67th Annual Report
National Cooperative Dry Bean Nurseries

2016

Compiled by
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Univ. of Nebraska, Panhandle Res. and Ext. Center

Cooperative Investigation among California, Colorado, Idaho, Maryland, Michigan, Montana, Nebraska, North Dakota, Washington, and Wyoming -State Experiment Stations and Agricultural Research Centers- as part of the Regional W-3150 Multi-State Project

and

University of Guelph, Canada

and

Agriculture Research Service – USDA

Call for 2017 Cooperative Dry Bean Nursery

Seed Submissions

It is time to request seed submission for 2017 Cooperative Dry Bean Nurseries. I would like to receive **the list of seed submission** no later than **April 1, 2017** and **the seed** must be here no later than **April 15, 2017**. All entries will be planted in replicated test plots across several locations in the United State and Canada. Data will be taken for seed yield, 100-seed weight and several agronomic and marketing characteristics. They will also be included in several disease nurseries including bean rust and ….. Michigan will conduct canning tests.

The seed requirements for each of the three groups are as follows:

1. Small-seeded (Black, Navy, Others): ~**15 lbs/line**.
2. Medium-seeded (Great Northern, Pink, Pinto, Small Red, Others): ~**25 lbs/line**.
3. Large-seeded (Cranberry, Kidney, Others): ~**35 lbs/line**.

Or 20,000 seeds

As in the past, all lines must be:

- X Western grown (West of the Rocky Mountain)
- X Pathogen free
- X If susceptible to BCMV, an ELISA test will be required.
- X Acceptable commercial quality (no broken, decayed, or off color seed)
- X **Seed should be untreated**

Fees: This fee structure was decided by the W-1150 members at The Annual meeting in Mayaguez, Puerto Rico in 2003

Public institutions: $150/line submitted
Private institutions: $300/line submitted

NURSERY OPERATIONS

Public institutions that request a nursery will be charged US $150 to defray seed handling expenses including treating, bagging, boxing and shipping costs. Please let me know if your institution is going to submit the seeds and participate in the field trial for 2017 CDBN.

Should you have any questions or concerns about the submission or participant fees please contact me or if you know anyone else who might like to submit seed or plant the nursery please let me know.

Contact and Shipping Information:

Dr. Carlos Urrea
University of Nebraska
Panhandle Research & Extension Center
4502 Avenue I
Scottsbluff, NE 69631
Office (308) 632-0556

Email: currea2@unl.edu

Table 1. List of Contributors and Cooperators - 2016

Name	Location	Seed Submitted	Planting seed	Locations No.
Shree Singh	Kimberly, ID			
Mike Moore	Powell, WY		yes	1
Bob Baumgartner	Lingle, WY		yes	2
Paul Gepts, Antonia Palkovic	Davis, CA		yes	3
Phil Miklas	Othello, WA	yes	yes	4
Mark Brick, Barry Ogg	Ft. Collins, CO	yes	yes	5
Juan M. Osorno	Hatton, ND; Park	yes	yes	6
Carlos Urrea, Jim Schild	Scottsbluff, NE	yes	yes	7
Jim Kelly, Evan Wright	Frankenmuth, MI		yes	8
Chengci Chen	Sidney, MT		yes	9
Peter Pauls, Tom Smith	Elora R.S, Ont	yes	yes	10
Talo Pastor-Corrales	Beltsville, MD		yes (rust test)	11
Bill Dean	Kimberly, ID			
James Beaver	Isabela, PR		yes	12

