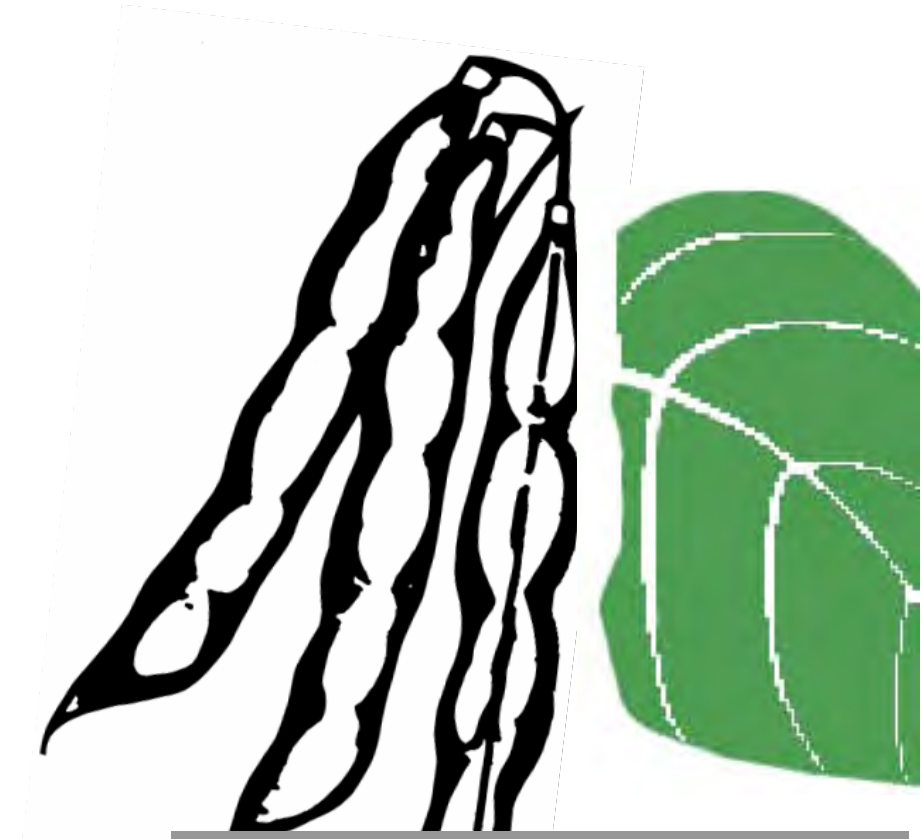
Technical Report TR04-08 December 2004

# Agricultural Experiment Station

Colorado State University
*Knowledge to Go Places*

College of Agricultural Sciences
Department of Soil and Crop Sciences
Cooperative Extension



# MAKING BETTER DECISIONS

## 2004 Dry Bean Variety Performance

## *Acknowledgments*

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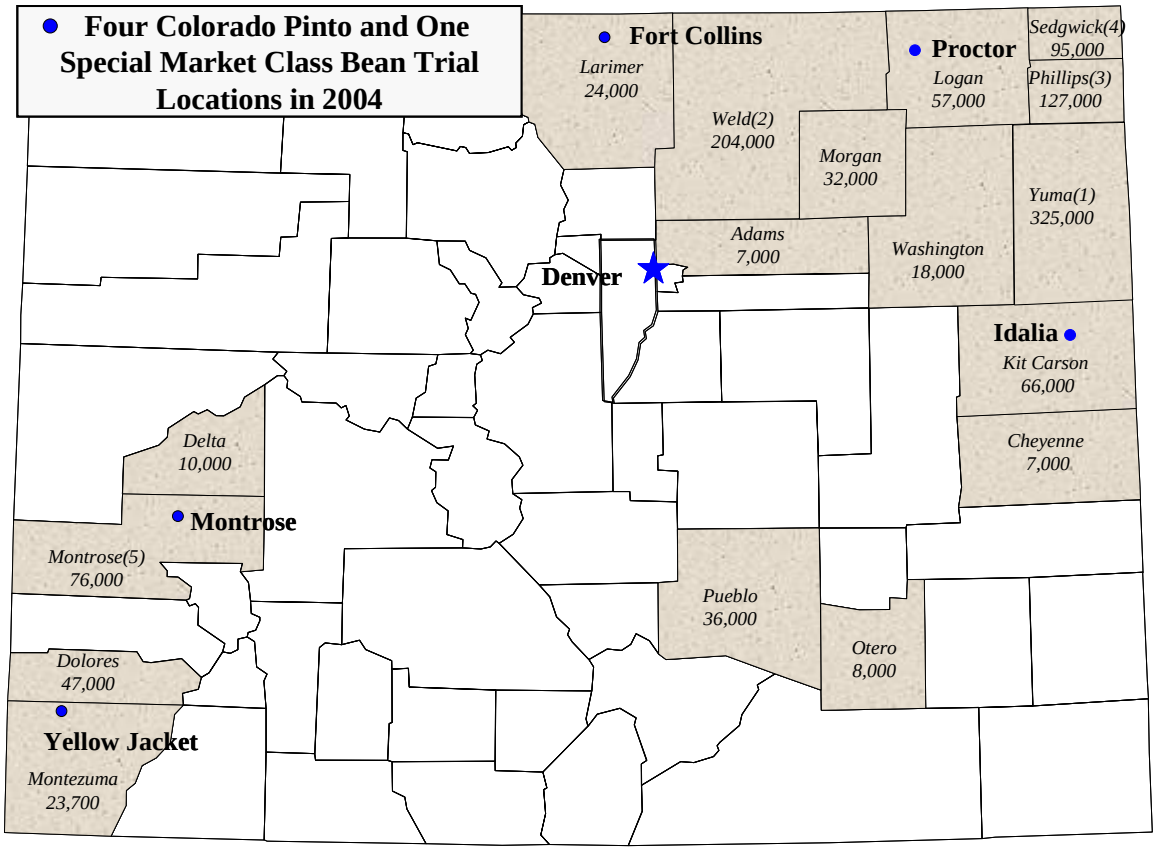



**2003 production (cwt) for the highest producing counties in Colorado.**

# 2004 COLORADO DRY BEAN PERFORMANCE TRIALS

## *Introduction*

Colorado is the seventh largest producer of dry beans in the United States, producing just over 5% of the nation's total dry edible beans. North Dakota is the highest producing state and produces just over a third of the total dry bean production in the country. Colorado dry bean acreage, both planted and harvested, has been well below 100,000 acres from 2002-2004 due primarily to drought and irrigation water uncertainty and shortage.

