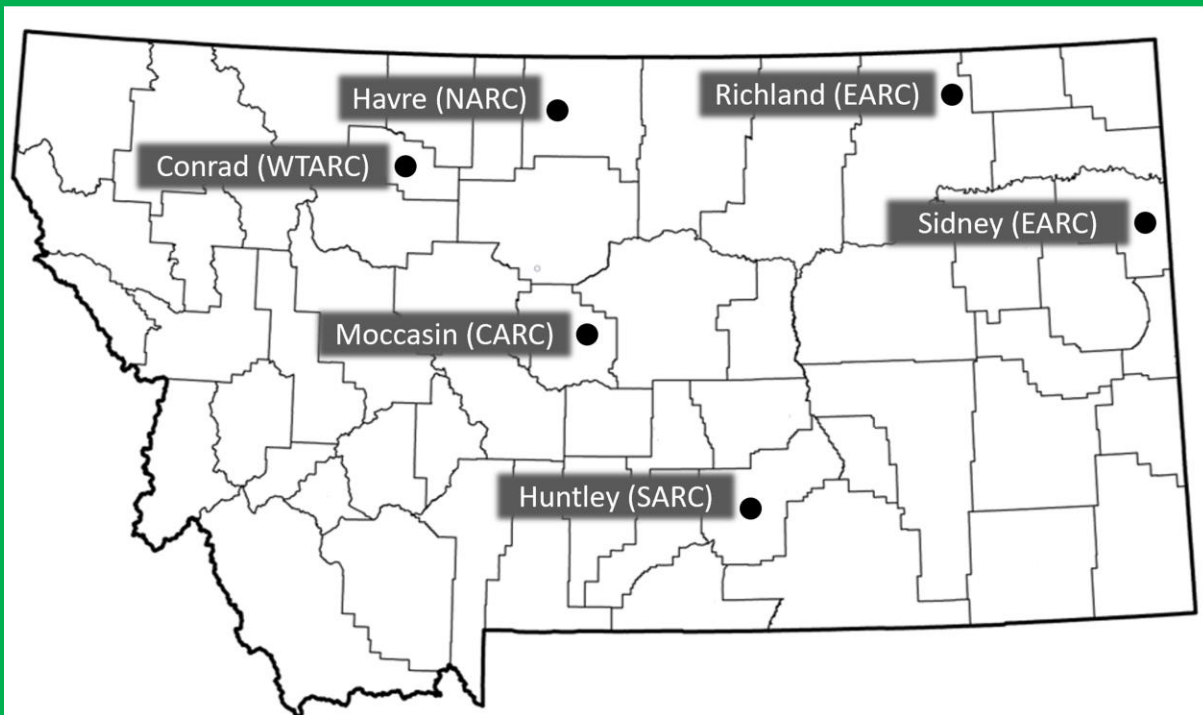


2024 Montana Cool-Season Spring Pulse Variety Evaluation Annual Report

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Montana State University
Montana Agricultural Experiment Stations

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The Montana State University Eastern Agricultural Research Center in Sidney, MT coordinates an annual variety evaluation for cool season spring pulse crops (dry pea, lentil, and chickpea) at multiple locations across the state of Montana. In 2024, funding for this project was obtained from the Montana Agricultural Experiment Station, the USA Dry Pea and Lentil Council, and testing fees from private entities submitting entries for evaluation. The results provided in this report reflect the efforts of a large team of individuals from the Montana State University Agricultural Experiment Stations, Montana State University Extension, industrial partners from the seed industry, and cooperating producers. The following list provides contact information for many of the individuals involved in the 2024 variety evaluation.

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PROJECT DESCRIPTION AND OBJECTIVE

Project Description

Cool season spring pulse crops (dry pea, lentil and chickpea) are an important component of Montana dryland crop rotations. For more than a dozen years the Montana State University Agricultural Experiment Stations have conducted annual pulse crop variety evaluations across the state of Montana to assist the selection of adaptation, yield potential and quality of these crops. The Montana State University Eastern Agricultural Research Center (EARC) in Sidney, Montana organizes and coordinates these efforts. In 2024, trials were conducted at four MSU Agricultural Research Centers and a cooperating producer's field south of Richland, Montana in the northeast corner of the state. The results reported herein are intended to aid producers, seed suppliers, breeders and the research community in variety development, selection, and deployment. The report is available both in print and electronic formats and can be found at: (<http://agresearch.montana.edu/earc/annualreports.html>).

Objective

The objective of this project is to evaluate adaptation, yield, and seed quality parameters for dry pea, lentil, and chickpea cultivars and breeding lines selected by stakeholder input across a broad range of Montana environments targeting the major pulse growing regions of the state.

METHODS

Procedures and Experimental Design

Seven dry pea, six lentil and ten chickpea entries were selected by the EARC to trial at all locations. In addition, seed companies and pulse breeders with an interest in Montana pulse production were invited to submit cultivars or experimental lines for evaluation in 2024. Locations available for evaluation were indicated in the invitation letter and the selection of trial locations for each entry was determined by the submitting party. Crops were planted at five dryland locations (Conrad, Havre, Huntley, Moccasin, and Richland) and one irrigated location (Sidney).

Seeds for all entries were tested for germination and treated with Obvius Fungicide (BASF Corporation, Research Triangle Park, NC) and Cruiser 5FS Insecticide (Syngenta Crop Protection, Inc., Greensboro, NC) according to the manufacturer’s instructions. Seeds were packaged on a per plot basis to obtain live seed rates of 8, 12 and 4 live seeds per ft² for pea, lentil, and chickpea, respectively. Seeds were sent to the cooperating research centers with an appropriate commercial rhizobial inoculant to be applied at planting. Research plots were planted in a randomized complete block design with four replicates per entry. Plot size varied amongst locations and was dictated by the equipment available at each location. Management practices vary by location but are consistent with typical practices for that region. In-season measurements and harvest data were collected by each cooperating center and sent to the EARC for analysis. Grain yield data was adjusted to 13% moisture content to facilitate comparison across locations. Dry pea protein concentrations were determined for pea samples by near-infrared spectroscopy (NIR) at the EARC in Sidney. Analysis of variance was performed in R (version 4.2.1) and Fisher’s LSD was performed from the agricolae package (version 1.3-5) for mean comparison whenever the F-test was significant at $P<0.05$.