Table 2. Contact information for 2016 Cooperative Dry Bean Nursery

Loc	First	Last	Affiliation	E-Mail	Phone
CA	Paul	Gepts	University of CA – Davis	plgepts@ucdavis.edu	530-752-774
	Antonia	Palkovic	University of CA – Davis	antoniapalkovic@gmail.com	
CO	Mark	Brick	Colorado State University	Mark.Brick@colostate.edu	970-491-6551
	Barry	Ogg	Colorado State University	Barry.Ogg@Colostate.edu	
ID	Shree	Singh	University of Idaho	singh@uidaho.edu	208-423-6559
	John	Dean	Idaho Seed Bean Co.	isbco@filertel.com	208-734-5221
MD	Marcial (Talo)	Pastor-Corrales	USDA/ARS	talo.pastor-corrales@ars.usda.gov	301-504-6600
MI	Jim	Kelly	Michigan State University	kellyj@msu.edu	517-355-0271
MT	Chengci	Chen	MSU Eastern Ag Research Center	cchen@montana.edu	406-433-2208
ND	Juan	Osorno	North Dakota State University	juan.osorno@ndsu.edu	701-231-8145
NE	Jim	Schild	University of Nebraska	jschild@unl.edu	308-632-1480
	Carlos	Urrea	University of Nebraska	currea2@unl.edu	3080632-0556
ON	Peter	Pauls	University of Guelph	ppauls@uoguelph.ca	519-824-4120 ext 52460
	Tom	Smith	University of Guelph	thsmith@uoguelph.ca	519-824-4120 ext 8339
PR	James	Beaver	University of Puerto Rico	j_beaver@hotmail.com	787-832-4040 ext. 2566
WA	Phil	Miklas	USDA-ARS	phil.miklas@ars.usda.gov	509-786-9258
WY	Mike	Moore	University of Wyoming	mdmoore@uwyo.edu	307-754-9815
	Jim	Heitholt	University of Wyoming	Jim.Heitholt@uwyo.edu	307-776-3104

Table 3. List of 2016 Cooperative Dry Bean Nursery Entries.

Entry No.	Line	Previous No.	From	Type	Source
1	PT9-5-6		P. Miklas	Pinto	WA
2	PT-11-13		P. Miklas	Pinto	WA
7	CO 14790-3		M. Brick	Pinto	CO
8	CENTENNIAL		M. Brick	Pinto	CO
18	LA PAZ	Check	Provita	Pinto	ID
19	OTHELLO	Check	Treasure Valley	Pinto	ID
5	COSD-7		M. Brick	Pinto/Slow darkening	CO
6	COSD-35		M. Brick	Pinto/Slow darkening	CO
9	NE12-15-161		C. Urrea	Pinto/Slow darkening	NE
21	ND-PALOMINO		J. Osorno, P. Miklas	Pinto/Slow darkening	ND, WA
3	XRAV-40-4		P. Miklas	Black	WA
4	BK 11-8		P. Miklas	Black	WA
14	ZENITH		J. Kelly	Black	MI
17	ECLIPSE	Check	Treasure Valley	Black	ID
10	LIGHTHOUSE		T. Smith	Navy	ON
15	ALPENA		J. Kelly	Navy	MI
16	SAMURAI		J. Kelly	Otebo	MI
11	ACUG 13-SR1		T. Smith	Small Red	ON
12	DYNASTY		T. Smith	Dark Red Kidney	ON
13	YETI		T. Smith	White Kidney	ON
20	CELRK	Check	Provita	Light Red Kidney	ID

The 2016 CDBN

The 2016 CDBN comprised 17 test entries and four checks.

Agronomic nurseries

There were approximately 1600 seeds supplied to each location sufficient to plant four 4-row replications, 20 to 25 feet long, for each entry. Seed treatment was provided by Syngenta Seed Co. and consisted of Cruiser, Maxim XL + Apron XL (MSDS are included with bean shipment unless nursery operator requested otherwise).

Disease Nurseries

There were 400 seeds (untreated) supplied to Beltsville, MD, for rust screening.

DATA RECORDING AND SCALES

The following were commonly recorded data by the CDBN collaborators. For ease and uniformity of reporting we shall describe and abbreviate each trait:

1. **Early Vigor (EV)**: Scored on a 1 to 9 scale, where 1= excellent and 9= very poor, within the first 3 weeks after emergence.

2. **Days to Flower (DF)**: Actual number of days from planting to when approximately 50% plants in a plot have at least one opened flower.

3. **Days to Maturity (DM)**: Actual number of days from planting to when approximately 50% of plants in a plot have at least one dry pod.

4. **Plant Height (PH)**: Record in cm from the base of the plant (soil surface) to the top node bearing at least one dry pod with seed.

5. **Growth Habit (GH)**: Record during flowering and verified when crop is senescent as type I=determinate erect or upright, II= indeterminate erect, and III= indeterminate prostrate.

