CHARACTERS ASSOCIATED WITH VIVIPARITY IN COMMON BEAN

Laís A. Pereira[1], Magno A. P. Ramalho[1*], Angela F. B. Abreu[2], Scheila R. Guilherme[1]

Department of Biology,
[1]Universidade Federal de Lavras, Lavras, MG, Brazil, [2]Embrapa Arroz e Feijão
*Corresponding author: magnoapr@dbi.ufla.br

INTRODUCTION: Brazilian farmers spread out the plants of common bean, after harvesting, to the time of threshing in the field. If harvest coincides with a rainy period, the great soil moisture content contributes to the germination of seeds while still in the pods, phenomenon known as viviparity, drastically reducing the production. The main solution is to obtain cultivars tolerant to high moisture content at the harvest time. For the selection of plants / progenies with less viviparity it is necessary to identify characters that can make selection easier. This study was carried out to verify the correlation between the pod wall thickness (PWT) and the percentage of germination of seeds in the pods (PGSP).

MATERIALS AND METHODS: The experiments were carried out at Universidade Federal de Lavras, Minas Gerais, Brazil. The lines ESAL 686 and Pérola were used as parents. ESAL 686 belongs to the Andean gene group and has pod walls of greater thickness. The Pérola line is of Mesoamerican origen and thinner pod. From the cross between the lines it was possible to evaluate 93 progenies $F_{3:4}$ with sown in February 2014.

After the harvest, the pods were removed. Part was used for measuring pod wall thickness (PWT), and the other part was used for evaluation of the percentage of germination of seeds while still in the pods (PGSP). For measurement of PWT, three pods/plant/plot were taken at random. The seeds were removed and a valve of the pods was subjected to measurements of thickness by an external digital micrometer, DIGIMESS brand, code 110.284, 0-25 mm capacity, and precision of ±0.002 mm. Measurement was made in the center of one of the valves of each pod.

For evaluation of PGSP, five pods/plot were evaluated leading to six replications. For that purpose, the pods were rolled up, two by two, in sheets of germination paper previously moistened with distilled water. The rolls were kept in germinators at 25°C with 12 hours of light in the Seed Analysis Laboratory. The total number of seeds and the number of germinated seeds were counted on the seventh day so as to obtain the PGSP.

The data were subjected to analysis of variance, according to the procedure presented by Steel et al.(1997). Broad sense heritability (h^2) of the progenies was estimated from analysis of variance, estimates of the mean squares of progenies (MSP) and mean square error (MSE) were used, as described by Ramalho et al. (2012). Phenotypic correlation (r_{XY}) was estimated between the mean values of the progenies for PWT (X) and PGSP (Y) (Bernardo, 2010).The correlated response $RC_{Y(X)}$ in trait Y (PGSP) was estimated by selection of the best 10% of progenies with greatest PWT (X), in a way similar to the model proposed by Falconer & Mackay (1996).

RESULTS AND DISCUSSION: The use of progenies was efficient in evaluation of PGSP, with heritability greater than 75% . The gain expected from selection, selecting the 10% with the lowest PGSP was -60.5% (Table 1). In the case of PWT, the heritability was 62%.One of the objectives of this study was to verify which of the two traits evaluated would allow greater efficiency in selection.

The estimate of correlation between PWT and PGSP was negative and different from zero (r = -0.5**). This fact contributed so that the response correlated by selection in PWT and expected gain in PGSP was less than that directly seen in the trait, though still expressive. Based on this last result, it may be inferred that the greater the pod wall thickness, the lower the germination. Considering that in the two methodologies there is similar difficulty of evaluation, use of the germination in the pod test, in principle, proved to be more promising. Unfortunately, there is difficulty in showing that this trait reflects tolerance to high moisture under field conditions, above all, due to the lower experimental precision in the evaluations under field conditions.

Table 1. Estimates of heritability (h^2) and gain expected from selection (GS) and correlated response ($RC_{Y(X)}$) obtained for the traits of pod wall thickness (PWT) and percentage of germination of seeds while still in the pods (PGSP). Lavras, 2014.

Indices evaluated	Trait under selection		
	PWT (mm X 100)	PGSP (%)	PWT/PGSP
h^2%	62	77	-
Mean of the progenies (Mo)	16.25	26.19	26.19
Mean selected	20.23	5.61	12.69
GS	2.47(15.2%)	-15.85(-60.5%)	-
$RC_{Y(X)}$	-	-	-10.40 (-39.69%)

* Correlated response of selection carried out in PWT and gain in PGSP.

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