MAKING BETTER DECISIONS

1996 Dry Bean Variety Performance Trials

Cooperative Extension
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$3.00

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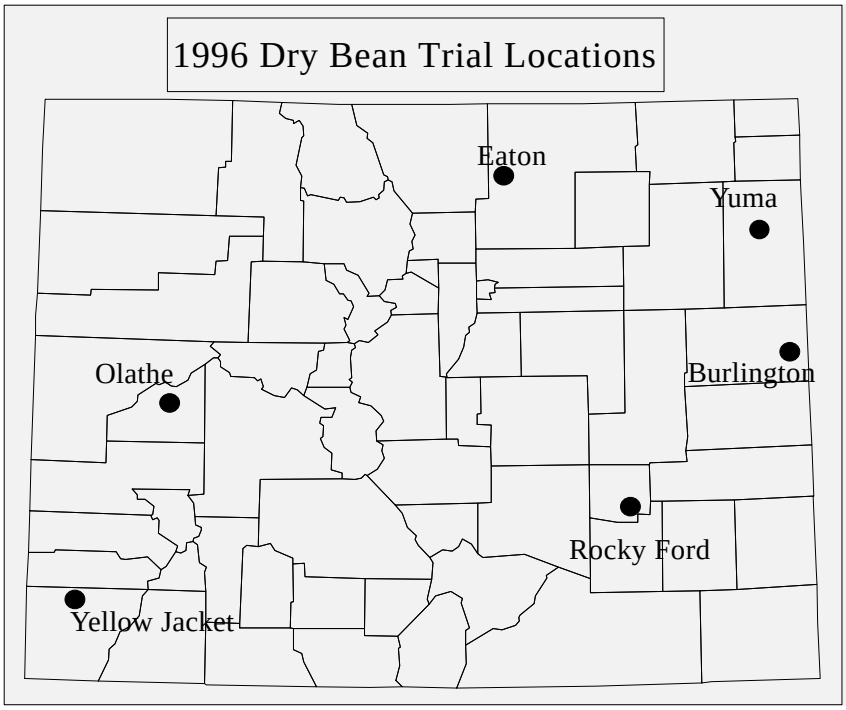

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The authors wish to express their gratitude to the Colorado farmers who generously contributed the use of their land, equipment, and time to conduct these trials for the benefit of all Colorado dry bean producers: Burlington - Steve Scott; Eaton - Chuck Winter; Olathe - John Case; and Yuma - Troy Newton. We are also grateful for the cooperation from Experiment Stations that allowed us to conduct trials at Rocky Ford (Arkansas Valley Research Center) and Yellow Jacket (Southwestern Colorado Research Center).

Technical Report TR 97-3

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1996 COLORADO DRY BEAN PERFORMANCE TRIALS

Introduction

Approximately 200,000 acres of dry beans are planted annually in Colorado. The value of dry bean production from $41.7 million (1995) to $94.5 million (1989), due to highly variable market prices. About two-thirds of Colorado's dry bean acreage is in eastern Colorado counties, especially Weld, Yuma, Kit Carson, Phillips, and Logan, and approximately one-third is found in the West Slope, especially in Dolores, Montezuma, and Montrose counties. The bean variety decision is a $5 million business annually in Colorado as our producers annually purchase seed worth that amount. To provide reliable and unbiased variety performance information to Colorado dry bean producers for making better decisions, Colorado State University personnel annually evaluate dry bean varieties at three locations in northeastern Colorado.

The 1996 trials were conducted in northeastern Colorado at Burlington, Eaton, and Yuma. Three separate market classes were tested: 1) pinto, 2) light red kidney, and 3) special (black, great northern, small white, and navy). A randomized complete block field design with four replicates was used in all trials. Test plots were planted and harvested by CSU's Crops Testing program. The seeding rate was approximately 87,120 seeds per acre. Plots consisted of four 30 inch rows, and harvest area was approximately 200 sq.ft. All trials were situated in commercial bean fields. Grain yields, reported in pounds per acre, were adjusted to 14% moisture content.

1996 Season Summary

This year was a full cropping season, characterized by early seeding, plentiful and well-distributed rainfall, and absence of water stress often brought on by periods of high summer temperatures. There were sufficient growing degree-days without periods of deleteriously high temperatures. There was no killing frost before harvest and full-season varieties were able to reach complete maturity in the field. Leaf rust, bacterial brown spot, common bacterial blight, and white mold were generally controlled until late in the season. At many sites the 1996 bean crop was damaged by frequent July and August hailstorms, bronzing, and heavy late season precipitation that impeded harvest operations and, in many cases, lead to reduced grain quality.

