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1999 Dry Bean Variety Performance Trials



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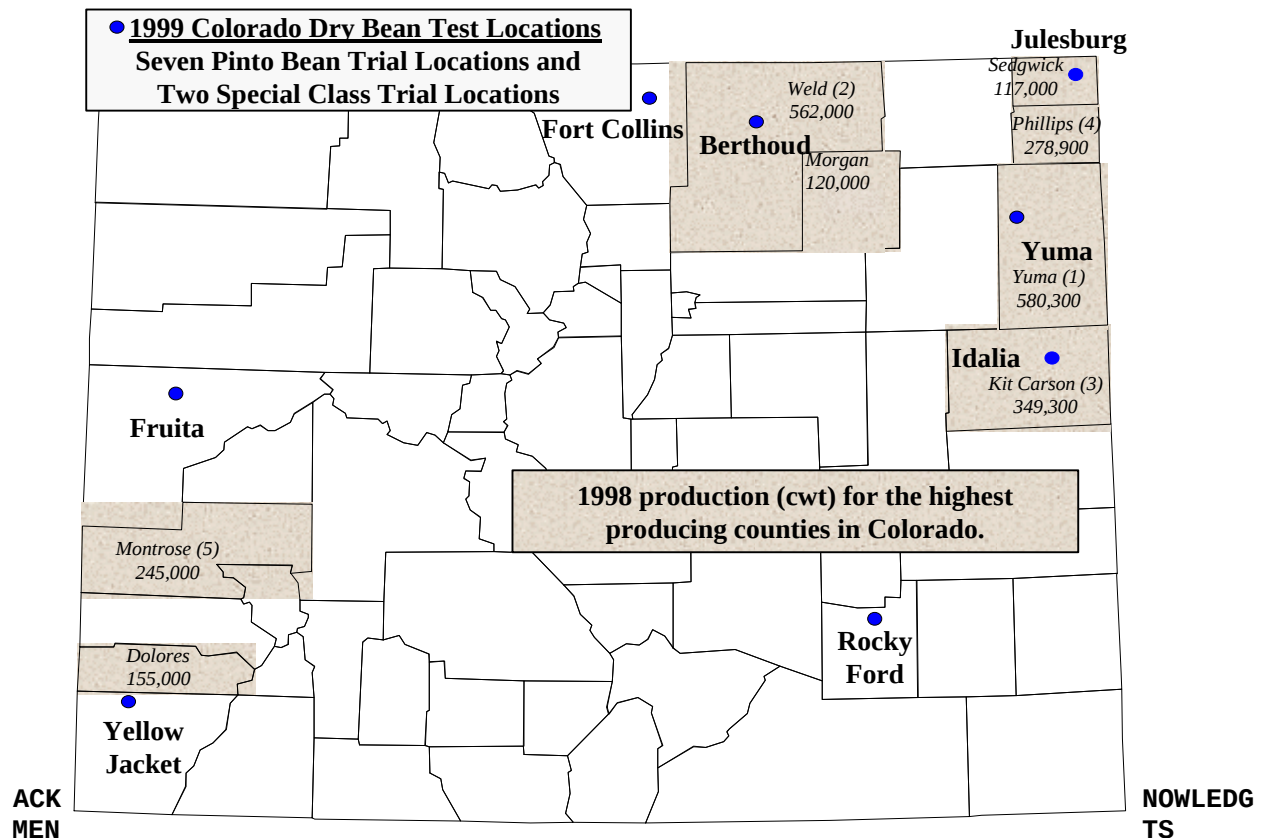


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The authors wish to express their gratitude to the Colorado farmers who generously contributed the use of their land, equipment, and time to conduct these trials for the benefit of all Colorado dry bean producers and bean dealers: Berthoud - Brent Adler; Idalia - Dennis Towns; Julesburg - Bruce Holcomb; Yuma - Debbie Nichols. We also acknowledge the participation of Colorado Experiment Stations at Fort Collins (Agricultural Research, Development and Education Center); Fruita (Western Colorado Research Center); Rocky Ford (Arkansas Valley Research Center) and Yellow Jacket (Southwestern Colorado Research Center). The success of the 1999 season is due in part to efforts of Colorado Cooperative Extension agents Ron Meyer (Golden Plains), Gary Lancaster (Sedgwick County) and Jerry Alldredge (Weld County); with research support provided by The Colorado Dry Bean Administrative Committee, and publication support provided by The Colorado Bean Network.

Technical Report TR 99-10

Agricultural
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Soil and Crop
Sciences

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Extension

December
1999

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1999 COLORADO DRY BEAN PERFORMANCE TRIALS

Introduction

Colorado bean producers harvested more than 150,000 acres of dry beans in 1999 and yields are expected to average 1700 lbs/acre. Dry bean producers spend over \$5 million on pinto bean seed every year, which means that the bean variety decision is extremely important. Reliable performance results from uniform variety trials help Colorado dry bean producers make better variety decisions. With funding from the Colorado Dry Bean Administrative Committee, Colorado State University personnel evaluate dry bean varieties at multiple locations in eastern Colorado.

1999 Season Summary

1999 was the first year that the uniform variety trial was planted at Yellow Jacket and Fruita in addition to five eastern Colorado trial locations (Berthoud, Julesburg, Yuma, Idalia, and Rocky Ford). The average performance over seven locations is a powerful tool to select varieties for the coming year. The trial serves a dual purpose of screening new CO lines emerging from CSU's pinto bean breeding program, allowing fast and reliable selection of new lines. Other market classes were tested at Fort Collins and at the Yuma Irrigated Research Farm. A randomized complete block field design with three replicates was used in all trials. The seeding rate was approximately 87,120 seeds per acre with plots consisting of four 30-inch rows. All trials were situated in CSU or commercial bean fields. Seed yields, in pounds per acre, were adjusted to 14% moisture content.

