

Technical Report TR12-12 November 2012

Colorado
State
University

Agricultural Experiment Station

College of Agricultural Sciences

Department of Soil & Crop Sciences

Extension



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Decisions

**2012 Colorado Dry Bean
Variety Performance Trials**

Table of Contents

Authors.....	3
2012 Colorado Dry Bean Performance Trials.....	4
2012 Irrigated Pinto Bean Variety Performance Trial at Lucerne.....	5
2012 Irrigated Pinto Bean Variety Performance Trial at Rocky Ford.....	6
2012 Irrigated Pinto Bean Variety Performance Trial at Yuma.....	7
COAGMET Monthly Summaries from 2010-2012.....	8
10-Year Summary of Pinto Bean Variety Performance in Colorado.....	9
Pinto Bean Variety Descriptions.....	10
Plant Arrangement Enhances Dry Bean Production for Some Varieties.....	13
Acknowledgments.....	14

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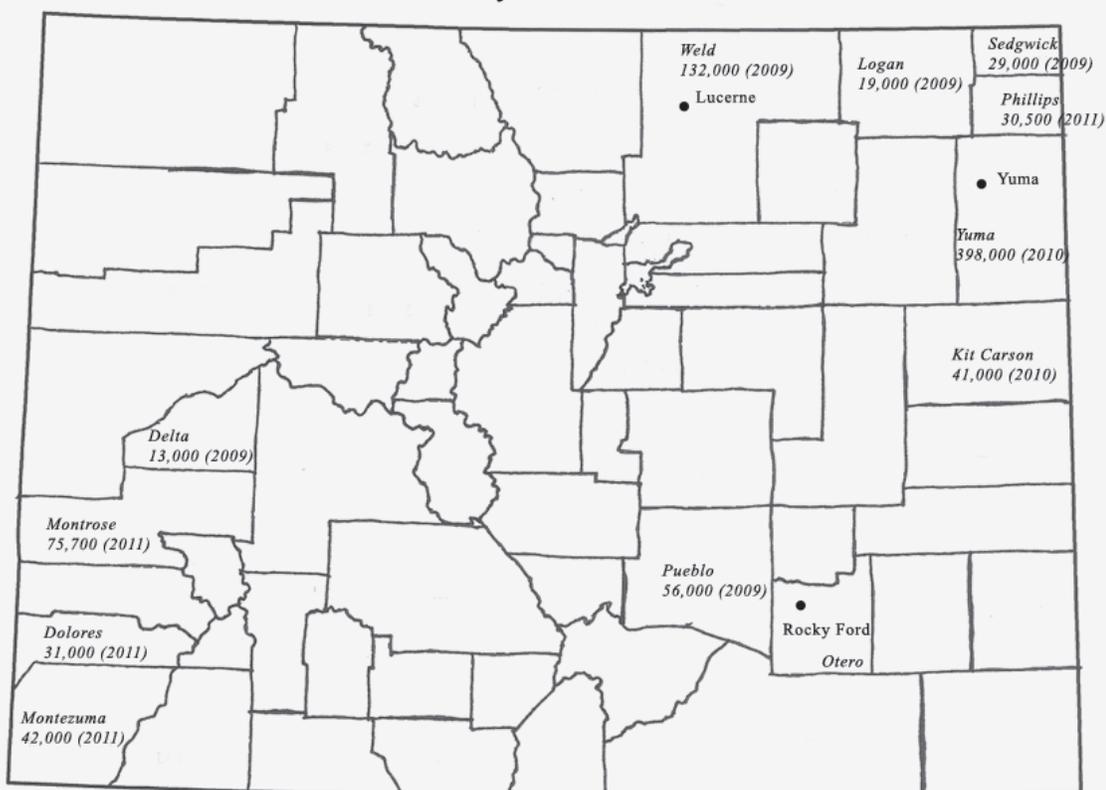
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2012 Colorado Dry Bean Performance Trials

The Colorado State University Crops Testing Program, Bean Breeding Program, and Bean Pathology Research Program provide unbiased, current, and reliable variety performance results and information to help Colorado dry bean producers make better planting decisions. Our uniform dry bean variety trials serve a dual purpose of screening experimental lines from CSU's Bean Breeding Program as well as testing them alongside commercially available varieties. This allows the breeding program to make variety advancement decisions and helps our program make informed recommendations for Colorado bean producers. Colorado State University promotes crop variety testing as a service to crop producers and seed companies who depend on us for unbiased and reliable crop variety performance information. The uniform dry bean variety trial is made possible by funding received from Colorado dry bean producers and handlers via the Colorado Dry Bean Administrative Committee, and the CSU Agricultural Experiment Station.

