

# Bill Z and Arapaho Pinto Bean Cultivars

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'Bill Z' and 'Arapaho' (*Phaseolus vulgaris* L.) are high-yielding pinto bean cultivars released by Colorado State University. These cultivars are well-adapted for production in Idaho and possess specific disease-resistance traits that make them desirable in other pinto bean production areas.

## Pedigree

**Bill Z** and Arapaho were developed by Colorado State University and the Colorado Agricultural Experiment Station. Bill Z was released in 1987. It was selected from the 1976 cross A56-244-39/'UI 111'//A56-244-8 (3526)///'Gloria'. Gloria is a pink cultivar and 3526 is an F<sub>2</sub> pinto selection from the A56-244/UI 111 cross. The A56-244 selections were provided by Dr. W. J. Zaumeyer. Bill Z was tested in advanced yield trials at Kimberly and Parma, Idaho, in 1994 and 1995 and in the Cooperative Dry Bean Nursery in 1985 and 1986. Bill Z was previously tested under the experimental designation CO 81-13197.

**Arapaho** was released in 1993. It is derived from an F<sub>4</sub> selection from the cross 'UI 114'/MO19/3/1367-1/N203//'Ouray'. UI 114 is a pinto cultivar released by the University of Idaho in 1965. Ouray pinto was released by Colorado State University in 1972. MO19 is a selection of unknown origin introduced from Mexico. N203 is a root rot-resistant line released by Oliver Norvell, Carnegie Institute of Washington, Stanford, California. 1367-1 is an experimental breeding line of unknown parentage in the Colorado State University breeding program. Arapaho was tested in Kimberly and Parma advanced yield trials in 1994 and 1995 and in the Cooperative Dry Bean Nursery in 1984, 1985, and 1991. Arapaho was also tested under the experimental designation CO 80-1744.

## Disease Reaction

**Bill Z** was tested for rust resistance in Colorado, Michigan, North Dakota, Nebraska, and Maryland. Bill Z was

resistant to bean rust (*Uromyces phaseoli* (Reben.) Wint. var. *typica* Arth.) found in Colorado with the exception of race 54. Bill Z was resistant to local rust races in Michigan, susceptible in North Dakota, moderately susceptible to resistant in Nebraska, and very susceptible to highly resistant, with a slow rusting reaction, in Maryland.

Bill Z possesses field tolerance to NL-8 and NY-15 strains of bean common mosaic virus (BCMV).

**Arapaho** possesses field tolerance to white mold (*Sclerotinia sclerotiorum* (Lib.) de Baryl). Arapaho is susceptible to rust strains found in Colorado and the High Plains region. Arapaho was tested in the 1990 USDA Rust Nursery and was segregating as resistant to local races found in Michigan. It was susceptible in Nebraska and very susceptible to rust races found in Maryland.

Arapaho is resistant to Type and NY-15 strains of BCMV and is susceptible to NL-3, NL-5, and Mexican strains in Pathogroups IV, VI, and VII, respectively. Arapaho probably carries the *i, bcu, bc1<sup>2</sup>* combination of recessive genes for BCMV resistance.

## Description

**Bill Z** has an indeterminate growth habit with short vines (Type III). Bill Z has intermediate resistance to lodging. Bill Z plants have dull green leaves and white flowers. Pods are striped and are set throughout the plant.

**Arapaho** has an upright (Type II) growth habit, with medium-long vines. Like other upright pinto cultivars, Arapaho may be prone to lodging because of stem breakage near the soil surface. Arapaho should be planted at populations greater than 72,000 plants per acre to avoid stem breakage and subsequent lodging. Arapaho plants have semi-glossy green leaves and white flowers. Pods are striped at maturity and are set throughout the plant. Arapaho pods usually bear four to five seeds.

Table 1. Maturity and seed size of pinto beans grown at Kimberly and Parma, Idaho.