1999 C S U - Dry bean variety trial observations

Dr. H. F. Schwartz

Disease pressure was low at all test sites during 1999. Trace infections of rust and white mold were noted at a few sites late in the season. In addition, there was scattered but light infection by various bacterial diseases, especially common bacterial blight on most varieties at the northeastern sites, Julesburg and Idalia. Root rot pressure, especially from *Fusarium* root rot, was fairly widespread and caused light to moderate damage on varieties at Idalia and Berthoud. However, disease pressure was not uniform or severe enough to allow for a systematic varietal evaluation for disease reactions.

Berthoud:

Trace *Fusarium* wilt and moderate *Fusarium* root rot pressure throughout the nursery, with trace rust noted on susceptible varieties late in the growing season.

Idalia:

Moderate damage from herbicide drift on August 12; moderate *Fusarium* root rot, trace common bacterial blight, and trace rust noted on Othello and Bill Z on August 25.

Julesburg:

Trace rust on Othello, Bill Z, Buckskin, Poncho, Cisco, USPT-73 on August 11 to August 25. Trace common bacterial blight infection throughout the nursery on August 25.

Rocky Ford:

Light to moderate damage from herbicide drift on July 22; moderate damage by Mexican Bean Beetle on August 5. No disease pressure.

Yuma:

Moderate herbicide carryover damage observed on July 23. No disease pressure.

DRY BEAN VARIETY DESCRIPTIONS - Summary of Test Plot Data from Eastern Colorado & Western Nebraska during 1996 - 1998

Prepared by Drs. H.F. Schwartz, J.J. Johnson & M.A. Brick - Colorado State University (9/99)

Variety	Origin/Year ¹	Growth Habit ²	Maturity ³	1996-98 Summary from CO + NE Data ⁴			Seed Quality Observation ⁵	Disease Resistance ⁶
Pinto's								
Apache	ISB-96	V	M	2224	1242	50	**	BC1 / BC2 / CT / RU
Bill Z	CSU-87	V	F	2260	1350	50	*	BC1 / BC2
Buckskin	Novartis-94	V	F	2539	1272	12		BC1 / BC2 / CT / HB / BBS
Burke (USWA 19)	USDA-98	SU/V	F	2323	1246	16		BC1/ BC2 / CT /RU / HB
Chase	UN-93	V	F	2508	1312	50	**	RU / WM / HB / BBS
Elizabeth	Fox - 97	V	F	2325	1251	12	**	RU
Frontier	NDSU-97	SU	L	2582	1246	5		BC1 / BC2 / RU / WM
GTS 900	Gentec-98	V	L	2322	1297	11		BC1 / BC2 / RU / WM
Hatton	NDSU-95	V	F	2195	1216	8		BC1 / BC2
Maverick	NDSU-95	SU	F	2330	1314	12		RU
Montrose (CO51715)	CSU-98	V	F	2761	1229	9	*	BC1 / BC2 / CT / RU
Othello	USDA-86	SU	M	2666	1268	6	*	BC1 / BC2 / CT
Poncho (ROG 179)	Novartis-98	V	L	2427	1263	46	*	BC1 / BC2 / RU / HB / BBS
Vision	Semanis-96	U	F	2319	1321	50	*	RU / FR
Winchester	Novartis-95	V	F	2660	1369	6		
Kidney Types								
Enola (yellow)	Proctor-98	B	F	1948	1112	3		RU / WM
CE-LRK	UC-89	B	M	2157	777	4		BC1 / BC2 / RU / WM
Foxfire	Novartis-92	B	F	2682	938	2		BC1 / RU / WM / CB / HB
Sacramento	UC-75	B	M	2368	818	3		RU / WM
Black's								
Black Jack	Gentec-93	B	L	1746	2427	2		WM / FR / HB
Midnight	SUNY-80	U	L	2331	2490	3		BC1 / BC2 / FR / PY
Shadow	Novartis-95	U	L	2469	2064	5		BC1 / BC2 / RU
Shiny Crow (CO96902)	CSU-00	V	F	2443	2134	4		BC1 / BC2
UI 911	UI-93	U	F	2003	2555	3		BC1 / BC2
Great Northern's								
Beryl	Novartis-84	V	F	2689	1602	3		BC1 / BC2 / CT / CB
Harris	UN-80	V	F	2522	1312	3		BC1 / BC2 / BY / CB / HB
Ivory	Novartis-83	V	M	2345	1265	3		BC1 / BC2 / CT / HB
Marquis	Novartis-92	V	F	2922	1518	3		BC1 / BC2 / WM / CB / HB
UI 425	UI-84	V	F	2728	1376	4		BC1 / BC2 / CT
Wei hing (GN 94-9)	UN-98	V	L	2528	1366	5		RU / CB

! Note 1: CSU = Colorado State University, Fox = Fox Bean of Idaho, Gentec = Gentec Seeds of Canada, ISB = Idaho Seed Beans, NDSU = North Dakota State University, Novartis = Novartis Seeds of Idaho, Proctor = Red Beard Bean of Colorado, Seminis = Seminis Seeds of Idaho, SUNY = Cornell University of New York, UC = Univ. of California at Davis, UI = Univ. of Idaho, UN = Univ. of Nebraska, USDA = USDA of Prosser Idaho

! Note 2: Growth Habit = V (vine), SU (semi-upright), U = (upright), B = (bush). Suggested plant populations: V = 75 - 80000, SU = 80 - 85000, U = 85 - 90000, B = 90 - 100000 / acre. Adjust fertility levels in relation to adjusted plant populations for each growth habit; for example, a common suggestion for low fertility soils for vine growth habits at 75000 plants is 75 lb N + 40 lb P / Acre.