List of collaborators and locations

The type of crop (pea, lentil, and chickpea) and number of entries for each of these crops evaluated at the different locations varied from location to location depending on the interest of seed suppliers and availability of resources at the respective location. The list of locations, collaborators and the type of crops evaluated at each location is shown in Table 1.

Table 1. Collaborators, locations, and crops evaluated in 2024

Location	Collaborator	Irrigation	Crops evaluated at location			
			Pea	Lentil	Chickpea	
Conrad	WTARC	No	X	X	X	Crop failure
Havre	NARC	No	X	X	X	
Huntley	SARC	No	X	X	X	
Moccasin	CARC	No	X			
Richland	EARC	No	X	X	X	Wildlife damage to chickpeas
Sidney	EARC	Yes	X	X	X	

†CARC = Central Agricultural Research Center, EARC = Eastern Agricultural Research Center, NARC = Northern Agricultural Research Center, SARC = Southern Agricultural Research Center, WTARC = Western Triangle Research Center, 'X' indicates the collaborator participated for the specific crop variety evaluation in 2024.

Precipitation and Management Practices

Precipitation, site information and agronomic management practices for the respective locations are summarized in Tables 2 and 3.

Table 2. Site characteristics for each trial location

	Havre (NARC)	Huntley (SARC)	Moccasin (CARC)	Richland	Sidney (EARC)
Soil Type	Telstad-Joplin Loam	Lohmiller Silty Clay	Danvers-Judith clay loam	Farnuf Loam	Savage Silty Clay Loam
Elevation (ft)	2690	3000	4250	2975	2200
Seasonal Precipitation (April - August) (in)	9.8	8.8	8.0	4.1*	6.4
Average Precipitation (April - August) (in)	7.9	8.4	8.9	8.5**	9.6
Irrigation (in)					2.2

* Data collected from an onsite weather station spanning 5/14/24 to 8/12/24

** Data from Opheim, MT weather station US00246238 approximately 12 miles from trial location

Table 3. Major agronomic management practices for each location in 2024

Location	Tillage	Seeding to Harvest Dates	Previous Crop	Fertilizer	Pesticide Applications
Pea Trials					
Havre	No-Till	4/15 to 7/30	Chem Fallow	None	Prowl H2O @ 32 oz/a on 10/20/23, RT3 @ 22 oz/a & Sharpen @ 1 oz/a on 4/13, Mustang Max @ 4 oz/a on 5/15
Huntley		4/25 to 8/13			Prowl H2O @ 16 oz/a & RT3 @ 32 oz/a preplant
Moccasin	No-Till	4/25 to 8/12	Hay Barley	20-30-20-10 @ 50 lb/ac	Prowl H2O @ 1.5 pt/a; RT3 @ 1.5 pt/a; Mustang Maxx @ 4 oz/a
Richland	No-Till	5/14 to 8/12	Durum	None	Fall-Valor, Spring-RoundUp/Sharpen
Sidney	No-Till	4/23 to 7/29	Spring Wheat	None	Panther @ 2 oz/a on 10/16/23; Varisto @ 21 oz/a and Cleanse @ 8 oz/a on 5/28
Lentil Trials					
Havre	No-Till	4/15 to 8/18	Chem Fallow	None	Prowl H2O @ 32 oz/a on 10/20/23, RT3 @ 22 oz/a & Sharpen @ 1 oz/a on 4/13
Huntley		4/25 to 8/13			Prowl H2O @ 16 oz/a & RT3 @ 32 oz/a preplant
Richland	No-Till	5/14 to 8/21	Durum	None	Fall-Valor, Spring-RoundUp/Sharpen
Sidney	Conv.	4/25 to 8/3	Spring Wheat	None	Outlook @ 14 oz/a on 4/25
Chickpea Trials					
Havre	No-Till	4/24 to 8/20	Chem Fallow	None	Prowl H2O @ 32 oz/a on 10/20/23, RT3 @ 22 oz/a & Sharpen @ 1 oz/a on 4/13
Huntley		4/25 to 8/28			Prowl H2O @ 16 oz/a & RT3 @ 32 oz/a preplant
Richland	No-Till	5/15 to 9/4	Durum	None	Fall-Valor, Spring-RoundUp/Sharpen
Sidney	No-Till	4/27 to 8/15	Spring Wheat	None	Panther @ 2 oz/a on 10/19/23; Cleanse @ 8 oz/a and Tough @ 20 oz/a on 6/3; Miravis Top at 13.7 oz/a on 6/26, 7/19 & 8/1; and Miravis Neo at 14 oz/a on 6/14 & 7/9

List of Varieties

Table 4 includes the list of varieties and experimental lines evaluated in 2024. Additional information for these entries can be obtained by contacting the respective seed suppliers listed in the acknowledgements section. Entries listed in this table include varieties requested by seed suppliers, varieties selected as check varieties by the Montana Agricultural Experiment Station and experimental lines from the Montana State University, North Dakota State University and USDA-ARS pulse crop breeding programs.