Trial Conditions

Burlington: Previously in corn, planted 5/23 (obtained good plant stands despite crusting prior to emergence), fertilizer was 80 N and 40 P_2O_5 /acre, herbicide was Sonalan/Eptam, and fungicide was tilt (1x) and champ (2x), diseases present were rust and bacterial brown spot. Eaton: Previously in corn, planted 5/16, no additional fertilizer, herbicide was Dual+Eptam, sulfur fungicide was flown on after hail (hailed on three times during July and August 1996 but still managed to produce good yields), rust was present late. Yuma: Previously in corn, planted 6/6, fertilizer was 50 N and 10 P_2O_5, herbicide was dual and treflan, fungicide was copper (4x), rust, bacterial brown spot, and common bacterial blight were all present in this trial. Poor plant stand in 14 plots resulted in average variety yields being based on remaining plots of each variety.

Table 1. Susceptible disease observations (x) for varieties in Colorado's 1996 bean variety performance trials.

	Rust				Bact Brown Spot			Common Bact Blight	
Variety	Eaton	Yuma	Burlington	Rocky Ford	Yuma	Burlington	Rocky Ford	Yuma	Rocky Ford
88-019-01-02							x		x
95YT122					x			x	
Apache					x	x			
Bill Z	x	x	x						
Cahone				x			x		x
Chase						x			
FX930101						x			
GTS-900	x		x		x	x			
Hatton	x			x	x	x			
Maverick		x				x			
NE 94-4						x			
Olathe	x	x	x		x	x		x	x
RNK 178					x	x		x	
RNK 179	x	x	x		x	x			
UI 126				x			x		
UI 129				x			x		
UI 114	x		x	x					
USWA-19		x		x	x	x			
USWA-20	x	x	x	x	x	x	x		
Vision						x		x	
Othello				x			x		
Arapaho				x			x		
Alubia Monet					x			x	
XPB 340					x				
USWA-12 (white)		x			x			x	
Moonbeam (GN)		x	x		x	x			

Notes: Disease observations made by Howard Schwartz, CSU extension pathologist, based on 2 or 3 field trial visits during the 1996 growing season.

means variety was not tested at that location in 1996

x means variety showed clear symptoms of the disease at that location

Pinto bean varietal descriptions

88-019-10-02 An experimental pinto from North Dakota State University.

95YT122 An upright short vine pinto with resistance to high plains rust races and Bean Common Mosaic Virus from Asgrow Seed Co.

Apache A semi-vine pinto with rust resistance and early maturity from Idaho Seed Bean.

Arapaho A variety released by Colorado State University in 1993 with semi-upright growth habit. It has some field tolerance to white mold but is susceptible to rust.

Bill Z A pinto variety from Colorado State University with semi-vine growth habit released in 1985 with resistance to bean common mosaic virus and moderate tolerance to bacterial brown spot. It is a productive variety when growing conditions are good, similar to Olathe for white mold susceptibility and maturity.

Cahone A vine type pinto variety developed for non-irrigated production in the San Juan Basin. It was released in 1981 by Colorado State University.

Chase A semi-vine variety released by the University of Nebraska. It is resistant to rust and white mold, moderately susceptible to bacterial brown spot, but susceptible to fusarium wilt.

Fisher A new pinto variety released by Colorado State University in 1994. It was developed for non-irrigated production in the San Juan Basin. It has similar maturity to Cahone.

FX930101 An experimental pinto from Fox Bean Co.

GTS-900 A full season pinto from Gentec.

Hatton A vine pinto with good seed characteristics from North Dakota State University with semi-vine growth habit. It is susceptible to rust and has similar maturity as Bill Z.