Colorado producers annually spend millions of dollars on pinto bean seed which makes variety selection important. Colorado State University's Crops Testing program, bean breeding program, bean pathology research, and agricultural research stations collaborate to conduct uniform variety trials annually to provide unbiased and reliable variety performance results from uniform variety trials to help Colorado dry bean producers' make better variety decisions. The uniform variety trial serves a dual purpose of screening experimental lines from CSU's bean breeding program, or from bean seed companies, and to compare commercial variety performance for making variety recommendations to Colorado bean producers. The uniform variety trial is made possible by funding received from Colorado dry bean producers and handlers via the Colorado Dry Bean Administrative Committee. Funding from the Colorado Bean Network makes it possible to publish the variety performance results in a quality, Making Better Decisions, report.

The 2004 uniform variety trials were planted at four locations. The two eastern Colorado locations were Proctor (Platte River Valley), and Idalia (Golden Plains). The two western Colorado locations were Montrose and Yellow Jacket. Varieties tested in 2004 are described in the following tables. A randomized complete block field design with three replicates was used in all trials. The seeding rate was approximately 85,120 seeds per acre with plots consisting of four 30-inch rows and 36 feet long. Trials were in commercial bean fields or on CSU research stations. Seed yields, in pounds per acre, are adjusted to 14% moisture content.

### Summary of the 2004 Dry Bean Growing Season

Based on weekly Colorado Crop Progress reports by the Colorado Agricultural Statistics Service, we can compare on a weekly basis, the evolution of the 2004 dry bean crop season to the 2003 season and to the 5-yr average in terms of percent of acreage planted, acreage emerged, acreage flowered, acreage cut, and acreage harvested. The initial months of May and June 2004 were favorable by comparison to May and June 2003, and the 5-yr average months of May and June, for percent of acreage planted and emerged. However, the cool, overcast weather from mid-June through early August slowed the development of the 2004 dry bean crop relative to other years. Wet and cold September and October field conditions prevented some bean producers from harvesting their bean crops, and dry bean cutting and harvest acreage had not reached 2003 or 5-yr average levels as of October 31, 2004. Even one of our variety trials could not be harvested until late October due to the same weather constraints.

Little rust was observed in Colorado this year though rust was found in western Nebraska. Isolated infestations of bacterial diseases and white mold were problematic in Colorado, but no widespread outbreaks of bean diseases were observed.

**Table 1. Cultural conditions for trials in 2004.**

| | Fort Collins | Idalia | Montrose | Proctor | Yellow Jacket |
|---|---|---|---|---|---|
| Soil Type | Fort Collins Clay Loam | Kuma-Kieth Silt Loam | Clay Loam | Norka Ulysses Loam | Wetherill Silty Clay Loam |
| Previous Crop | Forage Sorghum | Corn | Spring Barley | Wheat | Alfalfa |
| Fertilization | | | | | |
| N acre $^{-1}$ | 50 | 8 | 10.2 | 50 | 0 |
| $P_2O_5$ acre $^{-1}$ | 40 | 25 | 30.8 | | |
| S acre $^{-1}$ | | | 2.50 | | |
| Herbicide | Outlook | Trifaualan HF Champ | Lasso Micro Tech Sonalan | Sonalan Eptam | Outlook |
| Bactericide | None | None | | Nucop | None |
| Insecticide | None | None | Dimethoate | Asana, Excel | None |
| Irrigation | Sprinkler | Flood | Furrow | Sprinkler | Sprinkler |

## *Pinto Bean Varietal Descriptions*:

**00191** An experimental line from ProVita, Inc. (a private bean seed company in Idaho).

**02225** An experimental line from ProVita, Inc. (a private bean seed company in Idaho).

**99230** An experimental line from ProVita, Inc. (a private bean seed company in Idaho).

**99232** An experimental line from ProVita, Inc. (a private bean seed company in Idaho).

**Bill Z** A medium maturity (95-97 d) variety released 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 very productive variety with excellent seed quality. However, it is susceptible to white mold, common bacterial blight and rust.

**Buckskin** An early season (87-91 d) variety released by Rogers/ Syngenta Seeds, Inc. (RNK101). It is a vine Type III growth habit with resistance to bean common mosaic virus, but susceptible to white mold, rust, and bacterial brown spot.

**Buster** A variety from Seminis Seed Co. released in 1999. It is a semi-erect variety with resistance to rust.

**CO12531** An experimental pinto line from Colorado State University.

**CO12613** An experimental pinto line from Colorado State University.

**CO12786** An experimental pinto line from Colorado State University.

**CO83783** An experimental pinto line from Colorado State University.

**CO96731** An experimental pinto line from Colorado State University.

**CO96753** An experimental pinto line from Colorado State University.

**Grand Mesa** A medium maturity (96 d) variety from Colorado State University released in 2001. Grand Mesa combines resistance to rust, bean common mosaic virus, semi-upright Type II plant architecture 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.

**GTS-900** A full season (99 to 102 d) variety from Gentec Seed Co. with resistance to rust and upright architecture. It has some field tolerance to white mold.

**Montrose** A medium maturity (97 d) variety released by Colorado State University in 1999. It has resistance to rust and bean common mosaic virus. It has high yield potential and excellent seed quality. Because it has very prostrate vine Type III growth habit, it is highly susceptible to white mold.

**Othello** A short season (90 d) variety released by the USDA in 1986 with semi-upright growth habit. It is highly susceptible to rust and bacterial diseases, and moderately susceptible to white mold.

**Poncho** A medium maturity (97 d) variety released by Rogers/Syngenta Seeds, Inc. in 1998 with resistance to bean common mosaic, high yield potential and excellent seed quality. It has Type III growth habit. It is susceptible to rust and bacterial brown spot.

**Rally** A full season (100 to 105 d) variety from Gentec Seed Co. with resistance to rust and upright architecture. It has some field tolerance to white mold.

**Table 2. Average pinto bean performance over four Colorado locations in 2004**.

| | Location | | | | |
|---|---|---|---|---|---|
| Variety* | Idalia | Proctor | Montrose | Yellow Jacket | Average |
| | ----------Yield (lb/ac)---------- | | | | |
| Montrose | 2917 | 2912 | 2022 | 1731 | 2395 |
| Poncho | 2840 | 2394 | 2032 | 2040 | 2326 |
| CO12786 | 2536 | 2695 | 2218 | 1463 | 2228 |
| Buckskin | 2131 | 2275 | 1891 | 1960 | 2064 |
| Bill Z | 3015 | 2309 | 1628 | 1288 | 2060 |
| Buster | 2328 | 2586 | 1772 | 1529 | 2053 |
| CO96753 | 2527 | 2324 | 1953 | 1303 | 2027 |
| Pro Vita 00191 | 2381 | 2108 | 2058 | 1516 | 2016 |
| CO83783 | 2493 | 2255 | 1786 | 1301 | 1959 |
| CO96731 | 2053 | 2112 | 1888 | 1426 | 1870 |
| Pro Vita 99230 | 2288 | 2395 | 1390 | 1404 | 1870 |
| Rally | 2126 | 1826 | 1991 | 1250 | 1799 |
| Othello | 2249 | 2465 | 1238 | 1222 | 1793 |
| Pro Vita 99232 | 1982 | 1868 | 1924 | 1237 | 1753 |
| Grand Mesa | 2055 | 2387 | 1292 | 1171 | 1726 |
| GTS-900 | 2321 | 1720 | 1926 | 845 | 1703 |
| Pro Vita 02225 | 2189 | 2325 | 819 | 1331 | 1666 |
| CO12531 | 1996 | 1891 | 1349 | 1052 | 1572 |
| CO12613 | 1592 | 1793 | 603 | 935 | 1231 |
| **Average** | **2317** | **2244** | **1673** | **1368** | **1901** |

*Varieties ranked by the average yield over four locations in 2004.