Colorado produced approximately 702,000 hundredweight (cwt) of dry beans on 45,000 harvested acres in 2012. The total value of production was over \$26 million in 2011 (most recent available data). Three eastern Colorado trials were planted at Yuma, Lucerne, and Rocky Ford. Thirty-one varieties with diverse origins, maturities, disease resistance, growth habits, and adaptability were tested at all three irrigated trial locations. Results tables for the trials are presented in the following pages. Plot sizes were approximately 300 ft² and all trials were planted at 85,000 seeds per acre. Seed yields and seed sizes for all trial varieties are reported in the tables. Yields are adjusted to 14% seed moisture content.

2012 Colorado Dry Bean Trial Locations



Dry Bean production (cwt) for some high producing counties in Colorado

2012 Irrigated Pinto Bean Variety Performance Trial at Lucerne

Variety	Source	Yield ^a lb/ac	Moisture percent	Seeds/Pound count
La Paz	ProVita, Inc.	4285	10.6	1215
GTS-904	Gentec Inc.	4284	9.4	1092
CO 90693-5	Colorado State University	4276	9.3	1189
CO 91212-14	Colorado State University	4213	11.0	1291
Mariah	Seminis	4178	8.8	1197
Sinaloa	ProVita, Inc.	4078	8.5	1251
CO 91216-15	Colorado State University	3921	8.7	1071
CO 90848-11	Colorado State University	3902	9.4	1224
CO 91160-11	Colorado State University	3891	8.5	1136
CO 24972	Colorado State University	3889	11.3	1220
CO 91003-10	Colorado State University	3889	9.9	1069
CO 93096-02	Colorado State University	3884	7.3	1183
CO 91160-14	Colorado State University	3878	8.6	1130
CO 91007-11	Colorado State University	3855	12.6	1103
RS810	Seacat Farms	3807	11.3	1343
Croissant	Colorado State University	3765	8.7	1203
Long's Peak	Colorado State University	3702	8.9	1115
CO 91364-04	Colorado State University	3687	9.8	1233
Bill Z	Colorado State University	3664	8.1	1295
Windbreaker	Seminis	3654	7.8	1116
CO 92838-13	Colorado State University	3609	9.5	1040
CO 91003-13	Colorado State University	3569	11.2	1111
CO 90848-14	Colorado State University	3554	8.5	1116
Montrose	Colorado State University	3550	7.9	1188
CO 92838-07	Colorado State University	3498	9.6	1001
COB-816-03	Gentec Inc.	3483	11.6	1192
CO 91212-10	Colorado State University	3379	9.1	1103
RS971	Seacat Farms	3376	16.7	1365
Medicine Hat	Seminis	3353	7.8	1167
CO 91137-03	Colorado State University	3347	8.9	1155
Othello	Washington State University	3311	8.1	1232
Average		3765	9.6	1172
^b LSD (P<0.30)		291		

^aYields corrected to 14% moisture

^bIf the difference between two yields equals or exceeds the LSD value, the difference is significant.

Plot Size: 10' by 30'

Site Information

Cooperator: Brian Leafgren

Harvest Date: 9/10/2012

Planting Date: 5/25/2012

Seeding Rate: 85,000 seeds/ac

Fertilizer: Nitrogen at 50 lb/ac

Herbicides: Eptam and Dual

Irrigation Type: Furrow

Disease Comments: Trace infections of white mold and Fusarium wilt were observed in a few plots, but were too variable to rate.

