

Correlation and Path Analysis of Yield Contributing Traits and Seed Yield in Greengram [*Vigna Radiata* (L.) Wilczek]

T. Anuhya Jayaprada*, G.Roopla Lavanya¹, V. Ram Babu, Ch. Naga Sai Krishna and T. Sudheer Reddy

Department of Genetics and Plant Breeding, Naini Agricultural Institute,
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad-211 007, Uttar Pradesh, India.

Received: 22-11-2018

Accepted: 13-08-2019

DOI: 10.18805/IJARE.A-5174

ABSTRACT

The present investigation was undertaken to study the extent of interrelationship and direct and indirect effect of component characters on seed yield in a set of 20 genotypes of greengram. The material was evaluated in randomized block design with three replications during the *Kharif*, 2017. Observations were recorded for 13 quantitative characters. Correlation coefficient analysis revealed that seed yield per plant exhibit significant positive correlation with number of pods per plant, biological yield per plant, harvest index, plant height, number of seeds per pod, pod length, number of clusters per plant, seed index. Harvest index, biological yield per plant, number of pods per plant, seed index, number of seeds per pod, plant height and number of clusters per plant exhibited positive direct effect accompanied by significant positive correlation with seed yield. Thus priority should be given to these characters during selection for greengram yield improvement.

Key words: Correlation, Direct effect, Greengram, Indirect effect, Path analysis.

INTRODUCTION

Greengram [*Vigna radiata* (L.) Wilczek] is an important pulse crop grown extensively in both tropical and subtropical regions of the world. It is also known as mungbean or moong. It is a short duration grain legume with wide adaptability.

Correlation analysis is a biometrical technique to find out the nature and degree of association between various physico-chemical traits indicating yield, while path analysis split the correlation coefficient into direct and indirect effect so as to measure the relative contribution of each variable towards yield. Because yield is a complex trait and its expression is governed by many factors, it is logical to expect that a number of plant traits jointly contribute to enhance yield. Hence, keeping the above aspect in mind, efforts were made to establish interrelationship among various yield contributing traits and also their contribution towards pod yield of greengram. Therefore, the present study was undertaken with an objective to study correlation among the yield contributing traits and direct and indirect effects, among yield contributing traits in greengram.

MATERIALS AND METHODS

The present investigation was carried out at the Field Experimentation Centre, Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P. during *Kharif*, 2017. The experiment was conducted in randomized block design with 20 genotypes. The genotypes were replicated three times.

Genotypes were randomly arranged in each replication divided into 60 plots. The row to row spacing was 30 cm and plant to plant distance was 10 cm. The technique of random sampling was adopted for recording the observations of various quantitative characters of greengram. Five plants of each treatment from each replication were taken at random at the time of recording the data on various characters. Data of five plants were averaged replication wise and mean data was used for statistical analysis.

Following observations of each genotype - plant height (cm), number of primary branches per plant, days to 50% flowering, number of clusters per plant, number of pods per plant, days to maturity, number of seeds per pod, pod length (cm), seed index (g), biological yield per plant (g), harvest index (%), protein content (%) and seed yield per plant (g). The data recorded was subjected to the following analysis.

The phenotypic and genotypic correlation coefficient for all possible character pairs were computed to study inter relationship as suggested by Johnson *et al.* (1955) and Al-Jibouri *et al.* (1958) The technique of the phenotypic path coefficient analysis was first used for plant selection by Deway and Lu (1959).

RESULTS AND DISCUSSION

Correlation coefficient analysis (Table 1) revealed that seed yield per plant exhibited positive significant correlation with biological yield per plant, harvest index, number of pods per plant, plant height, pod length, number of seeds per pod, number of clusters per plant, seed index

*Corresponding author's e-mail: anuhjayayapradat@gmail.com and address; Andhra Bank Colony, Dowleswaram-533 125, Andhra Pradesh, India.

¹Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Naini, Allahabad-211 007, Uttar Pradesh, India.

Table 1: Correlation coefficient between seed yield and its component traits in greengram.