**Summary of Pinto Bean Variety Performance in Colorado Variety Trials from 1995-2004**

Every year CSU personnel conduct pinto bean variety performance trials in different locations. Both varieties and locations change from year to year so a straight-forward, statistical comparison of variety performance is not possible. However, it is useful to summarize yield performance over years to take stock of what we have done and to generate a vision of where we are going with regards to pinto bean variety testing. In the following table, yield performance by variety has been averaged over locations within each of eleven years. Entries reported are public and commercial named varieties common to all trials for a year. Public and private experimental lines were not included in this summary. The number of locations per year varied from three to six. The trial average (at bottom of each year's yield column) is a simple average of the yields of reported varieties for that year. The second column is the yield for each reported variety expressed as a percent of the trial average for each year. Average yield over years and average percent of trial average are shown in the columns at the extreme right. Finally, the table was sorted by highest average percent of trial average.

Thirty-nine public and commercial named pinto bean varieties have been tested during this eleven year period. Some varieties were only tested for one year, while Bill Z was tested in all eleven years. Montrose and Chase were tested for seven and eight years, respectively. Even though rigorous comparisons of performance cannot be made for varieties tested in different years and locations, the Colorado dry bean industry can use the table to gain insight into relative performance of a large number of varieties. Varieties that perform well in one part of the state and not so well in another part would be expected to show up in the middle of the table along with varieties that had mediocre performance over all locations.

**Table 3. Summary of Pinto Bean Variety Performance in Colorado Variety Trials from 1995-2004.**

| Variety | 1995 Yield | | 1996 Yield | | 1997 Yield | | 1998 Yield | | 1999 Yield | | 2000 Yield | | 2001 Yield | | 2002 Yield | | 2003 Yield | | 2004 Yield | | Long Term Ave Yield | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave | lb/ac | % ave |
| Montrose | | | | | 2830 | 134 | 2708 | 118 | 2821 | 111 | 3213 | 106 | 2705 | 104 | 2586 | 111 | 2956 | 114 | 2562 | 120 | 2798 | 115 |
| ROG 179 | | | | | 2396 | 113 | | | | | | | | | | | | | | | 2396 | 113 |
| USPT 72 | | | | | | | | | | | | | | | 2559 | 109 | | | | | 2559 | 109 |
| Chase | 1618 | 116 | 2260 | 103 | 2417 | 114 | 2628 | 115 | 2584 | 101 | 3049 | 100 | | | | | | | | | 2426 | 108 |
| Cisco | | | | | | | | | 2775 | 109 | 3280 | 108 | | | | | | | | | 3028 | 108 |
| Poncho | | | | | | | | | 2613 | 103 | 3332 | 110 | 2862 | 110 | 2371 | 101 | 2826 | 109 | 2398 | 112 | 2734 | 108 |
| UI-129 | 1458 | 105 | | | | | | | | | | | | | | | | | | | 1458 | 105 |
| Arapahoe | 1440 | 104 | | | | | | | | | | | | | | | | | | | 1440 | 104 |
| Bill Z | 1461 | 105 | 2459 | 112 | 2101 | 99 | 2167 | 95 | 2617 | 103 | 3212 | 106 | 2621 | 101 | 2613 | 112 | 2463 | 95 | 2253 | 106 | 2397 | 103 |
| GTS Cob 502-94 | | | | | | | | | | | 3139 | 103 | | | | | | | | | 3139 | 103 |
| Buster | | | | | | | | | 2672 | 105 | 3087 | 102 | 2654 | 102 | | | | | 2185 | 102 | 2649 | 103 |
| ROG 261 | | | | | 2116 | 100 | 2368 | 103 | | | | | | | | | | | | | 2242 | 102 |
| USPT-73 | | | | | | | 2217 | 97 | 2418 | 95 | 3230 | 106 | 2825 | 109 | 2374 | 102 | | | | | 2613 | 102 |
| UI 196 | 1397 | 101 | | | | | | | | | | | | | | | | | | | 1397 | 101 |
| ROG 117 | | | | | 2137 | 101 | | | | | | | | | | | | | | | 2137 | 101 |
| Frontier | | | | | | | | | 2542 | 100 | | | | | | | | | | | 2542 | 100 |
| ROG 214 | | | | | | | 2259 | 99 | | | | | | | | | | | | | 2259 | 99 |
| Vision | | | | | 1624 | 77 | 2421 | 106 | 2604 | 102 | | | 2790 | 107 | | | | | | | 2360 | 98 |
| NW-410 | 1349 | 97 | | | | | | | | | | | | | | | | | | | 1349 | 97 |
| Othello | 1420 | 102 | | | 2158 | 102 | | | 2265 | 89 | 3044 | 100 | | | | | | | 1936 | 91 | 2165 | 97 |
| Olathe | 1318 | 95 | 2174 | 99 | | | | | | | | | | | | | | | | | 1746 | 97 |
| Elizabeth | | | | | 2367 | 112 | 2281 | 100 | 2178 | 86 | 2780 | 92 | | | | | | | | | 2402 | 97 |
| Apache | | | | | 2107 | 100 | 2166 | 95 | | | | | | | | | | | | | 2137 | 97 |
| Maverick | | | 2021 | 92 | 1911 | 90 | 2434 | 106 | | | | | | | | | | | | | 2122 | 96 |
| Burke | | | 2329 | 106 | 2113 | 100 | 2066 | 90 | 2464 | 97 | 2713 | 89 | 2426 | 93 | | | | | | | 2352 | 96 |
| Grand Mesa | | | | | | | | | 2631 | 103 | 2902 | 96 | 2458 | 95 | 2329 | 100 | 2283 | 88 | 1865 | 87 | 2411 | 95 |
| Buckskin | | | | | 2008 | 95 | | | 2475 | 97 | 2769 | 91 | | | 2184 | 93 | 2382 | 92 | 2090 | 98 | 2318 | 94 |
| Kodiak | | | | | | | 2066 | 90 | 2542 | 100 | 2749 | 91 | | | | | | | | | 2452 | 94 |
| UI-126 | 1294 | 93 | | | | | | | | | | | | | | | | | | | 1294 | 93 |
| Rally | | | | | | | | | | | | | 2312 | 89 | 2134 | 91 | | | 1935 | 91 | 2127 | 90 |
| Hatton | | | 1930 | 88 | | | | | | | | | | | | | | | | | 1930 | 88 |
| UI 320 | | | | | | | 2000 | 87 | | | | | | | | | | | | | 2000 | 87 |
| ROG 299 | | | | | 1808 | 86 | | | | | | | | | | | | | | | 1808 | 86 |
| GTS-900 | | | | | 1610 | 76 | | | | | | | 2339 | 90 | | | | | 1989 | 93 | 1979 | 86 |
| UI-114 | 1145 | 82 | | | | | | | | | | | | | | | | | | | 1145 | 82 |
| USPT 74 | | | | | | | | | | | | | | | 1887 | 81 | | | | | 1887 | 81 |
| **Trial Average** | **1390** | | **2196** | | **2114** | | **2291** | | **2547** | | **3036** | | **2599** | | **2337** | | **2582** | | **2135** | | **2323** | |