Table 4. Dry pea, lentil and chickpea entries included in 2024 variety evaluation trials

Crop	Entry	Seed color/size	Maturity
Dry Pea	2822	Yellow	
	5206	Yellow	
	6020-11	Yellow	
	6242-1	Yellow	
	AAC Beyond	Yellow	Early
	AAC Carver	Yellow	Early
	AAC Chrome	Yellow	Medium
	AAC Julius	Yellow	
	AAC Profit	Yellow	Medium/Late
	Aragorn	Green	Medium
	B202318	Green	
	Banner	Green	
	Caphorn	Yellow	
	CDC 5791	Yellow	
	CDC 5845	Yellow	
	CDC Inca	Yellow	
	CDC Meadow	Yellow	
	CP5222Y	Yellow	
	CP5244Y	Yellow	
	DS-Admiral	Yellow	Medium
	Fairway	Green	
	Ginny 2	Green	
	GTPC001	Yellow	
	GTPR004	Yellow	
GTPR005	Yellow		

Table 4. Continued

Crop	Entry	Seed color/size	Maturity
Dry Pea	Hampton	Green	Medium
	Hyline	Yellow	
	LG Sunrise	Yellow	
	LGPN4184	Yellow	
	LGPN4258	Yellow	
	LGPN4260	Yellow	
	McMurphy	Yellow	
	MS GrowPro	Yellow	
	MS Prostar	Yellow	
	MT 457	Green	
	N15058-11	Yellow	
	ND Dawn	Yellow	Early
	Orchestra	Yellow	
	Passion	Green	
	PG Bank	Yellow	
	PG Cash	Yellow	
	PG Greenback	Green	
	Pizzazz	Yellow	
	Pro 143-6230	Yellow	
	Pro 171-7665	Green	
	PS16100017	Green	
	PS16NZ0003	Yellow	
	PS16NZ0004	Yellow	
	PS17100008	Yellow	
	PS17100022	Yellow	
	PS17100120	Yellow	
	PS17100182	Green	
	PS22100020	Yellow	
	PS22100111	Yellow	
	Salamanca	Yellow	Early
Shamrock	Green	Early	

Table 4. Continued

Crop	Entry	Seed color/size	Maturity
Lentil	Avondale	Medium Green	Medium
	CDC Greenstar	Large Green	
	CDC Impala CL	Small Red	Early
	CDC Richlea	Medium Green	Medium
	CDC Viceroy	Small Green	Early/Medium
	LC06601616R		
	LC14600016P		
	LC14600017P		
	LC14600027P		
	LC14600088R		
	LC19640192R		
	LC19640193R		
	LC19640586R		
	Pardina	Spanish Brown	
Chickpea	CDC Anna	Desi	Medium
	CDC Frontier	Kabuli	Late
	CDC Leader	Kabuli	Medium
	CDC Orion	Kabuli	Late
	CDC Palmer	Kabuli	Medium/Late
	Kasin	Kabuli	
	MT Bridger (NDC160236)	Kabuli	
	Myles	Desi	
	Nash	Kabuli	
	ND Crown	Kabuli	
	New Hope	Kabuli	
	Royal	Kabuli	
	Sawyer	Kabuli	
	Sierra	Kabuli	

RESULTS

Dry Pea Variety Evaluation in 2024

Fifty-six dry pea entries (43 yellow and 13 green) were evaluated in 2024 at five locations. Eight yellow pea and two green pea cultivars were selected as check varieties and tested at all locations. Ten experimental lines originated from university and government breeding programs. The remaining entries are cultivars and breeding lines from private entities and were tested at locations requested by the seed suppliers. Twenty-five of the 56 entries in the 2024 trial are new relative to 2023 highlighting the consistent addition of new cultivars and breeding material in the pea trial which has been common in recent years.

Results of the 2024 dry pea variety evaluations are presented in two groups based on cotyledon color: Tables 5-10 for yellow peas and Tables 11-16 for green peas. Reported data include yield, protein, thousand-kernel weight, test weight, plant height at harvest and days to flowering. Three-year yield and protein averages for 2022 through 2024 are presented for those entries with three years of data. Protein data is presented on a seed dry matter basis and data for all locations were collected on a single instrument employing the same protein prediction model allowing comparison of data across locations.

In 2024, pea yields were down at Huntley, Richland, and Sidney relative to 2023 and down at Moccasin relative to past averages. Irrigated yellow pea yields in Sidney averaged 4687 lb/a in 2024, down from 5422 lb/a in 2023. Consistent with recent years, two inches of water was applied to this trial during two irrigations in June. Seasonal rainfall was three inches below normal with much of the deficit coming in July during pod fill. Late season irrigations were avoided to prevent lodging, and no lodging was observed at crop maturity.

Planting of the 2024 Richland trial was delayed by weather until May 14th. Only four inches of rainfall were received during the growing season. Less than one inch was received in the month of July which corresponds to the period of flowering and pod fill at this location. Yields in Richland were slightly reduced relative to 2023 at an average of 1939 lb/a for yellow peas in 2024. Weed pressure was higher than normal in 2024 resulting in more variability in the trial.

After several years of below normal precipitation, the Havre location received above normal precipitation in 2024 including three- and one-half inches in a two-day period early in May. As a result, yellow pea yields improved to 3800 lb/a from 1683 and 2060 lb/a in the previous two seasons. A drop in seed protein of more than one percent accompanied this yield increase.

Table 5. Yellow Dry Pea Grain Yield (lb/a) with three-year averages in parentheses

