mean across 4 locations
Aragorn		3507	3013	3017	3179	
Hampton	1884	4103	3113	2982	3399	3021
Majoret	1300	4406	3042	2992	3480	2935
PS0877MT457	1395	4470	3116	3405	3664	3097
<i>Mean</i>	1579	3917	2930	2762		
<i>P-value</i>	<0.0001	<0.0001	0.6102	<0.0001		
<i>LSD (0.05)</i>	234	562	NS	574		
<i>CV (%)</i>	10.49	10.13	15.86	12.33		

Table 5. Mean days to flower for five dry pea genotypes across 7 locations in Montana in 2017.

Variety	Bozeman	Conrad	Creston	Havre	Huntley (Dry)	Moccasin	Sidney (Dry)	Mean Days to Flower
	days	days	days	days	days	days	days	days
Aragorn	58	67	53	62	68	45	59	59
Arcadia	58	72	54	63	69	39	61	59
Hampton	60	71	56	64	70	39	63	60
Majoret	60	70	55	64	70	50	62	62
PS0877MT457	56	68	52	59	67	54	55	59

Table 6. Mean plant height for five dry pea genotypes across 9 locations in Montana in 2017.

Variety	Bozeman	Broadview	Conrad	Creston	Havre	Huntley (Dry)	Moccasin	Richland	Sidney (Dry)	Mean Plant Height
	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
Aragorn	52	36	67	99	29	68	62	32	23	52
Arcadia	55	34	72	92	32	69	64	31	22	52
Hampton	50	34	71	88	32	70	63	31	22	51
Majoret	59	38	70	97	35	70	64	38	27	55
PS0877MT457	61	43	43	91	37	67	61	40	30	53

Table 7. Mean lodging score for five dry pea genotypes across 7 locations in Montana in 2017. Scores of 0 indicate no lodging while scores of 9 indicate complete lodging.

Variety	Bozeman	Havre	Moccasin	Richland	Sidney (Dry)	Mean Lodging
	0-9	0-9	0-9	0-9	0-9	0-9
Aragorn	0.9	1.8	4.5	0.0	0.0	1.4
Arcadia	0.2	1.5	6.3	0.5	0.0	1.7
Hampton	0.3	1.8	2.3	0.0	0.0	0.9
Majoret	0.2	2.0	0.8	0.5	0.0	0.7
PS0877MT457	1.0	1.5	2.5	1.0	0.0	1.2

Table 8. Mean 1000 seed weight for five dry pea genotypes across 7 locations in Montana in 2017.

Variety	Bozeman	Conrad	Creston	Havre	Moccasin	Richland	Sidney (Dry)	Mean 1000 Seed Weight
	gm	gm	gm	gm	gm	gm	gm	gm
Aragorn	191	211	192	231	147	188	205	195
Arcadia	186	187	182	221	133	181	214	186
Hampton	197	236	209	239	153	206	231	210
Majoret	210	226	217	238	165	202	221	211
PS0877MT457	208	242	222	254	176	214	241	222

Table 9. Mean protein content five dry pea genotypes across 8 locations in Montana in 2017.

Variety	Bozeman	Broadview	Conrad	Creston	Havre	Huntley	Moccasin	Sidney	Mean Protein
	%	%	%	%	%	%	%	%	%
Aragorn	23.35	21.18	17.33	21.90	19.85	26.33	26.45	10.40	20.85
Arcadia	21.88	21.08	14.00	21.08	16.28	27.40	26.33	10.35	19.80
Hampton	23.88	23.20	20.93	24.05	20.40	27.43	26.13	14.25	22.53
Majoret	23.78	22.33	18.35	22.50	20.18	27.70	28.65	12.90	22.05
PS0877MT457	23.53	24.28	14.78	23.93	21.80	27.70	26.55	14.10	22.08