6. **Lodging (LG)**: Scored at harvest on a 1 to 9 scale, where 1= 100% plants standing erect, and 9= 100% plants lay flat on the ground.

7. **Pod Clearance (PC)**: Recorded at harvest as percent of pods on plants not touching the ground or in contact with the soil surface.

8. **Biomass Yield (BY)**: Total plant dry weight recorded at 12% moisture and rounded up to the nearest whole number (lb/a).

9. **Seed Yield (SY)**: Recorded in lb/a at 12 % moisture and rounded up to the nearest whole number.

10. **Harvest Index (HI)**: The ratio of SY/BY expressed in % BY at 12% moisture.

11. **Weight of 100 seeds (SW)**: Weight of 100 randomly taken undamaged seed in grams at 12 % moisture.

12. **Appearance Desirability (SD)**: An aggregate value for seed size, shape, color and brilliance for the respective market class recorded by various scales (see footnotes).

For other traits and scoring methods, a footnote is provided with associated details.

Table 4. Summary Agronomic and Bean Rust Reaction Data for the 2016 CDBN†.

Entry No.	Market Class	Line	Yield	100-seed weight	Days to Flowering	Harvest Maturity	Rust (MD)		Rust (CO)
			lbs/acre	g 100 seeds^{-1}	days	days	(1-9)	Grade	(1-6)
1	PT	PT9-5-6	2723	36.4	48	95	1	R	2
2	PT	PT-11-13	2752	40.3	45	97	2	R	seg
7	PT	CO 14790-3	2634	41.0	48	101	2	R	2,3
8	PT	CENTENNIAL	2284	40.2	45	98	2-3	R	2
18	PT	LA PAZ	2750	39.0	50	97	3	R	2
19	PT	OTHELLO	2156	39.2	40	90	6-7	S	5,6
5	PT, SD	COSD-7	2345	39.4	45	96	2	R	3
6	PT, SD	COSD-35	2312	38.5	47	100	1	R	3
9	PT, SD	NE12-15-161	2576	48.4	44	98	1	R	3
21	PT, SD	ND-PALOMINO	2172	38.5	43	96	7	S	5,6
3	BLK	XRAV-40-4	2396	22.8	48	94	1	R	2
4	BLK	BK 11-8	2021	21.6	49	92	1	R	3
14	BLK	ZENITH	2420	23.2	50	99	5	I	5,6
17	BLK	ECLIPSE	2122	20.6	49	94	1	R	1
10	NAVY	LIGHTHOUSE	1974	21.2	47	99	7-8	S	5,6
15	NAVY	ALPENA	2463	19.6	50	99	3	R	4
16	OTEBO	SAMURAI	2718	27.0	49	99	7	S	5,6
11	SR	ACUG 13-SR1	2289	22.6	51	99	2	R	2,3
12	DRK	DYNASTY	2073	53.7	41	95	3	R	3
13	WK	YETI	1819	47.5	41	96	2	R	2
20	LRK	CELRK	1591	51.7	39	88	3-4	I	3

† Across locations not all market classes are tested in the exact same trial. At certain locations large, medium and small seeded market classes are tested in different trials within the same field or in completely different locations.

Table 5. 2016 CDBN. Summary for seed yield (lbs/acre) for individual locations.