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
2822	3733		1269		
5206	3682		1629		
6020-11	3728				4572
6242-1	3513				4576
AAC Beyond	3402			2112	
AAC Carver	3980 (2790)	2661	1615	1874 (2317)	5318 (5531)
AAC Chrome	3691 (2749)		1628		
AAC Julius	3553 (2671)		1723		
AAC Profit	3551 (2497)	2695	1676	1906 (2384)	5069 (5291)
Caphorn	3885			1887	
CDC 5791	3367				4209
CDC 5845	3607				4730
CDC Inca	3595	2153		1755	4575
CDC Meadow	4027	2263	1695	2142	5074
CP5222Y	3902 (2892)	2031		1910 (2222)	4509
CP5244Y	4233 (2954)	2492		1983 (2084)	4957
DS-Admiral	3840 (2667)	2391	1484	1914 (2127)	4796 (4656)
GTPC001					4578
GTPR004					4304
GTPR005					4205
Hyline	4009			1953	
LG Sunrise	3655	2246		2015	4956
LGPN4184	4218				4826
LGPN4258	4109				5131
LGPN4260	4392				5147
McMurphy	3770		1447		
MS GrowPro	3935			2174	
MS Prostar	4147			2077	
N15058-11	3930				4914
ND Dawn	3758 (2910)	2352	1805	1945 (2257)	4802 (4774)
Orchestra	4022 (2798)	3004	1488	2056 (2233)	4881 (5095)
PG Bank	3546	1831		1888	4108
PG Cash	3828	2265		2152	4823
Pizzazz	4183 (3064)			2234 (2378)	
Pro 143-6230	3869 (2711)			1885 (2047)	
PS16NZ0003	3663	2220		1720	4272
PS16NZ0004	3704			1960	
PS17100008	3905 (2948)	2270		1864 (2275)	4906
PS17100022	4100 (3022)	2647		2034 (2331)	4888
PS17100120	2990	1944		1285	3768
PS22100020	3536	2125		1784	4767
PS22100111	3407	2146		1897	4273
Salamanca	4047 (2866)				
Mean	3800	2319	1587	1939	4687
P-value	<0.0001	0.003	0.02	0.03	<0.0001
LSD	299	503	276	392	345
CV (%)	5.6	15.3	12.1	14.3	5.2

Table 6. Yellow Dry Pea Protein (% Dry Matter Basis) with three-year averages in parentheses

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
2822	26.6		28.7		
5206	26.6		28.8		
6020-11	25.6				26.3
6242-1	26.0				26.0
AAC Beyond	26.6			25.3	
AAC Carver	23.2 (23.9)	25.7	25.0	23.5 (23.4)	22.6 (21.9)
AAC Chrome	25.3 (25.6)		27.1		
AAC Julius	26.2 (27.1)		28.6		
AAC Profit	25.7 (26.6)	27.5	27.6	24.6 (24.9)	25.2 (24.9)
Caphorn	25.4			25.8	
CDC 5791	26.4				27.0
CDC 5845	25.6				25.5
CDC Inca	26.6	27.5		25.7	26.4
CDC Meadow	24.2	26.3	25.9	24.2	23.7
CP5222Y	25.0 (25.5)	27.6		24.3 (24.4)	24.6
CP5244Y	23.8 (25.5)	28.3		24.7 (25.0)	24.8
DS-Admiral	24.2 (25.4)	26.1	25.8	24.6 (24.3)	23.8 (23.5)
GTPC001					24.9
GTPR004					26.0
GTPR005					26.3
Hyline	23.8			23.6	
LG Sunrise	24.0	26.2		23.5	23.3
LGPN4184	25.3				25.7
LGPN4258	24.2				25.2
LGPN4260	24.8				25.1
McMurphy	26.0		29.8		
MS GrowPro	26.0			26.0	
MS Prostar	25.3			26.1	
N15058-11	25.0				25.3
ND Dawn	24.1 (24.6)	25.6	25.4	24.2 (24.0)	24.0 (23.2)
Orchestra	26.4 (27.2)	28.6	29.3	26.6 (26.7)	26.0 (27.1)
PG Bank	26.6	28.7		25.9	26.8
PG Cash	25.3	28.9		25.1	25.8
Pizzazz	24.6 (25.1)			25.0 (24.8)	
Pro 143-6230	24.9 (26.2)			24.3 (24.8)	
PS16NZ0003	26.5	29.4		25.6	26.3
PS16NZ0004	26.3			25.1	
PS17100008	23.7 (24.7)	26.7		24.2 (24.3)	24.3
PS17100022	25.1 (25.6)	27.7		24.5 (24.9)	25.6
PS17100120	25.0	25.0		23.9	24.8
PS22100020	24.5	27.7		24.8	24.3
PS22100111	24.5	26.6		23.3	24.5
Salamanca	24.4 (25.2)				
Mean	25.2	27.2	27.4	24.8	25.2
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
LSD	0.6	1.2	0.8	0.8	0.7
CV (%)	1.8	3.1	2.0	2.3	2.0

Table 7. Yellow Dry Pea Thousand Kernel Weight (g)

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
2822	196		179		
5206	191		186		
6020-11	196				216
6242-1	206				227
AAC Beyond	190			195	
AAC Carver	200	213	197	217	221
AAC Chrome	201		189		
AAC Julius	180		175		
AAC Profit	197	225	185	226	209
Caphorn	228			239	
CDC 5791	207				207
CDC 5845	210				226
CDC Inca	199	190		205	207
CDC Meadow	181	179	175	216	209
CP5222Y	204	207		210	236
CP5244Y	237	233		247	271
DS-Admiral	209	216	206	225	221
GTPC001					218
GTPR004					227
GTPR005					216
Hyline	212			217	
LG Sunrise	204	202		209	220
LGPN4184	204				232
LGPN4258	218				230
LGPN4260	223				267
McMurphy	218		192		
MS GrowPro	218			262	
MS Prostar	204			221	
N15058-11	218				228
ND Dawn	207	227	193	216	235
Orchestra	238	228	214	233	272
PG Bank	190	223		227	251
PG Cash	220	222		214	250
Pizzazz	266			257	
Pro 143-6230	184			198	
PS16NZ0003	234	225		232	267
PS16NZ0004	224			243	
PS17100008	235	229		231	241
PS17100022	224	216		223	257
PS17100120	231	223		242	259
PS22100020	226	233		234	245
PS22100111	227	224		231	253
Salamanca	226				
Mean	213	217	190	225	234
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
LSD	5.2	8.8	7.7	10.0	10.4
CV (%)	1.7	2.8	2.8	3.1	3.2

Table 8. Yellow Dry Pea Test Weight (lb/bu)