Maverick	An upright pinto resistant to rust, released by North Dakota State University.
NE 94-4	An experimental pinto with rust resistance from University of Nebraska.
NW-410	A semi-vine variety released by the USDA. The variety has good yielding ability and tolerance to Fusarium root rot, but is highly susceptible to rust and white mold.
Olathe	A semi-vine variety developed by Colorado State University and released in 1979. It is susceptible to rust, bacterial diseases and white mold. Seed size is comparable to UI 114, but seed shape is more rounded and may split more easily unless handled carefully.
Othello	A variety released by the USDA with a semi-upright growth habit. It has very good yielding ability, white mold avoidance due to its small plant size, but is highly susceptible to rust and bacterial diseases.
Ouray	An upright, bush growth habit variety released by Colorado State University in 1972. It is resistant to the Type and the New York 15 strains of BCMV, but susceptible to rust.
ROG 178	An experimental line from Rogers Seed Co., with rust resistance and moderate resistance to some bacterial diseases.
ROG 179	An experimental line from Rogers Seed Co., susceptible to rust, but moderately resistant to some bacterial diseases.
UI 114	A variety released by the University of Idaho in 1967 with maturity of 95-100 days. It is susceptible to rust, fusarium wilt, bacterial diseases and white mold.
UI 126	A variety released by the University of Idaho in 1983 with good yield potential and is similar to UI-114 for disease reactions. It is susceptible to rust and Fusarium wilt.
UI 129	A variety released by the University of Idaho in 1983, with good yield potential and similar to UI-114 for disease reactions. It is susceptible to rust and Fusarium wilt.
UI 196	A variety released by the University of Idaho in 1990, with high yield potential and similar to UI-114 for its disease reaction.
USWA-19	An experimental pinto from USDA-ARS Prosser Washington program.
USWA-20	An experimental pinto from USDA-ARS Prosser Washington program.
Vision	An upright pinto with resistance to rust from Asgrow Seed Co.

Table 2. Pinto bean performance at Burlington in 1996[1].

Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
USWA-19	2670	56.5	13.0	1210
USWA-20	2663	56.8	14.4	1184
Vision	2658	59.3	15.7	1216
GTS-900	2360	57.7	13.9	1208
ROG 179	2323	58.0	14.7	1258
Chase	2183	57.4	13.8	1251
Maverick	2158	57.2	14.2	1283
NE94-4	2112	57.8	14.0	1378
Bill Z	2088	57.1	13.6	1402
Olathe	1986	57.9	14.8	1276
FX930101	1850	58.0	14.8	1302
Hatton	1822	57.2	14.7	1165
ROG 178	1797	57.3	13.7	1433
UI 114	1721	57.8	14.5	1326
Apache	1596	59.3	14.3	1338
Average	**2132**	**57.7**	**14.3**	**1282**
CV%	13			
$LSD_{(.03)}$	207			

[1]Trial conducted on the Steve Scott farm; seeded on 5/23 and harvested 9/11.

Table 3. Pinto bean performance at Eaton in 1996[1].

Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
ROG 179	2332	52.5	11.2	1228
Vision	2279	53.7	12.1	1277
FX930101	2235	52.2	10.9	1246
USWA-20	2213	51.4	10.5	1273
Bill Z	2080	52.5	10.3	1332
UI 114*	2039	52.8	10.9	1237
USWA-19	2010	50.8	10.4	1215
Olathe	1996	53.0	11.1	1323
NE94-4	1875	51.5	11.0	1466
GTS-900	1871	52.5	10.5	1340
Chase	1850	52.1	10.2	1378
Maverick	1786	52.0	10.8	1308
Apache	1742	52.0	11.2	1252
Hatton	1715	52.1	10.7	1186
Average	**2028**	**52.2**	**10.9**	**1304**
CV%	15			
$LSD_{(.03)}$	232			

[1]Trial conducted on the Chuck Winter farm; seeded on 5/16 and harvested 9/12.
*Average yield computed from three of four replications.

Table 4. Pinto bean performance at Yuma in 1996[1].

Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
Apache	2383*	56.8	17.2	1318
USWA-19	2261	56.0	15.9	1278
Chase	2203	56.2	17.9	1437
ROG 179	2142	56.5	17.5	1345
Maverick	2114	55.3	20.3	1432
Bill Z	2107*	56.2	15.6	1386
Olathe	2103*	56.9	17.5	1368
USWA-20	1959	54.8	17.3	1324
NE94-4	1902	57.5	20.0	1478
95YT122	1816	57.4	18.0	1418
Vision	1799**	59.6	19.5	1371
UI 114	1716*	56.5	17.7	1422
Hatton	1712	56.4	20.0	1444
GTS-900	1711	57.7	17.3	1423
ROG 178	1628	56.9	17.0	1415
Average	**1944**	**56.8**	**18.2**	**1397**
CV%	15			
$LSD_{(.03)}$	181***			

[1]Trial conducted on the Troy Newton farm; seeded on 6/6 and harvested 9/9.
*Average yield computed from three of four replications.
**Average yield computed from two of four replications.
***This LSD is approximate due to 14 of 68 missing plot yields.