! Note 3: Maturity Classification = Days from planting to vine cutting in our region; E (Early, 85-89 days), M (Medium, 90-

94 days), F (Full Season, 95-99 days), L (Late, 100 or more days)

- ! Note 4: Yield data summarized from published reports of Colorado Variety Trials (CSU - J. Johnson), Nebraska Variety Trials (UN - D. Nuland) and Nebraska Farm Trials (D. Nuland & R. Zeller); these yields are conservative estimates of varietal potential since moderate plant populations were used uniformly for each trial, regardless of varying growth habits.
- ! Note 5: Seed Quality observations from dry bean industry and/or university personnel reflect the general appearance of seed of varieties that is generally light enough for most markets (*) or which may exhibit premature darkening and/or yellowing (***) within the 1st year after harvest.
- ! Note 6: Disease Resistance as defined by the variety release statement, and may range from immunity to tolerance to disease avoidance in our region: BBS = Bacterial Brown Spot, BC1 = Bean Common Mosaic Virus - NY Strain, BC2 = Bean Common Mosaic Virus - Type Strain, BY = Bean Yellow Mosaic Virus - Pea Strain, CB = Common Bacterial Blight, CT = Curly Top Virus, HB = Halo Blight, FR = Fusarium Root Rot, PY = Pythium, RU = Rust, WM = White Mold

Table 1. Dry bean trial cultural conditions in 1999.

	Berthoud	Fort Collins	Fruita	Idalia	Julesburg	Rocky Ford	Yellow Jacket Irrigated	Yellow Jacket Dryland	Yuma
Soil Type	Weld Silt Loam	Fort Collins Clay Loam	Billings Silty Clay Loam	Kuma-Kieth Silt Loam	Rago-Yuma Silt Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Haxtun Sandy Loam
Previous Crop	Corn	Corn	Corn	Corn	Corn	Alfalfa	Oats	Wheat	Corn
Fertilization									
N acre ⁻¹	40	150		3	76	20	30		150
P ₂ O ₅ acre ⁻¹	20	80		10	14	100	30		
S acre ⁻¹					5				
Zn acre ⁻¹	1				2 ½		4		
Herbicide (fungicide)	Frontier Sonalan	Basagran Frontier Rapture	Frontier Eptam Basagran	Treflan	Sonalan Eptam	Treflan	None (Copper)	None	Treflan Eptam
Insecticide	None	Sevin XLR	Dimethoate	None	None	Capture	None	None	None
Irrigation	Furrow	Furrow	Furrow	Furrow	Furrow	Furrow	Sprinkler	None	Sprinkler

Pinto bean varietal descriptions:

Bill Z	A variety release by Colorado State University in 1985. It has a vine Type III growth habit with resistance to bean common mosaic virus and moderate tolerance to bacterial brown spot. It is a productive variety when growing conditions are good, susceptible to white mold and rust, and medium maturity.	CO45188	to bacterial brown spot, but moderately susceptible to Fusarium wilt.
		CO46322	An experimental line from Colorado State University with resistance to rust.
		CO63603	An experimental line from Colorado State University with resistance to rust.
Buckskin	A Type III variety from Novartis Seeds, Inc.		
Burke	A medium season variety (USWA-19) released by Washington State in 1996. It has resistance to rust.	CO64000	An experimental line from Colorado State University with resistance to rust.
Buster	A new variety from Asgrow Seed Co. (5051) released in 1999.	CO64155	An experimental line from Colorado State University with resistance to rust.
Chase	A variety released by the University of Nebraska. It is resistant to rust and white mold, moderately resistant	CO66032	An experimental line from Colorado State University with resistance to

	rust.		
CO74630	An experimental line from Colorado State University with resistance to rust.	CO74905	An experimental line from Colorado State University with resistance to rust.
		CO75511	An experimental line from Colorado State University with resistance to rust.
		CO75714	An experimental line from Colorado State University with resistance to rust.
		Cisco	A variety from Novartis Seeds Inc. (RNK 354).
		Elizabeth	A variety from Fox Bean Co. with rust resistance.
		Frontier	A variety from North Dakota State University.
		Kodiak	A variety from Michigan (P94207) with rust resistance.
		Maverick	An upright variety that is resistant to rust, released by North Dakota State University.
Montrose	A variety released from Colorado State University in 1999 (CO51715) with resistance to rust and excellent seed quality.		
Othello	A variety released by the USDA with a semi-upright growth habit. It is highly susceptible to rust and bacterial diseases.		
Poncho	A variety from Novartis Seeds, Inc. (ROG 179) susceptible to rust, but moderately resistant to some bacterial diseases.		
USPT-73	An experimental line from USDA-ARS, Prosser, WA.		
Vision	A full season upright variety with resistance to rust released by Asgrow Seed Co.		

Table 2. Average pinto bean performance over seven Colorado sites in 1999.