Entry No.	Market Class	Line	CA	CO†	MI	MT	ND‡	NE	ON	WA	WY	Average
			lbs/acre									
1	PT	PT9-5-6	1007	2119	2970	4057	2770	2044	2530	4174	2833	2723
2	PT	PT-11-13	1545	2051	2620	3675	3220	2066	2496	4193	2903	2752
7	PT	CO 14790-3	1942	2109	2070	2925	2500	2667	2199	4091	3204	2634
8	PT	CENTENNIAL	965	1753	1240	3171	2860	2580	1930	3687	2368	2284
18	PT	LA PAZ	1006	2025	2490	4037	3130	3129	2808	.	3378	2750
19	PT	OTHELLO	780	1705	1560	3840	2370	1642	1190	3338	2975	2156
5	PT, SD	COSD-7	1390	1507	1460	3539	2420	2259	2002	3626	2901	2345
6	PT, SD	COSD-35	915	1691	1930	2914	2630	2012	1949	3735	3028	2312
9	PT, SD	NE12-15-161	1290	2063	1750	3261	2910	2643	1469	4592	3206	2576
21	PT, SD	ND-PALOMINO	335	1585	1190	3502	2950	2291	1476	3731	2490	2172
3	BLK	XRAV-40-4	1816	1652	1660	3618	2440	1885	2229	3485	2783	2396
4	BLK	BK 11-8	273	1385	1390	3778	2280	2405	1347	3182	2149	2021
14	BLK	ZENITH	666	1456	2510	2752	2420	2568	2260	4248	2899	2420
17	BLK	ECLIPSE	309	1736	2250	3392	2880	2108	1193	.	3106	2122
10	NAVY	LIGHTHOUSE	385	1109	1210	3629	2900	1716	1142	3315	2363	1974
15	NAVY	ALPENA	1825	1509	1880	3331	3300	2055	2208	3589	2466	2463
16	OTEBO	SAMURAI	1646	1604	3290	3474	3230	2088	2184	3793	3153	2718
11	SR	ACUG 13-SR1	1316	1626	1940	3896	2470	1857	1593	3741	2162	2289
12	DRK	DYNASTY	817	1730	3080	3242	**2140**	1858	1078	1808	2908	2073
13	WK	YETI	1302	874	3240	3020	**1400**	1222	1251	2152	1910	1819
20	LRK	CELRK	1383	873	2920	2979	**1070**	785	875	1368	2068	1591
		Grand Mean		1627	2120	3430	2760	2089	1781	3466	2726	2500
		LSD 0.05		399	310	762	500	888	291	490	784	
		CV %		14.8	11.0	19.6	12.8	25.7	13.8	8.4	20.3	
		Grand Mean‡					**1540**					
		LSD 0.05‡					**710**					
		CV %‡					**26.7**					

† Yield of Yeti and CELRK shattered prior to harvest.

‡ Park Rapids, MN (yield in bold).

Table 6. 2016 CDBN. Summary for 100-seed weight (g) for individual locations.

Entry No.	Market Class	Line	CO	MI	ND†	NE	ON	WA	WY	Average
			g							
1	PT	PT9-5-6	31.3	41.2	36.4	30.5	45.0	38.4	32.0	36.4
2	PT	PT-11-13	33.3	44.3	39.7	32.3	56.0	41.4	35.0	40.3
7	PT	CO 14790-3	33.3	44.3	44.4	37.4	51.2	42.3	34.0	41.0
8	PT	CENTENNIAL	36.5	40.6	40.4	37.9	47.9	44.0	34.0	40.2
18	PT	LA PAZ	34.3	45.7	35.5	35.5	49.3	.	34.0	39.0
19	PT	OTHELLO	32.2	38.8	40.7	35.6	49.5	41.7	36.0	39.2
5	PT, SD	COSD-7	32.2	41.3	40.3	35.9	52.2	41.9	32.0	39.4
6	PT, SD	COSD-35	31.2	43.6	42.2	36.4	43.9	40.2	32.0	38.5
9	PT, SD	NE12-15-161	40.0	45.4	50.2	48.3	58.3	51.5	45.0	48.4
21	PT, SD	ND-PALOMINO	29.6	37.9	41.6	36.5	44.6	43.1	36.0	38.5
3	BLK	XRAV-40-4	17.6	22.3	23.5	19.3	33.4	23.5	20.0	22.8
4	BLK	BK 11-8	18.1	22.4	22.6	19.7	26.2	23.5	19.0	21.6
14	BLK	ZENITH	18.5	26.0	21.8	20.1	31.3	24.7	20.0	23.2
17	BLK	ECLIPSE	17.4	23.1	21.3	17.9	25.0	.	19.0	20.6
10	NAVY	LIGHTHOUSE	17.2	21.3	23.1	18.5	26.8	22.2	19.0	21.2
15	NAVY	ALPENA	16.2	20.9	20.3	16.2	25.8	20.8	17.0	19.6
16	OTEBO	SAMURAI	21.4	28.9	30.8	21.5	36.3	26.2	24.0	27.0
11	SR	ACUG 13-SR1	18.6	26.3	25.5	19.6	27.4	22.1	19.0	22.6
12	DRK	DYNASTY	45.3	63.3	**52.7**	51.8	66.6	50.4	46.0	53.7
13	WK	YETI	41.1	57.1	**46.9**	43.7	57.7	44.9	41.0	47.5
20	LRK	CELRK	48.1	63.4	**48.2**	48.4	58.4	48.4	47.0	51.7
		Grand Mean	29.2	38.0	33.3	31.6		36.4	31.0	33.3
		LSD 0.05	1.5	1.8	2.1	3.3		2.1	3.0	
		CV %	3.1	3.3	4.4	6.5		4.5	5.8	
		Grand Mean†			**49.2**					
		LSD 0.05†			**3.5**					
		CV %†			**4.1**					