Table 5. Pinto bean performance at Rocky Ford in 1996[1].

Variety	Yield	% Test Average	Test Weight	Moisture
	lb/ac		lb/bu	%
Bill Z	3971	116	58.8	10.6
UI 129	3841	112	61.0	10.9
USWA-20	3757	110	57.6	10.6
NW-410	3710	109	60.9	10.8
UI 126	3675	107	59.9	10.9
Chase	3587	105	59.3	10.5
Othello	3565	100	60.5	10.5
Cahone	3462	101	59.4	11.4
Arapaho	3449	101	59.4	10.3
Olathe	3320	97	59.4	10.9
USWA-19	3242	95	56.6	9.8
UI 114	3093	90	60.4	10.4
Hatton	2991	87	58.4	10.3
Maverick	2339	68	56.8	10.2
Average	**3419**		**59.1**	**10.6**
CV%	10			
$LSD_{(.05)}$	465			

[1]Trial conducted on the Arkansas Valley Research Center; seeded on 5/24 and harvested 9/12.

Table 6. Irrigated pinto bean performance at Yellow Jacket in 1996[1].

Variety	Yield	Maturity
	lb/ac	
Maverick	1708	Medium to late
Bill Z	1679	Early to medium
88-019-10-02	1588	Late
Othello	1570	Medium
Chase	1478	Medium to late
USWA-19	1464	Medium to late
Olathe	1463	Medium
NW-410	1417	Early to medium
Hatton	1411	Early to medium
Arapaho	1359	Early to medium
USWA-12 (GN)	1352	Early to medium
USWA-20	1339	Late
UI 126	1190	Early
74425	1188	Medium to late
Average	**1440**	
CV%	16	
$LSD_{(.05)}$	NS	

[1]Trial conducted on the Southwestern Colorado Research Center; seeded on 6/6 and harvested 9/16.

Kidney bean varietal descriptions

Alubia Monet	A large white seeded line from Rogers Seed Company.
Horizon	A light red kidney that is resistant to bean common mosaic virus and some bacterial diseases, developed by Asgrow Seed Co.
USWA-33	An experimental light red kidney from USDA-ARS Prosser Washington program.
XPB340	A light red kidney with resistant to bean common mosaic virus from Asgrow Seed Co.

Note: Kidney beans usually escape white mold and have resistant to rust; however, occasionally a few pustules are observed.

Table 7. Kidney bean performance at Burlington in 1996[1].

Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
USWA-33	2092	54.2	16.0	73
Average	**2092**	**54.2**	**16.0**	**736**

[1]Trial conducted on the Steve Scott farm; seeded on 5/23 and harvested 9/11.

Table 8. Kidney bean performance at Yuma in 1996[1].

Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
Horizon	1865	54.0	13.8	905
XPB340	1355	54.3	14.2	947
Alubia Monet	723	55.2	30.8	853
Average	**1314**	**54.5**	**19.6**	**901**

[1]Trial conducted on the Troy Newton farm; seeded on 6/6 and harvested 9/9.

Special market class varietal descriptions

97373	An exotic experimental line from Colorado State University with very late maturity.
Fleetwood	A navy variety released by Canada in 1976. It is resistant to viruses, many races of rust and halo blight.
Hopi Purple	An exotic variety with late maturity when grown on the front range.
Midnight	A black variety from New York.
Moonbeam	An upright short vine great northern from Asgrow Seed Co.
NW-63	A small red vine variety released by the USDA in 1979. It is resistant to viruses and root rot stress.
UI 228	A small red Mexican bean from the University of Idaho released in 1993. It is an early-maturing bean with a semierect growth habit that yields well under adverse field conditions. It has excellent canning characteristics. It is resistant to BCMV strain found in Colorado.
UI 239	A small red Mexican bean from the University of Idaho released in 1993. It is a high-yielding, early-maturing red bean similar to NW63. It has better-than-average canning qualities. It has resistant to BCMV strain found in Colorado.
UI 537	A pink from the University of Idaho, susceptible to rust, but moderately resistant to some bacterial diseases.
UI 59	A great northern from the University of Idaho.
UI 686	A cranberry from the University of Idaho in 1989.
UI 911	A black bean released from the University of Idaho in 1993. It has high yields, an upright growth habit, and resistant to BCMV.
USWA-12	An experimental great northern from USDA-ARS Prosser Washington program.
Viva	A pink variety released by the USDA in 1974. It is resistant to viruses and root rot stress.

Table 9. White bean performance at Burlington in 1996[1].

Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
Moonbeam	2228	58.2	15.4	1406
Average	**2228**	**58.2**	**15.4**	**1406**

[1]Trial conducted on the Steve Scott farm; seeded on 5/23 and harvested 9/11.

Table 10. White bean performance at Yuma in 1996[1].

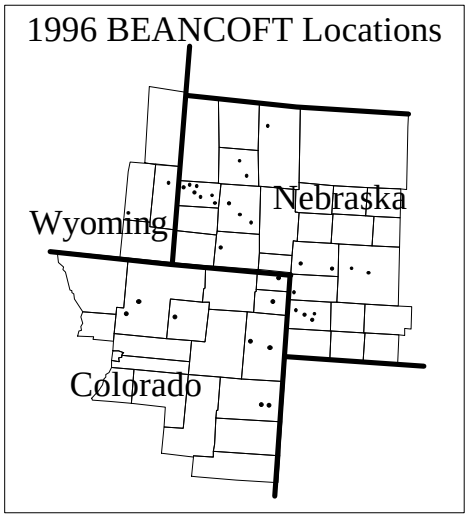
Variety	Yield	Test Weight	Moisture	Seeds
	lb/ac	lb/bu	%	#/lb
Moonbeam	1113	55.6	19.1	1659
USWA-12	665	52.0	22.1	1324
Average	**889**	**53.8**	**20.6**	**1491**

[1]Trial conducted on the Troy Newton farm; seeded on 6/6 and harvested 9/9.

Table 11. Market Class bean performance at Olathe in 1996[1].

Variety	Yield	Market Class	Seeds
	lb/ac		#lb
Viva	2649	pink	1703
Fisher	2547	pinto	1159
UI 537	2492	pink	1323
NW 63	2443	small red	1416
UI 196	2348	pinto	1247
UI 239	2314	small red	1471
Bill Z	2275	pinto	1337
Arapaho	2210	pinto	1241
UI 228	1972	small red	1450
UI 126	1953	pinto	1233
Olathe	1940	pinto	1318
Othello	1849	pinto	1294
Ouray	1808	pinto	1207
Fleetwood	1716	navy	2278
UI 686	1609	cranberry	884
Midnight	1587	black	2586
UI 911	1498	black	2389
UI 59	1449	great	1520
Chase	1445	pinto	1293
97373	1400	exotic	1297
Hopi Purple	1192	exotic	1229
Average	**1938**		**1470**
CV%	18		4
$LSD_{(.05)}$	497		83

[1]Trial conducted on the John Case farm; seeded on 5/29 and harvested 9/24.



BEANCOFT 1996

Collaborative On-Farm Tests of Pinto Bean Varieties

As part of what may have been the largest dry bean variety testing effort ever undertaken in the region, thirty-one tests were conducted in northeastern Colorado and western Nebraska during the 1996 growing season to assess the performance of new pinto bean varieties under farm conditions. The main objective was to help bean producers make better variety decisions based on unbiased and reliable variety performance information obtained under commercial field conditions. The second objective was to encourage cooperation among bean seed companies, bean processing companies, university personnel, and bean producers for testing appropriate technologies, including new varieties.

Jerry Johnson, CSU extension specialist; Howard Schwartz, CSU extension pathologist, and Mark Brick, CSU bean breeder; organized the trials in Colorado while David Nuland headed up the effort in Nebraska. The success of these collaborative on-farm tests of bean varieties, acronym BEANCOFT, depended on Colorado State University Cooperative Extension agents Ron Meyer, Bruce Bosley, Jerry Alldredge, Jim Zizz, and Gary Lancaster who identified and worked with bean producer collaborators to conduct these single-replicate tests in long, side-by-side, strips. In Colorado, we are thankful for the efforts of the seven 1996 BEANCOFT collaborating growers: Steve Scott (Burlington); Rod Rehnquist (Julesburg); Jim Lenz (Wray); Dallas Shafer (Holyoke); Steve Bruntz (Wiggins); Leonard Ditter (Lucerne); and Mark Spaier (Johnstown). Jerry Haynes of Jacks Bean in Holyoke was also very instrumental in BEANCOFT success.

