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GENETIC DIVERGENCE BY MORPHOAGRONOMIC TRAITS IN LIMA BEAN

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INTRODUCTION

Lima bean (*Phaseolus lunatus* L.) is an important crop in Central and South America and Africa. In Brazil, mainly in the Northeast region, is an income and alternative food source for the population; however it is also cultivated in South and Southeast regions. Lima bean reveals high polymorphism and seed morphology has been one of the key traits in understanding the genetic diversity in this species. The aim of this research was to study the genetic dissimilarity among 166 lima bean samples from Embrapa's Collection.

MATERIAL AND METHODS

A total of 166 samples of *P. lunatus* from Germoplasm Bank of the Embrapa Genetic Resources & Biotechnology (Cenargen, Brazil) and from Internacional Center for Tropical Agriculture (CIAT, Colombia) were evaluated with basis in eight continuous agronomic traits: days to flowering (DFL), length (LP) and width (WP) of the pod, number of locules per pod (NLP), number of seeds per pod (NSP), length (LS), width (WS) and thickness (TS) of the seed, included in descriptor list for lima bean published by International Plant Genetic Resources Institute (IPGRI, 2001). Mahalanobis' distance (D^2_{ij}) between genotypes and grouping Tocher's were estimated, as well as the relative contribution of each trait (SINGH, 1981).

RESULTS AND DISCUSSION

Significant differences ($P < 0.01$), by F test, for all traits among the genotypes tested were observed (Table 1), indicating the existence of genetic variability for those traits. Weight of 100 seeds ranged from 17.52 g (BF197) to 147.03 g (BF1113). DFL trait ranged from 26 to 184 days, demonstrating the selection possibility for this trait. LP and WP presented 42.50 mm to 129.17 mm and 8.40 mm to 27.32 mm, respectively. While NLP showed average of 2.79 and NSP average of 2.76. Length (LS), width (WS) and thickness (TS) of the seed ranged from 8.43 mm to 22.53 mm, 6.59 mm to 14.17 mm and 3.52 mm to 7.32 mm, respectively. However, there is samples includes in the three cultigroups defined by Mackie (1943) as well as comprises the genotypes of lima bean, from either the Andean or the Middle American Center of Domestication. In relationship to the size, most of the samples ranged from small the medium, in agreement with the criterion proposed by Mateo Box, cited by Vilhordo et al. (1996). Genetic distance among 166 samples ranged from 0.95 (BF84 and BF124) to 983.63 (BF113 and BF124). Three groups were formed by Tocher's method. 160 samples composed the group I; group II contains 5 genotypes; group III formed by only one sample (BF1113). The relative contribution of each trait (Table 1) indicated that the pod length (LP) (41.66%), days to flowering (DFL) (23.32%)

and number of locules per pod (NLP) were those who most contributed the total divergence (74.90%) among the samples of lima beans evaluated. These traits were the most efficient to explain the variability between samples and can be used in choose of parental aiming improving of lima bean. There wasn't correlation between genetic distance and origin of the samples.

Table1. Summary of the analysis of variance for days to flowering (DFL), length (LP) and width (WP) of the pod, number of locules per pod (NLP), number of seeds per pod (NSP), length (LS), width (WS) and thickness (TS) of the seed and relative contribution of each trait for genetic divergence among 166 lima bean samples, by method proposed by Singh – S._i (1981).

S.V	D.F.	MS							
		DFL (days)	LP (mm)	WP (mm)	NLP (un)	NSP (un)	LS (mm)	WS (mm)	TS (mm)
Samples	165	1474.07**	435.32**	14.00**	0.25**	0.26**	15.72**	5.04**	0.83**
Error	166	63.19	12.49	1.05	0.05	0.07	1.02	0.39	0.19
Average	-	95.87	64.30	14.47	2.79	2.76	12.60	9.26	5.59
UL ^{1/}	-	26.00	42.50	8.40	1.60	1.30	8.43	6.59	3.52
LL ^{2/}	-	184.0	129.17	27.32	4.00	4.00	22.53	14.17	7.32
C.V (%)	-	8.29	5.49	7.10	8.41	9.29	8.17	6.79	7.86
S. _i (%)	-	23.32	41.66	4.13	9.92	2.94	6.12	6.70	5.21

** : F significant at 1% (P<0.01)

^{1/}UP: Upper limit; ^{2/}LL: Lower limit.

CONCLUSIONS

High divergence among samples occurred in lima bean, especially between BF113 and G25633 samples. The traits pod length, days to flowering and number of locules per pod were those who most contributed the total divergence.

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