**Table 4. Pinto Bean Variety Performance Trial at Idalia[1] in 2004.**

| Variety | Yield | Moisture | Test Weight | Seed/lb |
|---|---|---|---|---|
| | lb/ac | % | lb/bu | No. |
| Bill Z | 3015 | 16.2 | 62.2 | 1115 |
| Montrose | 2917 | 16.2 | 63.0 | 1108 |
| Poncho | 2840 | 18.6 | 63.1 | 1029 |
| CO12786 | 2536 | 19.2 | 63.3 | 1170 |
| CO96753 | 2527 | 29.4 | 60.3 | 1066 |
| CO83783 | 2493 | 21.0 | 61.9 | 1087 |
| Pro Vita 00191 | 2381 | 18.0 | 62.8 | 1168 |
| Buster | 2328 | 20.6 | 62.1 | 1141 |
| GTS-900 | 2321 | 22.0 | 62.5 | 1128 |
| Pro Vita 99230 | 2288 | 20.3 | 62.6 | 1077 |
| Othello | 2249 | 18.0 | 62.5 | 1118 |
| Pro Vita 02225 | 2189 | 23.4 | 62.6 | 1102 |
| Buckskin | 2131 | 15.9 | 62.5 | 1097 |
| Rally | 2126 | 23.5 | 62.5 | 1096 |
| Grand Mesa | 2055 | 16.3 | 62.1 | 1223 |
| CO96731 | 2053 | 20.6 | 62.1 | 1102 |
| CO12531 | 1996 | 19.2 | 62.2 | 1123 |
| Pro Vita 99232 | 1982 | 18.6 | 62.6 | 1160 |
| CO12613 | 1592 | 17.7 | 61.8 | 1141 |
| Average | 2317 | 19.7 | 62.4 | 1118 |
| $LSD_{(0.30)}$ | 132 | | | |

[1]Trial conducted on the Dennis Towns farm; seeded 5/26 and harvested 9/18.

**Table 5. Pinto Bean Variety Performance Trial at Montrose[1] in 2004.**

| Variety | Yield | Seed/lb |
|---|---|---|
| | lb/ac | No. |
| CO12786 | 2218 | 1398 |
| Pro Vita 00191 | 2058 | 1506 |
| Poncho | 2032 | 1351 |
| Montrose | 2022 | 1404 |
| Rally | 1991 | 1297 |
| CO96753 | 1953 | 1419 |
| GTS-900 | 1926 | 1400 |
| Pro Vita 99232 | 1924 | 1272 |
| Buckskin | 1891 | 1377 |
| CO96731 | 1888 | 1382 |
| CO83783 | 1786 | 1338 |
| Buster | 1772 | 1296 |
| Bill Z | 1628 | 1470 |
| Pro Vita 99230 | 1390 | 1292 |
| CO12531 | 1349 | 1462 |
| Grand Mesa | 1292 | 1527 |
| Othello | 1238 | 1442 |
| Pro Vita 02225 | 819 | 1423 |
| CO12613 | 603 | 1402 |
| Average | 1673 | 1393 |
| $LSD_{(0.30)}$ | 153 | |

[1]Trial conducted on the Keith Catlin farm; seeded 6/4 and harvested 9/28.

**Table 6. Pinto Bean Variety Performance Trial at Proctor[1] in 2004.**

| Variety | Yield | Moisture | Test Weight | Seed/lb |
|---|---|---|---|---|
| | lb/ac | % | lb/bu | No. |
| Montrose | 2912 | 15.7 | 60.7 | 1262 |
| CO12786 | 2695 | 18.6 | 61.4 | 1239 |
| Buster | 2586 | 20.1 | 60.3 | 1130 |
| Othello | 2465 | 16.8 | 61.4 | 1215 |
| Pro Vita 99230 | 2395 | 20.7 | 60.5 | 1174 |
| Poncho | 2394 | 16.7 | 61.5 | 1228 |
| Grand Mesa | 2387 | 18.8 | 60.5 | 1403 |
| Pro Vita 02225 | 2325 | 20.6 | 62.5 | 1120 |
| CO96753 | 2324 | 32.8 | 57.5 | 1129 |
| Bill Z | 2309 | 16.5 | 60.9 | 1351 |
| Buckskin | 2275 | 14.9 | 60.6 | 1198 |
| CO83783 | 2255 | 22.1 | 60.4 | 1176 |
| CO96731 | 2112 | 22.0 | 60.6 | 1170 |
| Pro Vita 00191 | 2108 | 17.7 | 61.1 | 1252 |
| CO12531 | 1891 | 19.1 | 60.3 | 1327 |
| Pro Vita 99232 | 1868 | 20.7 | 61.7 | 1238 |
| Rally | 1826 | 24.5 | 61.1 | 1127 |
| CO12613 | 1793 | 16.3 | 60.3 | 1229 |
| GTS-900 | 1720 | 24.8 | 60.0 | 1153 |
| Average | 2244 | 20.0 | 60.7 | 1217 |
| $LSD_{(0.30)}$ | 213 | | | |

[1]Trial conducted on the Bob Duncan farm; seeded 6/7 and harvested 9/24.