2012 Irrigated Pinto Bean Variety Performance Trial at Rocky Ford

Variety	Source	Yield ^a	Test Weight	Moisture	Seeds/Pound
		lb/ac	lb/bu	percent	count
Mariah	Seminis	3702	59.4	9.5	1111
GTS-904	Gentec Inc.	3452	57.9	10.3	999
Montrose	Colorado State University	3398	59.1	10.3	1059
CO 91007-11	Colorado State University	3383	58.1	14.3	1061
CO 91003-10	Colorado State University	3317	58.6	11.7	1030
Othello	Washington State University	3313	59.5	9.6	1136
Bill Z	Colorado State University	3295	58.4	12.3	1142
CO 92838-07	Colorado State University	3188	56.6	10.4	1003
Long's Peak	Colorado State University	3129	57.6	10.3	1124
CO 90848-11	Colorado State University	3075	59.3	9.8	1080
CO 91160-14	Colorado State University	3059	58.8	10.4	1116
CO 91003-13	Colorado State University	3020	58.7	11.4	1056
Windbreaker	Seminis	3009	56.0	9.4	1017
La Paz	ProVita, Inc.	2995	59.3	9.8	1070
RS971	Seacat Farms	2967	56.2	14.0	1146
RS810	Seacat Farms	2948	57.1	12.6	1205
COB-816-03	Gentec Inc.	2893	58.0	11.0	1077
CO 92838-13	Colorado State University	2880	57.4	11.2	946
CO 90693-5	Colorado State University	2843	59.0	10.8	1103
Sinaloa	ProVita, Inc.	2811	58.7	9.4	1117
CO 24972	Colorado State University	2727	59.4	10.7	1259
CO 91212-14	Colorado State University	2719	60.6	10.3	1207
CO 91216-15	Colorado State University	2710	55.5	9.8	997
Medicine Hat	Seminis	2706	56.7	9.1	1064
CO 93096-02	Colorado State University	2633	56.2	9.9	1001
CO 90848-14	Colorado State University	2593	58.1	9.3	1104
Croissant	Colorado State University	2526	59.5	9.6	1158
CO 91364-04	Colorado State University	2421	59.2	9.7	1177
CO 91137-03	Colorado State University	2328	59.5	9.3	1044
CO 91160-11	Colorado State University	2314	58.7	11.5	1058
CO 91212-10	Colorado State University	2212	58.3	9.9	1063
Average		2921	58.2	10.6	1088

^bLSD (P<0.30)

361

^aYields corrected to 14% moisture

^bIf the difference between two yields equals or exceeds the LSD value, the difference is significant.

Plot Size: 10' by 30'

Site Information

Cooperator: Arkansas Valley Research Center
 Harvest Date: 9/10/2012 and 9/12/2012
 Planting Date: 5/23/2012
 Seeding Rate: 85,000 seeds/ac
 Fertilizer: 125 lb/ac of 18-46-0 applied Feb. 20, 2012
 Irrigation Type: Furrow

2012 Irrigated Pinto Bean Variety Performance Trial at Yuma

Variety	Source	Yield ^a	Test Weight	Moisture	Seeds/Pound
		lb/ac	lb/bu	percent	count
Montrose	Colorado State University	4076	61.4	9.9	1164
CO 93096-02	Colorado State University	3864	58.6	10.2	1153
Sinaloa	ProVita, Inc.	3833	60.2	10.9	1191
GTS-904	Gentec Inc.	3826	59.9	14.6	1160
CO 91364-04	Colorado State University	3773	60.1	12.3	1219
COB-816-03	Gentec Inc.	3765	60.0	14.9	1191
La Paz	ProVita, Inc.	3747	61.3	13.3	1308
Medicine Hat	Seminis	3741	58.6	10.1	1161
CO 91212-14	Colorado State University	3718	60.6	15.2	1279
CO 92838-13	Colorado State University	3629	58.6	13.8	1064
CO 90848-11	Colorado State University	3612	60.0	13.2	1236
Othello	Washington State University	3608	61.1	9.6	1184
Bill Z	Colorado State University	3595	60.1	11.2	1253
CO 91160-11	Colorado State University	3526	59.3	11.1	1129
Mariah	Seminis	3513	60.5	10.8	1231
CO 92838-07	Colorado State University	3510	59.6	12.5	1017
Croissant	Colorado State University	3419	59.5	11.1	1231
CO 91216-15	Colorado State University	3417	58.5	12.3	1091
Windbreaker	Seminis	3411	58.4	8.9	1185
CO 91003-10	Colorado State University	3298	58.8	13.3	1183
Long's Peak	Colorado State University	3157	58.5	15.6	1177
CO 91212-10	Colorado State University	3084	59.9	13.8	1135
RS971	Seacat Farms	3070	54.7	27.1	1297
CO 91003-13	Colorado State University	3063	58.4	15.6	1081
CO 91007-11	Colorado State University	2980	58.6	16.8	1145
CO 24972	Colorado State University	2892	59.7	14.5	1260
CO 91137-03	Colorado State University	2749	59.7	9.9	1127
CO 91160-14	Colorado State University	2681	58.8	11.9	1107
RS810	Seacat Farms	2674	58.2	17.4	1312
CO 90693-5	Colorado State University	2655	58.9	14.3	1140
CO 90848-14	Colorado State University	2360	59.7	12.3	1181
Average		3363	59.4	13.2	1180