Variety*	Location							Average 1999
	<u>Berthoud</u>	<u>Fruita</u>	<u>Idalia</u>	<u>Julesburg</u>	<u>Rocky Ford</u>	<u>Yellow Jacket</u>	<u>Yuma</u>	
	Yield (lb/ac)							
CO45188	2248	2795	2109	3427	3575	2634	3593	2912
Montrose	2549	2988	2293	3035	3324	1953	3605	2821
Cisco	2271	3189	2396	3226	3425	1978	2943	2775
CO74905	1844	2919	2337	3430	3149	1982	3463	2732
CO46322	2489	2372	2313	3156	3207	1899	3584	2717
CO64155	2221	2985	2118	2970	3167	2070	3423	2708

Buster	2187	3360	2319	2759	2518	2307	3253	2672
CO75511	2262	2915	2220	2878	2832	2462	2847	2631
Bill Z	2317	2754	2108	2991	3201	2084	2861	2617
Poncho	2688	2988	1876	2265	3340	2031	3105	2613
Vision	2044	2996	1841	2773	2951	2327	3301	2604
Chase	2183	2392	2208	3329	2651	2412	2916	2584
CO66032	2599	2613	1924	2554	3083	1873	3404	2579
Kodiak	2678	2863	2061	2948	2337	1686	3224	2542
Frontier	2312	2594	2012	2733	3524	1442	3174	2542
Buckskin	2425	2820	2119	2576	2750	2156	2477	2475
Burke	2236	2486	1644	3058	2365	2375	3081	2464
CO63603	2218	2668	2083	2429	2700	1876	3075	2436
Maverick	2101	2632	2044	2415	2463	2220	3161	2434
USPT-73**	2195	3274	2229	2183	1967	2662	-----	2418
CO74630	2197	2907	1753	2354	2692	1908	3064	2411
CO75714	1958	2958	1806	2216	2615	2058	3159	2396
CO64000	1935	3260	2129	2553	916	2438	3137	2338
Othello	2006	2764	1970	2555	1828	2354	2377	2265
Elizabeth	1564	2432	2016	2518	2144	1852	2719	2178
Average	2229	2837	2077	2773	2749	2122	3123	2559

*Varieties ranked by the average yield over seven locations in 1999.

**Average over six locations only due to insufficient data at Yuma.

Table 3. Pinto bean performance at Berthoud¹ in 1999.

Variety	Yield	Moisture	Seeds/lb.
	lb/ac	%	No.
Poncho	2688	12.3	1133
Kodiak	2678	14.7	1116
CO66032	2599	11.9	1271
Montrose	2549	11.3	1206
CO46322	2489	12.5	1075
Buckskin	2425	11.4	1267
Bill Z	2317	12.2	1218
Frontier	2312	18.2	1043
Cisco	2271	12.9	1161
CO75511	2262	11.8	1282
CO45188	2248	12.7	1197
Burke	2236	11.6	1123
CO64155	2221	11.6	1192
CO63603	2218	11.5	1226
CO74630	2197	12.0	1189
USPT-73	2195	12.0	1144
Buster	2187	13.0	1147
Chase	2183	12.2	1226
Maverick	2101	12.1	1208
Vision	2044	15.1	1230
Othello	2006	12.6	1205
CO75714	1958	11.8	1260
CO64000	1935	11.8	1344
CO74905	1844	11.7	1247
Elizabeth	1564	11.7	1277
Average	2229	12.5	1199
CV%	8.9		
LSD _(0.3)	170		

¹Trial conducted on the Brent Adler farm; seeded 6/7 and harvested 9/24.

Table 4. Pinto bean performance at Fruita¹ in 1999.

Variety	Yield	Seeds/lb.
	lb/ac	No.
Buster	3360	1241
USPT-73	3274	1040
CO64000	3260	1101
Cisco	3189	1126
Vision	2995	1220
Montrose	2989	1176
Poncho	2988	1116
CO64155	2985	1118
CO75714	2957	1182
CO74905	2919	1198
CO75511	2914	1211
CO74630	2907	1055
Kodiak	2863	1226
Buckskin	2820	1184
CO45188	2795	1167
Othello	2764	1135
Bill Z	2754	1231
CO63603	2668	1155
Maverick	2632	1205
CO66032	2613	1244
Frontier	2594	1082
Burke	2486	1111
Elizabeth	2432	1146
Chase	2392	1270
CO46322	2372	1101
Average	2837	1162
CV%	9.4	
LSD _(0.30)	229	

¹Trial conducted on the Western Colorado Research Center; seeded 6/21 and harvested 10/4.

Table 5. Pinto bean performance at Idalia¹ in 1999.

Variety	Yield	Moisture	Seeds/lb
	lb/ac	%	No.
Cisco	2396	16.0	1167
CO74905	2337	11.8	1297
Buster	2319	15.0	1140
CO46322	2313	16.9	1150
Montrose	2293	13.6	1138
USPT-73	2229	13.6	1058
CO75511	2220	14.5	1320
Chase	2208	17.0	1220
CO64000	2129	14.1	1200
Buckskin	2119	14.9	1223
CO64155	2118	15.3	1117
CO45188	2109	17.1	1205
Bill Z	2108	14.5	1265
CO63603	2083	14.0	1200
Kodiak	2061	17.1	1088
Maverick	2044	15.0	1180
Elizabeth	2016	15.4	1120
Frontier	2012	16.7	1155
Othello	1970	13.0	1188
CO66032	1924	12.8	1245
Poncho	1876	15.9	1133
Vision	1841	18.7	1403
CO75714	1806	18.1	1312
CO74630	1753	13.9	1108
Burke	1644	16.3	1144
Average	2077	15.2	1191
CV%	9.1		
LSD _(0.3)	162		

¹Trial conducted on the Dennis Towns farm; seeded 5/27 and harvested 9/6.

Table 6. Pinto bean performance at Julesburg¹ in 1999.

