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Research Article

CORRELATION AND PATH COEFFICIENT ANALYSIS FOR YIELD AND YIELD ATTRIBUTING CHARACTERS IN BLACKGRAM (*Vigna mungo L* Hepper)

SATHVIK D.* AND LAL G.M.
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, 211007, Uttar Pradesh, India
*Corresponding Author: Email - sathvik819@gmail.com

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Abstract: The present investigation was carried out on correlation and path coefficient analysis for 13 characters of blackgram on 21 hybrids and 13 parents with 2 checks (T-9 and AZAD-1) and were evaluated during *kharif*, 2017 in Randomized Block Design. The correlation studies exhibited highly significant and positive association for all the quantitative characters except with that of days to 50% pod setting, number of clusters per plant, number of pods per plant and seed index. The characters namely, days to 50% flowering, number of clusters per plant, pod length and seed index showed indirect effect on seed yield through various characters.

Keywords: Blackgram, Correlation, Path analysis

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Introduction

Blackgram (*Vigna mungo L.* Hepper) is commonly known as urid, mesh or Kalai. India is primary center of origin of blackgram and Central Asia is a secondary centre of origin. It is one of the most important legumes of India which belongs to family *leguminoceae*, sub order *Papilionaceae* and the tribe phaseoleae with chromosome number 2n=2x= 22. It is annual crop, erect or sub erect plant having trifoliate with papilionaceous flowers. The reported average of protein content is 24 per cent, fat is 1.4 per cent, mineral is 3.2 per cent and carbohydrates is 57.3 per cent. Blackgram is also grown as fodder crop, green manure and bio-agent for soil conservation. The crop also builds soil fertility by fixing about 70-90 kg nitrogen per hectare. It is extensively grown as intercrop and mixed crop with cereals under rain fed conditions. It is widely cultivated throughout the Asia, including India, Pakistan, Bangladesh, Sri Lanka, Thailand, Laos, Cambodia, Vietnam, Indonesia, Malaysia, South China, and Formosa. In Africa and U.S.A. it is probably recent. Association analysis provides measures of relationship among the traits and serves to assess the opportunity of mutual improvement of two desirable traits by common selection programme. The knowledge of the association of yield components with yield forms a pre-requisite for making effective selection, when two or more characters are simultaneously considered. The estimation of correlation coefficient enables to eliminate the characters with little or no importance during selection. Correlation studies are helpful in determining the yield components but they do not provide an exact picture of the relative importance of direct and indirect influence of each of the component character towards yield. Under such circumstances path coefficient analysis proves helpful, in partitioning the correlation coefficient into its direct and indirect effects of a set of independent variables on the dependent variable. If the correlation is due to direct effect, it reflects true and perfect relationship and such characters can be directly subjected for improving yield.

Materials and Methods

The present investigation was carried out for 13 characters of Blackgram (*Vigna mungo* L Hepper) and the experimental materials constituted of the germplasm collection of 36 genotypes (13 parents, 21 hybrids and 2 checks) among the parents *viz*., PU-38, MASH 338, PU-11-14, VBG-11-016, NDUK-13-4, NDUK-13-6, UTTARA, IU-02-1-3, LBG-791, VALLABH URD, PU-31, MU-06 and KU-96-7. Among the checks *viz*., T-9 and AZAD-1. The experiment was conducted in *Kharif*, 2017 in Randomized Block Design with a spacing of 30x10 cm with three replications at Field Experimentation Centre, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P. Recommended agronomical practices *viz*., thinning, weeding, uprooting of off-type plants were carried out time to time throughout crop duration. A basal dose of 20 kg N and 40 kg of P_2O_5 per hectare was applied during each cropping season. Five plants were selected at random and biometrical observations like, days to 50 % flowering, days to 50% pod setting, days to maturity, plant height (cm), number of primary branches per plant, number of clusters per plant, number of pods per plant, number of seeds per pod, pod length (cm), seed index (g), biological yield (g), harvest index (%) and seed yield per plant (g) were recorded on plot basis. Standard statistical procedures were used for the analysis of correlation coefficient values(r) at genotypic and phenotypic levels by Johnson et al., (1955a) and described by Singh and Choudhary, (1985) and path analysis was carried out as per the equation suggested by Dewey and Lu, (1959) originally proposed by Wright (1921) and described by Singh and Choudhary, (1985).

Results and Discussion

Correlation with seed yield per plant:

Correlation coefficient analysis at phenotypic level revealed that seed yield per plant is highly significant and positively associated with harvest index (0.6283**), number of primary branches per plant (0.4946**), days to 50% flowering (0.4167**), pod length (0.3738**), number of seeds per pod (0.3156**), plant height (0.2845**) and days to maturity (0.2721**) and significant and positively associated with biological yield (0.2185*). Whereas seed index (-0.0178) showed non-significant negative correlation and days to 50% pod setting (0.1498), number of pods per plant (0.1033) and number of clusters per plant (0.0794) showed non-significant positive correlation.