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
2822	59.5		63.1		
5206	60.3		63.2		
6020-11	60.3				63.1
6242-1	60.3				62.8
AAC Beyond	61.0			63.8	
AAC Carver	61.2	62.8	63.4	63.6	63.4
AAC Chrome	59.9		61.8		
AAC Julius	60.1		62.6		
AAC Profit	60.3	61.2	62.9	64.3	62.6
Caphorn	60.6			63.8	
CDC 5791	60.5				63.6
CDC 5845	59.8				62.5
CDC Inca	60.1	62.4		63.9	63.6
CDC Meadow	61.0	63.9	63.9	62.2	64.5
CP5222Y	62.0	62.1		65.7	65.1
CP5244Y	61.8	62.1		64.0	64.9
DS-Admiral	60.3	61.3	62.8	62.9	63.4
GTPC001					63.2
GTPR004					62.8
GTPR005					63.1
Hyline	60.2			62.7	
LG Sunrise	60.6	62.0		63.2	64.5
LGPN4184	60.9				63.1
LGPN4258	61.1				63.8
LGPN4260	60.1				63.5
McMurphy	60.4		62.4		
MS GrowPro	60.4			63.8	
MS Prostar	60.9			62.3	
N15058-11	61.3				64.1
ND Dawn	60.3	61.6	62.6	62.2	63.7
Orchestra	61.1	62.0	63.1	63.7	64.8
PG Bank	61.0	61.5		64.0	63.2
PG Cash	61.4	62.1		63.3	64.7
Pizzazz	61.8			65.1	
Pro 143-6230	60.2			63.2	
PS16NZ0003	61.0	63.2		66.0	64.3
PS16NZ0004	61.5			65.9	
PS17100008	61.0	62.4		62.8	64.4
PS17100022	61.5	62.3		64.8	64.4
PS17100120	60.7	62.2		65.5	63.1
PS22100020	60.4	60.7		63.1	63.2
PS22100111	60.5	62.1		64.6	63.6
Salamanca	60.4				
Mean	60.6	62.1	62.9	63.9	63.7
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
LSD	0.6	0.5	0.4	0.9	0.8
CV (%)	0.7	0.6	0.4	1.0	0.9

Table 9. Yellow Dry Pea Plant Height at Maturity (cm)

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
2822	65		52		
5206	63		59		
6020-11	59				73
6242-1	63				71
AAC Beyond	56			65	
AAC Carver	55	79	54	69	62
AAC Chrome	51		43		
AAC Julius	55		51		
AAC Profit	62	81	51	62	59
Caphorn	54			66	
CDC 5791	60				68
CDC 5845	65				74
CDC Inca	60	80		65	68
CDC Meadow	58	73	49	61	61
CP5222Y	61	72		70	58
CP5244Y	54	71		62	55
DS-Admiral	59	71	53	68	55
GTPC001					55
GTPR004					71
GTPR005					73
Hyline	63			65	
LG Sunrise	61	80		70	61
LGPN4184	58				60
LGPN4258	52				53
LGPN4260	55				59
McMurphy	60		52		
MS GrowPro	60			73	
MS Prostar	58			64	
N15058-11	54				58
ND Dawn	62	74	46	61	52
Orchestra	55	80	51	61	60
PG Bank	56	85		68	72
PG Cash	53	80		64	59
Pizzazz	50			63	
Pro 143-6230	62			60	
PS16NZ0003	59	79		77	61
PS16NZ0004	59			79	
PS17100008	45	67		56	47
PS17100022	67	89		74	47
PS17100120	54	60		61	53
PS22100020	54	77		66	54
PS22100111	62	72		72	76
Salamanca	59				
Mean	58	77	51	67	61
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
LSD	6.9	7.7	5	9	7
CV (%)	8.6	7.1	6.6	10.0	8.0

Table 10. Yellow Dry Pea Days to Flowering

Variety/Line	Havre	Huntley	Moccasin	Sidney
2822	67		71	
5206	67		72	
6020-11	68			59
6242-1	68			62
AAC Beyond	68			
AAC Carver	68	64	69	56
AAC Chrome	68		70	
AAC Julius	67		71	
AAC Profit	67	64	67	59
Caphorn	68			
CDC 5791	68			62
CDC 5845	68			60
CDC Inca	67	63		62
CDC Meadow	65	62	67	55
CP5222Y	62	64		54
CP5244Y	62	63		54
DS-Admiral	67	63	68	57
GTPC001				56
GTPR004				62
GTPR005				59
Hyline	67			
LG Sunrise	64	63		55
LGPN4184	67			56
LGPN4258	62			53
LGPN4260	62			59
McMurphy	67		70	
MS GrowPro	67			
MS Prostar	67			
N15058-11	64			55
ND Dawn	67	62	69	55
Orchestra	63	62	67	56
PG Bank	67	65		59
PG Cash	64	63		55
Pizzazz	62			
Pro 143-6230	67			
PS16NZ0003	68	64		56
PS16NZ0004	67			
PS17100008	62	62		55
PS17100022	67	64		55
PS17100120	68	66		54
PS22100020	64	62		56
PS22100111	67	64		59
Salamanca	64			
Mean	66	63	69	57
P-value	<0.0001	<0.0001	<0.0001	<0.0001
LSD	1.1	1.8	0.8	2
CV (%)	1.2	2.0	0.8	1.9

Table 11. Green Dry Pea Grain Yield (lb/a) with three-year averages in parentheses

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
Aragorn	3879 (2828)	2039	1848	1839 (2020)	3909 (2753)
B202318	3708			2095	
Banner	3849 (2776)			2138	
Fairway	3838 (2672)			1802	
Ginny 2	3984 (2849)			2016 (2164)	
Hampton	3730 (2681)	2403	1369	1953 (2265)	4530 (3796)
MT 457	3524	2641	1564	2156	4526
Passion	3743 (2771)			1812	
PG Greenback	3841	2516		1991	4584
Pro 171-7665	3580 (2680)			1609	
PS16100017	3767	2617		1637	4031
PS17100182	3600	2167		1707	4407
Shamrock	3647 (2567)		1402		
Mean	3745	2397	1546	1896	4331
P-value	0.6	0.1	0.03	0.02	0.001
LSD	NS	NS	320	338	334
CV (%)	7.9	14.4	13.4	12.4	5.2

