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RESULTADOS RELACIONADOS CON METODOLOGIAS DE MEJORAMIENTO DEL RENDIMIENTO DEL FRIJOL

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RESUMEN

Experiments were conducted to evaluate the screening honeycomb design of Fasoulas (1973, 1977) as a tool in the evaluation of yield potential in early generations. Table 1 illustrates the failure of the design to improve correlations of yields of spaced plants in the honeycomb with yields of randomized complete blocks with which yields were compared. Yields of individual plants modified as a percent of surrounding hexagon were generally slightly better than yields modified as a percent of surrounding control triangle, but neither modification justified the effort involved. Correlations were so low that the writer would not recommend highly spaced plants (0.70 m or above) in any evaluation of beans. Correlations between mutually exclusive sets of 2 randomized complete blocks ranged from 0.72** to 0.93**, suggesting that 2 randomized complete blocks were a more reliable measure of yield potential than 6 individual spaced plants in the honeycomb design.

A total of twenty-three parent lines, eleven determinate and twelve indeterminate, were evaluated in 2 studies of inter-varietal competition in beans Six determinate and six indeterminate varieties were observed in pure stands and random 3 1, 1 1, and 1 3 mixtures in a 2 replication split plot with effective plots of 240 plants in the smaller study, and 10 indeterminate and 10 determinate varieties were observed at 3 densities in 6 replications per density per group in the larger study Fifteen mixture combinations per group (determinate and indeterminate groups) were studied in the smaller and 90 mixture combinations per group were observed in the larger study Plants were grown on 0 6 m beds with 6 7 cm between plants in the smaller and 6 7, 13 35, and 26 7 cm between plants in the larger study

Both studies indicate that, in general, the best yielders in beans are also the best competitors, results opposite to those found in rice at high fertility Correlations between the yields of varieties in mixtures and in pure stands were 0 95** for the indeterminate and 0 89** for the determinate varieties in the smaller study Correlations of 0 77**, 0 97**, and 0 90** at high medium and low densities for the determinate group and 0 89**, 0 84**, and 0 90** at high medium and low densities for the indeterminate group were obtained in the second study Regression of the yield of one variety on the proportion of the other in the mixture showed that the best yielders were the best competitors for the indeterminate varieties in the smaller study, with the exception of P643, which was more competitive than its yields in pure stands might suggest, but the rank order of the yields of varieties in mixtures and in pure stands was the same except for the two lowest yielding varieties, one of which

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was virused Two other lines were also exceptions to the general rule in the larger study, P365, a Type III, which was unduly competitive, and 12-13-1, also a Type III, which fell in mixtures with respect to its yields in pure stands It is conceivable that mediocre lines such as P643 might come to dominate mixtures in 4 or 5 generations of bulk breeding

The correlation of 0 97** between yields in mixtures and yields in pure stands for the determinate varieties is almost certainly a more accurate reflection of the true situation than the correlation of 0 77** at the high density Mixture yields were based on about 10 times as many plants as pure stand yields, and the pure stand yields in the larger study are less than perfect estimates, although there was an obvious consistency between the yields in pure stands at medium and high densities for the indeterminate varieties There are no means for varieties over tests available to us at CIAT, but it is apparent that the mixtures actually favored the superior lines very consistently in both medium and high densities The actual potential of P089, for example, is almost certainly greater than that of P153, as indicated by yields in mixtures, but unfortunately not by yields in pure stands It appears to the writer that the general failure of bulk methods to be superior to pedigree systems based on visual selection or single seed descent tests is an indication that other factors besides competition, including the segregation of inferior competitors into succeeding generations and the high variety x year interaction are tending to neutralize the favorable effects of competition in the determinate varieties

Table 1 Correlations between mean yields of forty-seven varieties (as a group and separated by growth habit) from randomized complete blocks and mean yields modified and unmodified from 8 replications of a simulated screening honeycomb design with 1 15 and 0 70 m between plant spacings

	Spacing	Unmodified Mean Yields from Honeycomb	Mean Yields Corrected (Triangle)*	Mean Yields Corrected (Hexagon)*
Yield of 47 Varieties in RCB's	1 15	0 36*	0 36*	0 40*
	0 70	0 48**	0 43*	0 47**
Yield of 23 Determinate Varieties in RCB's	1 15	0 48*	0 53*	0 51*
	0 70	0 49*	0 37	0 53**
Yield of 24 Indeterminate Varieties in RCB's	1 15	0 29	0 24	0 36
	0 70	0 52**	0 49**	0 47*

*Yields of individual spaced plants in the honeycomb modified either as a percent of the surrounding triangle of controls (see Figure 1) or as a percent of the surrounding equidistant hexagon of 5 random varieties and 1 control

Table 2 Matrices of yields in mixtures for the 6 determinate and the 6 indeterminate varieties, based on means over 2 replications and 3 (1 3, 1 1, and 3 1) proportions for the mixture plots and means over 10 individual plots for the pure lines *

Determinate Varieties

		Associates 89	560	623	635	637	788	Variety Mean
Varieties	89	562 1	265 7	461 8	546 2	342 8	632 7	468 5
	560	482 1	623 4	515 5	862 0	625 3	955 7	677 3
	623	255 1	110 4	205 9	297 4	107 8	232 6	201 5
	635	730 7	501 7	542 0	628 0	421 2	577 0	566 8
	637	958 4	650 9	721 1	731 5	649 6	1000 7	785 4
	788	567 0	268 3	480 4	475 8	360 2	588 5	456 7
Mean of Associates		592 6	403 4	487 8	590 1	417 8	664 6	

Indeterminate Varieties

		Associates 246	498	524	566	643	698	Variety Mean
Varieties	246	201 6	225 8	149 9	160 6	194 9	147 0	180 0
	498	198 4	442 2	279 8	382 3	243 3	515 8	343 6
	524	599 3	683 0	613 1	597 0	619 3	1099 2	701 8
	566	780 9	722 2	619 5	665 5	681 0	1018 5	747 9
	643	493 4	476 3	508 5	545 9	470 0	885 6	563 3
	698	175 6	138 5	58 4	76 2	128 1	306 2	147 2
Mean of Associates		408 2	448 0	371 5	404 6	389 4	662 1	

*All values adjusted to a grams/80 plants basis, means for pure lines based on 800 plants, means for mixtures based on 720 plants