**Table 7. Pinto Bean Variety Performance Trial at Yellow Jacket[1] in 2004.**

| Variety | Yield | Seed/lb | Maturity[2] |
|---|---|---|---|
| | lb/ac | No. | |
| Poncho | 2040 | 1028 | L |
| Buckskin | 1960 | 1018 | L |
| Montrose | 1731 | 1219 | L |
| Buster | 1529 | 1070 | L |
| Pro Vita 00191 | 1516 | 1337 | L |
| CO12786 | 1463 | 1372 | L+ |
| CO96731 | 1426 | 1163 | L+ |
| Pro Vita 99230 | 1404 | 1144 | L+ |
| Pro Vita 02225 | 1331 | 1031 | VL |
| CO96753 | 1303 | 1178 | L+ |
| CO83783 | 1301 | 1096 | VL |
| Bill Z | 1288 | 1132 | M+ |
| Rally | 1250 | 1126 | L+ |
| Pro Vita 99232 | 1237 | 1044 | L |
| Othello | 1222 | 1109 | M |
| Grand Mesa | 1171 | 1271 | L |
| CO12531 | 1052 | 1195 | M+ |
| CO12613 | 935 | 1122 | L+ |
| GTS-900 | 845 | 1113 | VL |
| Average | 1368 | 1146 | |
| $LSD_{(0.05)}$ | 260 | | |

[1]Trial conducted at the Southwestern Colorado Research Center; seeded 6/10 and harvested 11/16.
[2]M =medium; L = late; VL = very late

Comments:

The trial was planted on spring moldboard plowed alfalfa ground. The field was pre-irrigated to minimize clods and provide moisture for germination. Slow growth characterized the trial in spite of the pre-irrigation and subsequent irrigations. The trial was damaged by hail on July 23 which resulted in leaf loss and a subsequent delay in maturity of the beans. Row cultivation was delayed until August 1 to allow the beans to put on additional leaves. A cooler than normal summer may have also delayed the maturity of the beans.

A second hail storm on Sept. 4 bruised the pods but did not result in shattering of the beans. The fall season was characterized by very wet weather which delayed harvest until Nov. 16. Bean quality was damaged by the hail and the wet weather.

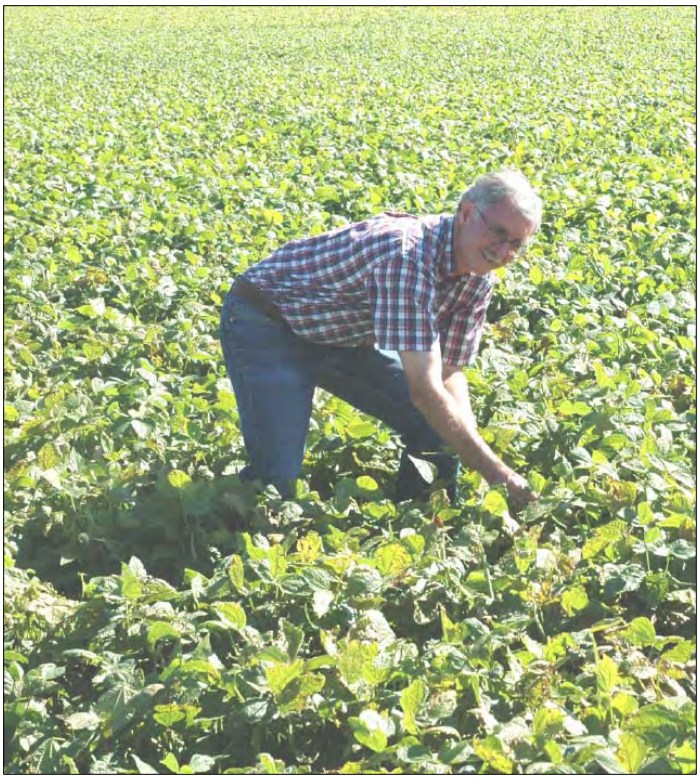
## 2004 Dry Bean Disease Observations – CSU Variety Trials in Eastern Colorado

*Notes taken by Drs. H. F. Schwartz & M. A. Brick*

| **ENTRY** | *PROCTOR 09/01/04)* | *IDALIA (09/01/04)* |
|---|---|---|
| CO 96753 | Trace CBB | Trace CBB |
| Rally | No CBB | Moderate CBB, Trace BBS |
| Grand Mesa | Trace CBB & FW | Trace CBB |
| Montrose | Trace CBB | Trace CBB |
| Pro Vita 00191 | Trace CBB | Trace CBB & BBS |
| GTS 900 | Light CBB | Moderate CBB |
| CO 12531 | Trace CBB | Moderate CBB |
| Bill Z | Light CBB | Trace CBB |
| CO 96731 | Trace CBB | Moderate CBB, Trace BBS |
| Buster | Trace CBB | Light CBB |
| Pro Vita 02225 | Light CBB | Trace CBB |
| Pro Vita 99230 | Moderate CBB | Moderate CBB |
| Othello | Severe CBB | Light CBB, Trace BBS |
| CO 12786 | Severe CBB | Light CBB |
| CO 12613 | Trace CBB | Light CBB, Trace FW |
| Buckskin | Trace CBB | Trace CBB |
| Poncho | Trace CBB | Trace CBB, Trace BBS |
| CO 83783 | Trace CBB | Trace CBB, Moderate BBS |
| Pro Vita 99232 | Moderate CBB | Light CBB, Light BBS |

Disease Notes: the following diseases were present in the variety plots at that location, and were indicative of a susceptible-type reaction. Absence of a note could indicate an escape, not necessarily a resistant reaction. There was no rust or white mold infection at either test plot.

CBB = Common Bacterial Blight, FW = Fusarium Wilt, BBS = Bacterial Brown Spot



## *Special Market Class Varietal Descriptions*:

**Beryl** A great northern variety released by Novartis Seed Co. in 1984. It has Type III vine growth habit and resistance to bean common mosaic virus.

**CELRK** A light red kidney bean released in 1989 with resistance to bean common mosaic virus, rust and some root pathogens. It is a bush Type I variety with medium season maturity (93-95 d).

**CO11094** A black seeded experimental line from Colorado State University.

**CO11096** A black seeded experimental line from Colorado State University.

**CO11113** A black seeded experimental line from Colorado State University.

**CO11116** A black seeded experimental line from Colorado State University.

**CO27864** A black seeded experimental line from Colorado State University.

**GTS-1102** A full season black variety from Gen-Tec Seeds, Limited.

**Midnight** A variety of black bean released from Cornell University in 1980. It has excellent seed type for opaque black beans. It is an upright Type II variety that is long season (99 or > d) with resistance to bean common mosaic virus.

**Myasi** A yellow bean variety released by Archer-Daniels-Midland Co. It is a bush Type I variety with medium season maturity (95 d). It is susceptible to endemic races of common bacterial blight and bean common mosaic virus.

