

OLIGOELEMENT LEVELS IN COMMON BEAN BREEDING LINES AND LANDRACES FROM RIO GRANDE DO SUL, BRAZIL

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INTRODUCTION

Food quality and economical viability have been common goals in breeding programs worldwide. Embrapa Temperate Climate common bean breeding program is seeking bean cultivars that have different characteristics from a nutritional standpoint, since it is known that inadequate intake of micronutrients leads to numerous disorders and metabolic abnormalities (FRANCO, 1999). This study focused on the variability of oligoelements concentrations among landraces from Rio Grande do Sul State, as compared to those from different breeding programs.

METHODS

Twenty six cultivars were studied, being nine landraces and seventeen derived from breeding programs. Seed multiplication was performed in 2009. The samples were dried in a mill and packed in glass jars with plastic lid. The elements analyzed were copper (Cu) - using a method of Perkin-Elmer (1982), Miyazawa et al. (1992b); Malavolta et al. (1989), iron (Fe)-through methods Ohlweiler (1974); Malavolta et al. (1989), manganese (Mn) - the methodology of Perkin-Elmer (1982), Miyazawa et al. (1992b) and zinc (Zn) - the method of Perkin-Elmer (1982); Malavolta et al. (1989), by atomic absorption spectrophotometry (AAS), as quoted by SILVA (1999).

RESULTS AND DISCUSSION

Results show that 16 of the cultivars had above-average results for at least one of the oligoelements examined and from these, three are landraces and the others from breeding programs. None of the cultivars was higher than the average for all oligoelements examined (Table 1).

Iron was the most abundant oligoelement showing an average of 30 mg kg⁻¹ followed by Zn, Mn and Cu, which is confirmed by Ribeiro et al. (2008). The cultivars BRS Expedito, Uirapuru, Fepagro-26, Minuano, and the lines TB 02-04 and TB 02-01, had higher concentrations of Fe.

Cultivars Guateian 6662 and FT Soberano showed higher concentrations of Cu, Fe and Zn, demonstrating its effectiveness in absorption and accumulation of micronutrients. Ribeiro et al. (2008) confirmed this characteristic for Guateian 6662, though this fact was not confirmed for FT Soberano. Cultivar FT Bonito had higher concentrations of Fe and Zn. The cultivars Macanudo and Macotaço had higher content of Cu and Fe and Rio Tibagi and FT Bionobre showed elevated levels of Cu and Zn, all of them from breeding program.

Landraces Cubano Cerrito, Preto Comprido and the line TB 02-24 showed high of Cu, Zn and Mn, respectively.

CONCLUSIONS

Cultivars that had higher levels of oligoelements are mostly part of breeding programs. Among the analyzed elements, iron has the highest mean concentration, followed by zinc, manganese and copper.

Table 1: Oligoelement levels in common bean breeding lines and landraces, from Rio Grande do Sul State. Pelotas, RS, Brazil, 2009.

Cultivar	Cu	Fe	Mn	Zn
mg kg ⁻¹			
Preto Comprido	10.01	26.92	16.81	33.04 *
Guabiju	10.90	22.84	14.37	19.63
Chocolate	8.48	19.74	15.92	20.88
Balim Grosso	11.06	27.94	15.05	21.09
Cubano Cerrito	12.30 *	21.05	16.10	19.34
Vermelho Escuro	7.36	32.18	14.86	24.72
Felipe	8.24	31.50	11.31	21.67
Grosso Amarelo	7.67	35.86	11.24	21.94
Amarelinho	7.47	33.97	12.04	23.16
TB 02-23	8.79	19.76	19.41	23.61
TB 02-24	8.76	32.08	25.85 **	29.44
TB 02-25	8.00	36.88	17.08	26.17
TB 02-26	9.96	19.02	17.30	19.82
TB 02-01	10.63	41.66 *	18.35	28.94
TB 02-04	10,53	17.46	21.46 *	23.51
Macanudo	11.85 *	38.97 *	15.27	29.50
FT Bonito	10.40	37.94 *	17.13	30.58 *
Guateian 6662	11.82 *	39.07 *	16.55	32.50 *
Macotaço	12.30 *	40.23 *	16.50	27.64
Fepagro-26	10.09	38.69 *	15.78	27.39
FT Soberano	12.22 *	38.33 *	16.45	33.93 *
Minuano	11.30	37.91 *	13.87	28.04
Rio Tibagi	12.90 *	33.69	17.11	32.27 *
FT Bionobre	12.51 *	35.12	16.38	32.42 *
BRS Exedito	9.36	29.00	23.83 *	24.63
Uirapuru	9.21	28.33	31.47 **	19.49
Standard Deviation	1.57	7.63	3.57	4.64
Mean	10.13	30.24	16.76	25.19

*indicates a value above mean plus one standard deviation and ** indicates a value above mean plus two standard deviations.

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