

**Seed Yield of Three Pinto Bean Cultivars With Contrasting Growth Habits Grown Under Different Plant Populations, Bed Widths and Row Arrangements.**

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Irrigated dry bean production in the western U.S. and Canada is conducted primarily with single rows planted on beds which are spaced to accommodate the existing farm equipment. These practices are especially true for pinto bean production, since the cultivars which are predominantly available possess Type III (Singh, 1982) growth habit. However, recently new pinto cultivars have become available which have type I, II, and III growth habits. Hence, there is need to reevaluate the effects of plant arrangement on seed yield of the cultivars which have different growth habits. Field research was conducted at Fort Collins and Fruita, Colorado in 1989 and 1990. The objectives of this research were to determine the response of seed yield among three pinto bean cultivars with contrasting growth habits to row arrangement (single vs. double rows on a bed), bed width (narrow and wide), and plant populations (low and high, 175 and 275 K ha<sup>-1</sup> respectively). The wide bed spacing was 0.76 m at both locations, however due to differences in planting equipment the narrow bed widths were 0.56 and 0.61 m at Ft. Collins and Fruita respectively. The Type I, II, and III growth habits were represented by the lines/cultivars 'RB 85232', 'Cinnabar' and 'Bill Z', respectively. The four factors were tested in a split plot design with four replicates at each location. Growing conditions were good at Fruita in both years, and at Fort Collins in 1989. However at Ft. Collins, in 1990 a hail storm severely damaged the plots.

Seed yield was consistently higher when grown under narrow bed width for all three growth habits over both years and locations (Table 1). Pod number, leaf area index (LAI) and light interception of photosynthetically active radiation (PAR) were also higher at the narrow bed widths. Among the yield components evaluated, pod number was most closely associated with seed yield.

Double row arrangement produced higher seed yield than single at Fort Collins in both years. Pod number, LAI and light interception also exhibited similar trends. However, row arrangement did not influence seed yield at Fruita.

Plant populations did not influence seed yield or growth variables at either location in 1989. However, in 1990 at Fort Collins, higher seed yield were obtained at the higher plant population. This response was likely due to the hail damage which killed many plants in the stand. In the analysis of variance, the factor for growth habits did not interact with other factors for seed yield at either Fruita or Fort Collins in 1989. A growth

habit, bed width by row arrangement interaction occurred in 1990 at Fort Collins. However, this interaction was due to change in magnitude among treatment means rather than a change in rank.

These results suggest that the three growth habits responded similarly to planting arrangements and density. In general seed yield was increased by planting on narrow beds with two rows on a bed. Thus pinto bean producers should consider planting either of the three growth habits in narrow beds, but double row arrangement will not consistently increase yield. Plant populations above 175,000 ha<sup>-1</sup> do not appear to increase yield.

Table 1. Mean seed yield of three pinto bean cultivars which differed for growth habit grown under narrow and wide bed spacing, and single and double row arrangement on a bed at Ft. Collins and Fruita CO in 1989 and 1990.

Bed width	Row Arrang.	Fort Collins, 1989			Fort Collins, 1990			Fruita Mean 1989-90		
		I	II	III	I	II	III	I	II	III
Narrow	Single	3004	2512	2828	1214	1263	1860	4048	3741	4562
	Double	3315	2742	3404	1720	1720	2215	3956	3636	4405
Wide	Single	2841	2301	2535	931	1042	1415	3436	3491	4226
	Double	3283	2723	2929	1499	1507	2207	3764	3541	4080
LSD (0.05)*		156	156	156	160	160	160	133	133	133

\* Means within columns separated by less than this value are not significantly different ( $p < 0.05$ ).

#### REFERENCES:

Singh, S. P. 1982. A key for identification of different growth habits of Phaseolus vulgaris L. Ann. Rep. Bean Imp. Coop. 25:92-95.