Annals of Arid Zone 39(1): 47-50, 2000

Variability and Character Association in Lablab Bean

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Abstract: Variability, corrleation and path-coefficient analyses were performed for seven characters in ten genotypes of lablab bean (*Lablab purpureus* (L) sweet). High genotypic as well as phenotypic coefficients of variation, high heritability and high genetic advance were observed for dry matter yield and green fodder yield. Dry matter yield was positively associated with plant height, number of primary branches per plant, stem thickness and green fodder yield. Path analysis showed that number of primary branches per plant, plant height, stem thickness and leaf:stem ratio are the important characters contributing to dry matter yield.

Key words: *Lablab purpureus*, variability, heritability, genetic advance, correlation coefficient, path analysis.

Lablab bean (*Lablab purpureus* L. sweet) is found in tropical regions of Asia and Africa. It has wide adaptability to various regions, viz., arid, semi-arid, humid, warm temperate, sub-tropical and humid rain forest regions, and also lowlands and highlands. There are several uses of lablab bean. One region may use it only for forage, while the other capitalizes on its food value. It grows very well under warm arid conditions. The crop is late in maturity and bridges the gap between rainy and winter season feed. Thus, the value of lablab bean as a fodder, during this period, is apparent.

Information on the genetic variation and association among the economic traits of a crop is of great value to plant breeders. It not only helps to understand the desirable and undesirable economic traits, but also helps in assessing the scope of simultaneous improvement of two or more attributes. Path analysis permits the understanding of the cause and effect of related traits. Information on the genetic parameters of forage characters in lablab bean is meagre.

Materials and Methods

Ten genotypes of lablab bean were sown in 10 rows of 4 m length each, with a spacing of 30 cm between the rows and 25 cm within a row in a randomized block design with three replications during *kharif*, 1997, at the Experimental Farm of Central Arid Zone Research Institute, Jodhpur. Recommended agronomical practices were adopted to raise a good crop under rainfed conditions. Five randomly selected plants in each plot and replication formed the basic material for the evaluation of seven forage characters, viz., plant height, number of primary branches per plant, longest branch length, stem thickness, leaf-stem ratio, green fodder yield per plant and dry matter yield per plant. The genotypic and phenotypic coefficients of variation, heritability in broad sense, genetic advance, correlation and path coefficients were worked out as per standard statistical procedures.

Table 1. Estimates of genetic variability, heritability and genetic advance in Lablab purpureus

Character	Range	Mean±SEm	GCV	PCV	Heritability (broad sense %)	Genetic advance as percentage of mean
Plant height (cm)	84.00-122.00	109.06±6.53	10.57	12.87	68	17.90
Primary branches/plant	6.00-7.80	7.10±0.32	6.99	8.87	62	11.41
Branch length (cm)	82.27-111.53	91.85±4.00	10.24	11.55	79	18.70
Stem thickness (mm)	8.30-10.77	9.07±0.46	6.81	9.25	54	10.36
Leaf-stem ratio	0.43-0.61	0.53±0.05	10.71	15.70	47	15.09
Green fodder (g $plant^{-1}$)	95.33-180.67	139.85±11.87	18.41	21.14	76	33.02
Dry matter (g $plant^{-1}$)	36.90-73.70	51.02±4.24	19.57	22.05	79	35.77

Results and Discussion

The analysis of variance showed significant genotypic differences among the genotypes for all the seven forage traits. The range of mean values was wider for green fodder yield, dry matter yield, plant height and branch, as has been reported by Yadav and Krishna (1985). The range was medium to low for rest of the traits. The relative amount of variation exhibited for different characters in the material could be judged through the study of genotypic and phenotypic coefficients of variation (GCV and PCV). The GCV and PCV were higher for green fodder yield and dry matter yield, and moderate for plant height, branch length and leaf-stem ratio, while low for primary branches and stem thickness (Table 1). The PCV values, which were higher than GCV values for all the traits, indicated the influence of environment in the expression of these traits.

