

2021 Nebraska Dry Bean Variety Trials

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In 2021, the PHREC Dry Bean Breeding program conducted twelve replicated field trials at two locations, the Scottsbluff Ag Lab (Scotts80-Field-3) and the Mitchell Ag lab (Field K), to evaluate which dry bean entries (varieties/experimental lines) are best suited for western Nebraska. These trials have been ongoing for 40 years to service the Nebraska dry bean industry. Information about dry bean variety performance is available on the web at <http://cropwatch.unl.edu/varietytest-Drybeans/2021>.

Locations and Germplasm

Ten replicated trials [two great northern (20 entries), two pintos (40 entries), two light red kidneys (LRK, 15 entries), two blacks (14 entries), and two navies (12 entries)] were planted at the Scottsbluff and Mitchell Ag Labs on June 3 and 2, respectively.

The soil at the Scottsbluff site (41°53.6' N, 103°40.7' W, 1200 m elevation) is a Tripp very fine sandy loam (coarse-silty, mixed, superactive, mesic Aridic Haplustolls). The soil at the Mitchell site (41°56.6' N, 103°41.9' W, 1240 m elevation) is a silt loam (Typic Ustorthents).

Agronomic Management

Scottsbluff Ag Lab

The field at the Scottsbluff Ag Lab was shallowly tilled (Landstar) on May 21, plowed on May 28, and sprayed/roller harrowed with Eptam @ 2.5 pts/acre and Sonalan @ 2 pts/acre on June 1.

The field at the Scottsbluff Ag Lab had 35.6# residual N and a 74# N manure credit, so no additional nitrogen was applied.

The field at the Scottsbluff Ag Lab was irrigated 13 times (9.5 inches) using sprinkler irrigation. It received an additional 2.54 inches of precipitation.

On August 10, the field was sprayed with Badge SC @ 16 oz/acre to prevent common bacterial blight.

Mitchell Ag Lab

The field at the Mitchell Ag Lab was shallowly tilled on May 18, plowed on May 18, and sprayed/roller harrowed with Eptam @ 2.5 pts/acre and Sonalan @ 2 pts/acre on May 24.

The field at the Mitchell Ag Lab had 74# residual, so no additional nitrogen was applied.

The field at the Mitchell Ag Lab was irrigated nine times (15.5 inches) using furrow irrigation. It received an additional 2.23 inches of precipitation.

On August 10, the field was sprayed with Badge SC @ 16 oz/acre to prevent common bacterial blight.

Experimental Design

The entries were assigned to experimental units using a randomized complete block design with four replications. Each plot consisted of four 22-foot rows spaced 22 inches apart. The target plant population was 80,000 plants/acre for all market classes except the LRK, which had a target population of 100,000 plants/acre. The trials were planted with a Hege cone planter. At the end of the growing season, a plot combine (Wintersteiger Classic) was used to harvest 20 feet of the middle two rows of each plot. Variety/line trials at the Scottsbluff and Mitchell Ag labs were undercut and combined on September 21 and 29.

Response Variables

Data collected were: yield (lbs/acre adjusted to 14% moisture), DTF (days to flowering, actual number of days from planting to when 50% of the plants had at least one flower opened), DTM (days to harvest maturity, actual number of days from planting to when 80% of the plants were ready to be harvested), 100-seed counts (weight of 100 seeds in grams adjusted to 14% moisture), test weight (lbs/bushel adjusted to 14% moisture), and growth habit (1= determinate upright; 2a= indeterminate upright short vine; 2b= indeterminate upright long vine; 3a= indeterminate prostrate short vine; 3b= indeterminate prostrate long vine). Data are presented in Tables 1 to 10.

Statistical Analysis

Data were analyzed using PROC MIXED (SAS, 2004). Means were separated using an F-protected LSD. All tests were considered significant at $P \leq 0.05$.