† Park Rapids, MN (100-seed weight in bold).

Table 7. 2016 CDBN. Summary for Days to Flowering (days) and Day To Harvest Maturity (days) for individual locations.

Entry No.	Market Class	Line	Days to Flowering				Dys to Harvest Matutiry							
			CO	MI	WY	Mean	CO	MI	ND†	NE	ON	WA	WY	Mean
1	PT	PT9-5-6	45	45	54	48	84	102	97	92	108	94	92	95
2	PT	PT-11-13	44	43	49	45	80	106	98	97	113	98	85	97
7	PT	CO 14790-3	45	47	51	48	82	110	113	101	113	102	87	101
8	PT	CENTENNIAL	44	43	48	45	79	110	101	100	113	99	84	98
18	PT	LA PAZ	47	47	55	50	84	104	96	98	110	.	87	97
19	PT	OTHELLO	40	39	42	40	72	95	94	94	101	91	83	90
5	PT, SD	COSD-7	43	43	48	45	77	110	100	97	107	96	84	96
6	PT, SD	COSD-35	44	45	51	47	80	110	110	99	112	101	88	100
9	PT, SD	NE12-15-161	44	42	45	44	78	106	103	100	107	103	89	98
21	PT, SD	ND-PALOMINO	44	43	42	43	82	110	100	99	98	95	85	96
3	BLK	XRAV-40-4	45	45	55	48	80	94	97	97	107	95	87	94
4	BLK	BK 11-8	46	45	56	49	81	93	90	99	99	96	88	92
14	BLK	ZENITH	47	46	56	50	83	99	100	100	113	105	93	99
17	BLK	ECLIPSE	47	44	56	49	83	93	94	99	104	.	88	94
10	NAVY	LIGHTHOUSE	45	45	52	47	83	101	101	99	111	108	89	99
15	NAVY	ALPENA	48	45	56	50	84	99	98	101	113	104	92	99
16	OTEBO	SAMURAI	47	47	54	49	81	108	105	100	115	97	88	99
11	SR	ACUG 13-SR1	48	48	57	51	81	103	103	99	111	105	89	99
12	DRK	DYNASTY	43	36	43	41	79	100	**95**	100	105	97	86	95
13	WK	YETI	42	37	43	41	79	102	**96**	99	110	96	87	96
20	LRK	CELRK	40	35	41	39	74	94	**86**	90	95	93	81	88
		Grand Mean	45	43	50	46	80	102	100	98	108	99	87	96
		LSD 0.05	1.7	2.3	2.0		3.0	2.2	6.0	2.9	3.3	2.0	2.0	
		CV %	2.3	3.1	3.3		2.2	2.0	5.0	1.8	2.6	2.0	2.0	
		Grand Mean†							**92**					
		LSD 0.05†							**3.0**					
		CV %†							**2.0**					

† Park Rapids, MN (days to maturity in bold).

Table 8. Bean Rust and Common Bacterial Blight (CBB) reaction at Beltsville, MD and Bean Rust at Fort Collins, CO in 2016.

