NUTRIENT CONTENT AND VIGOR CORRELATION IN WHOLE COMMON BEAN SEEDS IN TWO ENVIRONMENTS

Carla Xavier Alves[1], Gilberto A. Peripolli Bevilaqua[2], Irajá Ferreira Antunes[2], Patricia Tapia Medeiros[1]; Luis Osmar Braga Schuch[1]

[1]Universidade Federal de Pelotas, Caixa Postal 354, CEP 96010-900, Pelotas, RS, Brazil;
[2]Embrapa Clima Temperado, Pelotas, RS, Brazil

INTRODUCTION

The knowledge of the factors that can influence the quality of seed is crucial for the selection of materials to be used both for cultivation and breeding programs. One of the characters of relevance to examine the seed is the concentration of the main macro minerals and micronutrients, as some may provide higher germination percentage, seedling length and storability (Carvalho; Nakagawa, 1988). Genotypes that have greater capacity translocate and store nutrients in the seed has the greatest potential to produce seeds with high germination and seedling vigor under adverse conditions of biotic and abiotic stress (Marcos Filho, 2005). This trait is influenced by genetic factors and the large variability provides genotypes with various levels of macro and micronutrients in their seeds. This study was to evaluate the correlation between the concentration of nutrients of whole bean seed and physiological quality and vigor in two crop environments.

MATERIAL AND METHODS

Seeds of 15 varieties produced in São Luiz Gonzaga, in Rio Grande do Sul, Brazil, harvests in 2011 and 2012. The samples comprised the seeds produced in the competition assay of bean cultivars installed by Embrapa Temperate Climate.

The seeds obtained were subjected to follow tests: germination, accelerated aging, cold test, electrical conductivity, shoot and root length. In addition to the data from these tests were analyzed in whole seeds the follow nutrients: phosphorus, potassium, iron, magnesium, zinc, calcium and manganese, according to the methodology de Silva (1999).

Data were submitted to analysis of variance and correlation, using Pearson correlation coefficient between nutrients content and seed vigor.

RESULTS AND DISCUSSION

The analysis showed that some characteristics of seed quality correlate with the nutrient contained in its constitution (Table 1). The germination and shoot length were the features that stood out in this behavior. This fact was reported by Adams et al . (1993), which noted that the high percentage of germination of peanut seeds was related to the calcium content of the seed itself. In various functions in plants, manganese and zinc are determinants members of various processes such as protein synthesis, membrane permeability, ion absorption, respiration, synthesis of starch and hormonal control. Thus, there is a chance that both nutrients are involved in seed quality (Teixeira et al., 2005). While this work is no correlation of quality tests with zinc has been observed, manganese correlated for germination, accelerated aging and seedling length corroborating this hypothesis. The fact vigor tests, the seeds of the 2011 season, did not present a higher correlation between quality and nutrient content compared to the 2012 harvest, can be attributed to the difference of these levels for a crop to another. This result indicates that besides the presence of the element, its concentration influence the quality and availability of seeds and

were changed as the year of cultivation, a fact that according to Lemos et al. (2004), the nutritional characteristics are influenced by both the genotype and the environmental conditions on plant development and seed.

Table 1- Correlation coefficient between nutrients content and seed quality in two crops environment in São Luiz Gonzaga, RS, season 2011 and 2012.

Nutrient	Year	G	AA	CT	EC	RL	SL
P	2011	-0.1^{ns}	-0.2^{ns}	-0.18^{ns}	-0.19^{ns}	0.09^{ns}	-0.02^{ns}
	2012	0.32*	0.05^{ns}	-0.14^{ns}	0.60**	0.42**	0.59**
Ca	2011	0.01^{ns}	-0.18^{ns}	-0.36^{*}	-0.09^{ns}	0.09^{ns}	-0.01^{ns}
	2012	0.44**	0.30^{ns}	0.15^{ns}	0.03^{ns}	0.21^{ns}	0.30^{ns}
K	2011	-0.16^{ns}	-0.19^{ns}	-0.18^{ns}	0.23^{ns}	0.20^{ns}	0.18^{ns}
	2012	0.15^{ns}	0.22^{ns}	-0.23^{ns}	0.31*	0.09^{ns}	0.37*
Mg	2011	-0.17^{ns}	0.21^{ns}	0.32^{*}	0.42^{**}	-0.10^{ns}	0.38^{**}
	2012	0.40**	0.31*	0.17^{ns}	-0.06^{ns}	0.25^{ns}	0.23^{ns}
Fe	2011	0.12^{ns}	-0.15^{ns}	0.49^{**}	-0.20^{ns}	0.25^{ns}	-0.29^{ns}
	2012	0.43**	0.13^{ns}	-0.23^{ns}	0.08^{ns}	0.38*	0.39**
Zn	2011	-0.12^{ns}	-0.18^{ns}	-0.14^{ns}	0.01^{ns}	0.28^{ns}	-0.09^{ns}
	2012	0.05^{ns}	0.13^{ns}	-0.14^{ns}	-0.12^{ns}	0.13^{ns}	0.13^{ns}
Mn	2011	-0.07^{ns}	-0.13^{ns}	-0.35^{*}	-0.19^{ns}	0.29^{ns}	-0.07^{ns}
	2012	0.40**	0.55**	0.25^{ns}	-0.18^{ns}	0.36*	0.32*

*significant at 5%; ** significant at 1%; nutrients: phosphorus (P), calcium (Ca), potash (K), magnesium (Mg), iron (Fe), zinc (Zn) and manganese (Mn); vigor tests: germination (G), accelerated aging (AA), cold test (CT), eletrical conductivity (EC), root length (RL) e shoot length (SL).

The 2011 season, showed correlation negative, although not significant, between some nutrients, markedly P and Mn, with physiological quality and seed vigor. This fact can be connected with the climate conditions occurred, with abundant rainfall.

CONCLUSION

The mineral composition showed a pronounced effect on the vigor of seeds in the year 2012, which was not observed in 2011. The phosphorus and manganese were the nutrients that showed higher correlation with seed vigor, but only for the year 2012.

REFERENCES

Adams, J.F.; Hartozog. D.L.; Nelson, D.B. Supplemental calcium application on yield, grade, and seed quality of runner peanut. Agronomy Journal, v. 85, p.86-93, 1993.

Carvalho, N. M. & Nakagawa, J. Semillas: ciência, tecnologia e producción. Campinas: Fundação Cargill, 1988. 429 p.

Lemos, L.B.; Oliveira, R.S.; Palomino, E.C.; Silva, T.R.B. Características agronômicas e tecnológicas de genótipos de feijão do grupo comercial Carioca. Pesquisa Agropecuária Brasileira, v. 39, n. 4, p. 319-326, 2004.

Marcos Filho, J. Fisiologia de sementes de plantas cultivadas. Piracicaba: FEALQ, 2005. 495p.

Teixeira, I.R.; Borem, A.; Araujo, G.A.A.; Andrade, M.J.B. Teores de nutrientes e qualidade fisiológica de sementes de feijão em resposta à adubação foliar com manganês e zinco. Bragantia, Campinas, v.64, n.1, p.83-88, 2005.