^bLSD (P<0.30)

399

^aYields corrected to 14% moisture

^bIf the difference between two yields equals or exceeds the LSD value, the difference is significant.

Plot Size: 10' by 30'

Site Information

Cooperator: Richard Wacker

Harvest Date: 9/18/2012

Planting Date: 5/30/2012

Seeding Rate: 85,000 seeds/ac

Fertilizer: N-P-K-S-Zn at 85-60-21-20-1.5 lb/ac

Herbicides: Dual, Sonalan, Raptor, Basagran, and Outlook

Fungicides: Copper and Headline

Insecticide: Bifenthrin

Irrigation Type: Center Pivot

Disease Comments: Common bacterial blight infection varied from trace to moderate, and was most severe and consistent in entries such as Othello, Bill Z, and a few experimental lines. A mid-season yellowing of plots in the center of the nursery was observed, but did not appear to reduce plant vigor or yield.

∞ COAGMET Monthly Summaries from 2010-2012

Compiled by H. F. Schwartz & M. S. McMillan, Colorado State University www.coagmet.com

Monthly Daily High Temperature (F)

	<u>2010</u>		
	Holyoke	Burlington	Rocky Ford
May	70.1	70.1	76.2
June	84.3	84.1	88.8
July	87.9	84.0	91.5
Aug	87.9	86.9	90.9
Sept	81.9	82.8	88.5
average	82.4	81.6	87.2

	<u>2011</u>		
	Holyoke	Burlington	Rocky Ford
May	68.1	70.0	76.2
June	83.2	85.4	90.3
July	89.4	93.2	91.4
Aug	89.2	90.8	94.4
Sept	76.5	76.5	82.1
average	81.3	83.2	86.9

	<u>2012</u>		
	Holyoke	Burlington	Rocky Ford
May	78.1	77.9	79.9
June	92.1	93.5	91.3
July	94.0	93.1	95.2
Aug	89.2	89.1	92.0
Sept	82.1	75.7	82.7
average	87.1	85.9	88.2

Number of Days Above 95 F

	<u>2010</u>		
	Holyoke	Burlington	Rocky Ford
May	0	0	4
June	1	1	6
July	3	2	11
Aug	1	0	7
Sept	1	1	3
total	6	4	31

	<u>2011</u>		
	Holyoke	Burlington	Rocky Ford
May	0	0	1
June	2	2	9
July	2	11	14
Aug	6	8	18
Sept	1	1	1
total	11	22	43

	<u>2012</u>		
	Holyoke	Burlington	Rocky Ford
May	1	2	1
June	13	13	14
July	17	20	21
Aug	6	8	10
Sept	4	4	4
total	41	47	50

Monthly Rainfall (inches)

	<u>2010</u>		
	Holyoke	Burlington	Rocky Ford
May	1.0	1.7	1.2
June	4.8	0.2	1.9
July	2.8	3.3	3.9
Aug	2.7	2.5	2.0
Sept	1.5	0.4	0.2
total	12.8	8.1	9.1