Table 12. Green Dry Pea Protein (% Dry Matter Basis) with three-year averages in parentheses

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
Aragorn	24.6 (25.4)	27.8	25.8	25.0 (25.0)	24.4 (24.6)
B202318	23.0			22.9	
Banner	23.4 (23.9)			23.3	
Fairway	26.4 (27.3)			26.0	
Ginny 2	24.8 (25.5)			24.8 (24.7)	
Hampton	27.0 (27.0)	28.3	27.9	25.9 (26.4)	26.3 (26.4)
MT 457	25.9	28.4	26.8	25.5	26.1
Passion	24.2 (24.5)			23.7	
PG Greenback	24.3	27.1		24.0	24.9
Pro 171-7665	23.7 (24.3)			23.6	
PS16100017	26.5	26.5		25.2	26.5
PS17100182	28.0	28.9		26.2	26.7
Shamrock	26.1 (26.6)		26.2		
Mean	25.2	27.8	26.7	24.7	25.8
P-value	<0.0001	0.003	0.0006	<0.0001	<0.0001
LSD	0.7	1.1	0.8	0.7	0.6
CV (%)	2.0	2.7	2.0	2.0	1.5

Table 13. Green Dry Pea Thousand Kernel Weight (g)

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
Aragorn	202	194	185	198	221
B202318	203			191	
Banner	192			187	
Fairway	162			171	
Ginny 2	197			200	
Hampton	196	197	182	205	210
MT457	225	216	196	220	252
Passion	192			197	
PG Greenback	195	207		199	223
Pro 171-7665	212			216	
PS16100017	197	200		188	211
PS17100182	183	174		194	206
Shamrock	201		179		
Mean	197	198	185	197	221
P-value	<0.0001	<0.0001	0.004	<0.0001	<0.0001
LSD	7.0	7	8	9	6
CV (%)	2.5	2.3	2.8	3.2	2.0

Table 14. Green Dry Pea Test Weight (lb/bu)

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
Aragorn	59.6	62.1	62.2	62.1	62.6
B202318	61.4			64.8	
Banner	61.4			65.0	
Fairway	59.1			62.3	
Ginny 2	60.1			62.4	
Hampton	60.1	62.6	62.8	64.6	62.7
MT457	59.9	61.7	62.7	63.9	63.2
Passion	61.0			63.4	
PG Greenback	60.5	61.0		63.6	63.7
Pro 171-7665	61.0			63.3	
PS16100017	59.3	61.3		62.3	62.7
PS17100182	60.5	64.3		64.3	64.1
Shamrock	60.6		63.2		
Mean	60.3	62.2	62.7	63.5	63.1
P-value	<0.0001	<0.0001	0.009	<0.0001	0.0010
LSD	0.4	0.5	0.5	0.6	0.7
CV (%)	0.5	0.5	0.6	0.6	0.8

Table 15. Green Dry Pea Plant Height at Maturity (cm)

Variety/Line	Havre	Huntley	Moccasin	Richland	Sidney
Aragorn	49	71	46	59	45
B202318	51			68	
Banner	50			69	
Fairway	54			52	
Ginny 2	54			52	
Hampton	41	66	45	50	50
MT457	53	84	47	68	56
Passion	43			54	
PG Greenback	65	87		71	73
Pro 171-7665	52			50	
PS16100017	48	73		52	52
PS17100182	63	78		69	63
Shamrock	58		49		
Mean	52	76	47	60	56
P-value	<0.0001	0.0002	0.7	<0.0001	<0.0001
LSD	7.41	8.12	NS	7.93	6.57
CV (%)	9.9	7.2	10.6	9.2	7.9

Table 16. Green Dry Pea Days to Flowering

Variety/Line	Havre	Huntley	Moccasin	Sidney
Aragorn	62	60	66	53
B202318	60			
Banner	61			
Fairway	67			
Ginny 2	64			
Hampton	68	62	70	55
MT457	61	60	66	52
Passion	63			
PG Greenback	68	64		62
Pro 171-7665	64			
PS16100017	67	62		56
PS17100182	68	64		59
Shamrock	67		71	
Mean	65	62	68	56
P-value	<0.0001	0.002	<0.0001	<0.0001
LSD	1.4	2.1	0.7	1
CV (%)	1.5	2.3	0.7	1.3

Lentil Variety Evaluation in 2024

The 2024 lentil variety evaluation included 14 lentil entries evaluated at four locations. Included were six cultivars that represent the common classes of lentils with the remaining being advanced breeding lines from the USDA-ARS. Results of the 2024 lentil variety evaluations are presented in Tables 17-21. Reported data include yield, thousand kernel weight, test weight, plant height at harvest and days to flowering. Three-year averages for 2022 through 2024 are presented for entries with three years of data.

Irrigated lentil yields in Sidney were excellent for the second year in a row coming in at an average of 3232 lb/a. The lentil trial received its second irrigation on July 9th which helped mitigate the effects of the lack of rainfall received in Sidney in July and August. Grasshopper damage was not evident in this trial and no insecticide applications were required.

A late planting and lack of rainfall in June and July resulted in a second consecutive poor lentil crop at Richland. Weed pressure was substantial and variable throughout the trial. No grasshopper damage was observed.

Lentil yields in Havre improved relative to 2023 and were very similar to 2022. Lentils at this location did not benefit from the three- and one-half inches of rainfall in early May in the same manner as the pea trial.