The GRAND MEAN (bottom of each table) refers to the mean of the experiment. The coefficient of variation, expressed as a percentage (CV %), measures the variability of the experiment; large CVs indicate that a large amount of variation cannot be attributed to differences among entries. The LSD (Least Significance Difference) was used to evaluate differences among entries. If the difference between two entries exceeds the LSD value for a particular response variable, the higher value is significantly greater with 95% probability (0.05 level). If the difference between two entries is less than the LSD value, the values are considered similar.

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Table 1. 2021 Great Northern Variety Trial- Scottsbluff Ag. Lab.

Ent no	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight	Growth Habit
		lbs/acre	days	days	inches	lbs/bu	%	gr	
5	Virgo (13172)	4666	44	89	21.8	60.2	10.2	37.3	2b
20	NE1-20-31	4619	44	84	20.9	59.4	10.7	35.4	2b/3
17	NE1-17-41	4584	44	87	22.0	61.4	8.7	41.4	2b
16	NE1-17-36	4472	44	87	21.9	60.3	10.8	37.7	2b
2	Hydra	4451	44	89	17.0	62.6	10.2	40.3	3a
8	15215	4390	44	87	23.7	62.3	11.1	36.5	2b
18	NE1-17-31	4374	44	89	21.1	58.7	10.5	42.5	2b/3
12	NE1-17-9	4312	43	85	20.8	59.8	10.4	35.1	2b/3
10	17227	4299	44	86	21.1	59.5	10.7	38.9	2b/3
4	Andromeda	4289	42	83	18.3	60.6	11.2	41.5	2b/3
14	NE1-17-45	4265	43	86	21.9	61.4	10.9	39.4	2b
1	Aries	4238	43	84	21.0	60.9	10.5	35.8	2b
15	White Pearl (NE1-17-10)	4127	44	84	21.2	59.7	10.6	37.2	2b
9	16213	4104	44	90	21.2	61.6	10.8	41.9	2b
11	Panhandle Pride	3959	44	88	20.3	62.6	11.4	34.6	2b/3
3	Draco	3841	44	90	22.8	60.7	10.2	37.0	2b/3
19	NE1-20-21	3771	44	84	21.6	59.0	10.5	35.3	2b
7	14164	3685	44	84	20.9	60.7	10.8	36.7	2b/3
13	NE1-17-29	3305	44	84	21.4	57.7	10.5	34.2	2b
6	14172	3232	46	93	20.4	60.6	10.5	37.4	3a
	GRAND MEAN	4149	44	86	21.1	60.5	10.6	37.8	
	LSD 0.05	686	1	3	1.8	1.6	1.6	3.4	
	CV %	8.3	1.1	1.6	4.2	1.4	7.7	4.4	

Table 2. 2021 Great Northern Variety Trial- Mitchell Ag. Lab.

Ent	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight
no		lbs/acre	days	days	inches	lbs/bu	%	gr
16	NE1-17-36	4552	45	91	21.7	60.9	9.7	40.5
15	White Pearl (NE1-17-10)	4465	47	91	20.9	60.5	9.5	36.3
8	15215	4420	47	92	22.3	62.6	9.8	38.6
20	NE1-20-31	4334	45	90	18.4	60.8	9.5	35.5
14	NE1-17-45	4326	45	90	20.8	62.2	10.1	41.5
2	Hydra	4312	45	95	16.2	62.7	9.7	46.1
12	NE1-17-9	4280	46	89	19.8	60.7	9.6	35.1
4	Andromeda	4271	43	87	18.3	60.3	10.0	42.0
1	Aries	4217	43	85	20.4	61.0	9.7	37.5
17	NE1-17-41	4026	44	88	20.5	61.9	10.1	41.8
18	NE1-17-31	3986	44	88	20.7	58.2	9.3	42.4
13	NE1-17-29	3913	45	87	18.3	60.1	9.5	36.2
19	NE1-20-21	3768	45	87	19.5	59.4	9.4	35.5
5	Virgo (13172)	3740	47	89	20.2	60.0	9.7	36.6
11	Panhandle Pride	3735	45	91	19.4	62.1	9.9	37.0
10	17227	3694	44	85	18.7	59.3	9.8	35.0
3	Draco	3631	47	92	20.7	61.2	9.8	37.3
7	14164	3609	46	85	20.1	60.4	9.6	38.0
9	16213	3331	46	95	20.5	62.1	9.8	43.6
6	14172	1956	47	96	17.7	60.5	9.4	37.6
	GRAND MEAN	3928	45	90	19.7	60.8	9.7	38.7
	LSD 0.05	823	2	4	2.6	0.8	0.2	3.1
	CV %	10.5	2.4	2.3	6.5	0.7	1.2	4.0

Table 3. 2021 Pinto Variety Trial- Scottsbluff Ag. Lab.