Enrty No.	Market Class	Line	MD					CO
			Rust			CBB		Rust
			I	II	Grade	I	II	
			(1-9)†					(1-6)‡
1	PT	PT9-5-6	1	1	R	2	2	2
2	PT	PT-11-13	2	1	R	3-4	1	seg
7	PT	CO 14790-3	1	2	R	.	2	2,3
8	PT	CENTENNIAL	2-3	2-3	R	1	2	2
18	PT	LA PAZ	1	3	R	3	3	2
19	PT	OTHELLO	6-7	3-4	S	.	2-3	5,6
5	PT, SD	COSD-7	1	2	R	3-4	2	3
6	PT, SD	COSD-35	1	1	R	4-5	2	3
9	PT, SD	NE12-15-161	1	1	R	3	4	3
21	PT, SD	ND-PALOMINO	7	7	S	2	2	5,6
3	BLK	XRAV-40-4	1	1	R	2	2	2
4	BLK	BK 11-8	1	1	R	2	2	3
14	BLK	ZENITH	5	4-5	I	2	.	5,6
17	BLK	ECLIPSE	1	1	R	2	.	1
10	NAVY	LIGHTHOUSE	7	7-8	S	1	2	5,6
15	NAVY	ALPENA	3	3	R	2	2	4
16	OTEBO	SAMURAI	7	6-7	S		2	5,6
11	SR	ACUG 13-SR1	1	2	R	.	3	2,3
12	DRK	DYNASTY	1-2	3	R	6	3	3
13	WK	YETI	1	2	R	2-3	6-7	2
20	LRK	CELRK	3-4	3	I	7	7	3
		Pinto 114 (susc. Check)	8	8	S	1	3	
		Aurora (Int. Check)	3	2-3	R	2	1	
		Buster Res. Check)	1	2-3	R	3	2-3	

† Bean rust and CBB evaluation, scale 1-9, where 1-3= resistant, 4-6= intermediate and 7-9= susceptible.

‡ Bean Rust reaction to local endemic Colorado races: 1=no symptoms, 2 necrotic flecks, 3=small pustule, 4,5, or 6=susceptible.

Table 9. Miscellaneous trait data for 2016 CDBN.

Enrty No.	Market Class	Line	MI	ND†	ON	MI	WA	NE	ON		MI	WA	WA
			Plant Height			Lodging		Test Weight	Yield Mat Index	Harvestability	Agron. Score	Emergence	Appearance
			cm			(1-5)	(1-9)	lbs/bu		(1-5)	(1-7)	(1-9)	(1-5)
1	PT	PT9-5-6	51.3	65.0	38.0	1.7	2.8	61.9	23.5	2.9	5.0	2.0	3.3
2	PT	PT-11-13	54.3	63.0	40.0	1.7	4.2	60.6	22.1	2.6	4.0	2.3	3.1
7	PT	CO 14790-3	51.7	61.0	38.0	2.0	3.5	60.7	19.4	3.3	3.7	3.7	3.1
8	PT	CENTENNIAL	53.3	65.0	37.0	2.0	3.5	61.1	17.1	3.0	3.0	2.7	2.7
18	PT	LA PAZ	53.0	70.0	36.0	2.0	.	61.3	25.4	3.0	4.0	.	.
19	PT	OTHELLO	46.3	41.0	31.0	2.3	4.5	59.1	11.7	4.9	2.3	3.0	2.5
5	PT, SD	COSD-7	51.7	58.0	35.0	2.0	4.0	60.2	18.8	3.7	3.7	3.0	2.3
6	PT, SD	COSD-35	52.7	55.0	36.0	2.0	3.8	61.5	17.5	3.4	3.3	3.0	2.8
9	PT, SD	NE12-15-161	47.7	56.0	27.0	2.3	8.2	59.1	13.7	4.0	3.0	5.0	1.5
21	PT, SD	ND-PALOMINO	51.7	61.0	34.0	2.0	3.8	59.0	15.0	2.6	3.0	2.3	2.7
3	BLK	XRAV-40-4	47.8	57.0	29.0	1.0	1.8	62.3	20.8	2.7	3.8	2.3	3
4	BLK	BK 11-8	49.3	60.0	35.0	1.5	2.0	61.9	13.6	1.7	3.3	2.0	3.3
14	BLK	ZENITH	52.8	58.0	35.0	1.0	2.8	62.5	20.0	1.8	4.3	1.7	1.8
17	BLK	ECLIPSE	49.0	60.0	35.0	1.0	.	62.3	11.5	1.9	3.8	.	.
10	NAVY	LIGHTHOUSE	50.0	59.0	32.0	1.0	3.5	62.9	10.3	3.6	3.8	3.7	2.8
15	NAVY	ALPENA	53.5	67.0	35.0	1.0	1.8	63.2	19.6	2.1	5.0	4.0	2.8
16	OTEBO	SAMURAI	52.0	60.0	37.0	2.0	2.2	64.0	19.1	3.2	4.0	2.7	2.9
11	SR	ACUG 13-SR1	51.7	55.0	36.0	2.0	2.8	62.6	14.4	3.3	5.0	3.7	4
12	DRK	DYNASTY	50.5	**51.0**	30.0	2.0	2.0	59.7	10.2	2.0	3.8	4.0	.
13	WK	YETI	50.5	**46.0**	33.0	1.3	2.0	62.6	11.4	2.7	3.8	4.0	.
20	LRK	CELRK	44.0	**34.0**	31.0	1.0	1.5	58.9	9.3	2.1	3.5	4.0	.
		Gran Mean	50.7	59.0		1.7	3.2	61.3		2.9	3.8	3.1	
		LSD 5%	2.1	7.0		0.5	1.0	1.0		0.5	0.6	1.3	
		CV %	3.0	8.0		21.1	18.5	1.0		14.2	12.3	29.0	
		Gran Mean†		**44.0**									
		LSD 5%†		**4.0**									
		CV %†		**6.0**									