	Days to maturity	Seed size (seed/lb)						
		Kimberly			Parma			Combined mean
		1995	1994	Mean	1995	1994	Mean	
Arapaho	89	1,263	1,107	1,185	1,289	1,192	1,241	1,213
Bill Z	88	1,322	1,222	1,272	1,440	1,319	1,380	1,326
Othello	83	1,328	1,176	1,252	1,391	1,230	1,311	1,281
UI 114	85	1,230	1,171	1,201	1,286	1,180	1,233	1,217

**Table 2. Seed yields of pinto beans grown at Kimberly and Parma, Idaho.**

	Seed yield (lb/acre)						Combined mean
	Kimberly			Parma			
	1995	1994	Mean	1995	1994	Mean	
Arapaho	2,419	2,930	2,675	3,102	3,141	3,122	2,898
Bill Z	3,829	3,175	3,502	3,619	3,400	3,510	3,506
Othello	3,230	2,963	3,097	3,109	2,575	2,842	2,969
UI 114	3,451	3,175	3,313	3,147	2,878	3,013	3,163

**Table 3. Yield per day of pinto beans grown at Kimberly and Parma, Idaho.**

	Yield per day (lb/acre/day)						Combined mean
	Kimberly			Parma			
	1995	1994	Mean	1995	1994	Mean	
Arapaho	26.1	32.6	29.4	35.7	35.4	35.6	32.5
Bill Z	42.2	36.2	39.2	42.5	39.2	40.9	40.0
Othello	39.0	36.2	37.6	38.7	29.7	34.2	35.9
UI 114	40.5	37.7	39.1	38.1	32.7	35.4	37.3

Note: Yield per day = yield ÷ days to maturity. It measures rate of reproductive growth.

## Performance

Bill Z and Arapaho were tested in advanced yield trials in Kimberly and Parma, Idaho, and in the Cooperative Dry Bean Nursery to determine maturity, seed size, seed yield, and yield efficiency. In Idaho trials, Bill Z matured 88 days after planting, five days later than ‘Othello’ and three days later than ‘UI 114’ (table 1). Arapaho required 89 days to reach maturity in Idaho.

In both Kimberly and Parma trials, Bill Z seed was smaller than that of either Othello or UI 114 (table 1). Arapaho seed was larger than that of Othello or UI 114 grown at Kimberly. At Parma, Arapaho seed was larger than Othello seed and very similar in size to UI 114 seed. Bill Z mean seed size was 1,326 seeds per pound based on combined data from both locations, while Arapaho mean seed size was 1,213 seeds per pound.

Bill Z seed yields at Kimberly and Parma were higher than those of Arapaho, Othello, or UI 114 (table 2). In combined data from both locations, Bill Z yielded 3,506 pounds per acre. Arapaho seed yields at Kimberly were lower than those of either Othello or UI 114. At Parma, Arapaho seed yields were higher than those of Othello and slightly higher than those of UI 114. Combined data from both locations showed that Arapaho yielded 2,898 pounds per acre.

Mean yield per day (yield ÷ maturity) for Bill Z grown at Kimberly was similar to that of UI 114 and higher than that of Othello or Arapaho. At Parma, and in data combined from both locations, Bill Z had a higher mean yield per day than UI 114, Othello, or Arapaho.

Arapaho mean yield per day at Kimberly and in combined data was less than that of UI 114, Othello, or Bill Z. At Parma, Arapaho mean yield per day was very similar to that of UI 114 and higher than that of Othello.

## Summary

Bill Z pinto has high yield potential and is adapted to production in most areas where pinto beans are grown. Arapaho has an upright growth habit, white mold tolerance, and acceptable seed yields. Both cultivars are well-adapted for seed and commercial production in Idaho.

Plant Variety Protection (PVP) with the Title V option is approved for Bill Z and is pending for Arapaho. Under Title V, Bill Z and Arapaho may be sold only as a class of certified seed.

## The Authors

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**Foundation class Bill Z and Arapaho seed are available through the Idaho Foundation Seed Program, Kimberly Research and Extension Center, 3793 N 3600 E, Kimberly, ID 83341.**