	<u>2011</u>		
	Holyoke	Burlington	Rocky Ford
May	6.0	4.5	0.3
June	1.9	1.7	1.5
July	6.2	4.6	1.5
Aug	3.6	3.6	0.8
Sept	0.8	1.4	0.5
total	18.5	15.8	4.6

	<u>2012</u>		
	Holyoke	Burlington	Rocky Ford
May	1.0	0.0	0.3
June	1.3	0.0	0.1
July	1.2	0.7	1.0
Aug	0.9	3.1	0.1
Sept	0.3	1.0	0.8
total	4.7	4.8	2.3

Summary: 2012 had higher daily temperatures and less rainfall than 2011 for all sites.

Days above 95 F were greater for all sites, and could have increased vegetative growth and delayed flowering during 2012. Rainfall patterns were low in 2012, contributing to less bacterial disease and common rust // **CSU Veg Path Web Sites:**



10-Year Summary of Pinto Bean Variety Performance in Colorado

Every year CSU personnel conduct pinto bean variety performance trials in different locations across eastern Colorado. Both variety entries and locations change from year to year, and this table summarizes varieties that have been tested over multiple years. In the table, yield performance by variety has been averaged over locations within each of ten years. Entries reported are public and commercial named varieties common to all trials for a year. Experimental lines are not included in this summary. The number of locations per year varied from two to six. The trial average at the bottom of each year's yield column is a simple average of the yields of reported varieties for that year. Average yield over years is shown in the column at the far right.

10-Year Summary of Pinto Bean Variety Performance in Colorado Variety Trials from 2003-2012.

Variety ^a	Year										Long Term Average	
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012		lb/ac
Windbreaker							3415	3316		3358	3363	111
Mariah							3033	3105		3798	3312	110
Montrose	2956	2562	2449	3466	2587	4854	3569	3261	2660	3675	3204	106
Sinaloa									2799	3574	3187	105
Galeena			2374	3437	2508	5046	2390	3330			3181	105
Durango				3170	2390	4457	3136	3244	2301		3116	103
GTS-904					3118	3513	2634	3091	2468	3854	3113	103
Bill Z	2463	2253	2454	3689	2796	4910	3273	3418	2305	3518	3108	103
Poncho	2826	2398	2676	3033	3179	4432		3144			3098	102
99217				3080	2406	4482	3296	3082	2148		3082	102
Lariat					2528	4472	3010	3123	2204		3067	101
Medicine Hat							2902	2877		3267	3015	100
Stampede					2502	4015	3100	3081	2280		2996	99
Long's Peak							2973	2786	2684	3329	2943	97
La Paz			2490	3164	2586	3804	2177	2917	2700	3676	2939	97
Baja			2629	2963	2328	3730					2912	96
Othello		1936		3033				3020		3411	2850	94
Croissant							2855	2792	2479	3236	2841	94
Buckskin	2382	2090	2428	3090	2754	4024					2795	92
Grand Mesa	2283	1865	2265	2944	2429	4450	3132	2864	2204		2715	90
ND-307							2735	2949	2298		2661	88
Average	2582	2184	2471	3188	2624	4322	2977	3078	2425	3518	3024	

^aThe following varieties were only tested for a few years during the ten year period, and are not included in this performance summary: Buster, Kimberly, Rally, Shoshone, and Sonora.

Pinto Bean Variety Descriptions:

