Original Research Article

CORRELATION AND PATH COEFFICIANT ANALYSIS FOR QUANTITATIVE TRAITS IN GREENGRAM [*Vigna radiate* (L.) Wilczek]

ABSTRACT

Genetic variability, correlation coefficient and path coefficients analysis were carried outin a set of 20 genotypes of Greengram grown in an randomized block design with three replications during *kharif*- 2021. Analysis of variance indicated significant difference among genotypes for the characters plant height (cm), biological yield(g), seedindex(g), number of clusters per plant, days to 50 percent flowering. This indicated existence of variability among the genotype.The high estimates of heritability and genetic advance were found for the characters plant height, number of primary branches per plant. The highest percentage of PCV was observed for number of primary branches per plant and number of pods per plant. The GCV was highest for number of primary branches per plant. The association analysis revealed that the seed yield per plant exhibited positive and significant correlation with number of clusters per plant, seed index, biological yield, number of primary branches, pod length, harvest index and number of pods per plant. Path coefficient analysis revealed that number of clusters per plant followed by seed index (g), biological yield, primary branches, pod length, harvest index, number of seeds per pod, number of pods per plant were effective for the selection of high yielding genotype as they exhibited high positive direct effect along with significant positive correlation with seed yield. Based on the mean performance of the SML-668, PANT MOONG-05, BPMR-145, CO-7, BM 2002-1 were found superior in seed yield. These may be used as parents in crop improvement programs to develop high yielding varieties.

Keywords: Greengram, GCV, PCV, Heritability,Variability ,Correlation

INTRODUCTION

Greengram (*Vigna radiate* (L.) Wilczek,2n=22) belongs to genus Vigna of Leguminose family and it is diploid. Greengram is one of the most important edible foods of Asia widely cultivated and consumed in India ***Datta et al.,*** **(2012).** Greengram is predominantly self-pollinated crop considerable variation exist among Greengram cultivers and its wild specie ***Bisht et al.,*** **(2005).** Greengram is also known as Mung.Greengram is an important pulse crop which comes up

well under humid tropic, semi-arid and arid regions. At Global scenario India is contributing about 25 to 28 percent of total production in pulses.Greengram is an excellent source of protein which can be consumed as whole grain, sprouted form as well as dal in variety of ways in homes. In *kharif*-2021 season Greengram is cultivated about 70% and remaining 30% in summer or rabi season.

Greengram is one of themost widely adapted drought tolerant versatile green manuring and nutritious legumes.it is harvested in two months after sowing,which makes an ideal fit for crop in wheat and rice production system.it can improve soil fertility by fixing atmospheric nitrogen through their root nodule. Greengram is highly nutritive and it constitutes an important source of protein(23.6%) with carbohydrate(58%).

The main object of this work was to classify genetic variation among Greengram and correlation between yield and yield contributing traits,To estimate direct and indirect effect of yield contributing traits in Greengram.

MATERIALS AND METHODS

The experimental materials for present investigation consist of forty-one greengram genotypes including one check variety obtained from Department of Genetics and Plant Breeding, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, was evaluated at Field Experimentation Centre, SHUATS, Prayagraj, during *Kharif*-2021 in Randomized Block Design with three replications. Data were recorded for five randomly tagged plants for characters *viz.*, Days to 50% flowering, Days to 50% pod setting, Days to maturity, Number of clusters per plant, Number of primary branches, Plant height(cm), Number of pods per plant, pod length (cm), Biological yield per plant (g), Number of seeds per pod, Harvest index (%), Seed yield per plant(g), Seed index. A random selection of five plants in each plot was made and the observations were recorded on each selected plant. The mean values of each character under study were computed on the basis of five plants for each genotype in each replication**.** The data were analyzed statistically for various

genetic parameters such as genetic variability described by **(Burton and Devane, 1952)**, genotypic and phenotypic variances described by **Robinson *et al.*, (1951)** and correlation coefficients and path coefficient described by **(Dewey and Lu, 1959)**

RESULT AND DISCUSSION

On the basis of the mean, top five genotype having high seed yield per plant were selected. Among these genotypes SML-668, PANT MOONG-05, BPMR-145, CO-7, BM 2002- 1 were found superior for seed yield. Hence, it is suggested that these genotypes be tested in multi locations trials to confirm their superiority and may also be used as parents in hybridization programme to develop high yielding varieties.