Character	Plant Height (cm)	No. of Primary Branches	Days to 50% Flowering	No. of Clusters / Plant	No. of Pods / Plant	Days to Maturity	No. of Seeds / Pod	Pod Length (cm)	Seed Index (g)	Biological Yield / Plant (g)	Harvest Index (%)	Protein Content (%)	Seed Yield / Plant (g)
Plant Height (cm)	1.000	-0.244*	0.030	0.174	0.266**	-0.249*	0.285**	0.397**	0.414**	0.627**	0.165	0.044	0.560**
No. of Primary Branches / Plant	-0.430**	1.000	0.099	-0.088	0.155	0.112	-0.061	0.044	-0.154	-0.067	0.166	-0.010	0.050
Days to 50% Flowering	0.041	0.290**	1.000	-0.106	-0.223*	0.290**	-0.292**	0.029	0.022	0.005	0.002	-0.132	0.015
No. of Clusters / Plant	0.173	-0.301**	-0.141	1.000	0.245*	-0.239**	0.102	0.248*	0.262**	0.160	0.261	-0.089	0.316**
No. of Pods / Plant	0.262**	0.200*	-0.360**	0.241*	1.000	0.102	0.372**	0.305**	0.114	0.574**	0.439**	0.065	0.701**
Days to Maturity	-0.497**	0.088	0.480**	-0.241*	0.011	1.000	-0.147	-0.014	-0.131	-0.024	0.150	-0.056	0.071
No. of Seeds / Pod	0.389**	-0.275**	-0.451**	0.157*	0.602*	-0.400**	1.000	0.474**	0.300**	0.169	0.316**	0.128	0.347**
Pod Length (cm)	0.455**	-0.038	0.098	0.191*	0.386**	-0.057	0.680**	1.000	0.648**	0.325**	0.249*	0.057	0.416**
Seed Index (g)	0.493**	-0.381**	-0.1	0.304**	0.139	-0.244*	0.551**	0.779**	1.000	0.332**	0.052	0.104	0.282**
Biological Yield / Plant (g)	0.670**	-0.173	0.079	0.192*	0.613**	-0.076	0.247*	0.337**	0.407**	1.000	0.020	-0.146	0.721**
Harvest Index (%)	0.223*	0.305**	-0.047	0.304**	0.619**	0.249*	0.527**	0.398**	0.058	0.198*	1.000	-0.032	0.701**
Protein Content (%)	0.092	0.094	-0.230*	-0.03	0.069	-0.476**	0.344**	0.193*	0.177	-0.230*	-0.066	1.000	-0.135
Seed Yield / Plant (g)	0.584**	0.06	0.037	0.337**	0.790**	0.104	0.507**	0.478**	0.301**	0.790**	0.757**	-0.198*	1.000

* and **, significant at 5% and 1% respectively.

Upper and lower diagonals are phenotypic correlation and genotypic correlation respectively.

Table 2: Path coefficient analysis for seed yield and its component traits in greengram at phenotypic level.

Character	Plant Height (cm)	No. of Primary Branches	Days to 50% Flowering	No. of Clusters / Plant	No. of Pods / Plant	Days to Maturity	No. of Seeds / Pod	Pod Length (cm)	Seed Index (g)	Biological Yield / Plant (g)	Harvest Index (%)	Protein Content (%)	Correlation with Seed yield/plant
Plant Height (cm)	-0.0158	0.0039	-0.0005	-0.0028	-0.0042	0.0039	-0.0045	-0.0063	-0.0066	-0.0099	-0.0026	-0.0007	0.560**
No. of Primary Branches	0.0039	-0.0160	-0.0016	0.0014	-0.0025	-0.0018	0.0010	-0.0007	0.0025	0.0011	-0.0027	0.0002	0.050
Days to 50% Flowering	0.0006	0.0019	0.0191	-0.0020	-0.0043	0.0055	-0.0056	0.0006	0.0004	0.0001	0.0000	-0.0025	0.015
No. of Clusters / Plant	0.0039	-0.0020	-0.0024	0.0225	0.0055	-0.0054	0.0023	0.0056	0.0059	0.0036	0.0059	-0.0020	0.316**
No. of Pods / Plant	-0.0035	-0.0020	0.0029	-0.0032	-0.0129	-0.0013	-0.0048	-0.0039	-0.0015	-0.0074	-0.0057	-0.0008	0.701**
Days to Maturity	0.0033	-0.0015	-0.0038	0.0031	-0.0013	-0.0132	0.0019	0.0002	0.0017	0.0003	-0.0020	0.0007	0.071
No. of Seeds / Pod	0.0043	-0.0009	-0.0044	0.0015	0.0056	-0.0022	0.0151	0.0072	0.0045	0.0026	0.0048	0.0019	0.347**
Pod Length (cm)	0.0060	0.0007	0.0004	0.0037	0.0046	-0.0002	0.0071	0.0150	0.0097	0.0049	0.0037	0.0009	0.416**
Seed Index (g)	-0.0030	0.0011	-0.0002	-0.0019	-0.0008	0.0010	-0.0022	-0.0047	-0.0073	-0.0024	-0.0004	-0.0008	0.282**
Biological Yield / Plant (g)	0.4475	-0.0484	0.0036	0.1143	0.4102	-0.0177	0.1212	0.2324	0.2372	0.7137	0.0149	-0.1049	0.721**
Harvest Index (%)	0.1138	0.1140	0.0018	0.1791	0.3017	0.1029	0.2168	0.1713	0.0359	0.0143	0.6858	-0.0226	0.701**
Protein Content (%)	-0.0002	0.0000	0.0006	0.0004	-0.0003	0.0003	-0.0006	-0.0003	-0.0005	0.0007	0.0002	-0.0046	-0.135

Diagonal values are direct effect.