Variety	Yield	Moisture	Seeds/lb
	lb/ac	%	No.
CO74905	3430	17.9	1103
CO45188	3427	17.8	1082
Chase	3329	15.6	1088
Cisco	3226	18.6	1070
CO46322	3156	16.8	1067
Burke	3058	16.9	1118
Montrose	3035	15.9	1088
Bill Z	2991	15.7	1117
CO64155	2970	17.2	1063
Kodiak	2948	15.3	984
CO75511	2878	16.5	1152
Vision	2773	20.5	1170
Buster	2759	15.4	1047
Frontier	2733	20.1	991
Buckskin	2576	16.0	1147
Othello	2555	16.3	1097
CO66032	2554	16.0	1182
CO64000	2553	17.5	1078
Elizabeth	2518	16.6	1032
CO63603	2429	14.7	1146
Maverick	2415	15.5	1068
CO74630	2354	16.0	1114
Poncho	2265	16.5	1115
CO75714	2216	16.7	1138
USPT-73	2183	17.4	1047
Average	2773	16.8	1092
CV%	14.8		
LSD _(0.30)	350		

¹Trial conducted on the Bruce Holcomb farm; seeded 6/9 and harvested 10/6.

Table 7. Pinto bean performance at Rocky Ford¹ in 1999.

Variety	Yield	Moisture	Seed/lb
	lb/ac	%	No.
CO45188	3575	12.6	1132
Frontier	3524	16.9	958
Cisco	3425	13.1	1102
Poncho	3340	11.8	1076
Montrose	3324	12.1	1146
CO46322	3207	12.1	1061
Bill Z	3201	11.9	1148
CO64155	3167	12.5	1137
CO74905	3149	12.0	1147
CO66032	3083	11.2	1223
Vision	2951	15.1	1179
CO75511	2832	11.0	1214
Buckskin	2750	11.5	1166
CO63603	2700	11.0	1150
CO74630	2692	12.4	1103
Chase	2651	12.4	1130
CO75714	2615	12.4	1215
Buster	2518	11.4	1062
Maverick	2463	11.2	1117
Burke	2365	11.1	1191
Kodiak	2337	11.5	1020
Elizabeth	2144	12.0	1133
USPT-73	1967	12.2	1053
Othello	1828	12.3	1147
CO64000*	916	13.6	1239
Average	2749	12.3	1130
CV%	8.7		
LSD _(0.3)	205		

¹Trial conducted on the Arkansas Valley Research Center; seeded 5/21 and harvested 9/30.

*Mexican Bean Beetle Damage.

Table 8. Irrigated pinto bean performance at Yellow Jacket¹ in 1999.

Variety	Yield	Seed/lb
	lb/ac	No.
USPT-73	2662	1270
CO45188	2634	1582
CO75511	2462	1467
CO64000	2438	1350
Chase	2412	1518
Burke	2375	1329
Othello	2354	1331
Vision	2327	1356
Buster	2307	1402
Maverick	2220	1341
Buckskin	2156	1465
Bill Z	2084	1563
CO64155	2070	1387
CO75714	2058	1618
Poncho	2031	1387
CO74905	1982	1491
Cisco	1978	1483
Montrose	1953	1535
CO74630	1908	1458
CO46322	1899	1535
CO63603	1876	1523
CO66032	1873	1628
Elizabeth	1852	1442
Kodiak	1686	1362
Frontier	1442	1325
Average	2122	1446
CV%	15.2	
LSD _(0.30)	276	

¹Trial conducted on the Southwestern Colorado Research Center; seeded 6/11 and harvested 9/29.

Table 9. Pinto bean performance at Yuma¹ in 1999.

Variety*	Yield	Moisture	Seeds/lb
	lb/ac	%	No.
Montrose	3605	19.1	1103
CO45188	3593	18.9	1058
CO46322	3584	17.5	1006
CO74905	3463	19.0	1091
CO64155	3423	19.6	1080
CO66032	3404	17.6	1219
Vision	3301	18.1	1064
Buster	3253	17.5	1035
Kodiak	3224	14.8	949
Frontier	3174	22.4	931
Maverick	3161	17.2	993
CO75714	3159	16.1	1044
CO64000	3137	18.6	1003
Poncho	3105	17.7	1055
Burke	3081	17.9	1030
CO63603	3075	15.2	1121
CO74630	3064	19.3	1031
Cisco	2943	20.9	1144
Chase	2916	18.1	1048
Bill Z	2861	16.5	1188
CO75511	2847	16.6	1161
Elizabeth	2719	18.6	1032
Buckskin	2477	17.0	1122
Othello	2377	19.3	1100
Average	3123	18.1	1067
CV%	10.6		
LSD _(0.30)	245		

¹Trial conducted on the Irrigation Research Farm; seeded 6/17 and harvested 10/11.

*Variety USPT-73 was not reported due to insufficient data.

Black, light red kidney and special market class bean varietal descriptions:

Calypso	A black and white seeded novelty variety.
Chardonnay	A light red kidney line from Asgrow Seed Co (B340).
CO32948	An experimental black seeded line from Colorado State University.
CO32977	An experimental black seeded line from Colorado State University.
CO40696	An experimental black seeded line from Colorado State University.
CO45685	An experimental black seeded line

Table 10. Dryland Pinto Bean Variety Trial at Yellow Jacket¹ in 1999.