- 99217** An AmeriSeed Inc. pinto variety from ProVita, Inc. that is late maturing (98-102 days) with a II B plant type. It has an intermediate resistance to rust and *Bean common mosaic virus* (BCMV).
- Bill Z** A pinto variety released in 1985 from Colorado State University. Bill Z has been one of the most widely grown pinto varieties in the western US and northern highland regions of Mexico. It combines medium maturity (94-97 days), high yield, excellent seed quality and yield stability into a variety that both growers and processors desire. It has semi-vine growth habit and carries resistance to curly top, BCMV and *Bean common mosaic necrosis virus* (BCMNV), with tolerance to Fusarium root rot, common bacterial blight and bacterial brown spot.
- Croissant** A pinto variety released in 2008 from Colorado State University. Croissant combines several desirable commercial pinto bean traits including excellent seed color and size, high yield potential, resistance to prevalent strains of rust in the High Plains, and resistance to BCMV and BCMNV. Croissant has medium harvest maturity (93 to 98 days) and semi-upright plant architecture in most environments, however, it can lodge in soils with high nitrogen and soil moisture content.
- Durango** An AmeriSeed Inc. pinto variety from ProVita, Inc. with intermediate resistance to rust and BCMV. It is a mid to late season maturing variety (98-102 days) with a II B plant type.
- Galeena** An AmeriSeed Inc. pinto variety from ProVita, Inc. with intermediate resistance to rust and BCMV. It is a full season maturing variety (100-104 days) and has a II B plant type with a medium to wide profile.
- Grand Mesa** A pinto variety released in 2001 from Colorado State University. Grand Mesa is a medium maturity (94-98 days) variety that combines resistance to rust, BCMV, and field tolerance to white mold, but is susceptible to common bacterial blight and bacterial brown spot. It has moderate yield potential and good seed quality with a semi-upright Type II plant architecture.
- La Paz** An AmeriSeed Inc. pinto variety from ProVita, Inc. with intermediate resistance to rust and BCMV. It is a full season maturing variety (99-103 days) that has an upright medium to narrow profile and a II B plant type.
- Lariat** A pinto line released by the North Dakota Agricultural Experiment Station in 2008 and tested as ND020069. It has a Type II upright short vine with good lodging resistance. In Colorado it is a full season variety at approximately 99-100 days. It is resistant to rust and BCMV.
- Long's Peak** A pinto variety released in 2011 from Colorado State University. Long's Peak combines several desirable commercial pinto bean traits including excellent seed color and size, high yield potential, resistance to prevalent strains of rust in the High Plains, and resistance to BCMV and BCMNV. Rust resistance is derived from a single recessive gene that allows small rust pustules to form on the leaves late in the growing season. Long's Peak has upright plant architecture in most environments and has medium plant maturity (94-98 days).

- Mariah** A pinto variety released by Seminis. It is a medium maturing plant (93-97 days) with an erect, short-vine growth habit and resistance to BCMV and rust.
- Medicine Hat** A pinto variety released by Seminis. Medicine Hat is an early season variety (88-90 days) with short-vine growth habit. It is resistant to BCMV and rust.
- Montrose** A pinto variety released in 1999 from Colorado State University. Montrose was released to provide a high yielding pinto variety with improved resistance to rust. It is a medium season variety (94-97 days) with a semi-vine type growth habit. Montrose is resistant to all known races of rust in the High Plains and western US. It has excellent seed quality and possesses resistance to curly top virus, BCMV, BCMNV, and it has tolerance to Fusarium root rot. It is highly susceptible to white mold.
- ND-307** A pinto variety developed by North Dakota State University. It is a late season (>100 days) high yielding variety with upright short-vine growth habit and has resistance to rust and BCMV.
- Othello** A pinto variety released by the USDA in 1987. It is an early variety (84 to 87 days) with resistance to BCMV, some root rot pathogens, and curly top virus. It is susceptible to local strains of rust, all bacterial blights, and white mold. It has good seed quality.
- Poncho** A medium maturity (97 days) pinto variety released by Rogers/Syngenta Seeds, Inc. in 1998. It has resistance to BCMV, high yield potential, and excellent seed quality. It has a Type III growth habit. It is susceptible to rust and bacterial brown spot.
- Sinaloa** An AmeriSeed Inc. pinto variety from ProVita, Inc. It has a high yield potential and is a medium-full season maturing variety (96-100 days) with a II B plant type.
- Stampede** A pinto line released by the North Dakota Agricultural Experiment Station in 2008 as ND0203 51. It has full season maturity in the High Plains (96-99 days), high yield capacity and excellent seed size, shape, and appearance. Stampede is an erect variety, with very good lodging resistance. It is resistant to rust and BCMV.
- Wind-breaker** A pinto line released by Seminis. It is a medium maturing pinto bean (94-98 days) with an upright, short-vine growth habit, and resistance to BCMV and rust.