† Park Rapids, MN (Plant Height in bold).

Emergence (1-9); Lodging (1-5) and (1-9); Harvestability (1-5); and Appearance (1-5) where 1 is best and 5 or 9 is worst.

Agronomic score (1-7) where 1 is worst and 7 best.

Table 10. Canning data for 2016 CDBN from Michigan.

Entry No.	Market Class	Line	Canning Score (1-5)[†]
1	PT	PT9-5-6	3.0
2	PT	PT-11-13	3.4
7	PT	CO 14790-3	2.2
8	PT	CENTENNIAL	3.0
18	PT	LA PAZ	3.5
19	PT	OTHELLO	4.1
5	PT, SD	COSD-7	3.2
6	PT, SD	COSD-35	2.8
9	PT, SD	NE12-15-161	3.7
21	PT, SD	ND-PALOMINO	3.2
3	BLK	XRAV-40-4	3.6
4	BLK	BK 11-8	4.2
14	BLK	ZENITH	4.4
17	BLK	ECLIPSE	3.9
10	NAVY	LIGHTHOUSE	4.2
15	NAVY	ALPENA	2.5
16	OTEBO	SAMURAI	1.2
11	SR	ACUG 13-SR1	3.5
12	DRK	DYNASTY	1.2
13	WK	YETI	2.1
20	LRK	CELRK	3.7

[†]These are visual ratings based on overall appearance averaged across a group of ~15 evaluators. The scale is 1 to 5, where 1=undesirable and 5=highly desirable

2016 CDBN Notes

Mike Moore, Wyoming Seed Certification Service; Camby Reynolds, Powell Research and Extension Center, Jolene Sweet, Wyoming Seed Certification Service, Jeremiah Vardiman, UW Extension, Andrea Pierson, Powell Research and Extension Center.

In 2014, Wyoming ranked eighth nationally in dry bean (Phaseolus vulgaris L.) production, fourth in the production of pinto beans. In the same year, Wyoming growers produced 799,000 hundred-weight of pinto beans on 37,600 harvested acres, averaging 21.3 hundred-weight per acre.

The University of Wyoming Seed Certification Service coordinates the dry bean variety performance evaluation at this location in a continuous and on-going program. In cooperation with the National Cooperative Dry Bean Nursery, a wide range of germplasm is evaluated each year, including promising new lines and newly released varieties, assisting producers in selecting varieties best suited for Wyoming soils and climate. Public and private (proprietary) varieties are tested.