Ent no	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight	Growth Habit
		lbs/acre	days	days	inches	lbs/bu	%	gr	
28	USDA-Rattler (PT11-13-31)	5210	45	89	23.5	60.5	10.2	37.1	2b/3
8	Gleam	4717	45	85	23.2	62.9	10.3	33.5	2b
11	20-241	4713	45	83	23.6	60.9	10.5	39.0	2b
37	NE2-20-3	4664	43	87	19.7	59.5	10.3	35.7	3a
32	NE2-17-18	4661	45	92	17.6	60.3	10.4	45.2	3a
13	Mystic (17454)	4545	46	87	24.5	62.8	10.8	38.7	2b
2	Monterrey	4488	47	90	22.2	61.8	10.4	35.0	2b/3
9	20-250	4485	45	91	20.0	57.4	10.5	53.4	2b/3
30	SV6139GR	4473	45	84	19.7	61.2	10.1	33.9	2b
17	Palomino	4465	43	87	20.3	59.5	9.9	35.4	2b
24	52646-14	4363	46	86	22.0	58.7	10.3	42.0	2a
12	Cancun (14411)	4330	47	89	24.8	59.8	10.0	41.7	2b
14	20-308	4319	46	90	21.1	49.1	16.7	28.2	3a
1	La Paz	4281	47	89	22.1	61.9	10.6	34.5	2b/3
33	NE2-17-37	4262	45	95	20.0	60.1	10.5	34.8	3a
5	Radiant	4223	44	84	22.5	60.9	10.6	35.1	2b
6	Cowboy	4220	46	84	23.4	60.8	10.4	36.1	2b
36	NE4-18-55	4195	45	90	21.8	59.8	10.5	49.1	2b/3
4	Vibrant B	4114	45	83	22.0	61.1	10.9	33.1	2b
38	NE2-20-12	4100	43	84	18.8	58.1	9.6	37.4	2b/3
3	Torreón	4075	46	84	22.5	61.9	10.6	35.5	2b
39	NE2-20-14	4074	42	76	21.0	61.8	10.6	35.5	2b
7	Lumen	4054	46	86	22.3	64.5	10.3	33.1	2b
40	NE4-18-16	3986	44	86	19.9	47.5	17.9	31.8	2b
34	NE4-17-10	3980	45	86	21.0	57.8	10.0	38.4	2b
10	20-239	3961	44	83	22.2	61.0	9.8	33.8	2b
31	Windbreaker	3928	45	86	18.9	57.5	9.9	40.7	3a
21	33503-14	3921	46	91	19.3	60.0	10.3	39.5	2b/3
18	41767-15	3883	44	85	20.7	62.6	10.1	39.2	2b/3
29	USDA-Diamondback (PT16-9)	3849	46	89	22.0	61.1	10.4	35.2	2b/3
20	32330-14	3825	47	90	22.6	59.3	10.1	38.9	3a
19	30837	3820	45	87	20.4	60.9	10.4	39.8	2b/3
15	20-310	3817	46	85	20.7	60.0	10.2	43.4	2b
16	Staybright	3812	45	90	21.5	61.4	10.4	37.2	2b/3
35	NE4-17-6	3788	43	86	18.7	58.3	10.2	41.1	2b
22	47053-15	3572	46	91	21.3	59.9	10.1	40.0	3a
23	47057-7	3531	46	90	24.1	59.2	10.3	40.7	2b
27	EX1846-P	3221	45	86	20.3	57.7	9.7	35.9	2b
26	EX1845-P	3176	45	85	21.5	58.8	9.8	32.0	2b
25	EX1844-P	3165	46	87	19.9	58.3	10.0	38.1	2b
	GRAND MEAN	4107	45	87	21.3	59.7	10.6	37.7	
	LSD 0.05	611	2	3	2.1	8.2	4.7	6.3	
	CV %	7.5	2.1	2.0	5.0	6.9	22.2	8.5	

Table 4. 2021 Pinto Variety Trial- Mitchell Ag. Lab.

