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Genotypic and Phenotypic Correlations Among Some Quantitative Characters in Mung Bean *

by

S. P. SINGH, H. B. SINGH [1], S. N. MISHRA [2] and A. B. SINGH

Introduction: In practical plant breeding a knowledge of the associations among various yield contributing characters is useful in planning and evaluating a breeding programme. Correlation studies are meant to determine the relationships among various traits which are useful in making selection in the breeding material. Information available on the genetic association among various characters in *mung* bean is very limited. The present investigation was undertaken to determine genotypic and phenotypic correlations between different pairs of characters and their simultaneous inheritance in *mung* bean.

Material and method: The material consisted of twenty-six strains of *mung* bean provided by the Economic Botanist (Legumes), Kanpur. The material was sown in a randomised block design with four replications. Twenty plants were selected at random in each replication for each treatment. Observations were recorded for days to flower, plant height, stem diameter, number of primary branches and leaves, days taken from flowering to maturity, pods per plant, pod length, total weight of 10 pods, seed weight of 10 pods, shelling percentage, seeds per pod, seed size and yield.

Genotypic, phenotypic correlation coefficients and coheritability estimates were calculated with the help of following formulae:—

1. Genotypic (rG) correlation $= \dfrac{\text{Genotypic covariance of X and Y}}{\sqrt{\text{Genotypic variance of X} \times \text{Genotypic variance of Y}}}$

2. Phenotypic (rP) correlation $= \dfrac{\text{Phenotypic covariance of X and Y}}{\sqrt{\text{Phenotypic variance of X} \times \text{Phenotypic variance of Y}}}$

3. Coheritability $= \dfrac{\text{Genotypic covariance}}{\text{Phenotypic covariance}} \times 100$

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* Contribution from Department of Botany, Government Agricultural College, Kanpur.

[1] Lecturer, V. N. B. Degree College, Rath, Hamirpur, U. P. [2] Research Scholar, Department of Agronomy, University of Wisconsin, U. S. A.

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Results and discussion : Genotypic and phenotypic correlation coefficients, and coheritability estimates are presented in table 1. Genotypic and phenotypic correlation coefficients were positive and significant for all pairs of characters except in four cases i. e. between yield and number of leaves, yield and days to flower, number of primary branches and total weight of 10 pods, and number of primary branches and pod length. In these cases negative associations were observed. Highest genotypic correlations were obtained between number of primary branches and number of leaves, total weight of 10 pods and pod length, pods per plant and stem diameter, and yield and seed weight of 10 pods. In general, the genotypic correlation coefficients were higher in values than the phenotypic correlation coefficients for the corresponding pairs of variables. However, these differences were slight in most cases. Similar results were also obtained by Davis *et al* (1961) in wheat, Carlson and Moll (1962) in orchard grass and by Povilaitis (1965) in tobacco.

TABLE 1. *Genotypic and phenotypic correlation coefficients and coheritability estimates between different pairs of characters in mung bean.*

Character	rG	rP	coheritability in percentage
Yield and			
number of leaves	—0.320*	—0.333*	84.04
plant height	0.271*	0.263*	91.17
stem diameter	0.452*	0.255*	99.16
days to flower	—0.266*	—0.248*	41.00
days to maturity	0.773**	0.744*	95.34
days from flowering to maturity	0.570*	0.076 NS	56.50
pods per plant	0.788**	0.746**	56.20
pod length	0.385*	0.400*	82.13
seeds per pod	0.510*	0.476*	85.31
total weight of 10 pods	0.590*	0.529*	99.72
seed weight of 10 pods	0.886**	0.552*	97.12
seed size	0.295*	0.378*	92.44
Plant height and			
pods per plant	0.589*	0.417*	77.87
days to flower	0.432*	0.912*	41.00
Primary branches and			
stem diametr	0.533**	0.570*	50.79
number of leaves	0.957**	0.883**	90.05
total weight of 10 pods	—0.758**	—0.727**	91.55
plant height	0.753**	0.747**	89.10
pod length	—0.489*	—0.477*	87.90

TABLE 1. *(Contd.)*

Character	rG	rG	coheritability in percentage
Stem diameter and seeds per pod	0.637**	0.632**	53.18
seed size	0.454*	0.329*	81.55
Pods per plant and seeds per pod	0.491*	0.363*	79.13
stem diameter	0.890**	0.230*	89.25
Total weight of 10 pods and pod length	0.950**	0.880**	94.42

The highest coheritability estimate (99.72%) was recorded for yield and stem diameter yield and grain weight of ten pods, yield and days from sowing to maturity, total weight of ten pods and pod length, and yield and size. All these pairs of characters which had shown high coheritability values, had positive genotypic and phenotypic associations among themselves. This suggests that these characters are not much affected by environment and selection for yield should be more effective if it is based on these component characters. The lowest coheritability estimate (41.00%) was obtained for yield and days to flower, and plant height and days to flower. This indicates that these characters are much affected by environment.

Summary: Genotypic and phenotypic correlation coefficients, and coheritability estimates were worked out between fifteen agronomic characters in *mung* bean. Positive values of genotypic and phenotypic associations were observed between twenty pairs of characters out of twenty-four. Negative associations were observed between yield and number of leaves, yield and days to flower, number of primary branches and total weight of 10 pods, and number of primary branches and pod length. Coheritability estimates ranged from 99.7% for yield and total weight of 10 pods to 41.00% for yield and days to flower. Values were found to be higher for seven pairs, low for five pairs, whereas moderate for all other pairs of characters.

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REFERENCES

CARLSON, I. J. and R. H. MOLL. 1962. Phenotypic and genotypic variation and covariation in quantitative characters in strains of orchard grass. *Crop. Sci.* 2 : 281—6.

DAVIS, W. H., G. K. MIDDLETON and R. E. COMSTOCK. 1956. Biometerical studies of yield in segregating populations of Korean *Lespedeza*. *Agron. J.* 48 : 268—72.

POVILAITIS, B. 1965. Genotypic correlations among certain quantitative characters in tobacco. *Canad. J. Genet. Cytol.*. 7 : 523—9.