Genotypic coefficient of variation (GCV) for 12 characters ranged from 2.30% for days to maturity to 28.41% (Number of primary branches). High GCV (>20%) was recorded for Number of primary branches (28.41%), Moderate GCV (10-20%) was recorded for plant height (19.62%), Number of pods per plant (19.57%), seed yield per plant (18.44%), pod length (17.60%), biological yield (15.24%), harvest index (12.36%), number of clusters per plant (10.98%), seed index (10.33%). Low GCV was recorded for Days to 50% flowering (9.31%), seeds per pod (5.95%) and days to maturity (2.30%).

Phenotypic coefficient of variation (PCV) for 12 characters ranged from 3.25% for days to maturity to 32.89% (Number of primary branches). High PCV (>20%) was recorded for number of primary branches (32.89%), Number of pods per plant (21.56%), Moderate PCV (10-20%) was recorded for plant height (19.76%), seed yield per plant (19.70%), pod length (19.61%), number of clusters per plant (16.95%), biological yield (15.88%), harvest index (15.28%), seed index (13.71%), Days to 50% flowering (10.15%). Low GCV was recorded for seeds per pod (7.30%) and days to maturity (3.25%).

The results of heritability for all the 12 characters are presented inThe estimates of heritability (%) in the broad sense for 12 characters studied, which ranged from 42.10 to 98.50%. High heritability (broad sense) (>60%) was recorded for character plantheight (98.50%), biological yield (92.11%), seed yield per plant (87.60%), days to 50%flowering (84.28), number of pods per plant (82.40%), pod length (80.59%), number ofprimary branches (74.62%), seed per pod (66.41%), harvest index

(65.41%).

The present investigation was carried out to identify proper accessions from the germplasm for future breeding programme. Prior to breeding crop for higher yield, it is essential to generate information regarding interrelationship between different plant characters with seed yield and among themselves, since its facilities the quicker assessment of high yielding genotypes in selection programme. Yield is a complex character controlled by polygenes. Therefore, selection made on the basis of its phenotypic expression alone is likely to be misleading. It is, hence, essential to measure the contribution of various traits to the yield through correlation and partitioning the correlation coefficient into the components of direct and indirect effects.

Genotypic correlations of the components characters with seed yield per plant

Analysis of correlation coefficient revealed that seed yield per plant exhibited positive and significant correlation associated with number of clusters per plant (0.844**), seed index (0.833**), biological yield (0.736**), number of primary branches (0.722**), pod length (0.702**), harvest index (0.601**), number of pods per plant (0.522*), While the negative non-significant association with plant height (-0.197), days to 50% flowering (-0.186) and days to maturity (-0.093).

Phenotypic correlation of the components characters with seed yield / plant

Analysis of correlation coefficient revealed that seed yield per plant exhibited positive and highly significant correlation with seed index (0.657**), biological yield (0.657**), harvest index (0.617**), number of primary branches per plant (0.597*), pod length (0.570**), number of clusters per plant (0.536**), number of seeds per pod (0.534**), number of pods per plant (0.480**) and Negative non-significant correlation exhibited plant height (-0.184), days to 50% flowering (-0.128) and days to maturity (-0.111).

Table 1: Genetic parameter of characters of Green gram evaluated during *kharif* 2021-22

Sr. No.	Characters	Genotypic coefficient of variation (%)	Phenotypic coefficient of variation(%)	Heritabilityin broad sense (%)	Genetic advance	Genetic Advance as percentage of mean
1.	Days to 50% flowering	9.31	10.15	84.28	7.21	17.61
2.	Days to maturity	2.30	3.25	50.21	2.07	3.36
3.	Plant height	19.62	19.76	98.50	20.58	40.10
4.	No. of primary branches	28.41	32.89	74.62	1.74	50.56
5.	No. of cluster per plant	10.98	16.95	42.01	0.49	14.66
6.	No. of Pods per plant	19.57	21.56	82.40	2.91	36.59
7.	Seeds per pod	5.95	7.30	66.41	0.97	9.99
8.	Pod length	17.60	19.61	80.59	2.47	32.55
9.	Biological yield	15.24	15.88	92.11	10.25	30.13
10.	Harvest index	12.36	15.28	65.41	7.51	20.60
11.	Seed index	10.33	13.71	56.75	0.64	16.03
12.	Seed yield per plant	18.44	19.70	87.60	4.38	35.56

Table 2: Genotypic correlation coefficient between yield and its component characters in Greengram during *Kharif* 2021