Pinto Bean Experimental lines:

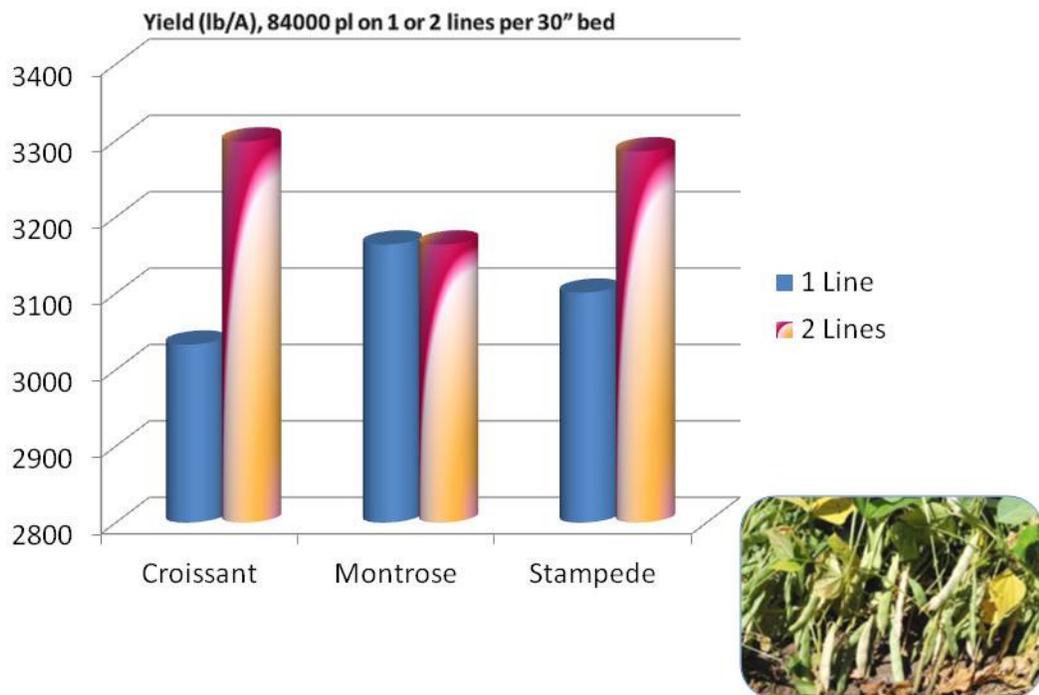
CO24972	An experimental pinto line from Colorado State University.
CO90693-5	An experimental pinto line from Colorado State University.
CO90848-11	An experimental pinto line from Colorado State University.
CO90848-14	An experimental pinto line from Colorado State University.
CO91003-10	An experimental pinto line from Colorado State University.
CO91003-13	An experimental pinto line from Colorado State University.
CO91007-11	An experimental pinto line from Colorado State University.
CO91137-03	An experimental pinto line from Colorado State University.
CO91160-11	An experimental pinto line from Colorado State University.
CO91160-14	An experimental pinto line from Colorado State University.
CO91212-10	An experimental pinto line from Colorado State University.
CO91212-14	An experimental pinto line from Colorado State University.
CO91216-15	An experimental pinto line from Colorado State University.
CO91364-04	An experimental pinto line from Colorado State University.
CO92838-07	An experimental pinto line from Colorado State University.
CO92838-13	An experimental pinto line from Colorado State University.
CO93096-02	An experimental pinto line from Colorado State University.
COB-816-03	An experimental pinto line from Gentec, Inc.
GTS-904	An experimental pinto line from Gentec, Inc.
RS810	An experimental pinto line from Seacat Farms.
RS971	An experimental pinto line from Seacat Farms.

Plant Arrangement Enhances Dry Bean Production for Some Varieties

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Agronomic studies during the last three years showed that planting double lines instead of single lines per bed increased yield an average of 10 percent for less prostrate pinto varieties such as Croissant and Stampede when compared to a prostrate variety Montrose grown at 84,000 plants per acre.

CSU Dry Bean Spacing Experiment (2010 - 12)



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