**Sacramento** The standard for seed quality of light red kidney variety. It was released from Sacramento Valley Milling in 1976. It has resistance to rust and some root rot pathogens. It is a bush Type I variety with medium season maturity (90 d).

**Shiny Crow** A shiny black seeded line from Colorado State University released in 1998. It has a prostrate Type III growth habit, and is susceptible to white mold. It is resistant to bean common mosaic virus. It was released as a specialty bean specifically for the dry-pack shiny black bean market. It should not be grown for the commercial opaque or dull seed black bean market or mixed with opaque black beans.

**Weihing** A great northern variety released by the University of Nebraska in 1998. It has upright Type II growth habit and resistance to rust and common bacterial blight. Seed quality is excellent and has full season maturity (97-99 d) in Colorado.

**Table 8. Black Bean Variety Performance Trial at Fort Collins[1] in 2004.**

| Variety | Yield | Seed/lb |
|---|---|---|
| | lb/ac | No. |
| Midnight | 2476 | 2768 |
| CO27864 | 2466 | 2558 |
| GTS-1102 | 2358 | 2674 |
| CO11096 | 2178 | 2088 |
| CO11116 | 1831 | 2474 |
| Shiny Crow | 1796 | 2346 |
| CO11113 | 1761 | 2562 |
| CO11094 | 1500 | 2149 |
| Average | 2046 | 2452 |
| $LSD_{(0.30)}$ | 149 | |

[1]Trial conducted at the Agricultural Research, Development and Educational Center; seeded 6/4 and harvested 11/4.

**Table 9. Light Red Kidney Bean Variety Performance Trial at Fort Collins[1] in 2004.**

| Variety | Yield | Seed/lb |
|---|---|---|
| | lb/ac | No. |
| CO28855 | 1838 | 893 |
| CO28851 | 1780 | 944 |
| CO28850 | 1488 | 907 |
| Sacramento | 1421 | 855 |
| CELRK | 1410 | 819 |
| Average | 1587 | 884 |
| $LSD_{(0.30)}$ | 117 | |

[1]Trial conducted at the Agricultural Research, Development and Educational Center; seeded 6/4 and harvested 11/4.

**Table 10. Great Northern Variety Performance Trial at Fort Collins[1] in 2004.**

| Variety | Yield | Seed/lb |
|---|---|---|
| | lb/ac | No. |
| CO26885 | 3188 | 1428 |
| CO26716 | 2599 | 1390 |
| Beryl | 2459 | 1624 |
| Weihing | 2018 | 1353 |
| Average | 2566 | 1448 |
| $LSD_{(0.30)}$ | 150 | |

[1]Trial conducted at the Agricultural Research, Development and Educational Center; seeded 6/4 and harvested 11/4.

**Table 11. Yellow Bean Variety Performance at Fort Collins[1] in 2004.**

| Variety | Yield | Seed/lb |
|---|---|---|
| | lb/ac | No. |
| Myasi-Mayacoba | 2177 | 1288 |

[1]Conducted at the Agricultural Research, Development and Educational Center; seeded 6/4 and harvested 11/4.

## *From Howard's Desk, Bean Disease IPM Strategies for 2005:*

1. Rotate out of dry beans for at least 2 years.
2. Eliminate bean debris and sources of volunteer beans during the fall of 2004 and spring of 2005.
3. Plant high quality, certified, treated seed of disease resistant varieties, if available and suitable for your market needs.
4. Follow recommended production practices to avoid stress from extremes of moisture, temperature, and soil compaction.
5. Manage water and fertilizer inputs to provide adequate, but not excess components for the crop need to avoid excess canopy development.
6. Carefully scout fields to detect foliar infection as early as possible, get confirmation of disease diagnosis from appropriate experts.
7. Monitor reports on weather patterns, disease forecasts, and confirmed sightings in your region via the CSU VegNet.
8. When infection is confirmed in or near your field, implement a timely program of fungicides and bactericides with protectant and systemic modes of action. Rotate appropriate fungicide chemistry, apply labeled rates, and stay within recommended spray and harvest intervals.
9. Adjust combine at harvest to maximize seed quality, and reduce loss of seed which can germinate next spring to produce volunteer plants.
10. Thoroughly incorporate each season's crop debris + pathogens to reduce carryover and potential disease pressure the following season. Rely upon cultivation and herbicide in next year's rotation crop to reduce volunteer bean emergence and possible infection by pathogens which can then be spread to next year's host crop of beans.