Ent	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight
no		lbs/acre	days	days	inches	lbs/bu	%	gr
6	Cowboy	4902	47	88	22.0	61.2	9.8	37.5
8	Gleam	4845	47	91	22.0	63.2	9.5	35.0
5	Radiant	4719	47	89	21.7	61.4	8.9	36.6
13	Mystic (17454)	4637	46	93	22.8	63.9	9.8	40.7
12	Cancun (14411)	4600	47	92	24.4	59.8	9.4	44.4
2	Monterrey	4438	47	93	21.9	62.6	9.7	34.8
3	Torreon	4374	47	85	21.6	62.3	9.6	35.6
18	41767-15	4336	44	92	19.3	62.7	9.4	42.7
30	SV6139GR	4316	47	89	19.9	61.5	9.4	34.8
34	NE4-17-10	4308	45	91	20.0	57.8	9.1	41.2
24	52646-14	4303	47	91	20.6	59.2	9.5	44.2
28	USDA-Rattler (PT11-13-31)	4216	47	89	24.5	60.5	9.4	38.0
35	NE4-17-6	4195	43	91	18.5	59.2	9.0	42.0
38	NE2-20-12	4190	41	87	18.0	58.5	9.2	40.1
40	NE4-18-16	4154	45	91	18.1	60.8	9.4	41.0
7	Lumen	4149	47	91	20.5	64.0	9.7	35.1
14	20-308	4145	47	96	20.9	61.5	8.9	38.6
17	Palomino	4143	43	95	20.7	59.2	8.7	35.9
1	La Paz	4127	47	91	21.1	61.8	9.6	33.4
4	Vibrant B	4057	45	85	21.6	61.2	8.8	33.1
37	NE2-20-3	4019	44	95	18.3	59.1	9.4	36.6
31	Windbreaker	4015	47	87	18.9	58.7	9.1	37.8
19	30837	4010	47	92	18.2	60.8	9.6	42.1
33	NE2-17-37	4006	44	91	19.0	60.3	9.4	35.3
11	20-241	4003	47	85	23.1	61.0	9.7	36.4
21	33503-14	3998	47	99	21.3	60.3	9.2	41.4
20	32330-14	3997	47	98	22.8	59.5	9.5	41.0
32	NE2-17-18	3939	46	98	17.9	60.9	9.5	45.4
27	EX1846-P	3870	47	84	20.2	58.3	9.3	37.5
10	20-239	3822	43	84	21.9	60.5	9.4	36.4
39	NE2-20-14	3818	41	84	18.2	62.0	9.5	38.0
22	47053-15	3805	47	95	22.2	60.0	9.2	43.1
29	USDA-Diamondback (PT16-9)	3758	47	96	21.3	60.9	9.5	33.7
36	NE4-18-55	3720	43	97	20.8	60.2	9.6	48.0
15	20-310	3717	47	89	18.9	60.1	9.4	44.8
16	Staybright	3688	47	92	20.5	61.5	9.4	38.5
26	EX1845-P	3596	47	86	20.3	58.8	9.5	33.0
23	47057-7	3510	46	92	22.0	58.4	9.2	41.4
9	20-250	3359	47	98	19.9	57.5	9.0	52.2
25	EX1844-P	2853	47	87	20.9	58.8	9.3	34.5
	GRAND MEAN	4066	46	91	20.7	60.5	9.3	39.0
	LSD 0.05	788	1	4	2.4	0.8	0.3	2.5
	CV %	9.8	1.6	2.3	6.0	0.7	1.7	3.3

Table 5. 2021 Light Red Kidney Variety Trial- Scottsbluff Ag. Lab.