Materials and Methods

The experiment was located at the University of Wyoming Research and Extension Center in Powell, Wyoming. The soil, a Garland clay loam, (fine, mixed, mesic: Typic Haplarid), was prepared by roller harrow and leveled in the spring. Chemical weed control consisted of a preplant incorporated chemical treatment of 2 pints of Sonalan and 1 pint of Outlook applied on May 4. The plots received 100 units of N, 20 units of P and 5 units of Zn per acre on May 19. The plots were planted on June 4 in three row plots that were 5.5 feet wide by 20 feet long. IH 185 planter units with cone attachments were used, set on 22-inch row spacing. The experimental design was a randomized block with 4 replications. Cultivation controlled weed escapes during the growing season. Furrow irrigation was applied on May 6, June 29, July 10, July 20, and August 10. Visual estimates for days to 50 percent bloom (50 percent of plants at second bloom) and days to maturity (50 percent of the plants with one buckskin pod) were made. Subplots of one row by 10 feet were pulled by hand, and plots were threshed with an Almaco stationary plot thresher. The seed was hand-picked to remove dirt clods and seed mixtures. Samples were then weighed for clean seed yield per plot and seeds per pound.

Results and Discussion

Stand establishment was very good. Summer temperatures and precipitation were reasonable, and all entries matured prior to the first frost.

Acknowledgements

This nursery was possible only with significant assistance. Powell R & E Center staff managed the plots. Jeremiah Vardiman took the bloom notes, and Adrea Pierson assisted with statistical analysis. Their efforts are greatly appreciated.

Bean Breeding Nurseries at MSU in 2016

The dry bean breeding program initiated its eight season on the 450 acre Saginaw Valley Research & Extension Center (SVREC) research farm near Frankenmuth MI in 2016. A total of

2001 yield trial plots (14 tests) were harvested in 2016 and 1004 single plant selections were made in the early generation nurseries. Yield trials at the SVREC included 48-entry standard navy test; 48-entry standard black test; 64-entry standard GN test: 32-entry standard pinto test; 40-entry standard red/pink test; 30-entry drought trial and 36-entry Co-op and regional test that includes pinto, GN, red and pinks from other programs. At the Montcalm Research Farm (MRF) near Entrican, MI, kidney bean yield trials were dramatically increased to include 24-entry standard kidney and bush cranberry test; 80-entry preliminary dark red kidney test; 88-entry white kidney test; 64-entry light red kidney test; 9-entry yellow bean trial and 64-entry white mold test. All trials were direct harvested except for kidney and cranberry beans at Montcalm. Weather during the early growing season was dry and hot and beans were under considerable stress during the critical flowering period in Frankenmuth (see figure). Temperatures were above average in the 2016 season and exceeded 90F during June and July. Rainfall late in August resulting in plants re-greening and setting a double crop that reflected in lower yields and necessitated chemical desiccation in commercial fields. Selection for tolerance to drought stress during the extended dry period was possible in all nurseries based on performance under these conditions. White mold plots at MRF had supplemental irrigation to encourage disease development. However, disease incidence in this nursery was very low in the susceptible checks due to high temperatures and lack of prior bean production on this particular land parcel where the nursery was located.

SVREC Frankenmuth	June	July	August	Sept	4-month totals
30-year average:	2.66	2.34	3.01	2.98	10.98 inches
2016 amounts:	1.51	3.47	5.15	2.03	12.16 inches

CDBN trial planted at Agronomy Field Headquarters in Davis

In summary, we planted 3 reps and each plot was 10' long by 15' wide (6 rows). We had two heatwaves in Davis this summer, which caused a lot of blossom drop, and at the end of the season when the plants were recovering and having a last flush of blossoms, we had a major spider mite infestation. With canopy closure at that time, we lacked the means to apply a pesticide effectively without crushing the plants. Therefore, yields were quite low for us this year.

MSU Eastern Agricultural Research Center, Sidney, MT

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OBJECTIVE:

The evaluate yield of dry bean varieties in eastern Montana and their response to zinc application.

MATERIALS AND METHODS:

Location: EARC irrigated farm located in Sidney, MT
Soil Type: Savage Clay Loam
Precipitation May – September 2016: 9.5 in
Irrigation water depth used through the growing season: 14 inch

Jim Heitholt, University of Wyoming reported that the 2016 CDBN was destroyed by hail in Lingle, WY.