## *CoAgMet Weather Data Summary, 2002-04*

*Howard F. Schwartz and Mark S. McMillan*

| | | TOTAL RAINFALL (IN) | | | | | AVERAGE HIGH TEMPERATURE (F) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | JUN | JUL | AUG | SEP | JUN – SEP TOTAL | JUN | JUL | AUG | SEP | JUN – SEP AVERAGE |
| **NORTHEAST** | | | | | | | | | | | |
| **Ault** | **2002** | 1.14 | 1.94 | 0.31 | 0.45 | 3.84 | 87.4 | 90.3 | 85.0 | 76.2 | 84.7 |
| | **2003** | 1.31 | 0.04 | 2.09 | 0.24 | 3.68 | 77.0 | 90.4 | 89.3 | 77.0 | 83.4 |
| | **2004** | 1.76 | 0.70 | 1.84 | 0.99 | 5.29 | 75.7 | 84.9 | 82.0 | 76.8 | 78.9 |
| **Burlington** | **2002** | 1.69 | 0.11 | 1.48 | 0.21 | 3.49 | 91.2 | 92.6 | 87.5 | 78.2 | 87.3 |
| | **2003** | 6.17 | 0.37 | 0.89 | 0.64 | 8.07 | 77.8 | 93.9 | 92.8 | 80.5 | 86.3 |
| | **2004** | 1.46 | 2.87 | 2.19 | 2.49 | 9.01 | 80.1 | 85.4 | 83.4 | 82.3 | 82.8 |
| **Fort Morgan** | **2002** | 0.91 | 0.35 | 1.52 | 0.56 | 3.34 | 90.0 | 92.4 | 88.8 | 78.5 | 87.4 |
| | **2003** | 1.28 | 2.48 | 0.67 | 0.06 | 4.49 | 80.7 | 93.6 | 91.0 | 81.2 | 86.6 |
| | **2004** | 2.61 | 0.37 | 1.22 | 0.48 | 4.68 | 78.4 | 87.2 | 84.2 | 81.1 | 82.7 |
| **Kersey** | **2002** | 0.73 | 0.32 | 1.02 | 0.72 | 2.79 | 89.7 | 93.0 | 87.1 | 78.3 | 87.0 |
| | **2003** | 0.99 | 1.59 | 1.01 | 0.38 | 3.97 | 79.2 | 93.2 | 91.3 | 79.8 | 85.9 |
| | **2004** | 1.91 | 0.64 | 0.81 | 0.98 | 4.34 | 78.1 | 86.8 | 84.0 | 80.0 | 82.2 |
| **Peckham** | **2002** | 0.66 | 1.30 | 0.45 | 0.79 | 3.20 | 91.2 | 92.2 | 87.8 | 79.0 | 87.6 |
| | **2003** | 1.23 | 0.16 | 2.22 | 0.29 | 3.90 | 80.1 | 94.1 | 93.9 | 80.0 | 87.0 |
| | **2004** | 1.78 | 0.48 | 1.82 | 1.20 | 5.28 | 78.7 | 90.6 | 88.3i | 83.4i | 85.3 |
| **Wray** | **2002** | 1.10 | 0.70 | 3.11 | 0.84 | 5.75 | 89.8 | 92.0 | 85.2 | 77.3 | 86.1 |
| | **2003** | 1.32 | 2.05 | 2.27 | 0.49 | 6.13 | 79.7 | 92.9 | 92.0 | 81.4 | 86.5 |
| | **2004** | 2.74 | 3.63 | 1.82 | 1.88 | 10.07 | 79.4 | 84.3 | 83.7 | 81.8 | 82.3 |
| **Yuma** | **2002** | 1.55 | 0.48 | 4.58 | 1.19 | 7.80 | 87.6 | 89.7 | 83.1 | 76.2 | 84.1 |
| | **2003** | 2.39 | 1.19 | 0.67 | 0.19 | 4.44 | 77.9 | 89.9 | 88.3 | 78.7 | 83.7 |
| | **2004** | 2.53 | 4.58 | 1.99 | 2.33 | 11.43 | 78.0 | 83.6 | 80.9 | 78.9 | 80.4 |
| **WEST SLOPE** | | | | | | | | | | | |
| **Delta** | **2002** | 0.00 | 0.60 | 0.54 | 3.02 | 4.16 | 92.7 | 92.3 | 88.0 | 76.4 | 87.3 |
| | **2003** | 0.19 | 0.00 | 0.23 | 1.63 | 2.05 | 87.4 | 96.5 | 93.2 | 81.0 | 89.5 |
| | **2004** | 0.00 | 0.21 | 0.05 | 1.58 | 1.84 | 87.1 | 91.5 | 87.6 | 77.7 | 86.0 |
| **Dove Creek** | **2002** | 0.01 | 0.82 | 0.29 | 2.03 | 3.15 | 87.0 | 88.7 | 84.8 | 72.9 | 83.3 |
| | **2003** | 0.20 | 0.21 | 0.57 | 2.07 | 3.05 | 82.1 | 90.7 | 86.2 | 75.4 | 83.6 |
| | **2004** | 0.38 | 0.37 | 0.92 | 2.66 | 4.33 | 81.3 | 80.0i | 82.4 | 71.9 | 78.9 |
| **Grand Junction** | **2002** | 0.04 | 0.14 | 1.63 | 1.62 | 3.43 | 91.5 | 94.8 | 89.4 | 77.4 | 88.3 |
| | **2003** | 0.22 | 0.12 | 1.19 | 1.38 | 2.91 | 87.0 | 99.0 | 95.9 | 83.6 | 91.4 |
| | **2004** | 0.04 | 0.09 | 0.87 | 1.49 | 2.49 | 87.0 | 93.9 | 89.4 | 78.4 | 87.2 |

* i – incomplete

## *The Current Status of Dry Bean Weed Management*

*Dr. Scott Nissen*

It is probably no surprise to most producers that Roundup Ready technology has had a significant impact on the development and introduction of new herbicides into the market place. The standard procedure was to develop herbicides for the corn, rice, wheat and soybean markets first, and then companies would expand those products into other crops like dry beans. Since the development of new products for the major markets has essentially dried up, there is very little potential for new herbicides to be available for dry bean producers.

Herbicides that have crop safety in dry beans, but are not labeled through conventional means, can still make it to the market place through several other routes. First a residue tolerance must be established for dry beans, which means establishing what the maximum allowable pesticide residue is for that commodity at harvest. Once a tolerance has been established, the state can work with the EPA to label the herbicide as a Section 18 Emergency or Crisis Exemption or a Special Local Need 24c label. Colorado received a Section 18 label for the herbicide **Reflex®** (fomesafen, Syngenta) in dry beans for the 2004 growing season. Reflex has had a similar label in Nebraska for several years mainly for the purpose of controlling herbicide-resistant waterhemp (*Amaranthus rudis*). A high percentage of common waterhemp populations in Nebraska and Kansas are resistant to herbicides like Pursuit and Raptor. Since weeds are spread so easily, herbicide resistant water hemp is starting to appear in eastern Colorado.

Very few producers took advantage of this new product according to the Colorado Department of Agriculture. Because this is a Section 18 Exemption, growers are required to contact the CDA for a permit number and special labeling prior to making a Reflex application. Is this lack of interest in Reflex due to a lack of herbicide-resistant common waterhemp in eastern Colorado or is it due to the fact that growers were not made aware of this new technology?

The purpose of this article is to provide producers with some basic information about Reflex that will allow them to make informed decisions about the advantages and disadvantages of using this product. First, producers should have some reason to suspect that they are having a problem with herbicide-resistant common waterhemp. Since common waterhemp can also be resistant to atrazine, it is possible that weed populations could be increasing in other parts of the crop rotation. Common waterhemp can be confused with pigweed so it is important to make sure you identify the plant correctly. A guide to identifying common waterhemp and other related species can be found online at www.oznet.ksu.edu/library/crpsl2/s80.pdf. If producers have been using post-emergence herbicides such as Raptor or Pursuit and still have significant populations of large common waterhemp plants at the end of the field season, this could be a good indication that there is a resistance problem.

The spectrum of weeds controlled by Reflex is not as broad as with Raptor. Reflex controls weeds by a different mechanism (a different mode of action) and will control weeds that are resistant to Raptor or Pursuit. The primary weed species that would be controlled with Reflex, that is not controlled by Raptor, is common water hemp (Table 1). Therefore, Reflex would not be used as the primary broadleaf herbicide, but must be tank mixed with other herbicides to broaden the weed control spectrum. One advantage to Raptor is that it has significant grass activity and will control barnyardgrass, fall panicum, crabgrass and green foxtail.