Three bean seed companies each donated 900 lbs. of seed for testing in seven Colorado locations, twenty-one Nebraska farms, and Wyoming location. The five varieties were also included in the Colorado small-plot bean varieties trials which accounted for three of the nine Colorado results. Seed for the Idaho Seed Bean Company variety, Apache, an early-maturing, rust-resistant variety was donated by Jacks Bean. Asgrow Seed Company donated the seed of Vision, a full-season, rust-resistant variety. Rogers Brothers furnished the seed of RNK 179, a full-season variety resistant to bacterial brown spot. The seed of Chase and Bill Z, two public varieties, was provided by University of Nebraska researchers. Chase is a full-season, rust-resistant variety that has performed well in Colorado performance trials. Bill Z is a pinto bean industry standard, susceptible to many prevalent strains of rust.

Results and Discussion

The yield data is shown in Table 1 for Colorado and the other states. Two general observations characterized the BEANCOFT results: 1) varieties responded differently at each location, and 2) there was little difference among variety yields *averaged* over locations. Grain yields are reported in pounds per acre adjusted to 14% moisture content. Figure 1 is a line graph showing yields at nine Colorado locations. The three small-plot trial locations are designated with an asterisk. This figure graphically illustrates how dramatically varieties changed rank over locations. Based on the yield data, the large variation in variety yields over locations makes it difficult for Colorado bean producers to choose a single best variety.

Figure 2 is a graphic comparison of average yields over the nine Colorado locations. The least significant difference (LSD) is generally used to decide if yields are significantly different from one variety to another. If the difference in yield between two varieties is greater than the LSD value, they are judged to be significantly different from one another. Figure 2 shows that there was no significant yield difference among varieties over the nine Colorado locations. Figure 3 graphically depicts the average yield of the five varieties over all 31 BEANCOFT tests. Chase, RNK 179, and Vision were significantly higher yielding than Apache and Bill Z. Nevertheless, there was much variation among varieties from location to location (Fig. 1). This comparison of average yields using LSDs is not very useful for making future predictions.

A probability approach to the analysis is more revealing because it combines the average yield with a measure of variability in yield from location to location (standard deviation of each variety) to obtain an estimate of future variety performance based on the probability of obtaining different yield levels. The results of this approach when applied to the yield data for all 31 locations are shown in Table 2. In low yielding environments, RNK 179 has the highest probability, 97.5% chance, of yielding 1500 lb/ac or more. In the same environments, Apache has the lowest probability, 91%, of yielding 1500 lb/ac or more. A change in probability rank becomes obvious at different yield levels. For example, Chase has the highest probability, and Bill Z the lowest probability, of producing 2400 lb/ac or more. At the 3000 lb/ac level, Vision has the highest probability. To use this approach for variety selection, bean producers are encouraged to find the yield level that best approximates their long-term average yield and to compare variety probabilities at that level, keeping in mind that these comparisons are based only on yield and may neglect important quality or local environmental or disease considerations.

In conclusion, all of the varieties entered in BEANCOFT 1996 are good varieties. There were no clear winners and no clear losers because of so much variation in yield among varieties from location to location.

BEANCOFT 1996 was a pilot project that was highly rewarding but more expensive and time-consuming than expected. There are no plans to re-conduct BEANCOFT trials until new varieties are developed that warrant this level of effort.

Table 1. 1996 performance of five pinto bean varieties in collaborative on-farm tests in Colorado, Nebraska, and Wyoming.

Test Location	Apache	Bill Z	Chase	RNK 179	Vision
Lucerne	3014	2616	2030	2276	2053
Wiggins	2269	2367	2611	2473	2567
Julesburg	1512	1471	1353	1883	1210
Holyoke	2633	2657	3293	2871	3234
Wray	2594	1954	2441	2151	2826
Burlington	3108	2784	2840	2278	2572
Eaton*	1742	2080	1850	2332	2279
Yuma*	2383	2107	2203	2142	1799
Burlington*	1596	2088	2183	2323	2658
Colorado Average	**2317**	**2236**	**2311**	**2303**	**2355**
Torrington, WY	3533	3145	3198	3107	3601
Mitchell, NE	3235	3176	3157	3422	3192
Imperial-1, NE	3530	2610	3357	3070	3196
Imperial-2, NE	3297	2769	2750	2682	3072
Morrill, NE	2439	2778	2565	3367	3054
Champion, NE	2758	2755	3435	2580	2304
Imperial-3, NE	2726	2242	3172	2795	2471
Bayard, NE	2202	2377	2895	2440	2960
Lyman, NE	1863	2771	2373	2842	2670
Hemingford, NE	2390	2740	2334	2473	2217
Berea, NE	2330	1992	2868	2517	2443
Scottsbluff-1, NE	2168	2590	2667	2073	2589
Scottsbluff-2, NE	1531	2388	1933	2486	2807
McGrew, NE	1922	1660	2227	2186	3076
Bridgeport, NE	2170	2090	2439	2356	1921
Paxton, NE	1787	1904	2351	1551	2644
Gering, NE	1918	1821	1889	2448	2024
Brule, NE	1823	1661	2376	1879	2104
Dalton, NE	1757	1789	2123	2273	1447
Venango, NE	2451	1366	2354	1515	1666
Minatare, NE	1381	1969	1999	2067	1831
Hay Springs, NE	1797	1660	1990	1859	1662
Average all tests	**2318**	**2270**	**2492**	**2410**	**2456**