Residual effects = SQRT (1-1.0018)

* and **, significant at 5% and 1% respectively.

and positive non-significant correlation with days to maturity, number of primary branches per plant and days to 50% flowering, whereas protein content exhibited negative significant correlation with seed yield per plant. The significant correlation coefficient between two characters indicates that the association between these two characters is high. The positive correlation between two characters means that increase in the value of one character will lead to increase in second character. Similarly, the negative correlation means that increase in one variable will lead to decrease in second character and *vice versa*. The value of genotypic correlation coefficient is higher than the phenotypic correlation value, it means that there is strong association between these characters genetically, but the phenotypic value is lessened by the significant interaction of environment. Positive association of seed yield with number of pods per plant and branches per plant was earlier reported by Eswaran and Kumar (2015), Garje *et al.* (2014) found that the seed yield per plant was significantly and positively correlated with number of primary and secondary branches per plant, number of cluster per plant, number of pod per plant and number of seed per pod. Anand *et al.* (2016) reported positive association of seed yield with number of pods per plant and number of clusters per plant.

REFERENCES

- Al-Jibouri, H.A., Miller, P.A. and Robinson, H.F. (1958). Genotypic and environmental variation and correlation in upland cotton cross of interspecies origin. *Agronomy Journal*. **50**: 633-636.
- Anand, G., Anandhi, K. and Paulpandi, V.K. (2016). Genetic variability, correlation and path analysis for yield and yield components in F_6 families of greengram [*Vigna radiata* (L.) Wilczek] under rainfed condition. *Electronic Journal of Plant Breeding*. **7**(2): 434-437.
- Dewey, D.R. and Lu, K.H. (1959). Correlation and path coefficient analysis of crested wheatgrass seed production. *Agronomy Journal*. **51**: 515-518.
- Eswaran, R. and Senthil kumar, N. (2015). Correlation and path analysis in greengram [*Vigna radiata* (L.) Wilczek] for drought stress. *Plant Archive*. **15**(1): 247-249.
- Gadakh, V.K., Deth, A.M. and Kathale, M.N. (2013). Genetic variability, correlations and path analysis studies on yield and its components in mungbean [*Vigna radiata* (L.) wilczek]. *Bioinfolet*. **10**(2): 441 – 447.
- Garje, U.A., Bhailume, M.S., Nagawade, D.R. and Parhe, S.D. (2014). Genetic association and path coefficient analysis in green gram [*Vigna radiata* (L.) Wilczek]. *Journal of Food Legumes*. **27**(2): 151-154.
- Johnson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Genotypic and phenotypic correlations in soybean and their implication in selection. *Agronomy Journal*. **47**: 477- 483.
- Jyothsna, S., Patro, T.S.S.K., Ashok, S., Rani, Y.S. and Neeraja, B., (2016). Character association and path analysis of seed yield and its yield components in greengram (*Vigna radiata*). *International Journal of Theoretical & Applied Sciences*. **8**(1): 31-36.

Path analysis (Table 2) revealed that the characters biological yield per plant and harvest index exhibited positive direct effect with seed yield, whereas number of primary branches per plant and plant height exhibited negative direct effect towards seed yield.

The correlation between biological yield per plant and harvest index is due to direct effect, it reveals true relationship between them and direct selection for these traits would be rewarding for yield improvement. Gadakh *et al.* (2013) observed that harvest index recorded highest positive direct effect on grain yield per plant followed by biological yield per plant, number of seeds per pod and number of primary branches per plant. Eswaran and Senthilkumar (2015) observed that number of branches per plant, number of seeds per pod, days to first flowering, pod length, number of clusters per plant and number of pods per cluster had maximum direct contribution on seed yield under drought stress in greengram.

CONCLUSION

Harvest index, biological yield per plant, number of pods per plant exhibited positive direct effect accompanied by significant positive correlation with seed yield. Thus priority should be given to these characters during selection for greengram yield improvement.