EVALUATION OF COMMON BLACK BEANS IN 2007 AND 2008 IN BRAZIL

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Among the many bean types cultivated in Brazil, black beans are the second most produced with 430,000 t per year (FEIJÃO, 2010), corresponding to 20% of the total national output (Del Peloso & Melo, 2005). These beans are cultivated and consumed mostly in the south of Brazil (States of Rio Grande do Sul, Paraná, Santa Catarina), and Rio de Janeiro, but are also cropped in other states in smaller amounts. The evaluation of Embrapa Rice and Beans breeding program lines are carried out in a network of national trials in the states representing 76% of the total national production (Goiás, Distrito Federal, Mato Grosso, Paraná, Santa Catarina, Rio Grande do Sul, São Paulo, Sergipe, Bahia and Alagoas). The final evaluation is performed in national trials network carried out in a great number of environments, representing the environmental conditions the new cultivars will be subjected. The release of new cultivars has been contributing to increase the national average yield of 1,223 kg ha^{-1} (FEIJÃO, 2010); therefore the search for new improved cultivars must be permanent.

In 2007 and 2008 trials were conducted in 85 environments in the States of Goiás, Distrito Federal, Mato Grosso, Paraná, Santa Catarina, Rio Grande do Sul, São Paulo, Sergipe, Bahia and Alagoas, at the winter, dry and wet cropping seasons. The experimental design was a completely randomized block design arranged in four meters long four row plots, with three replicates and data collected in the two central rows. Each trial comprised 14 black bean benotypes (10 lines and four controls: BRS Valente, BRS 7762 Supremo, BRS Grafite, and IPR Uirapurú) (Table 1). Field evaluations were performed for plant architecture, resistance to disease and lodging through a 1 to 9 ranking scale: grade 1 for ideal and 9 for undesirable phenotypes. In the laboratory 100 seed weight was determined. Beans yield data were subjected to the analysis of variance, followed by data joint analysis, using the Scott Knott at 10% for mean comparison.

The joint analysis showed adequate experimental precision (CV=14.2%) and significant differences ($P<0.01$) among genotypes, environment, and genotypes x environment interactions were detected, which was expected, considering the great variability present among environment trials. Average yield was very high (2,170 kg ha^{-1}). Genotypes performing the best for each trait evaluated were: CNFP 10794 and CNFP 10793 for yield; BRS 7762 Supremo, for plant architecture and lodging; BRS Valente for angular leaf spot resistance; CNFP 10794 for bacterial common blight, and CNFP 0221 for anthracnose. When traits data were analyzed jointly, two promising lines were identified: CNFP 10794 and CNFP 10793 (Table 1). These lines yielded higher than all controls and were 16% more productive than the most yielding control: BRS Valente. They also performed similarly between themselves for other characteristics, which could be attributed to the crosses they originate from: (POT51///ICAPIJAO/XAN170//BAC16/XAN91) and (POT51///OAC88-1/A429//OAC88-1/RM35) respectively. These lines ranked medium for plant architecture and superior in the general trial average, but similarly to the control BRS Grafite. For lodging they performed slightly inferior to the trial general average, but were similar to the control BRS Valente. Concerning disease resistance they were susceptible to angular leaf spot, ranking higher than the control; however, for common

bacterial blight reaction, they ranked the lowest and similarly to the best control – IPR Uirapurú. Regarding anthracnose, both lines were graded lower than BRS Valente and BRS Grafite, but CNFP 10794 showed higher resistance, with grade 3.1 versus 9 attributed to CNFP 10793. Besides, the maximum grade for CNFP 10794 was 7, versus 9 attributed to CNFP 10793, suggesting a total susceptibility of that line to some of those environments tested. Those lines also presented beans lager than the average (24g/100 seeds), similar to BRS Grafite. Based on those observations line CNPF 10794 will be released as a new cultivar.

Table 1. Mean yield (kg ha^{-1}) (PROD), 100 seed weight (M100) and average[(1)] and maximum[(2)] grades for plant architecture (ARQ), lodging (ACA), common bacterial blight (CBC), angular leaf spot (MA) and anthracnose (AN), of 14 genotypes of black common beans , evaluated in 85 environments in Brazil, in 2007 and 2008.

Genotype	PROD	ARQ	ACA	MA	CBC	AN	M100
CNFP 10794	2537 a	4.3[(1)] – 7[(2)]	3.5 - 6	5.2 - 8	2.6 - 7	3.1 - 7	25
CNFP 10793	2500 a	4.2 - 7	3.3 - 7	5.0 - 8	2.7 - 5	3.7 - 9	24
CNFP 10807	2239 b	4.0 - 6	4.1 - 8	5.3 - 8	2.7 - 6	2.3 - 9	22
CNFP 10806	2216 b	3.8 - 6	3.8 - 7	4.5 - 7	3.0 - 6	2.8 - 7	20
BRS VALENTE	2180 c	3.8 - 6	3.5 - 8	3.7 - 8	4.2 - 7	5.2 - 9	20
IPR UIRAPURU	2166 c	3.6 - 6	3.7 - 7	4.0 - 7	2.8 - 6	3.6 - 7	21
CNFP 10214	2140 c	4.5 - 6	4.5 - 8	4.9 - 8	3.3 - 7	3.3 - 9	23
CNFP 10800	2137 c	3.4 - 6	3.8 - 8	5.1 - 9	3.6 - 7	4.2 - 9	21
CNFP 10805	2128 c	3.7 - 7	3.8 - 7	4.4 - 8	2.8 - 7	2.4 - 8	20
BRS 7762 SUPREMO	2088 d	2.9 - 7	2.3 - 5	4.3 - 7	3.1 - 6	2.6 - 9	21
BRS GRAFITE	2068 d	4.3 - 6	4.4 - 7	4.4 - 8	3.0 - 6	5.2 - 9	24
CNFP 10799	2054 d	3.6 - 7	2.7 - 5	4.3 - 7	4.0 - 6	2.4 - 9	21
CNFP 10025	2015 e	4.1 - 7	3.6 - 7	4.9 - 9	3.8 - 7	3.0 - 7	19
CNFP 10221	1911 f	4.6 - 6	5.1 - 8	5.2 - 8	3.4 - 7	1.5 - 7	18
AVERAGE	2170	3,9	3,7	4,7	3,2	3,2	21

[1]Means followed by the same leter do not differ among themselves (Scott Knott at 10% probability).

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