GAU Res. J. 1999. 25 (1) : 32-34

Gene Action in Indian Bean*

M. G. Valu, H. M. Pandya**, H. L. Dhaduk and M. A. Vaddoria

Department of Agricultural Botany, College of Agriculture, Gujarat Agricultural University, Junagadh-362 001

ABSTRACT

Gene actions for yield and its components studied in the F_1s of a 7 x 7 half diallel cross involving seven different lines of Lablab purpureus (L) Sweet. Variance due to GCA and SCA along with D and H components revealed that both additive and non-additive gene actions were in operation in the inheritance of all the traits studied. Further dominance ratio indicated the presence of overdominance of in almost all the characters. Heritability estimates were high for pod length and number of seed per pod indicated the prospect of involving these traits through selection while it was moderate to low for days to first picking, number of branches per plant, number of pods per plant and pod yield per plant.

(Received on 15th May, 1999)

INTRODUCTION

A genetic analysis of quantitative characters would be necessary for the formation of coherent breeding procedure in crop improvement. Diallel analysis is useful device for rapid overall picture of genetic relationship among a number of genotypes. This technique has been extensively used in formulating breeding programme in Indian bean. Therefore the study reported here was design to gather information on genetic parameters of diallal cross in Indian bean.

MATERIALS AND METHODS

All possible combinations (excluding reciprocals) among seven diverse genotypes viz., G.P.L. No. 88, JIB (P-2, G.P.L. No. 36, JDL-79, G.P.L. No. 48 and JIB (P)-6 of bean were made and 21 F_1 with their 7 parents were grown in a randomized block design with three replications at Vegetable Research Station, Gujarat Agricultural University, Junagadh during *rabi* season 1997-98. The distance between rows was 90 cm, while the plant to plant distance was 75 cm. Observations were recorded on five randomly selected plants from each entry in each replication for days to first picking, number of branches per plant, pod length, number of seeds per pod, number of pods per plant and pod yield per plant.

RESULTS AND DISCUSSION

The estimate of genetic components of variation and related estimators are presented in Table 1. The estimates of additive genetic

*Part of M.Sc. (Agri.) thesis submitted by the senior author to Gujarat Agricultural University, S. K. Nagar-385 506.

**Present address : Associate Professor, Department of Agricultural Botany, College of Agriculture, Gujarat Agricultural University, Junagadh 362 001 (Gujarat).

TABLE 1

Estimates of components of genetic variance with their standard *error* and ratios of estimates.

Genetic components	*Days to first picking*	*No. of branches per plant*	*Pod length*	*No. of seeds per pod*	*No. of pods per plant*	*Pod yield per plant*
D	20.15 ±9.21	0.72 ±0.56	9.04** ±0.79	0.25** ±0.01	421.90 ±400.45	1943.27 ±5308.83
H_1	68.42* ±22.17	3.68* ±1.34	5.71* ±1.90	0.19** ±0.03	4402.88** ±964.07	71667.02** ±12780.85
H_2	46.75 ±19.53	3.61* ±1.18	4.51* ±1.67	0.17** ±0.02	3537.68** ±849.48	66399.01** ±11261.72
h^2	30.52 ±13.52	0.40 ±0.80	0.40 ±1.12	0.01 ±0.02	1648.58* ±570.55	63039.77 ±7563.89
F	34.09 ±22.09	-0.16 ±1.34	2.26 ±1.89	0.07 ±0.03	-316.78 ±960.67	-124.39 ±12735.76
E	6.92 ±03.26	0.36 ±0.20	0.6 ±0.28	0.01 ±0.01	51.63 ±141.58	640.01 ±1876.95
$(H_1/D)^{1/2}$	1.84	2.26	0.79	0.87	3.23	6.07
$H_2/4H_1$	0.17	0.24	0.20	0.23	0.20	0.23
$\frac{(4DH_1) + F}{(4DH_1)-F}$	2.70	0.90	1.37	1.38	0.79	0.99
h^2/H_2	0.65	0.11	0.09	0.03	0.48	0.95
Heritability (ns)	24.53	11.98	70.96	59.46	7.88	2.54
t^2	0.39	0.04	0.33	0.01	4.16	2.08

variance (D) were significant for pod length and number of seeds per pod. It indicated that both additive and dominance components were important in the inheritance of these traits. Only dominance components (H_1 and H_2) of genetic variance were significant for days to first picking, number of branches per plant, number of pods per plant and pod yield per plant. This advocated that these traits were primarily under the control of non-additive gene action. The average degree of dominance $(H_1/D)^{1/2}$ was found in the range of overdominance for all the characters except for number of seeds per pod. Asymmetrical distribution of positive and negative genes in the parental lines was noticed from the estimate ($H_2/4H_1$) for all the characters. Asymmetrical distribution of alleles in the parents was also reported by Singh *et al.* (1980), Singh and Dabus (1992) and Sawant (1994). The value of h^2/H_2 was low in most of the cases, indicating that the inheritance of the particular character was generally controlled by a few genes of gene groups (Singh *et al.* 1980).

Estimated narrow sense heritability was high for pod length and number of seeds per

pod indicated the prospect of improving these traits through selection while it was moderate to low for days to first picking, number of branches per plant, number of pods per plant and pod yield per plant. These results indicated the major role of non-additive gene action in the inheritance of the characters studied and hence a limited scope for their improvements through straight selection.

Inheritance of particular character was generally governed by a few genes or gene groups. Heritability estimates in general were low to high for yield and its component characters.

REFERENCES

Sawant, D. S., 1994. Gene control for yield and its attributes in cowpea. *Ann. Agric. Res.*, **15** (2) 140-143.

Singh, R. and B. S. Dabus, 1992. Inheritance of yield and its components in cowpea (*Vigna unguiculata* (L) Walp.) *Intern. J. Trop. Agric.*, **10** (2) : 161-164.

Singh, S. P., Singh, S. N. and K. K. Gupta, 1980. Combining ability and inheritance studies through diallel in bean (*Dolichos lablab*). *Hort.*, **37** (4) : 392-396.