Table-1 List of Parents

SN	Genotypes
1	PU-38
2	MASH 338
3	PU-11-14
4	VBG-11-016
5	NDUK-13-4
6	NDUK-13-6
7	UTTARA
8	IU-02-1-3
9	LBG-791
10	VALLABH URD
11	PU-31
12	MU-06
13	KU-96-7
14	T-9
15	AZAD-1

Table-2 List of Genotypes

S. No	Genotypes	Crosses
1.	SHUATSURD 93	NDUK-13-6 x KU-96-7
2.	SHUATS URD 94	NDUK-13-6 x PU-31
3.	SHUATS URD 95	NDUK-13-6 x IU-02-1-3
4.	SHUATS URD 96	NDUK-13-6 x PU-11-14
5.	SHUATS URD 97	NDUK-13-6 x NDUK-13-4
6.	SHUATS URD 98	NDUK-13-6 x PU-38
7.	SHUATS URD 99	NDUK-13-4 x KU-96-7
8.	SHUATS URD 100	NDUK-13-4 x LBG-791
9.	SHUATS URD 101	NDUK-13-4 x PU-31
10.	SHUATS URD 102	MASH 338 x PU-11-14
11.	SHUATS URD 103	MASH 338 x PU-38
12.	SHUATS URD 104	MASH 338 x VALLABH URD
13.	SHUATS URD 105	MASH 338 x PU-31
14.	SHUATS URD 106	MASH 338 x MU-06
15.	SHUATS URD 107	MASH 338 x VBG-11-016
16.	SHUATS URD 108	MASH 338 x KU-96-7
17.	SHUATS URD 109	MASH 338 x UTTARA
18.	SHUATS URD 110	NDUK-13-6 x MASH 338
19.	SHUATS URD 111	NDUK-13-6 x MU-06
20.	SHUATS URD 112	NDUK-13-4 x MASH 338
21.	SHUATS URD 113	LBG 791 x PU-38

Correlation coefficient analysis at genotypic level revealed that seed yield per plant is highly significant and positively associated with harvest index (0.6945**), number of primary branches per plant (0.5514**), days to 50% flowering (0.4836**), pod length (0.3885**), number of seeds per pod (0.4118**), plant height (0.2970**), days to maturity (0.3014**) and biological yield (0.2515**). While days to 50% pod setting (0.1350), number of pods per plant (0.1397) and number of clusters per plant (0.0883) showed non-significant positive correlation. Non-significant negative correlation is showed by seed index (-0.0331).

Path coefficient analysis

Path coefficient analysis at phenotypic level revealed that positive direct effects with positive correlation on grain yield was observed for the characters *viz*., days to 50% flowering (0.0798), plant height (0.0272), number of primary branches per plant (0.2351), number of pods per plant (0.0599), number of seeds per pod (0.0352), biological yield (0.5346) and harvest index (0.7916). Whereas days to 50% pod setting (-0.0739), days to maturity (-0.0329), number of clusters per plant (-0.0623), pod length (-0.0211) and seed index (-0.0794) showed true relationship by establishing significant negative association and negative direct effect on grain yield per plant. Path coefficient analysis at genotypic level revealed that positive direct effects with positive correlation on grain yield was observed for the characters *viz*., days to 50% flowering (0.1620), days to maturity (0.0709), number of primary branches per plant (0.2670), number of pods per plant (0.0539), biological yield (0.7892) and harvest index (1.0041**). Whereas days to 50% pod setting (-0.1063), plant height (-0.0639), number of clusters per plant (-0.0854), number of seeds per pod (-0.0320), pod length (-0.0993), and seed index (-0.0591).

Conclusion

Considering the nature and magnitude of character association and their direct and indirect effects, it can be inferred that simultaneous improvement of grain yield per plant is possible through manifestation of harvest index followed by biological yield, number of primary branches per plant, days to 50% flowering and number of pods per plant. Hence for increasing the seed yield direct selection based on these traits would be rewarding.

Application of research: Since the population is increasing hence there is a urgent need to provide high yield varieties to meet the demand. Unavailability of cultivars with high potential. Therefore, present study has been undertaken to identify the best hybrid which can give high yield.

Research Category: Genetics and Plant Breeding

Abbreviations:

cm : Centimeter, g : Gram, kg : Kilogram, Mm : Millimeter, rg : Genotypic correlation coefficient, rp : Phenotypic correlation coefficient, % : percentage.

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***Principle Investigator or Research Guide: Dr Gabrial M. Lal.**
University: Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, 211007, Uttar Pradesh, India
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Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

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