Burton (1952) suggested that genotypic coefficient of variation, along with heritability estimates, would give better idea about the efficiency of selection. In the present study, the heritability estimates were higher for dry matter yield, green fodder yield, branch length, plant height and primary branches per plant, while moderate for stem thickness and leaf-stem ratio. The characters having high heritability and high genetic advance are mostly controlled by additive gene action (Panse, 1957). It is, therefore, necessary that for an effective improvement of different traits, both the genetic parameters should be considered together. The values of genetic advance were high for green fodder yield, dry matter yield, plant height and branch length, and were moderate for rest of the traits. Green fodder yield, dry matter yield, plant height and branch length exhibited high heritability, coupled with high genetic advance. Therefore, it can be inferred that these characters are under the control of additive gene action and potential possibilities exist for the improvement of these traits through simple selection.

Number of primary branches per plant had high heritability and moderate genetic

Table 2. Path analysis of the genotypic correlation coefficients between dry matter yield and its contributing traits in Lablab purpureus

Characters	Plant height	Primary branches/ plant	Branch length	Stem thickness	Leaf-stem ratio	Green fodder (yield/ plant)	Correlation coefficient with dry matter (yield/plant)
Plant height	-0.082	0.277	0.058	-0.163	0.231	-0.031	0.289*
Primary branches/plant	-0.024	0.994	-0.037	0.109	0.076	-0.468	0.600**
Branch length	-0.034	-0.249	0.142	-0.044	-0.218	0.071	0.332*
Stem thickness	0.031	0.235	-0.014	0.438	-0.144	-0.208	0.367*
Leaf-stem ratio	-0.046	0.175	-0.075	-0.122	0.411	-0.073	0.269
Green fodder (g plant^{-1})	-0.005	0.916	-0.021	0.189	0.062	-0.482	0.660**

*, ** Significant, at 5% and 1% levels, respectively. Diagonal values indicate direct effects; residual effect =0.5514.

advance, while stem thickness and leaf-stem ratio had moderate heritability and moderate genetic advance. This suggests that the traits are under the control of non-additive gene action and improvement of the traits is possible through indirect selection methods.

The genotypic correlation coefficients were generally higher for all the combinations than their respective phenotypic correlation coefficients. The phenotypic correlation decreased due to environmental effects. At the genotypic level, the dry matter yield was significantly and positively associated with plant height, primary branches per plant, stem thickness and green fodder yield, while it was significantly and negatively associated with branch length. Plant height was significantly and positively associated with primary branches per plant, branch length and leaf-stem ratio. Green fodder yield was significantly and positively associated with branches per plant, stem thickness and dry matter yield. These findings are in agreement with those of Srinivasan and Vijendra Das (1996). Vasanthi and Vijendra Das (1996) also observed positive correlation between dry matter yield and green fodder yield in this crop. The genotypic correlations were negative and significant between plant height and stem thickness, branch length and leaf-stem ratio, and stem thickness and leaf-stem ratio. At phenotypic level, dry matter was significantly and positively associated only with branches per plant and green fodder yield. Therefore, forage yield can be improved by selecting simultaneously for tall plant and more number of primary branches per plant.

The path analysis revealed that primary branches per plant had contributed the most towards dry matter yield, followed by stem thickness, leaf-stem ratio and branch length (Table 2). These characters, except the leaf-stem ratio, were also significantly and positively associated with dry matter yield. Vasanthi and Vijendra Das (1996) reported that primary branches did not contribute towards dry matter yield and green fodder yield in this crop. The highest negative direct effect of green fodder yield on dry matter yield was nullified by the highest positive indirect effect through branches per plant in this study. The indirect contribution of other characters, viz., plant height through branches per plant and leaf-stem ratio, and stem thickness through branches per plant, were also appreciable. Yadav and Krishna (1985) also observed the contribution of plant height on dry matter yield via stem thickness. From these findings, it can be inferred that besides plant height and primary branches per plant, leaf-stem ratio and stem thickness can also be relied upon for the selection in a breeding programme for improvement of forage crops.

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