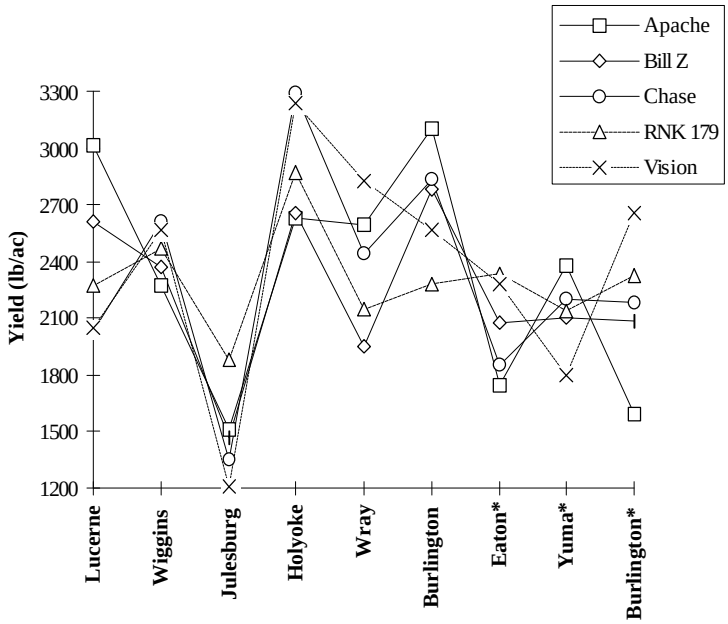


Figure 1. Yield of five pinto bean varieties at nine Colorado sites.

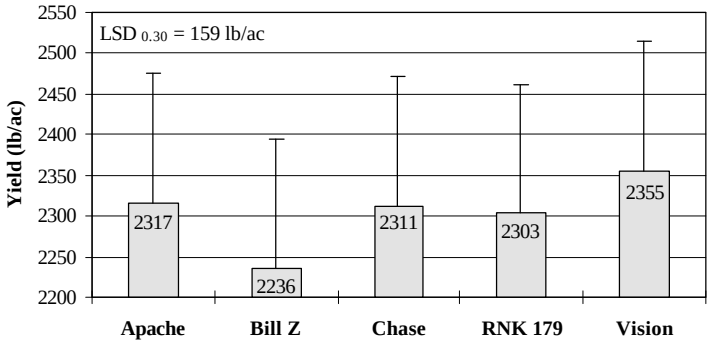


Figure 2. Average yield of five pinto bean varieties at nine Colorado sites.

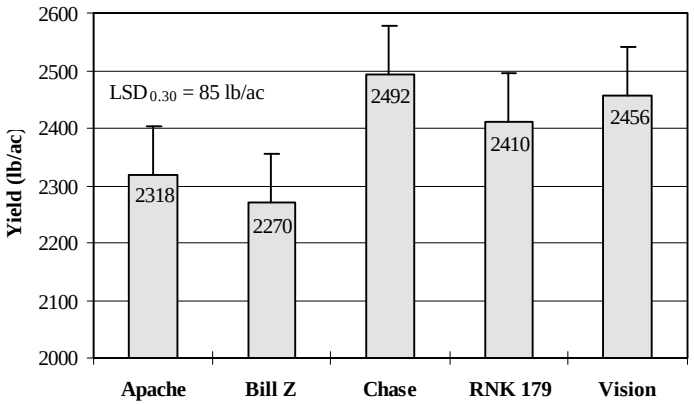


Figure 3. Average yield of five pinto bean varieties over all 31 BEANCOFT sites.

Table 2. Probabilities of obtaining or exceeding yield level by variety.