Ent no	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight	Growth Habit
		lbs/acre	days	days	inches	lbs/bu	%	gr	
12	L4063262	3378	45	98	22.8	58.5	10.6	49.8	1
1	Big Red 1	3219	41	80	19.1	58.9	9.5	43.7	1
7	161041	3077	45	89	21.6	58.6	10.3	45.2	1
2	Ronnie's Red	3058	45	90	23.9	58.5	10.3	48.3	1
3	Red Zone	3038	44	93	22.3	57.6	10.1	45.5	1
6	161014	3011	44	88	19.4	57.7	10.3	48.1	1
11	L1032326	2945	44	91	19.5	57.0	10.7	49.4	1
10	CELRK	2915	40	77	16.6	58.2	8.4	42.6	1
5	15923	2889	42	81	16.1	57.3	9.0	44.8	1
8	161082	2861	43	81	20.1	59.6	9.1	41.1	1
9	Pink Panther	2837	43	87	19.2	57.2	9.5	45.8	1
15	Panhandle Red	2680	44	85	18.5	58.2	9.6	44.7	1
14	NE10-20-18	2609	40	84	19.6	57.8	9.5	41.6	1
13	Clouseau	2592	41	80	19.5	57.3	8.8	42.4	1
4	Red Dawn (09363)	2441	39	74	17.2	56.3	8.0	40.8	1
	GRAND MEAN	2903	43	85	19.7	57.9	9.6	44.9	
	LSD 0.05	448	2	4	1.7	0.7	0.9	2.8	
	CV %	7.7	1.9	2.5	4.3	0.6	4.6	3.1	

Table 6. 2021 Light Red Kidney Variety Trial- Mitchell Ag. Lab.

Ent no	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight
		lbs/acre	days	days	inches	lbs/bu	%	gr
1	Big Red 1	3665	42	89	20.5	58.1	9.2	54.3
4	Red Dawn (09363)	3652	42	83	18.2	57.5	8.3	57.5
7	161041	3591	49	102	27.1	57.1	9.3	59.4
6	161014	3427	48	98	22.5	58.0	9.0	59.4
10	CELRK	3315	40	87	19.1	58.2	9.2	55.1
2	Ronnie's Red	3276	47	101	25.0	57.9	8.9	63.5
3	Red Zone	3199	46	102	24.6	56.4	9.1	56.4
8	161082	2899	43	91	20.0	58.8	9.0	54.7
5	15923	2773	42	89	18.9	57.0	9.2	57.0
14	NE10-20-18	2715	42	92	21.9	57.8	9.3	54.3
9	Pink Panther	2596	42	93	20.6	57.2	9.1	56.2
15	Panhandle Red	2584	42	92	20.3	58.6	9.2	55.7
13	Clouseau	2271	42	93	20.4	58.4	9.1	57.3
	GRAND MEAN	3074	44	93	21.5	57.8	9.1	57.0
	LSD 0.05	406	2	3	2.6	0.9	0.4	3.1
	CV %	6.5	1.9	1.6	6.1	0.8	2.0	2.6

Table 7. 2021 Black Variety Trial- Scottsbluff Ag. Lab.

Ent	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight
no		lbs/acre	days	days	inches	lbs/bu	%	gr
9	17715	4355	49	93	22.8	62.8	11.0	20.9
4	Spectre (14497)	3950	48	95	26.6	62.9	10.5	20.4
5	BlackBeard (14506)	3897	49	91	28.0	62.2	10.0	20.9
8	Nimbus (14500)	3861	49	93	27.5	62.6	10.5	20.3
12	NE14-206	3816	47	90	21.8	61.9	10.5	21.8
2	Black Bear	3721	47	91	22.5	62.8	10.9	18.3
7	13505	3643	47	87	26.5	62.1	10.3	17.8
3	Black Tails (13489)	3545	47	85	21.4	63.5	10.2	18.5
1	Eclipse	3494	48	87	23.2	62.3	10.3	19.2
13	NE14-20-8	3457	48	88	21.3	62.7	11.0	19.9
11	Ace	3341	48	86	23.9	62.4	10.5	19.1
14	NE4-18-4	3313	46	84	19.1	59.4	10.5	23.1
10	17724	3290	49	89	24.5	63.4	10.3	16.4
6	13496	3067	48	88	23.8	61.6	10.1	19.3
	GRAND MEAN	3625	48	89	23.8	62.3	10.5	19.7
	LSD 0.05	527	1	3	2.0	0.6	0.8	1.3
	CV %	7.2	1.0	1.7	4.3	0.5	3.8	3.2

