INDEX TO SELECT THE BEST SEGREGATING POPULATIONS OF COMMON BEAN

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The breeding programs of common bean in Brazil have aimed to develop highly grain yield varieties with favorable phenotypes for other traits that interest farmers and consumers. By the way, bean breeders have long been interested in modifying plant architecture to obtain plants with erect habit and minimum lodging, as possible while grain yield capacity is maintained or enhanced. In order to selection the best segregation population the breeder must to consider these characteristics simultaneously. Thus this work was carried out to verify if a selection index with equal weight for standardized variables is useful to assessing the genetic values of parents in a diallel crossing.

Partial diallel analysis was used to access the general and specific combining abilities from crosses involving six parents with carioca grain type, commercially acceptable, highly yield but with undesirable architecture (prostate plants) in the group I, with other six parents in the group II that was formed for cultivars with upright plants, but showing some restriction on grain type.

In the diallel matching were obtained 28 F_1's of the 36 possible crossing. These 28 combinations, were grew to obtain F_2 and after it, F_3 generations. Trials, with three replications, were conducted in Department of Biology of Universidade Federal de Lavras (UFLA experimental field in order to evaluate these segregating populations, in Lavras-MG, Brazil.

Grain yield (g/plot), plant architecture and lodging (notes ranging 1 to 9 phenotypes for these last characteristics) were obtained and after it, standardized variable Z_{ijk} was obtained by the following estimator:

$$Z_{ijk} = \frac{y_{ijk} - \overline{y}_{.jk}}{s_{jk}} \text{ where,}$$

Z_{ijk} is the standardized value for the character k, in replicate j, for population i; y_{ijk} is the observed value of the character k, in replicate j, for population i; $\overline{y}_{.jk}$ is the overall average of the character k, in replicate j; and, s_{jk} is the phenotypic standard deviation for the character k en replication j.

As the value Z_{ijk} assumers positive and negative values was added the value three to obtain only positive estimates, and performed the sum of Z estimated for grain yield, architecture and lodging in order to use it like a index. Diallel analysis were carried out using generations means, according to Griffing's model IV, adapted by Gerald & Miranda Filho (1998) for diallel over lest square method, for index composed by sum of Z.

It was formed that General Combining Ability (GCA) for group I explained 57.5% of total variation among populations. These results allow inferring that the Z index presents predominantly additive genetic control. The higher GCA effect was observed for CVIII8511 (Table 1). Therefore, considering the three characters simultaneously, this cultivar was the best parent overall because its hybrid combinations showed highest performance average. For group II, the highest estimates of GCA were observed for Meia-Noite and RP133 (Table 1)

Table 1 – Average and GCA effects of parents in group I (GCA I) and group II (GCA II) for the standardized variable Z

	RP26	RP133	RP166	Suprema	Valente	Meia-noite	CGCI
CV8511	10.99	9.17	10.93	11.83	9.28	-	1.38
MAII16	8.47	-	6.98	7.54	-	9.01	-1.08
VC3	7.44	8.74	8.63	7.64	8.40	-	-0.64
MAII22	9.55	9.86	7.87	8.46	8.85	10.01	0.13
MAII2	8.68	-	-	10.01	9.48	9.15	0.15
majestoso	8.57	-	8.92	9.46	8.11	-	-0.19
CGCII	0.00	0.18	-0.02	0.02	-0.45	0.57	

Although high average to Z index can be observed for a population it may be deficient in one or more agronomical characters. Therefore, is desirable to associate this estimate with graphic method. In this new situation, each axis of the graphic corresponds to one variable. This procedure was adopted for the three best populations, considering the average of two generations. It is observed in Figure 1, that population CVIII8511 x Supreme showed high estimate of Z due population excellent performance of plant architecture and lodging, however, it was deficient in grain yield. On the other hand, for population 8511CVIII x RP26 and CVIII 8511 x RP166 it was not observed. These latter were much more balanced for these three characteristics in the index.
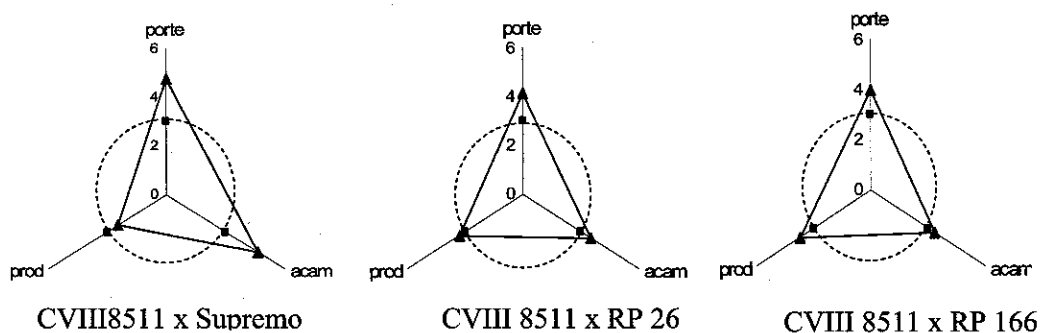

CVIII8511 x Supremo   CVIII 8511 x RP 26   CVIII 8511 x RP 166

Figure 1 - Graphic representation of standardized values for plant architecture (porte), lodging (acam) and yield (prod) by three populations that had high sum of Z.

ACKNOWLEDGEMENT

REFERENCE

GERALDI, I.O. e MIRANDA FILHO, J.B. Adapted models for the analysis of combining ability of varieties in partial diallel crosses. Revista Brasileira de Genética, Ribeirão Preto, v.11, n.2, p.419-30, 1988.