Yield Level	Apache	Bill Z	Chase	ROG 179	Vision
1500	0.910	0.943	0.974	0.975	0.948
1600	0.881	0.916	0.960	0.960	0.928
1700	0.845	0.879	0.940	0.937	0.901
1800	0.802	0.833	0.913	0.906	0.868
1900	0.754	0.776	0.877	0.865	0.828
2000	0.699	0.710	0.833	0.812	0.781
2100	0.640	0.636	0.779	0.748	0.728
2200	0.577	0.557	0.717	0.675	0.669
2300	0.512	0.475	0.647	0.594	0.605
2400	0.446	0.395	0.572	0.509	0.538
2500	0.383	0.318	0.494	0.423	0.470
2600	0.322	0.249	0.416	0.341	0.403
2700	0.265	0.189	0.342	0.266	0.339
2800	0.214	0.138	0.273	0.200	0.279
2900	0.170	0.098	0.212	0.145	0.225
3000	0.131	0.067	0.160	0.101	0.177

1996 BEAN SEED SURVEY

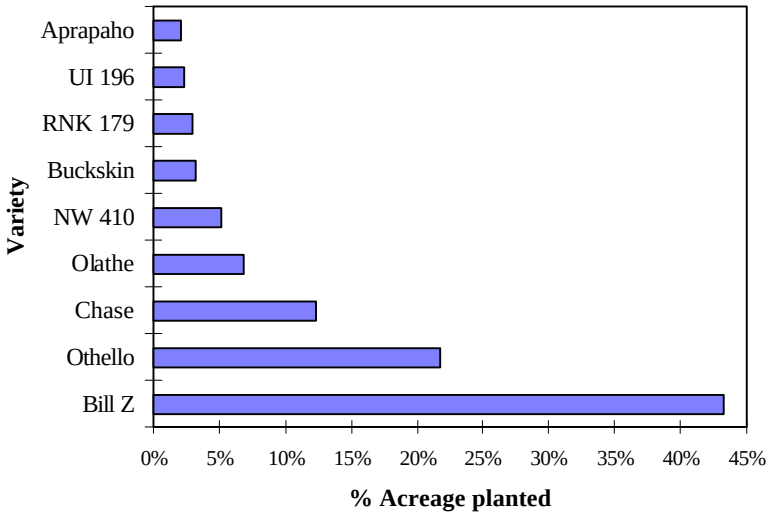


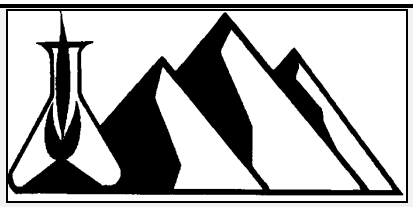
Figure 4. Percentage of 1996 pinto bean acreage planted to different varieties.

A bean survey was conducted by M. A. Brick and H. F. Schwartz in late 1996 to solicit feedback on pinto seed quality and needs for commercial producers and processors. A 45% response was obtained from the forty Colorado commercial bean dealers surveyed. Survey results are summarized below:

- The most important criteria used to purchase certified bean seed are: *QUALITY* and *PRICE*.
- The most important attributes of quality bean seed are: size, purity, germination, clean, uniform seed treatment, weed-free, disease-free, and no splits.
- Future pinto varieties should possess: *High Priority* - high yield + white mold and rust resistance; *Moderate Priority* - seed quality/size + bacterial blight and Fusarium wilt resistance; *Low Priority* - upright plant type and tolerance to salt.
- More than 2/3 of the respondents agreed that:
  - there are too many varieties on the market to choose from
  - breeding programs place too much emphasis on yield, and not enough on seed quality factors
  - certified seed is a value for the producer

Additional Copies

Crops Testing has made numerous changes to improve the quality of the 1996 Colorado Dry Bean Variety Performance Trials report. Changes have led to greater costs that we wish to partially recoup from sales of extra copies of this report without deviating from our traditional distribution policy and our public mandate to deliver reliable dry bean variety performance data to Colorado producers. We will continue to provide ten copies to each of the seed companies entering bean varieties in the trials. We hope that seedsmen and seed companies will order additional copies to help defray costs of publication and to encourage us to make improvements in the quality of the report. Additional copies of this report may be ordered from Crops Testing, Cynthia Johnson at C-4 Plant Science Building, Fort Collins, CO 80523; Telephone (970) 491-1914; FAX number (970) 491-2758; or e-mail cjohnson@ceres.agsci.colostate.edu for $3/copy. Colorado Cooperative Extension agents may obtain up to 10 copies of this report by calling Cynthia Johnson or by sending an e-mail message.



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