Table 17. Lentil Grain Yield (lb/a) with three-year averages in parentheses

Variety/Line	Havre	Huntley	Richland	Sidney
Avondale	1382	1710	1254 (1281)	3462 (3026)
CDC Greenstar	1296	1289	1025 (1018)	2991 (2706)
CDC Impala CL	1085	1885	890 (1005)	2708 (2643)
CDC Richlea	1134	1941	1148 (1300)	3388 (2983)
CDC Viceroy	1170	1603	900 (1024)	3042 (2813)
LC06601616R	1495	1552	875	3160
LC14600016P	1321	1369	1008	3418
LC14600017P	1208	1340	922	2886
LC14600027P	1260	1446	931	3194
LC14600088R	1177	1542	1163 (1382)	3281 (3099)
LC19640192R	1374	2215	1058	3589
LC19640193R	1323	1712	1011	3468
LC19640586R	1461	1638	1068	3396
Pardina	1245	1530	861	3268
Mean	1281	1626	1008	3232
P-value	0.003	0.003	0.02	0.004
LSD	200	419	225	418
CV (%)	10.9	18.1	15.6	9.1

Table 18. Lentil Thousand Kernel Weight (g)

Variety/Line	Havre	Huntley	Richland	Sidney
Avondale	42.6	49.8	44.8	47.9
CDC Greenstar	59.0	64.6	60.1	64.4
CDC Impala CL	26.9	29.4	25.1	29.7
CDC Richlea	45.0	50.0	46.6	49.8
CDC Viceroy	28.5	32.1	28.8	31.7
LC06601616R	47.4	45.6	42.4	47.5
LC14600016P	42.8	44.2	39.5	45.0
LC14600017P	39.6	45.1	41.8	47.2
LC14600027P	41.6	49.2	44.0	48.5
LC14600088R	46.4	54.7	50.4	55.5
LC19640192R	39.8	46.6	40.1	46.7
LC19640193R	40.0	44.9	39.7	45.1
LC19640586R	43.0	53.7	47.3	54.2
Pardina	33.9	37.5	33.5	38.6
Mean	41.2	46.2	41.7	46.5
P-value	<0.0001	<0.0001	<0.0001	<0.0001
LSD	1.3	1.9	1.7	2.4
CV (%)	2.3	2.9	2.9	3.7

Table 19. Lentil Test Weight (lb/bu)

Variety/Line	Havre	Huntley	Richland	Sidney
Avondale	61.0	60.2	62.3	61.2
CDC Greenstar	57.3	59.2	59.9	58.6
CDC Impala CL	64.1	64.0	65.7	64.1
CDC Richlea	59.8	59.8	61.5	60.1
CDC Viceroy	63.4	63.9	64.9	63.9
LC06601616R	60.2	63.2	65.1	63.8
LC14600016P	62.6	61.9	64.6	63.7
LC14600017P	62.6	63.6	64.8	63.5
LC14600027P	60.3	61.3	62.6	61.6
LC14600088R	59.9	60.2	61.6	60.3
LC19640192R	60.3	60.4	62.0	61.0
LC19640193R	59.7	60.4	62.0	61.3
LC19640586R	61.5	60.7	61.5	60.6
Pardina	63.7	64.0	65.5	64.8
Mean	61.2	61.6	63.1	62.0
<i>P</i>-value	<0.0001	<0.0001	<0.0001	<0.0001
LSD	0.3	1.6	0.3	0.4
CV (%)	0.4	1.9	0.3	0.5

Table 20. Lentil Plant Height (cm)

Variety/Line	Havre	Huntley	Richland	Sidney
Avondale	23	43	35	43
CDC Greenstar	27	40	36	40
CDC Impala CL	26	44	31	42
CDC Richlea	24	41	34	41
CDC Viceroy	25	41	31	42
LC06601616R	24	41	30	39
LC14600016P	23	43	33	39
LC14600017P	22	41	33	38
LC14600027P	24	38	26	41
LC14600088R	25	42	32	40
LC19640192R	24	43	35	43
LC19640193R	23	44	33	42
LC19640586R	22	42	34	43
Pardina	18	37	27	39
Mean	24	41	32	41
P-value	<0.0001	0.1	<0.0001	0.6
LSD	2.7	NS	3.8	NS
CV (%)	8.0	7.5	8.3	9.6

Table 21. Lentil Days to Flowering

Variety/Line	Havre	Huntley	Sidney
Avondale	61	64	55
CDC Greenstar	67	65	60
CDC Impala CL	67	64	60
CDC Richlea	64	65	53
CDC Viceroy	67	65	60
LC06601616R	62	64	55
LC14600016P	63	64	55
LC14600017P	64	64	53
LC14600027P	66	64	53
LC14600088R	61	64	56
LC19640192R	61	60	55
LC19640193R	60	60	60
LC19640586R	61	64	55
Pardina	61	63	53
Mean	63	63	56
<i>P</i>-value	<0.0001	<0.0001	<0.0001
LSD	1.4	1.0	1.0
CV (%)	1.6	1.1	1.3

Chickpea Variety Evaluation in 2024

The 2024 statewide chickpea variety evaluation included 14 entries (12 Kabuli type and two Desi type). All entries for 2024 are now named cultivars following the release of NDC160236 as MT Bridger. Data are presented for three dryland locations and one irrigated location in Tables 22-26. Average yield and seed size data for the three-year period, 2022 through 2024, are presented for those entries that were trialed in all three years.

Irrigated chickpea yields in Sidney were very similar to 2023 yields with an average of 3789 lb/a. *Ascochyta* blight was observed at the onset of flowering and required a total of 5 fungicide applications starting at the first observance of lesions on leaves to prevent progression of the disease.

Chickpea yields in Richland were poor at an average of 828 lb/a. It appears that lack of rainfall during June and July in Richland had a more significant impact on lentil and chickpea yields as compared to peas. Consistent with previous years, antelope grazing occurred late in the season with significant damage observed for some cultivars.

Yields in Havre came in at an average of 2351 lb/a. This is an improvement relative to 2023 (1117 lb/a) and 2022 (1714 lb/a) and is the best yield observed at this location amongst the past five years.