Characters	Days to 50% Flowering	Days to maturity	Plant height	No. of primary branches	No. of cluster per plant	No. of Pods per plant	Seeds per pod	Pod length	Biological yield	Harvest index	Seed index	Seed yield per plant
Days to 50% flowering	1.00	0.640**	0.049	-0.100	0.139	-0.253	-0.260*	-0.432**	-0.330*	0.073	0.018	-0.186
Days to maturity		1.00	-0.156	-0.187	-0.235	-0.306*	0.122	-0.642**	-0.623**	0.618**	0.174	-0.093
Plant height			1.00	-0.377**	-0.304*	0.015	-0.259*	0.037	-0.224	-0.072	-0.274*	-0.197
No. of primary branches				1.00	0.921**	0.784**	0.822**	0.292*	0.523**	0.434**	0.779**	0.722**
No. of cluster per plant					1.00	0.818**	0.675**	0.628**	0.540**	0.574**	0.637**	0.844**
No. of Pods per plant						1.00	0.639**	0.500**	0.437**	0.216	0.486**	0.522**
Seeds per pod							1.00	0.187	0.261*	0.512**	0.583**	0.565**
Pod length								1.00	0.778**	0.197	0.308*	0.702**
Biological yield									1.00	-0.076	0.428**	0.736**
Harvest index										1.00	0.720**	0.601**
Seed index											1.00	0.833**
Seed yield per plant												1.00

*, ** significant at 5% and 1% significance level, respectively

Table 3: phenotypic correlation coefficient between yield and its component characters in Greengram during *Kharif* 2021

Characters	Days to 50% flowering	Days to maturity	Plant height	No. of primary branches	No. of cluster per plant	No. of Pods per plant	Seeds per pod	Pod length	Biological yield	Harvest index	Seed index	Seed yield per plant
Days to 50% flowering	1	0.440**	0.039	-0.126	0.054	-0.164	-0.154	-0.385**	-0.272*	0.077	0.063	-0.128
Days to maturity		1	-0.133	-0.037	-0.119	-0.189	-0.068	-0.396**	-0.375**	0.214	0.058	-0.111
Plant height			1	-0.326*	-0.181	0.019	-0.203	0.043	-0.205	-0.066	-0.192	-0.184
No. of primary branches				1	0.651**	0.623**	0.661**	0.257*	0.406**	0.338**	0.561**	0.597**
No. of cluster per plant					1	0.488**	0.461**	0.340**	0.350**	0.348**	0.499**	0.536**
No. of Pods per plant						1	0.480**	0.460**	0.380**	0.208	0.328*	0.480**
Seeds per pod							1	0.152	0.186	0.486**	0.537**	0.534**
Pod length								1	0.674**	0.111	0.194	0.570**
Biological yield									1	-0.151	0.358**	0.657**
Harvest index										1	0.523**	0.617**
Seed index											1	0.657**
Seed yield per plant												1

*, ** significant at 5% and 1% significance level, respectively

Table 4: Analysis of Variance (ANOVA) for 12 characters in Greengram genotypes during *Kharif*-2021

Characters	Mean sum of Squares		
	Replication (df=2)	Treatment (df=19)	Error (df=38)
Days to 50% flowering	2.22	19	38
Days to maturity	0.1	46.28**	2.71
Plant height	1.76	8.01**	1.99
No. of primary branches	0.55	305.52**	1.54
No. of cluster per plant	0.16	3.19**	0.33
No. of Pods per plant	1.44	0.59**	0.19
Seeds per pod	0.11	7.79**	0.52
Pod length	0.14	1.17**	0.17
Biological yield	0.73	5.77**	0.43
Harvesting index	3.38	83.01**	2.3
Seed index	0.01	71.78**	10.76
Seed yield per plant	0.68	0.63**	0.13

***,** = Significant at 5 and 1 per cent, respectively**

CONCLUSION

Significant variation to all the characters were observed in the present study. Based on present investigation, it can be concluded that maximum yield was recorded in SML-668 (0.0018 kg/ha) genotype .Number of primary branches, number of pods per plant had the highest magnitude of phenotypic and genotypic coefficient of variation.Seed yield per plant showed significant and positive association with clusters per plant, seed index, biological yield, number of primary branches at both phenotypic and genotypic level hence, these can be utilized in indirect selection of genotypes for high seed yield. Path coefficient at phenotypic and genotypic level reveled that have direct positive effect on seed yield per plant for Number of clusters per plant, seed index (g), biological yield, primary branches, Pod length.

Therefore,these traits may be given during selection for yield improvement in green gram.

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