Table 8. 2021 Black Variety Trial- Mitchell Ag. Lab.

Ent	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight
no		lbs/acre	days	days	inches	lbs/bu	%	gr
12	NE14-206	3847	48	92	21.0	62.2	8.7	22.2
11	Ace	3345	47	88	23.5	62.4	8.3	18.8
1	Eclipse	3262	48	88	22.6	62.5	8.4	18.9
14	NE4-18-4	3172	47	86	21.0	59.8	8.3	22.4
13	NE14-20-8	3097	49	90	20.0	62.7	8.1	19.5
	GRAND MEAN	3345	48	89	21.6	61.9	8.4	20.4
	LSD 0.05	400.1	1.1	3.4	1.8	0.4	0.5	0.9
	CV %	5.6	1.1	1.8	3.9	0.3	2.8	2.2

Table 9. 2021 Navy Variety Trial- Scottsbluff Ag. Lab.

Ent	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Moisture	100-seed weight
no		lbs/acre	days	days	inches	lbs/bu	%	gr
1	HMS Medalist	3962	47	91	23.4	63.1	11.4	18.1
2	Blizzard	3887	47	91	22.1	63.2	11.5	19.7
4	Armada (13068)	3774	48	90	21.9	62.4	11.4	20.8
5	HMS Victory (15094)	3727	47	88	21.9	63.1	11.5	19.3
8	T9905	3673	47	89	21.0	63.2	11.2	19.6
6	Liberty (15095)	3545	47	92	21.8	63.0	11.8	19.5
12	SV1893GH	3434	47	91	20.4	62.6	11.1	21.2
11	EX1804-N	3238	46	85	20.4	62.0	12.0	18.1
7	Apex	3125	45	92	21.8	61.9	11.8	22.2
3	HMS Bounty (12047)	2962	46	89	21.5	62.6	11.1	16.2
10	EX1803-N	2635	47	84	20.8	62.2	11.4	18.5
9	EX1802-N	2268	46	84	17.6	61.6	11.1	17.6
	GRAND MEAN	3353	47	89	21.2	62.6	11.4	19.2
	LSD 0.05	686	1	3	1.7	0.6	1.0	1.3
	CV %	10.1	1.3	1.6	3.9	0.5	4.4	3.2

Table 10. 2021 Navy Variety Trial- Mitchell Ag. Lab.

Ent	PEDIGREE	Yield at 14%	Flowering	Maturity	Plant Height	Test Weight	Mositure	100-seed weight
no		lbs/acre	days	days	inches	lbs/bu	%	gr
13	ND 132162	3633	51	98	22.5	62.5	9.2	17.7
11	EX1804-N	3490	47	88	21.9	62.6	9.2	17.4
8	T9905	3303	49	92	18.9	62.7	9.4	19.3
12	SV1893GH	2691	51	93	20.5	62.2	9.2	19.6
9	EX1802-N	2565	47	88	19.7	62.2	9.2	17.3
10	EX1803-N	2316	47	87	21.4	62.1	9.1	17.6
7	Apex	1948	47	102	21.6	62.6	9.2	23.1
	GRAND MEAN	2850	48	93	20.9	62.4	9.2	18.9
	LSD 0.05	527	1	4	1.8	0.6	0.2	1.0
	CV %	8.9	0.9	2.3	4.2	0.5	1.1	2.5