Variety	Yield	Maturity ²
	lb/ac	
Cahone	1454	Sept.13
89721*	1416	+3-5 days
78158*	1377	+3-5 days
90432-2-10*	1324	+3-7 days
Fisher*	1300	+3-5 days
90436-2-2*	1272	+3-5 days
90436-2-3*	1251	+3-5 days
28141-33*	1246	+3-5 days
28140-3*	1237	+3-5 days
90432-2-8*	1209	+3-5 days
28140-8*	1171	+3-5 days
10152-2-2*	1109	+3-5 days
Average	1281	
CV%	4.3	
LSD _(0.05)	79	

¹Trial conducted on the Southwestern Colorado Research Center; seeded 6/12 and harvested 9/22.

²Maturity relative to Cahone.

*Experimental lines from Colorado State University.

CO45693	from Colorado State University. An experimental black seeded line from Colorado State University.
Enola	A yellow seeded variety from Red Beard Bean Co., Delta, CO.
Foxfire	A light red kidney line from Novartis Seeds, Inc.
H9606-6	An experimental black seeded line from the USDA-ARS Prosser, WA.
H9666-9	An experimental light red kidney line from the USDA-ARS Prosser, WA.
ICB10-5	A black seeded line from the USDA-

ARS Prosser, WA.

Matterhorn	A great northern variety released by Michigan State University in 1998.
ROG 728	A light red kidney line from Novartis Seeds, Inc.
Sacramento	A light red kidney variety from Sacramento Valley Milling.
Shiny Crow	A shiny black seeded line from Colorado State University (CO96902), scheduled for release

UI 911	in 2000 for seed and in 2001-20002 for commercial production. A black seeded variety from University of Idaho. It has high yields, an upright growth habit, and resistance to BCMV seed.
USLK-1	A light red kidney line from Washington State University.

Table 11. Average black bean performance over two eastern Colorado sites in 1999.

Variety	Location		Average* 1999
	Fort Collins	Yuma	
	Yield (lb/ac)		
Shiny Crow	2059	3443	2751
CO45693	1590	3028	2309
CO45685	1590	3002	2296
ICB10-5	1427	2901	2164
H9606-6	1383	2840	2112
UI 911	1667	2491	2079
Average	1619	2951	2285

*Varieties ranked by the average yield over two locations in 1999.

Table 12. Black bean performance at Fort Collins¹ in 1999.

Variety	Yield	Seeds/lb
	lb/ac	No.
Shiny Crow	2059	2272
UI 911	1667	2336
CO45693	1590	2375
CO45685	1590	2113
ICB10-5	1427	2261
H9606-6	1383	2077
Average	1619	2239
CV%	11.2	
LSD _(0.30)	162	

¹Trial conducted on the Agricultural Research Development and Education Center; seeded 5/31 and harvested 10/11.

Table 13. Black bean performance at Yuma¹ in 1999.

Variety	Yield	Moisture	Seeds/lb
	lb/ac	%	No.
Shiny Crow	3443	18.2	1832
CO45693	3028	13.6	1814
CO45685	3002	14.0	1798
ICB10-5	2901	17.4	1731
H9606-6	2840	15.0	1815
UI 911	2491	14.2	1899
Average	2951	15.4	1815
CV%	9.4		
LSD _(0.30)	210		

¹Trial conducted on the Irrigation Research Farm; seeded 6/17 and harvested 10/12.

Table 14. Average light red kidney bean performance over two eastern Colorado sites in 1999.

Variety	Location		Average* 1999
	Fort Collins	Yuma	
	Yield (lb/ac)		
ROG 728	1438	3455	2447
H9666-9	1874	2638	2256
Foxfire	1296	2850	2073
Sacramento LRK	610	2667	1638
USLK-1	741	2221	1481
Chardonnay	523	2133	1328
Average	1080	2661	1870

*Varieties ranked by the average yield over two locations in 1999.

Table 15. Light red kidney bean performance at Fort Collins¹ in 1999.

Variety	Yield	Seeds/lb
	lb/ac	No.
H9666-9	1874	823
ROG 728	1438	931
Foxfire	1296	1028
USLK-1	741	893
Sacramento LRK	610	1127
Chardonnay	523	951
Average	1080	959
CV%	12.1	
LSD _(0.30)	117	

¹Trial conducted on the Agricultural Research Development and Education Center; seeded 5/31 and harvested 10/11.

Table 16. Light red kidney bean performance at Yuma¹ in 1999.

Variety	Yield	Moisture	Seeds/lb
	lb/ac	%	No.
ROG 728	3455	14.1	716
Foxfire	2850	13.5	773
Sacramento LRK	2667	13.2	699
H9666-9	2638	16.1	755
USLK-1	2221	12.5	717
Chardonnay	2133	13.8	728
Average	2661	13.8	731
CV%	13.9		
LSD _(0.30)	281		

¹Trial conducted on the Irrigation Research Farm; seeded 6/17 and harvested 10/12.

Table 17. Average special market class bean performance over two eastern Colorado sites in 1999.

Variety	Location		Average*
	Fort Collins	Yuma	1999
	Yield (lb/ac)		
Enola	1601	3520	2560
Matterhorn	1743	3032	2387
CO32977	1383	2776	2080
CO32948	1220	2832	2026
CO40696	1285	2531	1908
Calypso	1176	2558	1867
Average	1402	2875	2138

*Varieties ranked by the average yield over two locations in 1999.

Table 18. Special market class bean performance at Fort Collins¹ in 1999.

Variety	Yield	Seeds/lb
	lb/ac	No.
Matterhorn	1743	1328
Enola	1601	1207
CO32977	1383	1214
CO40696	1285	1239
CO32948	1220	1234
Calypso	1176	954
Average	1402	1196
CV%	16.5	
LSD _(0.30)	207	

¹Trial conducted on the Agricultural Research Development and Education Center; seeded 5/31 and harvested 10/11.

