SEED YIELD OF SEGREGATING POPULATIONS OF CULTIVATED X WILD *Phaseolus vulgaris*.[1]

Jorge A. Acosta-Gallegos[2], Teresa S. Herrera-Flores[2], Bismarck Aguilar-Garzón[2] and Paul Gepts[3]

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2. Bean program, INIFAP, Apdo. Postal 10, Chapingo, Méx. CP56230, MEXICO

3.Dep. Agron. & Range Sci., Univ. of Calif., One Shields Ave., Davis, CA 95616-8515

The common bean was domesticated from a wild legume widely distributed in Mexico, Central and South America. Comparison of genetic diversity in wild vs cultivated *P. vulgaris* has suggested that a reduced number of wild populations were domesticated (Debouck and Tohme, 1989; Gepts, 1998) leading to a reduced variability in the cultigen. In spite of the availability of hundreds of accessions of wild *P. vulgaris* the actual use of them in breeding programs is reduced. The aim of our project is to demonstrate the value of the wild bean germplasm in breeding for quantitative traits and at the same time develop cultivars/populations adapted to the highlands of Mexico. Beebe *et al.* (1997) recently discussed the value in breeding of naturally occurring wild-weed-crop complexes. In this project we are accelerating the process of utilization of wild germplasm and the artificial formation of such complexes. The ultimate goal is to derive from such complexes high yielding lines to be used as commercial cultivars or as parental stocks.

The cultivar Negro Tacaná was crossed with three different wild bean accessions. For each of these three crosses, three different populations were established: simple cross, double recombinants (the crossing of different F1s plants within a simple cross) and backcross one. A field trial was established in the summer of 1998 at The Valle de Mexico Experiment Station, near Texcoco, Mex., which included the cultivated parent Negro Tacaná and the nine segregating populations, all of which were in the F4 generation(Table 1). The experimental design was a RCBD with three replications and experimental plots of three rows 5 m in length and 0.8 m between rows. Plant stand was aprox. 100,000 plants/ha. For detailled data taking, nine individual plants per plot were randomly chosen and marked. Data recorded included phenology, seed yield per plant and per plot and seed mass.

The three backcross and double recombinant populations showed a phenology similar to that of the cultivated parent (Table 1). In the case of the segregating populations, maturity was determined on the tagged individual plants when the plant exhibited at least one dry pod since in the simple and double recombinants many plants exhibited lots of plants with wild traits such as ripe pods in the lower nodes and flowers on the tips of the branches, aggressive vegetative growth, etc. In all segregating populations, there were individual plants that showed larger yields than the plants of the cultivated parent (data not shown). In the case of seed yield per ha, all three backcross derived populations and the one derived from the simple cross of Negro Tacaná x G 24429 showed a yield similar to that of the bred parental line.

The three backcross populations showed a seed size similar to the one of the cultivated parental line, while all the populations derived from simple crosses and double recombinants showed intermediate seed size. The seed size of the wild populations ranged from 5.0 g/100 seeds in G 12729 to 9.5 g/100 seeds in the Hidalgo population, a typical sylvestroid or weedy type. In this study, a single backcross allowed the recovery of the average seed yield and seed size displayed in the cultivated parent. In addition, most plants in the backcross populations resembled type III growth habit of landraces and cultivars, widely grown in the Mexican highlands.

These results and the fact that in all populations individual plants displayed larger yield than plants of Negro Tacaná suggest that lines could be extracted from these populations with significantly higher yield potential than the cultivated parent and a suitable agronomic phenotype. Of the three types of crosses, large backcross populations seem to be the most

appropiate for the transfer of quantitative traits and for allowing the quick recovery of good agronomic traits in the progeny.

Table1. Agronomic traits of nine segregating F4 populations resulting from wild x cultivated crosses and the bred cultivated parent, grown in Texcoco, Mexico, 1998.

Population/Cultivar	Days to 50% flowering	Days to maturity	g/plant (n=27)	100 seed weight	Yield Kg/ha
Negro Tacaná (NT)	**55**	**107**	**67.0**	**16.7**	**1688**
Negro Tacaná x G12300	63	110	76.3	14.5	1724
Negro Tacaná x Hidalgo	66	113	55.2	10.1	1192
Negro Tacaná x G 24429	56	114	69.4	9.6	916
Ave. simple cross	**62**	**112**	**67.0**	**11.4**	**1277**
NT (NT x G12300)	59	111	63.1	19.3	1474
NT (NT x Hidalgo)	56	109	87.9	15.9	1565
NT (NT x G24429)	56	106	62.4	15.8	1651
Ave. backcross one	**57**	**109**	**71.1**	**17.0**	**1563**
(NT x G12300)(NT x G12300)	60	104	35.3	10.1	818
(NT x Hgo.)(NT x Hgo.)	59	109	73.1	13.3	1378
(NT x G24429)(NT x G24429)	55	109	58.4	13.2	1166
Ave. double cross	**58**	**107**	**55.6**	**12.2**	**1121**
DMS 0.05	7.5	12.0	38.4	6.0	597

References

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