Table 1. Comparison of control with Raptor and Reflex for several important broadleaf weeds in dry beans.

| Herbicide | Kochia* | Velvetleaf | Nightshade | Lambsquarters | Pigweed | Waterhemp |
|---|---|---|---|---|---|---|
| Raptor | E | E | E | G | E | nc |
| Reflex | nc | F | E | nc | E | E |

*control of nonherbicide resistant kochia only
E=excellent control, greater than 90%
G=good control, between 80-89%
F=fair control, between 70-79%
nc=no control

Rotational restrictions are another difficult issue when planning weed management strategies in a diverse cropping system. Pursuit is an excellent broadleaf herbicide for dry beans, but the restrictions for replanting to sugar beet and a number of other crops limits its use primarily to corn/dry bean rotations. Raptor has significantly shorter replant restrictions to sugar beets and potatoes, but these crops are still restricted to 18-26 and 9 months, respectively, following application. Reflex also has the potential of injury to rotational crops. In many cases, Raptor and Reflex have similar "plant back" restrictions.

Table 2. Number of months required between application of Raptor or Reflex and planting to these rotational crops.

| Herbicide | Corn* | Wheat** | Proso | Potato | Canola | Beets | Sunflower | Alfalfa |
|---|---|---|---|---|---|---|---|---|
| Raptor | 8.5 | 3 | 18 | 9 | 18 | 18-26 | 9 | 9 |
| Reflex | 10 | 4 | 18 | 18 | 18 | 18 | 18 | 18 |

*includes field, pop and sweet corn
**includes winter and spring wheat

Reflex has been evaluated for weed control and crop safety at CSU, and has preformed well realizing that the weed spectrum is somewhat limited. Tank mixes with Select, Raptor, and Basagran have been compared and as expected tank mixes with a grass-only herbicide like Select did not result in optimum weed control, while tank mixes with Raptor and Basagran provided excellent weed control throughout the growing season. The major issue with Reflex appears to be rate relative to performance and pricing. In Nebraska, many growers were reluctant to use 16 oz of product and only used 12 oz to save money; however, herbicide performance suffered at the lower application rate. If the problem is sufficient to consider using Reflex then it appears that the 16 oz rate is necessary.

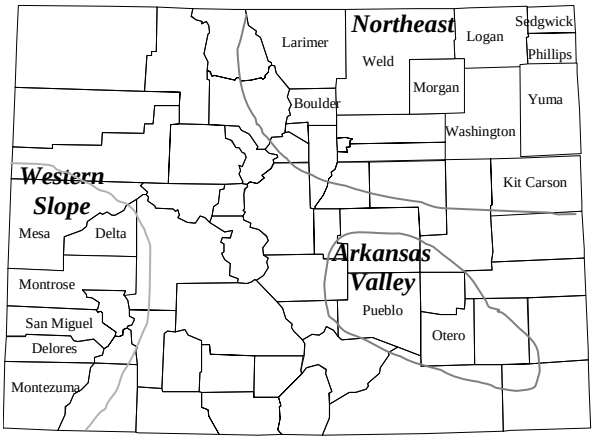
Reflex provides growers with a technology to manage herbicide-resistant common waterhemp. Since weeds do not recognize state boundaries, it is only a matter of time before common waterhemp becomes a significant problem in eastern Colorado. With support from the CDBAC, the search will continue for new weed management options for Colorado dry bean producers.

## *Potential Risk of Bean Diseases in Colorado by Geographical Region*

*Dr. Howard F. Schwartz*

| Region/County | Rust | Bacterial* Disease | White Mold |
|---|---|---|---|
| *Northeast* | | | |
| 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 |
| *Arkansas Valley* | | | |
| Pueblo | Moderate | Low | Low |
| Otero | Moderate | Low | Low |
| *Western Slope* | | | |
| 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 |

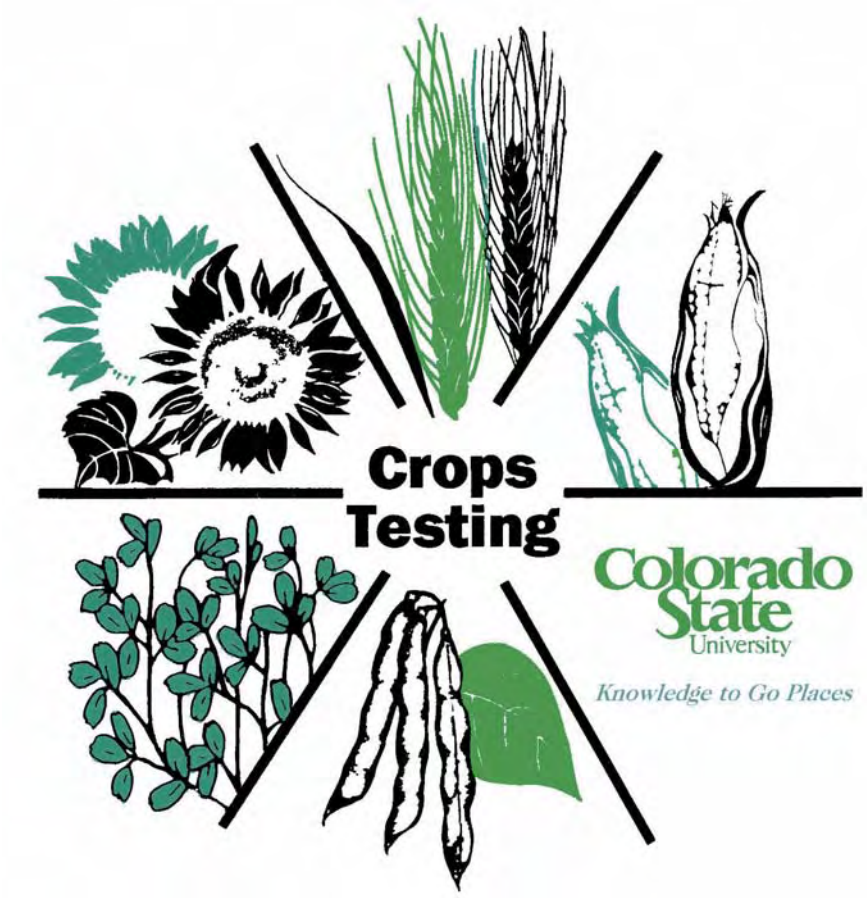
*Complex of Halo Blight, Bacterial Brown Spot, &/or Common Bacterial Blight.

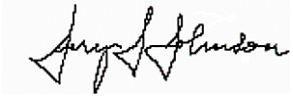



**http: //www.csuag.com**

## *Entry Forms for 2005 Trials*

Entry forms for 2005 trials may be obtained from the Department of Soil and Crop Sciences, Colorado State University, Cynthia Johnson, C03 Plant Science Building, Fort Collins, CO 80523-1170; telephone (970) 491-1914; fax (970) 491-2758; e-mail cynthia.johnson@colostate.edu or web site *http://www.csucrops.com*.



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Colorado State University Cooperative Extension

*Putting Knowledge to Work*

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