Table 19. Special market class bean performance at Yuma¹ in 1999.

Variety	Yield	Moisture	Seeds/lb
	lb/ac	%	No.
Enola	3520	18.3	972
Matterhorn	3032	12.9	1111
CO32948	2832	17.6	1244
CO32977	2776	18.0	1256
Calypso	2558	14.5	855
CO40696	2531	16.5	1081
Average	2875	16.3	1086
CV%	10.0		
LSD _(0.30)	219		

¹Trial conducted on the Irrigation Research Farm; seeded 6/17 and harvested 10/12.

Dry Bean Production Systems and Statistics in the U.S.A.

By Dr. Howard F. Schwartz

Review of U.S. Bean Production Systems:

Dry beans are produced on nearly 2 million acres in diverse cropping systems throughout the United States, and are categorized as either dryland (rainfed) or irrigated (center pivot or sprinkler, furrow or flood, drip). Crop rotations usually follow a 2 - 4 year interval with alternating crops that include small grains such as wheat, sunflower, corn, sugar beet, or vegetables such as potato and onion.

Most adapted dry bean varieties mature in 85 to 110 days, with machinery providing all labor required from planting to harvest. Growth habits vary from Type I (determinate) for most large-seeded market classes to Type II and III (indeterminate) for small to medium-seeded market classes. Most market classes offer a wide selection of varieties, and growers often select those varieties with the best adaptation, highest seed quality, and the most effective resistance to prevalent plant diseases.

Planting dates vary for specific regions within the United States, but the majority of dry beans are planted during May to July, and harvested during August to late September. Row spacing varies from 30 to 40 inches for dryland systems to 22 to 30 inches for most irrigated systems; and there are some solid seeded systems with a row spacing of 6 to 8 inches.

Certified seed classes are planted by most growers and this high quality product is obtained from private and public seed industries in western states such as Colorado, Wyoming, Idaho, Oregon, Washington and California with drier environments that are less conducive to seed-borne plant pathogens and their diseases. Some midwestern states (Michigan, North Dakota, Minnesota) may increase the volume of western-produced seed stocks for one year prior to distribution to local growers. Most of the 1-year old certified seed is treated with pesticides (combination of bactericide, fungicide and insecticide) to enhance germination and seedling establishment.

Growers plant to stand to achieve recommended densities of 30,000 to 50,000 plants / acre for dryland systems, and 75,000 to 125,000 plants / acre for irrigated systems depending upon the varietal growth habit and market class. For

example, a 75,000 plant population is desired for a type III pinto grown on a 30 inch wide row spacing under furrow irrigation; while a 100,000 plant population is desired for a type I light red kidney grown on a 22 - 30 inch row spacing under sprinkler irrigation.

Fertilizer inputs vary depending upon the cropping system, soil conditions and resources available to the grower. Soil pH may vary from 5 to 8 throughout the U. S. Soil types range from mineral (low organic matter less than 2 %) to organic, which in turn affects nutrient availability, deficiencies, toxicities and requirements for the bean crop. Therefore, fertilizer recommendations vary for their specific content and amount, depending on the soil conditions, plant population, market class and grower preference. A small portion of growers also rely upon inoculants (*Rhizobium*); especially those growers who produce organic beans.

Pesticides (herbicides, insecticides, fungicides, bactericides, nematicides) are applied to the seed, soil, or foliage, depending upon the specific chemistry involved, cost and targeted pest(s). Herbicides are applied pre-plant, pre-emergence or post-emergence, depending upon the specific chemistry, priority weeds, and cropping system. Common weeds throughout the U. S. include nightshades, pigweed, lambsquarter and various grass species.

Soil-borne diseases and insects are generally targeted with seed and planter-box treatments; with some applications to the seed furrow at planting. Foliar and pod diseases and insect pests are generally targeted with foliar pesticides applied with a ground-rig, airplane or injection system. Applications can be made by the grower if licensed by state and/or federal programs, or by certified applicators.

Common insect pests throughout the U. S. include soil-borne (maggots, wireworms, cutworms), defoliating (flea beetle, grasshoppers, western corn rootworm, Mexican bean beetle), sucking and leaf-curling (aphids, leafhoppers, spider mites, thrips), and pod and seed-feeding (cutworm) insects. Each production region and season will vary for the complex of insect threats, if any, to the crop.

Common plant disease problems throughout the U. S. include fungal (*Pythium*, *Rhizoctonia*, *Fusarium*, white mold, rust, anthracnose, angular leaf spot), bacterial (halo blight, bacterial brown

spot, common bacterial blight), viral (bean common mosaic, bean yellow mosaic, curly top) and nematode (root knot, root lesion) diseases. Each production region and season will vary for the complex of disease threats, if any, to the crop.

Many growers rely upon crop consultants hired by the grower or provided by the local bean elevator to scout their fields for agronomic and pest problems, and provide advice on and timing for appropriate management strategies. These consultants often receive training from and work in collaboration with their local university research scientists and extension educators.

As the dry bean crop approaches maturity, some growers rely upon crop desiccants to obtain more uniform drying of the crop (e.g., high density planting of light red kidneys) prior to undercutting, windrowing and combining operations when the seed moisture content (16 % or higher) is appropriate for threshing with conventional cylinder, rotary cylinder and specialized designs. Some upright plant types of navy and black beans are becoming more adaptable to direct cutting and threshing operations; e.g., in north central regions of the U. S.

Seed may be stored on farm by the grower, but generally is delivered from the field to local elevators for weighing, cleaning and storage at low moisture (12 – 14 %) until the crop is marketed. Elevators will segregate the harvested beans by market class, and some elevators also separate by the degree of seed quality demanded by domestic and international markets and consumers.