Table 22. Chickpea Grain Yield (lb/a) with three-year averages in parentheses

Variety/Line	Havre	Huntley	Richland	Sidney
CDC Anna	2453 (1801)	3117	912 (1384)	3714 (3993)
CDC Frontier	2630 (1881)	3419	884 (1358)	3941 (4262)
CDC Leader	2600 (1811)	2888	1080 (1281)	3995 (4277)
CDC Orion	2433 (2018)	3152	1037 (1142)	3713 (4120)
CDC Palmer	2436 (1817)		1186 (1518)	
Kasin	2228 (1659)			
MT Bridger	2692 (2195)	3411	758 (1187)	4099 (4387)
Myles	2320 (1702)	2770	886 (1312)	3608 (3633)
Nash	1935 (1393)	2783	368 (565)	3171 (3335)
ND Crown	2390 (1791)	2852	740 (1201)	4092 (4057)
New Hope	2280 (1534)		495 (564)	
Royal	2200 (1635)	3202	818 (463)	3884 (3691)
Sawyer	2303 (1662)	3032	969 (1054)	3868 (3714)
Sierra	2022 (1182)	2383	629 (629)	3594 (3489)
Mean	2351	3001	828	3789
P-value	<0.0001	0.03	<0.0001	<0.0001
LSD	189	567	256	441
CV (%)	5.6	13.1	21.6	8.1

*Note: Antelope damage at Richland was observed throughout the growing season. Most years, this damage tends to be entry specific. In 2024, damage was most prevalent on entries ‘Nash’ and ‘New Hope’.

Table 23. Chickpea Test Weight (lb/bu)

Variety/Line	Havre	Huntley	Richland	Sidney
CDC Anna	60.8	59.4	60.5	62.3
CDC Frontier	62.8	62.1	63.4	64.0
CDC Leader	60.8	61.3	62.8	63.4
CDC Orion	60.1	60.0	62.2	62.2
CDC Palmer	61.1		62.9	
Kasin	63.8			
MT Bridger	61.9	61.8	63.0	64.1
Myles	58.6	59.4	60.5	62.3
Nash	59.2	59.7	60.7	61.7
ND Crown	61.3	61.7	63.4	63.6
New Hope	61.3		62.8	
Royal	59.8	60.5	61.3	62.2
Sawyer	61.4	61.6	63.2	63.3
Sierra	60.0	59.7	61.9	61.5
Mean	60.9	60.9	62.5	63.0
<i>P</i>-value	<0.0001	<0.0001	<0.0001	<0.0001
LSD	1.0	0.4	0.7	0.7
CV (%)	1.2	0.5	0.8	0.8

Table 24. Chickpea Seed Size (% greater than 8.73 mm) with three-year averages in parentheses

Variety/Line	Huntley	Richland	Sidney
CDC Anna	0.0	0.0 (0.3)	0.0 (0)
CDC Frontier	9.3	10.8 (22.2)	6.4 (9.6)
CDC Leader	18.4	22.6 (35.6)	17.5 (22.9)
CDC Orion	43.8	35.8 (51.3)	59.3 (51.7)
CDC Palmer		28.6 (44.1)	
MT Bridger	22.1	23.6 (45.3)	16.4 (22.1)
Myles	0.0	0.0 (0)	0.0 (0)
Nash	90.3	78.5 (77.3)	84.9 (78.7)
ND Crown	48.3	45.2 (56.6)	47.9 (51.4)
New Hope		34.3 (51.1)	
Royal	72.7	68.9 (63.8)	69.7 (72.8)
Sawyer	40.6	24.8 (37.7)	13.2 (18.6)
Sierra	82.6	63.4 (64.5)	75.8 (73.4)
Mean	38.9	33.6	35.5
P-value	<0.0001	<0.0001	<0.0001
LSD	9.9	9.3	6.5
CV (%)	17.8	19.4	12.7

Table 25. Chickpea Plant Height (cm)

Variety/Line	Havre	Huntley	Richland	Sidney
CDC Anna	32.2	45.5	36.3	54.8
CDC Frontier	31.2	50.0	34.3	56.8
CDC Leader	28.5	42.0	38.0	48.8
CDC Orion	29.4	44.5	35.8	55.0
CDC Palmer	27.5		37.5	
Kasin	39.5			
MT Bridger	36.1	50.8	41.5	60.0
Myles	32.0	45.5	36.3	54.8
Nash	32.4	47.8	38.5	58.8
ND Crown	36.3	52.5	43.0	58.3
New Hope	38.4		45.0	
Royal	36.7	47.3	39.8	61.0
Sawyer	30.3	49.3	39.5	57.0
Sierra	33.6	47.0	38.0	59.0
Mean	33.1	47.5	38.7	57.4
P-value	<0.0001	0.0005	0.0008	0.0003
LSD	2.5	4.1	4.5	4.9
CV (%)	5.3	6.0	8.1	5.9

Table 26. Chickpea Days to Flowering

Variety/Line	Havre	Huntley	Sidney
CDC Anna	62	67	51
CDC Frontier	63	67	55
CDC Leader	61	67	55
CDC Orion	58	67	51
CDC Palmer	61		
Kasin	63		
MT Bridger	63	67	53
Myles	60	67	51
Nash	63	67	55
ND Crown	62	66	55
New Hope	63		
Royal	64	67	58
Sawyer	59	66	51
Sierra	64	67	51
Mean	62	67	53
P-value	<0.0001	0.5	<0.0001
LSD	1.1	NS	0.7
CV (%)	1.2	1.1	0.9

FUTURE PLANS

The EARC will continue to lead the statewide variety evaluations in the coming years provided there is a need from pulse growers, seed industries, breeders, and there is funding to support the effort. New for 2025 will be an evaluation of winter peas and winter lentils. In the fall of 2024, winter pea and lentil trials were planted in Sidney, Havre and Moccasin. An evaluation of winter survival and yield performance is slated for 2025.

DISCLAIMER:

The information given herein is supplied with the understanding that no discrimination is intended and no endorsement by the Montana Agricultural Experiment Station is implied. The results of individual trials and studies are considered **PRELIMINARY** in nature and should **NOT** be considered as a product endorsement or recommendation for commercial use. Inclusion and or exclusion of any commercial variety in this summary does not constitute a recommendation by Montana State University Agricultural Experiment Station or EARC.