

Pinto Bean Variety Trial

Lawrence M. Sullivan and Gary Cramer, Extension Agricultural Agents, Cochise County;  
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Ron Berens, Wickes Agriculture Cooperator Kansas Settlement, Cochise County

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Elevation: 4100 feet

Crop History:

Planted: June 23, 1981 into preirrigated soil.  
Seeding Rate: 76 lbs/acre  
Weed Control: 1½ pts. treflan applied prior to planting and a hand weeding in late July.

Disease Control: Applications of copper hydroxide were made on July 20 and August 20 for control of common bean blight.

Harvested: Cut 9/19/81, windrowed 9/22/81, and combined 9/26/81.

| Fertilizer: | Source  | Lbs/A | Time of Application | Lbs N/A | Lbs P <sub>2</sub> O <sub>5</sub> /A |
|-------------|---------|-------|---------------------|---------|--------------------------------------|
|             | 16-20-0 | 300   | Prior to Planting   | 48      | 60                                   |
|             |         |       | Total               | 48      | 60                                   |

Irrigation: The plot received, including the preplant, 4 irrigations of well water. An additional 5 inches occurred as rainfall for an estimated total of 29 acre inches/acre.

Plot size: 15 X 788 feet.

| Variety  | Yield (lbs/plot) <sup>1/</sup> |       |       | Ave. Yield (lbs) | Dockage (%) | Yield <sup>2/</sup> (lbs/acre) |
|----------|--------------------------------|-------|-------|------------------|-------------|--------------------------------|
|          | Rep 1                          | Rep 2 | Rep 3 |                  |             |                                |
| NW 410   | 544                            | 405   | 497   | 482              | 9.2         | 1777 a                         |
| Luna     | 521                            | 428   | 415   | 455              | 10.8        | 1678 a                         |
| UI 111   | 472                            | 497   | 376   | 448              | 8.5         | 1654 a                         |
| Olathe   | 538                            | 411   | 364   | 438              | 7.3         | 1615 a                         |
| UI 114   | 559                            | 377   | 376   | 437              | 7.2         | 1613 a                         |
| Wyo. 166 | 560                            | 327   | 399   | 428              | 8.3         | 1582 a                         |
| NW 590   | 406                            | 305   | 471   | 394              | 11.4        | 1453 a                         |
| Columbia | 322                            | 335   | 482   | 380              | 7.8         | 1400 a                         |

<sup>1/</sup>All yields have been adjusted to a 12% moisture content.

<sup>2/</sup>Yields followed by the same letter are not significantly different at the .05 level by the Student-Newman-Keuls' Test.

Dry Bean Variety Test

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Assistant Extension Specialist--Field Testing

Phelps Dodge Farm, Cooperator

Hereford, Arizona

Elevation: 4200 feet

Crop History:

Planted: June 25, 1981  
Seeding Rate: 70 lbs of inoculated bean seed per acre  
Previous Crop: Fallow  
Herbicides: None  
Insecticides: One application of Sevin was made for bean beetles on Aug. 5, 1981.  
Fertilization: 25 units of N from Nitro-Sol were applied in irrigation water on Aug. 11.  
Irrigation: Four irrigations of four inches each were applied in addition to about eight inches of rainfall.

Plot Size: 3' x 11'

| Entry        | Type | Yield (grams/plot) |        |         |        | Ave. Yield<br>(grams) | Yield <sup>1/</sup><br>(lbs/A) |
|--------------|------|--------------------|--------|---------|--------|-----------------------|--------------------------------|
|              |      | Rep I              | Rep II | Rep III | Rep IV |                       |                                |
| Ca #5        | C.P. | 1092               | 872    | 874     | 1097   | 984                   | 2861 a                         |
| Co1. 3385    | P.   | 1176               | 925    | 852     | 711    | 916                   | 2663 ab                        |
| Columbia     | P.   | 708                | 707    | 531     | 891    | 709                   | 2061 abc                       |
| Olathe       | P.   | 590                | 915    | 637     | 588    | 683                   | 1986 abcd                      |
| 77213        | P.   | 739                | 699    | -       | 607    | 682                   | 1983 abcd                      |
| Chief        | S.W. | 672                | 407    | 865     | 779    | 681                   | 1980 abcd                      |
| U.I. 114     | P.   | 604                | 747    | 712     | 588    | 663                   | 1928 abcd                      |
| KO 334       | P.   | 859                | 618    | 593     | 552    | 656                   | 1907 abcd                      |
| Ouray        | P.   | 535                | 651    | -       | 777    | 654                   | 1901 abcd                      |
| GR 364       | P.   | 678                | 700    | 608     | 587    | 643                   | 1870 bcd                       |
| ISB 730      | S.W. | 566                | 529    | 640     | 619    | 589                   | 1713 bcd                       |
| AZ-1         | Mung | 509                | 730    | 495     | 551    | 571                   | 1660 bcd                       |
| Wyoming 166  | P.   | 481                | 742    | 573     | 458    | 564                   | 1640 bcd                       |
| Fiesta       | P.   | 556                | 407    | 754     | 448    | 541                   | 1573 cd                        |
| Brown Tepary |      | 709                | 500    | 546     | 358    | 528                   | 1535 cd                        |
| KP 97        | P.   | 633                | 651    | 398     | 429    | 528                   | 1535 cd                        |
| GR 410       | P.   | 360                | 482    | 608     | 582    | 508                   | 1477 cd                        |
| Gala         | P.   | 708                | 374    | 422     | 422    | 481                   | 1399 cd                        |
| 77133        | P.   | 378                | 472    | 496     | 356    | 426                   | 1239 cd                        |
| GR 113       | P.   | 62                 | 513    | 313     | 465    | 338                   | 983 d                          |

<sup>1/</sup>Yields followed by the same letter are not significantly different at the .05 level by the Student-Newman-Keuls' Test.

#### VARIATION IN PHYSIOLOGICAL CHARACTERISTICS OF ALFALFA

Cathy A. Sivilli, A. K. Dobrenz and Wally Hofmann

##### Summary

An F<sub>2</sub> low photorespiration experimental alfalfa is being used to measure the range in photosynthesis, dark respiration and photorespiration. A ten fold difference was found in the rate of carbon dioxide uptake (photosynthesis) among plants within the same variety of alfalfa. This wide range in physiological processes will permit the development of alfalfa varieties that have the ability to incorporate more total CO<sub>2</sub> which we hope will improve yield.

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Although researchers have determined the intricate biochemical pathways of many physiological process which are involved with plant growth and development, little is known about the heritability or possible potential for improving yield by selecting plants which display superior physiological attributes. We have initiated a project in the Plant Science Department which is aimed at finding individual plants within currently adapted varieties that have higher carbon dioxide uptake (photosynthesis) and lower dark and photorespiration rates.

One hundred individual plants from "Ariz. Low Photorespiration Cycle<sub>2</sub>" alfalfa were used to measure photosynthesis, dark respiration and photorespiration. Plants were seeded at 20 kg/ha in October of 1981 and the physiological characteristics were evaluated during the 2nd re-growth of 1982.

There is a wide range in the rates of photosynthesis, dark respiration and photorespiration among 100 plants of the same alfalfa germplasm (Fig. 1). This wide range in physiological performance suggests that a recurrent selection program aimed at improving yield by selecting alfalfa plants which have desirable physiological attributes may be feasible. The best rate of these physiological characteristics for maximum yield has not yet been determined.

Plants which have the highest photosynthesis and lowest dark and photorespiration rates are being used to develop a new alfalfa. This new alfalfa will be screened again next summer and those plants with superior physiological attributes will be used in our breeding program.