Review of Production Statistics:

The USA dry bean industry consists of 17 bean reporting states: California, Colorado, Kansas, Idaho, Michigan, Minnesota, Montana, Nebraska, New Mexico, New York, North Dakota, Oregon, Texas, Utah, Washington, Wisconsin, and Wyoming. Market types consist of snap, lima (large & baby), navy (pea), small white, small red, black, great northern, pinto, pink, cranberry, kidney (light red, dark red, white) and miscellaneous beans (e.g., Anasazi, Mayocoba, heirlooms – Swedish Brown, Jacob's Cattle, etc.); in addition some industry reports include garbanzo (chickpeas), blackeye (cowpeas), mung and adzuki beans.

At this point, estimates from industry representatives indicate that the 1999 crop production should be average, however, there are concerns that seed quality may be lower than average because of moisture problems before and during harvest in some regions of the country.

Table 1. Average USA dry bean production by state, 1997 - 1999.

State	Area Harvested (000 Acres)	Yield (lbs/Acre)	Total Production (000 cwt)
California	123	2133	2649
Colorado	143	1817	2594
Idaho	103	2100	2144
Kansas	21	1917	395
Michigan	313	1617	5049
Minnesota	172	1500	2624
Montana	13	2187	287
Nebraska	191	2003	3825
New Mexico	8	1767	131
New York	33	1427	501
North Dakota	613	1327	8239
Oregon	10	1910	184
Texas	15	1173	188
Utah	6	620	38
Washington	38	2223	851
Wisconsin	8	1750	145
Wyoming	34	2197	725

Table 2. Average USA production statistics by dry bean market classes, 1996 - 1999.

Bean Market Class	Total Production (000 cwt, 1996-98)	Acres Planted (000 Acres, 1998-99)
Black	2340	210
Small Red	655	36
Pink	700	50
Cranberry	522	37
Red Kidney	2210	152
Small White	119	3
Navy (Pea)	5141	333
Great Northern	2229	124
Baby Lima	577	20
Large Lima	522	26
Pinto	12607	863
Other (Yellow,	709	69
Blackeyed Pea	706	45
Garbanzo (Chickpea)	408	30
TOTAL	29385	1998

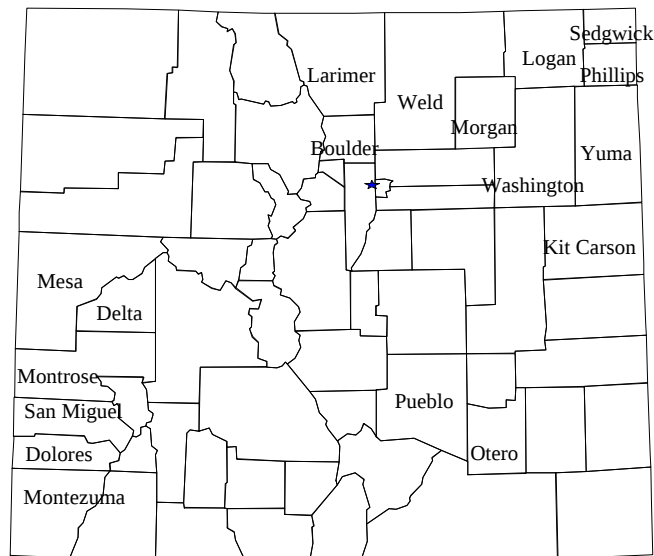
- ! U. S. D. A. Production Estimates
! Metric Conversions: hectares = Acre x 0.4047, kg/ha
= lb/A x 1.12, MT = pounds / 2205.

Potential Risk of Bean Diseases in Colorado by Geographical Region

Howard F. Schwartz

Region/County	Rust	Bacterial* Disease	White Mold
<u>Northeast</u>			
Boulder	Low	Low	Moderate
Larimer	Low	Low	Moderate
Weld	Moderate	Moderate	High
Morgan	Moderate	Moderate	Moderate
Washington	High	High	Moderate
Logan	High	Moderate	Moderate
Sedgwick	High	High	High
Phillips	High	High	High
Yuma	High	High	High
Kit Carson	High	High	Moderate
<u>Arkansas Valley</u>			
Pueblo	Moderate	Low	Low
Otero	Moderate	Low	Low
<u>Western Slope</u>			
Mesa	Low	Low	Moderate
Delta	Low	Low	Moderate
Montrose	Low	Low	Moderate
San Miguel	Low	Low	Low
Dolores	Low	Low	Low
Montezuma	Low	Low	Low

*Complex of Halo Blight, Brown Spot, &/or Common Bacterial Blight



Entry Forms for 2000 Trials

Entry forms for 2000 trials may be obtained from the Department of Soil and Crop Sciences, Colorado State University, Cynthia Johnson, C-4 Plant Science Building, Fort Collins, CO 80523-1170; Telephone (970) 491-1914; Fax number (970) 491-2758; or e-mail cjohnson@agsci.colostate.edu or web site <http://www.colostate.edu/Depts/SoilCrop/extension/CropVar/index.html>

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<u>Winter Wheat</u> 1999 Variety Trial Results 1999 MEY Yield Results	<u>Dry Beans</u> 1999 results	<u>Corn</u> 1999 silage results 1999 dryland and irrigated grain results
Crop Variety Performance for Colorado Crops		
<u>Sunflower</u> 1999 results- oil and confection hybrids	<u>Alfalfa</u> 1999 results	<u>Spring Wheat</u> Barley, & Oats see 1998 results

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