

EVALUATION OF VIGOR TESTS FOR THE SELECTION OF BEAN GENOTYPES WITH HIGH SEED VIGOR

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INTRODUCTION: Bean landraces are a good option for use in breeding programs due to their special characteristics such as seed quality and vigor of the seedlings. The process of coevolution and adaptation to environmental changes could provide desirable genes and identify genotypes for hybridization programs (Bevilaqua et al., 2014). The high performance of seeds is very important for obtaining good stands of plants in cropping systems and seedlings with high performance. Work developed by Ribeiro et al. (2008) evaluating 32 bean cultivar cultivars for potential agricultural and nutritional use, showed that some of them stand out for nutritional composition and certain agronomic characteristics. The objective of this work was to evaluate the seed quality of bean cultivars grown in different environments in relation to commercial cultivars, to identify those with the highest physiological potential of their seeds.

MATERIALS AND METHODS: Seeds of 15 bean genotypes were evaluated, including breeding lines and landraces, and BRS Intrepido, for black grain, and Carioca, colored grain as checks. The seeds were from the 2012 trial of cultivars of the South Brazilian network, conducted in the municipalities of Sobradinho and São Luiz Gonzaga, in Rio Grande do Sul. In the first municipality, the sowing season was in October and the harvest was carried out in January. In the second, in the second cropping season, the sowing season was in January and the harvest was carried out in April. The fertilization was performed with NPK fertilizer, using 300 kg ha⁻¹ of formula 10-30-10. Harvesting was performed by harvesting the plants, followed by drying in ambient air. The seeds were submitted to germination tests, according to Brazil (2009), accelerated aging, cold, electrical conductivity, shoot length and seedling root, described in Krzyzanowski (1999). The data obtained from the performed tests were submitted to analysis of variance and the means compared by the Scott-Knott test at 5% probability.

RESULTS AND DISCUSSION: The analyzes carried out showed high quality seeds in landraces and breeding lines, where in all tests they were statistically superior to the commercial cultivars used as controls. These results demonstrate the potential of using these varieties in the development of cultivars of quality and with greater resistance to adverse conditions during the establishment stage of the crop. The genotypes presented different results in both sites, indicating the presence of interaction of the genotype with the environment. The germination test was efficient in separating the genotypes for differences in seed performance, unlike tests of accelerated aging and cold, which were not efficient in separating the genotypes in the level of vigor, in both places. This fact may lead to the need for methodological adjustments in the performance of these vigor tests for the species. The seedling root length vigor test was the one that showed the greatest sensitivity for the separation of genotypes into vigor classes, being an excellent test in the variety selection.

In Sobradinho, the genotypes TB 0307 and TB 0325 stood out for high germination, while in São Luiz Gonzaga, Iolanda and Vinho stood out. In Sobradinho, TB 0222, TB 0305, Iberico and TB 0221 stood out for their high root growth, all of black grain. In this local, we can highlight TB 0221 and TB 0226, the first of black grain and the second of red grain. In São Luiz Gonzaga, the most notable were Iberico, TB 0226, TB 0307 and TB 0222, with different types of grain. This

fact can be attributed to the presence of seed dormancy in some genotypes, which is corroborated by the fact that the phenotype was repeated in the two sites under very different cultivation conditions for TB 0226.

TB 0221 and TB 0325 can be highlighted in terms of high vigor, low electrical conductivity and high root growth of the seedlings at both cultivation sites. However, the first showed root growth below the best treatments. The genotypes Iolanda and Carioca, colored seed, and TB 0305 and Ibérico, both black seeded, stood out in relation to the vigor tests in Sobradinho, but this was not repeated in São Luiz Gonzaga. The genotypes TB 0305, Iberico and TB 0221 were distinguished for high root growth at both sites. The conductivity test presented discrepant data in relation to the other tests, because genotypes superior for vigor in the other tests were those that presented the highest values of electrical conductivity. This fact contradicts data by Kryzanowski et al (2004), that high-vigor seeds have low electrical conductivity.

Table 1. Results of germination (G), accelerated aging (AA), cold test (CT), seed electrical conductivity (EC), seedling root length (SRL) in landraces (LR) and lines of the breeding program of beans in Sobradinho (1fst) and São Luiz Gonzaga (2 sec), RS.

Genotypes	Grain Color	G		AA		CT		EC		SRL	
		%									
TB 0222 (BL)	black	92b	95c	79b	96a	92a	97a	37,9c	42,5c	14,7a	8,0c
TB 0325 (BL)	black	94a	94c	87a	93a	90a	97a	51,8a	59,2a	11,4b	10,0b
TB 0305 (BL)	black	88b	94c	85a	80a	86a	77c	43,6b	40,1d	14,0a	14,0a
TB 0221(BL)	black	87c	96b	90a	93a	96a	98a	24,4e	36,5d	13,4a	14,3a
TB 0324 (BL)	black	89b	92c	85a	91a	87a	94a	53,9a	58,2a	11,0b	8,6c
BRS Intrepido	black	81d	96b	71b	93a	86a	97a	35,6c	42,0c	12,5b	6,5e
Carioca	brown	90b	94c	89a	86a	78a	94a	50,2a	45,2c	12,5b	13,4a
Guabiju (LR)	black	89b	92c	91a	89a	88a	96a	30,5d	48,8b	12,2b	5,3e
Iberico (LR)	black	92b	82d	81b	91a	91a	94a	35,8c	50,8b	13,3a	13,4a
Iolanda (LR)	red	89b	99a	86a	98a	88a	94a	28,5d	36,3d	12,0b	11,1b
TB 0220 (LR)	black	91b	89c	71b	88a	90a	95a	43,9b	54,5a	11,0b	11,9b
TB 0225 (LR)	black	84c	95c	82b	85a	89a	96a	33,7c	50,6b	11,2b	11,1b
TB 0226 (LR)	red	75d	90c	90a	92a	82a	96a	38,8c	45,7c	11,4b	6,7d
TB 0307 (LR)	red	96a	94c	76b	97a	78a	99a	47,4b	40,6d	12,1b	3,9e
Vinho (LR)	purple	86c	99a	79b	91a	90a	87b	21,6e	25,8e	11,4b	12,6a
Cv%		3,2	4,9	8,4	7,9	6,4	5,5	6,2	6,5	10,2	9,0

Means followed by the same letter do not differ significantly for the Scott- Knott test at 5% probability.

CONCLUSIONS: The tests of accelerated aging and cold were not efficient in separating the bean genotypes according to vigor levels, with a strong interaction of the results with the site. The seedling root length was the most effective test for vigor classification. TB 0221, TB 0305, and Iberico presented the most consistent results at both sites.

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