YIELD STABILITY OF C_1 FAMILIES FROM RECURRENT SELECTION OF CARIOCA COMMON BEANS

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Recurrent selection is a breeding method used to obtain a great number of genotypes carrying several alleles of interest, and to allow continuous improvement of the base population. Therefore, one strategy to improve yield is to simultaneously select genotypes for tolerance to other limiting factors affecting crop yield, such as disease susceptibility, low soil fertility and water deficit stress, in addition to develop a new plant ideotype, with erect stature, short and straight branches and high first pod insertion. Yield stability and adaptability of common bean families from the first selection cycle (C_1) of recurrent selection were evaluated at Embrapa Rice and Beans Research Center, using carioca bean genotypes, with the objective to select superior families, to provide lines and intercrossing, and to obtain new selection population.

Seven recurrent selection trials were conducted using three controls (BRS Estilo, BRS Cometa e BRS Pontal), and 78 C_1 families. Three trials were carried out in 2008 using families from $C_1S_{0:3}$ families (one in the winter season in Santo Antônio de Goiás-GO and two in the wet season in Ponta Grossa-PR and Sete Lagoas-MG). The other four trials were conducted in 2009 using $C_1S_{0:4}$ families: one in the winter season (Santo Antônio de Goiás-GO); two in the dry season (Ponta Grossa- PR and Lavras- MG); and one in the wet season (Frei Paulo- SE). The experimental design was a triple square lattice 9x9 and data were submitted to individual and joint analysis of variance using the Genes program (CRUZ, 2001), a genetics and statistics computer applicative. Analyses of yield stability and adaptability were carried out using the methodology proposed by Annichiarico (1992). To measure family behavior within a particular environment, ambient conditions were decomposed into favorable (yield above overall mean) and unfavorable (below overall mean). This method is based upon the so called genotypic confidence index (ωi), using a coefficient of 75% or $\alpha= 0.25$.

Significant differences were detected among families (at .01 level of probability) in all trials and joint analyses, also presenting significant interactions between families and environments. According to results obtained for stability and adaptability analyses performed for the 20 most productive families (Table 1), family SRC-207103318 presented the highest Wi general value (112.5), indicating 75% probability to produce 12.5% more than the average value obtained for all environments evaluated. Besides, it also presented confidence indexes above favorable (111.9) as well as unfavorable environments (113.7), which demonstrate the stability of this genotype over a varied crop conditions. Family SRC- 207103079 surpassed 29.7% the overall mean obtained from the unfavorable environments (Wi=129.7), revealing its adequacy for family agriculture. Under favorable ambient conditions, family SRC-207103004 (Wi=118.3) presented the highest production stability indicating to be responsive to technology inputs.

The above results lead to the conclusion that it is possible to select high yield families, either with ample or specific stability to both favorable and unfavorable conditions that may be improved

with the objective of obtaining superior cultivars and/or to be recombined for further recurrent selection procedures.

Table 1. Overall response and responses to favorable and unfavorable environments; and average yield of selected families obtained in the Carioca Beans Recurrent Selection Program in Santo Antônio de Goiás-GO, Ponta Grossa-PR, Sete Lagoas-MG, Lavras-MG and Frei Paulo-SE during wet, dry and winter seasons in 2008 and 2009.

Families	Wi Overall	Wi Unfavorable	Wi Favorable	Yield (Kg/ha)
SRC-207103318	112.5	113.7	111.9	1963
SRC-207103079	107	129.7	97.8	1848
SRC-207102999	106.8	105	109.1	1942
SRC-207103299	106.6	109.8	104.4	1873
SRC-207103296	106.5	118.3	100.4	1870
SRC-207103004	106.1	87.6	118.3	2077
SRC-207103049	105.7	106.9	106.3	1855
SRC-207103169	105.6	121.9	99.1	1826
SRC-207103167	105.0	106.8	103.6	1867
SRC-207103498	104.7	104.6	105	1851
SRC-207103304	104.5	108.4	102.5	1834
SRC-207102863	104.1	96.7	109.8	1892
SRC-207103102	103.8	97.5	108.1	1840
SRC-207102959	103.6	114.9	100.2	1814
SRC-207103781	100.7	104.8	98.4	1741
SRC-207103757	95.6	74.7	111.7	1872
SRC-207103587	92.6	103.7	86.7	1704
SRC-207103578	90.9	89.2	91.5	1701
SRC-207103459	89.4	96.4	85.3	1638
SRC-207103154	79.4	60.1	93	1609

REFERENCES

CRUZ, C.D. Programa genes: Versão Windows: aplicativo computacional em genética e estatística. **Viçosa: Editora UFV**, 2001. 648p.

ANNICCHIARICO, P. Cultivar adaptation and recommendation from alfafa trials in Northern Italy. **Journal of Genetics and Plant Breeding**, v.46, p.269-278, 1992.